

DESIGN CONSULTANCY | BUILDING COMPLIANCE | BUILDING SIMULATION

SUSTAINABILITY STATEMENT

&

ENERGY STRATEGY

3no. New Dwelling Houses at Land to the rear of 2 Woodwell Cottages, Woodwell Road. Shirehampton, Bristol.

Presented to:

Hallen Developments Ltd

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ISSUE SHEET

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Bristol Development Framework Core Strategy. Adopted June 2011
 Bristol Climate Change and Sustainability Practice Note. July 2020

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Bristol Development Framework Core Strategy. Adopted June 2011
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1. EXECUTIVE SUMMARY

This Energy & Sustainability Statement has been prepared to support the Planning Application for the proposed 3no. new dwelling houses to the reat of 2 Woodwell Cottages, Woodwell Road, Bristol.

The report will address the requirements of policies BCS13-BCS16 of the Bristol City Council Core Strategy¹, which relate to Climate Change, Sustainable Energy, Sustainable Design and Construction and Flood Risk and Water Management. The calculations and methodology used within this assessment and report structure, are in accordance with the Policy Guidance and the Bristol Climate Change and Sustainability Practice Note².

In order to establish predicted figures for the development, and to accurately assess the most feasible solution for the Energy & CO₂ Reduction Strategy, the property has been modelled using the governments Standard Assessment Procedure (SAP2012). In accordance with Bristol guidance, the current SAP2012 Carbon Emission factors have been used within the calculations and to demonstrate compliance with the policy requirements. However, as these are currently outdated, additional calculations have also been carried out based on the draft SAP10 Carbon Emission factors, which provide more accurate figures for us to consider within our calculations and report.

In accordance with the Energy Hierarchy, a baseline has been established which is based on mains Gas heating and hot water and is compliant with Parts L1A of the Building Regulations. After establishing this baseline, further Energy Efficiency measures are then incorporated prior to exploring a more energy efficient supply and renewable technologies.

As detailed in policy BCS14, the Heating and Hot Water system has been specified in accordance with the Heat Hierarchy following a feasible assessment, and the proposed Heating & Hot Water will be provided by efficient Gas Combination boilers supplemented by a 4.08kWp PV system. This will be 1.36kWp on each dwelling. (4no. 340W Panels).

A Summary of the Energy & CO2 reduction can be seen below:

ENERGY & CO ² DEMAND REDUCTION SUMMARY				
	ENERGY demand (kWh pa)	ENERGY Saving (%)	CO2 demand (kg pa)	CO2 Saving (%)
BASELINE - Building Regulations Part L1A compliance	18783.8		4474.8	
BE LEAN — After further Energy Efficiency Measures	17236.7	8.2%	4108.9	8.2%
BE GREEN - After on-site Renewable or LZC Technologies	13991.5	18.8%	2424.6	41%
Scheme Offset or shortfall financial contribution				
TOTAL Savings		25.5%		45.8%

Above: Figure 1 – Energy & CO2 reduction Summary

The predicted annual saving in Energy from the PV array, following Energy Efficiency measures, has been calculated as 3245.2kWh. Based on SAP2012 Carbon Emission factors this equates to a 41% reduction in predicted regulated CO₂ with a 45.8% reduction overall.

A full breakdown of the energy demand and associated CO2 can be seen in appendix A.

¹ Bristol Development Framework Core Strategy. Adopted June 2011

² Bristol Climate Change and Sustainability Practice Note. July 2020

2. INTRODUCTION

This Energy & Sustainability Statement has been prepared to support the Planning Application for the proposed 3no. new dwelling houses to the rear of 2 Woodwell Cottages, Woodwell Road, Bristol.

The report will address the requirements of policies BCS13-BCS16 of the Bristol City Council Core Strategy¹, which relate to Climate Change, Sustainable Energy, Sustainable Design and Construction and Flood Risk and Water Management. The calculations and methodology used within this assessment and report structure, are in accordance with the Policy Guidance and the Bristol Climate Change and Sustainability Practice Note².

In order to establish predicted figures for the development, and to accurately assess the most feasible solution for the Energy & CO² Reduction Strategy, the property has been modelled using the governments Standard Assessment Procedure (SAP2012). In accordance with Bristol guidance, the current SAP2012 Carbon Emission factors have been used within the calculations and to demonstrate compliance with the policy requirements. However, as these are currently outdated, additional calculations have also been carried out based on the draft SAP10 Carbon Emission factors, which provide more accurate figures for us to consider within our calculations and report.

We have worked with the design team and provided further consultancy to how the proposed development should address the issues of sustainability, resource efficiency and climate change, to reduce its overall environmental impact and demonstrate compliance with the relevant Bristol planning policy requirements and Part L of the Building Regulations.

¹ Bristol Development Framework Core Strategy. Adopted June 2011

² Bristol Climate Change and Sustainability Practice Note. July 2020

3. THE POLICY REQUIREMENTS

Bristol City Council is committed, through the Core Cities Climate Change Declaration and the Climate Change Act 2008, to an 80% reduction in CO² emissions by 2050. ¹

In order to achieve this goal, through its Planning Policies, Bristol Council have set out a holistic approach to promote and assess the Sustainability of new developments, through good design, resource efficiency and Carbon reduction.

The key requirements of the relevant policies of the Bristol City Council Core Strategy¹, which relate to Climate Change, Sustainable Energy, Sustainable Design and Construction and Flood Risk and Water Management are below:

Policy BSC13 Climate Change

Development should contribute to both mitigating and adapting to climate change, and to meeting targets to reduce carbon dioxide emissions.

Development should mitigate climate change through measures including:

- High standards of energy efficiency including optimal levels of thermal insulation, passive ventilation and cooling, passive solar design, and the efficient use of natural resources in new buildings.
- The use of decentralised, renewable and low-carbon energy supply systems.
- Patterns of development which encourage walking, cycling and the use of public transport instead of journeys by private car.

Development should adapt to climate change through measures including:

- Site layouts and approaches to design and construction which provide resilience to climate change.
- Measures to conserve water supplies and minimise the risk and impact of flooding.
- The use of green infrastructure to minimise and mitigate the heating of the urban environment.
- Avoiding responses to climate impacts which lead to increases in energy use and carbon dioxide emissions.

These measures should be integrated into the design of new development.

New development should demonstrate through Sustainability Statements how it would contribute to mitigating and adapting to climate change and to meeting targets to reduce carbon dioxide emissions by means of the above measures.

Policy BCS14

Proposals for the utilisation, distribution and development of renewable and low-carbon sources of energy, including large-scale freestanding installations, will be encouraged. In assessing such proposals the environmental and economic benefits of the proposed development will be afforded significant weight, alongside considerations of public health and safety and impacts on biodiversity, landscape character, the historic environment and the residential amenity of the surrounding area.

Development in Bristol should include measures to reduce carbon dioxide emissions from energy use in accordance with the following energy hierarchy:

¹ Bristol Development Framework Core Strategy. Adopted June 2011

² Bristol Climate Change and Sustainability Practice Note. July 2020

- 1. Minimising energy requirements;
- 2. Incorporating renewable energy sources;
- 3. Incorporating low-carbon energy sources.

Consistent with stage two of the above energy hierarchy, development will be expected to provide sufficient renewable energy generation to reduce carbon dioxide emissions from residual energy use in the buildings by at least 20%. An exception will only be made in the case where a development is appropriate and necessary but where it is demonstrated that meeting the required standard would not be feasible or viable.

The use of combined heat and power (CHP), combined cooling, heat and power (CCHP) and district heating will be encouraged. Within Heat Priority Areas, major development will be expected to incorporate, where feasible, infrastructure for district heating, and will be expected to connect to existing systems where available.

New development will be expected to demonstrate that the heating and cooling systems have been selected according to the following heat hierarchy:

- 1. Connection to existing CHP/CCHP distribution networks
- 2. Site-wide renewable CHP/CCHP
- 3. Site-wide gas-fired CHP/CCHP
- 4. Site-wide renewable community heating/cooling
- 5. Site-wide gas-fired community heating/cooling
- 6. Individual building renewable heating

Policy BCS15

Sustainable design and construction will be integral to new development in Bristol. In delivering sustainable design and construction, development should address the following key issues:

- Maximising energy efficiency and integrating the use of renewable and low-carbon energy;
- Waste and recycling during construction and in operation;
- Conserving water resources and minimising vulnerability to flooding;
- The type, life cycle and source of materials to be used;
- Flexibility and adaptability, allowing future modification of use or layout, facilitating future refurbishment and retrofitting;
- Opportunities to incorporate measures which enhance the biodiversity value of development, such as green roofs.

New development will be required to demonstrate as part of the Sustainability Statement submitted with the planning application how the above issues have been addressed. For major development and development for health or education uses, the Sustainability Statement should include a BREEAM Additionally, in the case of a super-major development, a BREEAM for Communities assessment will be required. For non-residential development, from 2016, a BREEAM "Excellent" rating will be expected. All new development will be required to provide satisfactory arrangements for the storage of refuse and recyclable materials as an integral part of its design. Major developments should include communal facilities for waste collection and recycling where appropriate.

New homes and workplaces should include the provision of high-speed broadband access and enable provision of Next Generation broadband. (References to Code for Sustainable Homes removed)

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Policy BCS16

Development in Bristol will follow a sequential approach to flood risk management, giving priority to the development of sites with the lowest risk of flooding. The development of sites with a sequentially greater risk of flooding will be considered where essential for regeneration or where necessary to meet the development requirements of the city.

Development in areas at risk of flooding will be expected to:

be resilient to flooding through design and layout, and/or

incorporate sensitively designed mitigation measures, which may take the form of on-site flood defence works and/or a contribution towards or a commitment to undertake such off-site measures as may be necessary, in order to ensure that the development remains safe from flooding over its lifetime. All development will also be expected to incorporate water management measures to reduce surface water run-off and ensure that it does not increase flood risks elsewhere. This should include the use of sustainable drainage systems (SUDS).

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4. DEVELOPMENT OVERVIEW

The application site is the land to the rear of no. 2 Woodwell Cottages, it is the second phase of the development, following the previous approval for 2no. dwellings adjacent.



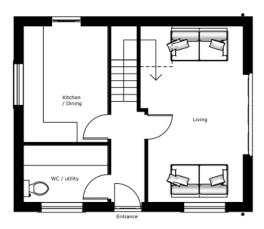
Above: Figure 1 - Site Location Plan

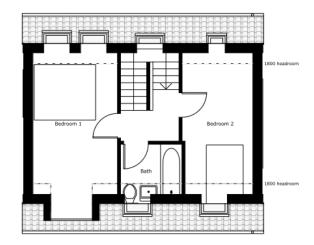
The site is already a residential plot and therefore supports the proposed use class, it is within easy reach of a variety of shops, restaurants and residential amenities, in addition to well defined public transport links.

The SAP calculation have been based on the drawings by MLG architects.

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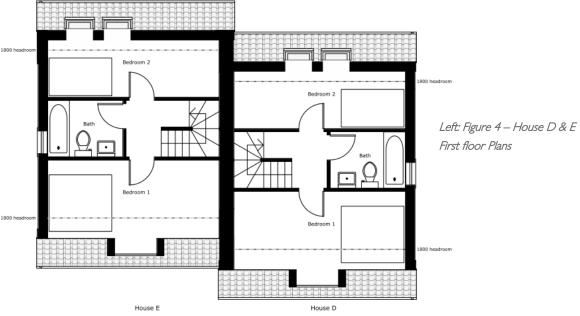




Above: Figure 2 – House C Floor Plans



Left: Figure 3 – House D & E Ground Floor Plans



¹ Bristol Development Framework Core Strategy. Adopted June 2011

 $^{^{\}rm 2}$ Bristol Climate Change and Sustainability Practice Note. July 2020

5. ENERGY STRATEGY

To demonstrate compliance with Policies BSC13-16, a Sustainability Statement and compliant Energy Strategy should demonstrate how the development has taken a comprehensive approach to mitigating and adapting to climate change in accordance with the Energy and Heat Hierarchy.

In order to establish predicted figures for the development, and to accurately assess the most feasible solution for the Energy & CO² Reduction Strategy, the property has been modelled using the governments Standard Assessment Procedure (SAP2012).

In accordance with Bristol guidance, the current SAP2012 Carbon Emission factors have been used within the calculations and to demonstrate compliance with the policy requirements. As these are currently outdated, additional calculations have also been carried out based on the draft SAP10 Carbon Emission factors, which provide predicted figures for us to consider within our calculations and report.

Predicted energy demands & associated CO_2 have been shown in the following stages and tables, over a compliant Part L1A Baseline, in accordance with the Bristol Policies and the Bristol Climate Change and Sustainability Practice Note. The Full Energy Demand & CO_2 reduction spreadsheet can be seen in Appendix A.

BASELINE ENERGY DEMAND

In accordance with the Energy Hierarchy, a baseline has been established which is based on mains Gas heating and hot water with all fabric parameters and controlled fittings compliant with Parts L1A of the Building Regulations.

BASELINE Calculation			
	SAP 2012 - Current	SAP 10 - Predicted	
Energy demand (kWh pa)	18783.8	18783.8	
Regulated emissions (kg pa)	4474.8	3976.3	

BASELINE Calculation Specification				
	Part L1A Limiting Fabric	BASELINE Fabric		
	Parameters	Parameters		
Ground Floor U Value (W/m2K):	0.25	0.17		
External Wall U Value (W/m2K):	0.30	0.24		
Roof U Values (W/m2K):	0.20	0.15		
Windows & Doors U Value (W/m2K):	2.0	1.4		
Windows & Doors G Value:	-	0.6		
Thermal Bridging	Use of ACDs and Thermal	Lintels for lower Psi Values		
Air Permeability:	10	5.38		
Ventilation:	Natural Ventilation with local extract			
Heating:	Wet Central Heating - Mains Gas Combi Boiler			
Hot Water:	Mains Gas Combi Boiler	Mains Gas Combi Boiler		
Lighting:	90% Low Energy Lighting			

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IMPROVED (BE LEAN) ENERGY DEMAND

After establishing this baseline, further Energy Efficiency measures are then specified to reduce the overall Energy demand. Designing with a 'fabric first' approach is the most sustainable and user effective way to improve and maximise energy efficiency and reduce carbon emissions for the dwelling over its lifetime. It involves improving the performance of the components and materials that make up the building fabric, before considering the use of mechanical or electrical building services systems and renewable/LZC technologies.

IMPROVED (BE LEAN) Calculation			
	SAP 2012 - Current	SAP 10 - Predicted	
Energy Saving from EE measures (kWh pa)	1547.1	1547.1	
Emissions Saving from EE measures (kg pa)	365.9	327.3	
Regulated Emissions after EE measures (kg pa)	4108.9	3649	
Emissions Saving from EE measures (%)	8.2%	8.2%	

IMPROVED (BE LEAN) Calculation Specification				
	Part L1A Limiting Fabric	BASELINE Fabric		
	Parameters	Parameters		
Ground Floor U Value (W/m2K):	0.25	0.17		
External Wall U Value (W/m2K):	0.30	0.20		
Roof U Values (W/m2K):	0.20	0.14		
Windows & Doors U Value (W/m2K):	2.0	1.4 roof windows 1.3		
Windows & Doors G Value:	-	0.6		
Thermal Bridging	Use of ACDs and Thermal Lintels for lower Psi Values			
Air Permeability:	10 4			
Ventilation:	Natural Ventilation with local extract			
Heating:	Wet Central Heating - Mains Gas Combi Boiler			
	+ Delayed Start Thermostat			
Hot Water:	Mains Gas Combi Boiler			
Lighting:	100% Low Energy Lighting			

FINAL (BE GREEN) ENERGY DEMAND & CARBON REDUCTION

The use of different Renewable and Low Zero Carbon technologies has been explored through the design development of this project and additional advice has been sought from Renewable Technology Suppliers to ensure that the chosen technology was feasible for the project. See section 6 for feasibility assessment.

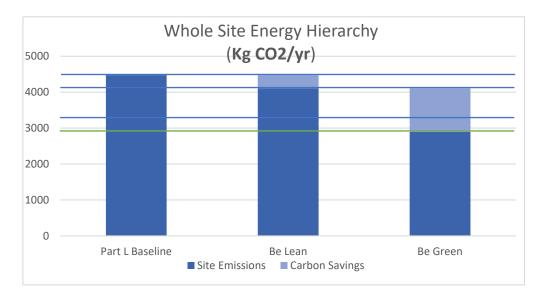
FINAL (BE GREEN) Calculation		
	SAP 2012 - Current	SAP 10 - Predicted
Energy Saving from Renewable/LZC Tech (kWh pa)	3245.2	3245.2
Emissions Saving from Renewable/LZC Tech (kg pa)	1684.3	756.1
Regulated Emissions after Renewable/LZC Tech (kg pa)	2424.6	2892.9
Emissions Saving from Renewable/LZC Tech (%)	41%	20.7%

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The target is to achieve at least a 20% reduction in predicted regulated CO₂ from the incorporation of on-site renewable technologies and the target has been exceeded.

We have increased the amount of PV to ensure the 20% reduction is also achieved based on the predicted SAP10 figures.



Baseline Emissions 4474.8kg Improved Emissions 4108.9kg Bristol Target 20% 3287.2kg Final CO2 (Green) 2892.9kg

A full breakdown of the energy demand and associated CO2 savings can be seen in appendix A.

¹ Bristol Development Framework Core Strategy. Adopted June 2011

² Bristol Climate Change and Sustainability Practice Note. July 2020

6. LZC TECHNOLOGY FEASIBILITY

The following different Renewable or Low Zero Carbon Technologies have been considered, and where deemed feasible for further consideration, have been assessed within SAP to obtain predicted regulated Energy demand figures, associated CO₂ emissions and fuel costs.

For the purposes of the feasibility assessment we have included Carbon Factors and Fuel Unit Prices from both the current SAP 2012 figures and the predicted SAP10 figures.

All savings are shown from the Renewable or LZC Technology only, over the stage 2 IMPROVED (BE LEAN) calculation with the exact same fabric specification. Where a Technology replaces the Gas Central heating system, the initial outlay cost is shown minus the cost of this system.

IMPROVED (BE LEAN) Calculation Specification				
	Part L1A Limiting Fabric	BASELINE Fabric		
	Parameters	Parameters		
Ground Floor U Value (W/m2K):	0.25	0.17		
External Wall U Value (W/m2K):	0.30	0.20		
Roof U Values (W/m2K):	0.20	0.14		
Windows & Doors U Value (W/m2K):	2.0	1.4 roof windows 1.3		
Windows & Doors G Value:	-	0.6		
Thermal Bridging	Use of ACDs and Thermal Lintels for lower Psi Values			
Air Permeability:	10 4			
Ventilation:	Natural Ventilation with local extract			
Heating:	Wet Central Heating - Mains Gas Combi Boiler			
	+ Delayed Start Thermostat			
Hot Water:	Mains Gas Combi Boiler			
Lighting:	100% Low Energy Lighting			

IMPROVED (BE LEAN) Calculation		
	SAP 2012	SAP 10 -
Wet Central Heating & Hot Water Efficient Gas Combination Boiler	Figures -	Figures -
	Current	Predicted
Regulated ENERGY Demand after EE measures (kWh pa)	17236.7	17236.7
Regulated CO2 Demand after EE measures (kg pa)	4108.9	3649.0
	-	-
Total Energy Cost (SAP pa)	£1039.1	
Initial Cost Outlay	3.5K- 4.0K	
Predicted EPC Rating (relating to running costs)	B84	

The full Energy Demand, CO2 & Cost Analysis worksheets and SAP worksheets can be seen in the Appendices.

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Biomass Heating

Biomass is any plant-derived organic material that renews itself over a short period.

Biomass energy systems are based on either the direct or indirect combustion of fuels derived from those plant sources. The most common form of biomass is the direct combustion of wood in treated or untreated forms. The use of biomass is becoming increasingly common in some European countries (some countries such as Austria are heavily dependent on biomass).

The environmental benefits relate to the significantly lower amounts of energy used in biomass production and processing compared to the energy released when they are burnt. This can range from a four-fold return for biodiesel to an approximate 20-fold energy return for woody biomass. Biomass-fuels can be used to produce energy on a continuous basis (unlike renewables such as wind or solar energy) and it can be an economic alternative to fossil fuels as it is a potential source of both heat and electricity.

Biomass systems have design management and maintenance requirements associated with sourcing, transportation and storage and are therefore more commonly used in commercial developments rather than domestic installations. It can be less convenient to operate than mains-supplied fuels such as natural gas and are more management intensive and require expertise in facilities management. Sources of biomass can also fluctuate, so boilers should be specified to operate on a variety of fuels without risk of overheating or tripping out.

Even a small biomass system would be impractical for these properties, the plot is on a residential street adjacent to other dwellings and housing the boilers, hoppers and fuel stores would take up a lot of space as well as being more difficult to facilitate and maintain for prospective buyers. There would likely be issues with accessible delivery and could be noise implications for neighbours. The system would also be quite a bit more expensive than other more suitable options and therefore this was not considered further.

Wind

Wind turbines convert the kinetic energy in wind into mechanical energy that is then converted to electricity. Turbines are available in a range of sizes and designs and can either be free-standing, mounted on a building or integrated into a building structure.

Wind generation would not be suitable for this property type and location. Average wind speed around this area is likely to be under 5m/s at 10m level, and the built-up residential area means that the wind would be turbulent.

Ground Source Heat pumps

A heat pump is a device that takes up heat at a certain temperature and releases it at a higher temperature. The essential components of a heat pump are heat exchangers (through which energy is extracted and emitted) and a means of pumping heat between the exchangers. The effectiveness of the heat pump is measured by the ratio of the heating capacity to the effective power input, usually known as the coefficient of performance (COP).

Ground-source heat pumps (GSHP) extract heat from the ground. They are classified as either water-to-air or water-to-water units depending on whether the heat distribution system in the building uses air or

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water. Ground source heat pumps either use long shallow trenches or deep vertical boreholes to take low grade heat from the ground and then compress it to create higher temperatures.

Ground Source Heat Pumps would not be suitable for this development, running the ground loops or boreholes for the 3 properties as well as the associated plant would require a lot of space and the ground work, initial outlay cost and additional requirements for plant and maintenance means that it would not be feasible.

Air Source Heat pumps

Air source heat pumps absorb heat from the outside air. This is usually used to heat radiators, underfloor heating systems, or warm air convectors. An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside.

The system performs down to air temperatures of -20° c which means that they are more than suitable for installations within the UK. Hot water and Heating can be provided 365 days a year. The hot water can be produced without the aid of electrical immersions and at around 50° c so is often boosted with electric immersion or a small buffer tank with heat exchangers at each shower to boost instantaneously at the source on demand.

There are two main types of air source heat pump system:

Air-to-air systems produce warm air which is circulated by fans. They are unlikely to provide you with hot water as well and are more common in non-domestic buildings such as offices. An air-to-water system distributes heat via a wet central heating system.

Air Source Heat Pump		
Saving from Renewable/LZC Technology Following Energy Efficiency Measures	SAP 2012 Figures - Current	SAP 10 - Figures - Predicted
Energy Saving from Renewable/LZC Tech (kWh pa)	8401.2	8401.2
Emissions Saving from Renewable/LZC Tech (kg pa)	0 (+476.7)	1590.3
Emissions Saving from Renewable/LZC Tech (%)	0 (+11.6)	43.6%
	-	
Initial Cost Outlay (Approx. Minus replaced Gas heating & hot water system)	15-19K	
FIT or RHI to consider	No	
Fuel Cost SAVING Per Annum	£0	
Fuel Cost INCREASE Per Annum	£935.7	
Payback (yrs)	None	
Predicted EPC Rating (relating to running costs)	C80	

Summary

This technology may be suitable for the properties, the system would be a split system with an indoor and outdoor unit. Technical advice would be need sought from a specialist supplier or Mechanical & Electrical consultant to confirm whether the technology would be suitable and provide further advice to

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whether they could be sited correctly for all dwellings where they would receive adequate unobstructed, clean airflow and shading from the sun in summer without causing any noise impact on the properties.

An ASHP wet central heating system will work better with underfloor heating, if radiators are used, they will heat to a lower temperature than with a Gas boiler and will usually have to be around double the size. A storage cylinder would also be required which wouldn't be required with the Gas Combi boiler.

The initial cost outlay would be more expensive than a Gas boiler and there will e no RHI. Compared with the Gas Combi boiler alone, without any renewables, running costs would be much higher for the occupant and the predicted EPC rating is lower.

This option does not meet the planning policy requirement of 20% reduction in CO2 under current SAP 2012 calculations and has increased emissions of 476.7 kg/annum. It would meet the requirement based on future predicted figures.

Solar Hot Water (Thermal)

Solar water heating systems are one of the more familiar renewable technologies used, they use the energy from the sun to heat water. Solar heating systems use a heat collector that is usually mounted on a roof in which a fluid is heated by the sun. This fluid is used to heat water that is stored in either a separate hot water cylinder or in a twin-coil hot water cylinder, the second coil is used to provide additional heating from a boiler or other heat source.

Solar Hot Water Panels could be mounted onto the roof space to supplement a mains Gas Combi boiler. They were considered along with other technologies based on a 4.8m2 Evacuated Tube System on each dwelling and the results are as follows:

Solar Hot Water Panels		
Saving from Renewable/LZC Technology Following Energy Efficiency Measures	SAP 2012 Figures - Current	SAP 10 - Figures - Predicted
Energy Saving from Renewable/LZC Tech (kWh pa)	2063.6	2063.6
Emissions Saving from Renewable/LZC Tech (kg pa)	400.3	429.9
Emissions Saving from Renewable/LZC Tech (%)	9.7%	11.8%
		•
Initial Cost Outlay	9.5k-10.5k	
FIT or RHI to consider	No	
Fuel Cost SAVING Per Annum	£54.1	
Fuel Cost INCREASE Per Annum	£0	
Payback (yrs)	175	
Predicted EPC Rating (relating to running costs)	B85	

Summary

This technology would be feasible for the project, the Solar Hot Water system could be installed along with an efficient Gas boiler, the downside is that a storage cylinder would also be required, which isn't required with the Gas Combi Boiler, so additional indoor space would be required.

Future occupiers would benefit from a very small saving in running costs.

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This option does not meet the planning policy requirement of 20% reduction in CO2 using either current or predicted carbon factors.

Photovoltaic (PV) Panels

Photovoltaic (PV) modules convert sunlight directly to DC electricity.

A PV system could be mounted onto the roof space to supplement a mains Gas Combi boiler wet central heating system to generate electricity, and therefore reduce grid supplied electricity and running costs. Battery storage can now also be added to minimise the reliance on the grid even further.

There are many renewable energy suppliers and whilst this cannot be factored into the SAP calculations for consistency and comparability, this is another good way to reduce your Carbon Emissions.

The PV amount has been increased to meet the 20% target on predicted figures, the results are as follows:

PV – 4.08kWp System – 1.36kWp on 3no. Dwellings					
Saving from Renewable/LZC Technology Following Energy Efficiency Measures	SAP 2012 Figures - Current	SAP 10 - Figures - Predicted			
Energy Saving from Renewable/LZC Tech (kWh pa)	3245.2	3245.2			
Emissions Saving from Renewable/LZC Tech (kg pa)	1684.3	756.1			
Emissions Saving from Renewable/LZC Tech (%)	41%	20.7%			
	-				
Initial Cost Outlay	8-9K				
FIT or RHI to consider	No				
Fuel Cost SAVING Per Annum	£461.4				
Fuel Cost INCREASE Per Annum	£0				
Payback (yrs)	17				
Predicted EPC Rating (relating to running costs)	B90				

Summary

The 4.08kWp PV system has been chosen for the project, the PV system would be installed along with an efficient Gas Combination boiler wet central heating system and when comparing all factors within the feasibility assessment, this is deemed the best option for the project.

The installation will be the easiest and cheapest option for the builder and even without FIT payments, this option provides good selling points to prospective buyers who will have a familiar heating and hot water system that will be easy to use and simple and cheap to maintain. With a high EPC rating and Electricity generated by the PV, the occupier will benefit from the lower running costs and the system will pay back in a reasonably short period of time. The amount of PV proposed means that the 20% reduction in CO2 is achieved on both current and predicted carbon factors.

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² Bristol Climate Change and Sustainability Practice Note. July 2020

7. SUSTAINABILITY STATEMENT

This report demonstrates that the policy requirements have been considered throughout the early design stages of this development. Improvements will be incorporated throughout the Design & Construction, to ensure that the scheme will perform above the minimum standards of Part L of the Building Regulations.

The site is in a good location in an already establish residential area and therefore supports the proposed use class. The new dwelling is within easy reach of a variety of shops, restaurants and residential amenities, in addition to well defined public transport links.

The following section summarises the measures taken to create a holistically sustainable development.

Designing for Climate Change adaption, mitigation & Energy Efficiency

A fabric first design approach will mean that insulation standards including glazing, and air-tightness, will exceed current Building Regulations Part L standards. Improved air tightness and good U Values, will also limit heat losses and gains, reduce heating and cooling requirements and therefore associated running costs and CO2.

To help manage and promote energy efficiency from occupant use Low Energy Lighting is specified, where supplied, white goods will be energy efficient (A+ or A rated) and smart meters will be provided to assist occupants with Energy management. A building user guide will also be provided to educate the occupants and encourage them to use the building and its services and appliances properly and efficiently. Sanitaryware and white goods will also be specified with Low water usage and if required flow restrictors to minimise water use.

It is proposed that the Heating and Hot water will be via efficient Gas Combi boilers supplemented by a 4.08kWp PV system, which will be split as 1.36kWp (4no. 340WPanels) on each dwelling, mounted on the rear east facing roof on house C, and the South facing roof for house D & E. Following the feasibility assessment and all areas being considered, this was deemed to be the best option for the project, it is the easiest and cheapest system to install, with no additional space required internally or externally for condensers or water storage cylinder, it would familiar and easy to maintain by the occupant as well as being the lowest on running costs with the shortest payback period and it achieves the 20% target on both current and predicted figures.

Materials

Consideration will be given to using materials and construction that have a low environmental impact, such as those achieving an A+ or A rated under BRE's Green Guide. Where possible, materials will be chosen that are local and responsibly sourced (such as FSC timber), recycled or reclaimed. All insulation materials will have a GWP (Global Warming Potential) of 5 or less.

Waste

The contractor will produce a Site Waste Management Plan (SWMP) to set targets and monitor to reduce waste and divert from landfill. The dwelling will incorporate dedicated internal and external general waste and recyclable storage in accordance with the LA collection.

¹ Bristol Development Framework Core Strategy. Adopted June 2011

² Bristol Climate Change and Sustainability Practice Note. July 2020

Health & Wellbeing

Rooms will have good levels of day lighting, and décor will enhance this so to reduce the need for artificial lighting. Materials with low VOC emissions will be used. Gardens are provided so that the occupants have access to private outdoor space.

Transport

Parking is provided outside the dwellings and there are excellent public transport links nearby and amenities are within walking distance. Cycle storage will also be provided.

¹ Bristol Development Framework Core Strategy. Adopted June 2011

² Bristol Climate Change and Sustainability Practice Note. July 2020

APPENDICES:

A: Energy Demand Assessment Work Sheets

B: SAP Calculation Worksheets - BASELINE

C: SAP Calculation Worksheets – IMPROVED (BE LEAN)

D: SAP Calculation Worksheets – FINAL (BE GREEN)

E: Predicted EPCs

F: Feasibility Work Sheets

¹ Bristol Development Framework Core Strategy. Adopted June 2011

² Bristol Climate Change and Sustainability Practice Note. July 2020

SITE WIDE ENERGY DEMAND, CO2 & COST ANALYSIS - WOODWELL P2								
OPTION 1 - PV	HOUSE C	HOUSE D	HOUSE E	SITE TOTAL	CURRENT CARBON I	FACTORS - SAP 2012	PREDICTED CARBON	N FACTORS - SAP 10
Stage 1 - BASELINE Energy Demand	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1825.6	1800.4	1800.4	5426.3	0.216	1172.1	0.210	1139.5
Space Heating (211)	4195.5	3892.0	3892.0	11979.4	0.216	2587.6	0.210	2515.7
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	75.0	75.0	75.0	225.0	0.519	116.8	0.233	52.4
Lighting (232)	385.4	383.8	383.8	1153.0	0.519	598.4	0.233	268.7
TOTAL	6481.5	6151.2	6151.2	18783.8		4474.8		3976.3
Stage 2 - IMPROVED Energy Demand Following Energy Efficiency Measures	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1827.2	1801.4	1801.4	5430.0	0.216	1172.9	0.210	1140.3
Space Heating (211)	3574.5	3479.5	3479.5	10533.5	0.216	2275.2	0.210	2212.0
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	75.0	75.0	75.0	225.0	0.519	116.8	0.233	52.4
Lighting (232)	350.4	348.9	348.9	1048.2	0.519	544.0	0.233	244.2
TOTAL	5827.1	5704.8	5704.8	17236.7		4108.9		3649.0
Stage 3 - FINAL Energy Demand following Renewable or LZC Technologies	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1827.2	1801.4	1801.4	5430.0	0.216	1172.9	0.210	1140.3
Space Heating (211)	3574.5	3479.5	3479.5	10533.5	0.216	2275.2	0.210	2212.0
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	75.0	75.0	75.0	225.0	0.519	116.8	0.233	52.4
Lighting (232)	350.4	348.9	348.9	1048.2	0.519	544.0	0.233	244.2
PV	-921.1	-1162.1	-1162.1	-3245.2	0.519	-1684.3	0.233	-756.1
TOTAL	4906.0	4542.7	4542.7	13991.5		2424.6		2892.9

CO² REDUCTION SUMMARY - SAP2012

Summary of CO2 Emission Reductions	Total CO2 emissions (kgCO2/year)
Baseline emissions	4474.8
Improved emissions after application of energy efficiency measures.	4108.9
CO2 Reduction from application of energy efficiency measures.	365.9
Improved emissions after incorporation of efficient energy supply	4108.9
CO2 Reduction from efficient Energy Supply.	0.0
Final emissions after incorporation of renewable energy	2424.6
CO2 Reduction from incorporation of renewable energy	1684.3
CO2 displaced in total	2050.2
Summary of CO2 Emission Reductions	Total reduction (%)
% CO2 displaced by energy efficiency measures	8.2%
% CO2 displaced by efficient supply of energy	0.00%
% CO2 displaced by renewable energy	41.0%
% CO2 displaced in total	45.8%

CO² REDUCTION SUMMARY - SAP10

Summary of CO2 Emission Reductions	Total CO2 emissions (kgCO2/year)
Baseline emissions	3976.3
Improved emissions after application of energy efficiency measures.	3649.0
CO2 Reduction from application of energy efficiency measures.	327.3
Improved emissions after incorporation of efficient energy supply	3649.0
CO2 Reduction from efficient Energy Supply.	0.0
Final emissions after incorporation of renewable energy	2892.9
CO2 Reduction from incorporation of renewable energy	756.1
CO2 displaced in total	1083.4
Summary of CO2 Emission Reductions	Total reduction (%)
% CO2 displaced by energy efficiency measures	8.2%
% CO2 displaced by efficient supply of energy	0.00%
% CO2 displaced by renewable energy	20.7%
% CO2 displaced in total	27.2%

ENERGY REDUCTION SUMMARY - SAP2012

Summary of Energy Reduction:	Total Regulated Energy Use (kWh/yr):
Baseline Energy Demand.	18783.8
Improved Energy Demand after application of energy efficiency measures.	17236.7
Energy Saved from application of Energy Efficiency Measures.	1547.1
Improved Energy Demand after incorporation of efficient energy supply.	17236.7
Energy Saved from incorporation of efficient energy supply.	0.0
Improved Energy Demand after incorporation of renewable energy technology.	13991.5
Energy Saved from incorporation of renewable energy technology.	3245.2
Energy Demand reduction in total	4792.3
Summary of Energy Reduction:	Total Energy Reduction (%):
% Energy Demand reduction from efficiency measures	8.2%
% Energy Demand reduction by efficient supply of energy	0.00%
% Energy Demand reduction by renewable energy	18.8%
% Energy Demand reduction in total	25.5%

ENERGY REDUCTION SUMMARY - SAP10

Summary of Energy Reduction:	Total Regulated Energy Use (kWh/yr):
Baseline Energy Demand.	18783.8
Improved Energy Demand after application of energy efficiency measures.	17236.7
Energy Saved from application of Energy Efficiency Measures.	1547.1
Improved Energy Demand after incorporation of efficient energy supply.	17236.7
Energy Saved from incorporation of efficient energy supply.	0.0
Improved Energy Demand after incorporation of renewable energy technology.	13991.5
Energy Saved from incorporation of renewable energy technology.	3245.2
Energy Demand reduction in total	4792.3
Summary of Energy Reduction:	Total Energy Reduction (%):
% Energy Demand reduction from efficiency measures	8.2%
% Energy Demand reduction by efficient supply of energy	0.00%
% Energy Demand reduction by renewable energy	18.8%
% Energy Demand reduction in total	25.5%

PROJECT KEY RESULTS

Reference	Property Type	SAP	EI	DER	TER
HOUSE C - BASELINE	House	B 83 (83.3123514001231)	85.7	18.89	18.9
HOUSE D - BASELINE	House	B 83 (83.4923581800995)	86.1	18.72	18.7
HOUSE E - BASELINE	House	B 83 (83.4923581800995)	86.1	18.72	18.7
HOUSE C - IMPROVED	House	B 84 (84.4508318813645)	87.2	17.03	18.9
HOUSE D - IMPROVED	House	B 84 (84.3359566261234)	87.2	17.36	18.7
HOUSE E - IMPROVED	House	B 84 (84.3359566261234)	87.2	17.36	18.7
HOUSE C - FINAL	House	В 90 (90.1206729781524)	92.3	11.11	18.9
HOUSE D - FINAL	House	В 90 (89.7940780831301)	92.1	11.59	18.7
HOUSE E - FINAL	House	A 92 (91.6134524117822)	93.8	9.66	18.7
HOUSE C - FINAL ASHP	House	C 80 (80.2899632511737)	82.3	22.5	27.6
HOUSE D - FINAL ASHP	House	C 80 (80.3148443202348)	82.3	22.89	27.2
HOUSE E - FINAL ASHP	House	C 80 (80.3148443202348)	82.3	22.89	27.2
HOUSE C - FINAL SHW	House	B 85 (85.2682356078918)	88.5	15.43	18.9
HOUSE D - FINAL SHW	House	B 85 (85.2069046419929)	88.6	15.63	18.7
HOUSE E - FINAL SHW	House	B 85 (85.2069046419929)	88.6	15.63	18.7

PROJECT KEY RESULTS

DFEE	TFEE	Percent Improvement	Total Floor Area	Main Heating Fuel Requirement (DER)	Secondary Main Heating Fuel Requirement (DER)	Secondary Heating Fuel Requirement (DER)	Water Fuel Requirement (DER)
54.3	57.0	0.05	81.5	4195.45	0.0	0	1825.6
50	53.0	0	78.4	3891.98	0.0	0	1800.4
50	53.0	0	78.4	3891.98	0.0	0	1800.4
48.2	57.0	9.89	81.5	3574.49	0.0	0	1827.2
46	53.0	7.26	78.4	3479.49	0.0	0	1801.4
46	53.0	7.26	78.4	3479.49	0.0	0	1801.4
48.2	57.0	41.22	81.5	3574.49	0.0	0	1827.2
46	53.0	38.09	78.4	3479.49	0.0	0	1801.4
46	53.0	48.4	78.4	3479.49	0.0	0	1801.4
48.2	57.0	18.48	81.5	1287.07	0.0	0	1354.1
46	53.0	15.81	78.4	1233.2	0.0	0	1339.9
46	53.0	15.81	78.4	1233.2	0.0	0	1339.9
48.2	57.0	18.23	81.5	3485.04	0.0	0	1194.7
46	53.0	16.24	78.4	3355.8	0.0	0	1179.3
46	53.0	16.24	78.4	3355.8	0.0	0	1179.3

PROJECT KEY RESULTS

Electricity Pumps Fans Requirement (DER)	Electricity Lighting Requirement (DER)	PV Energy Produced (DER)	Wind Energy Produced (DER)	Total CO2 (DER)	HLP	PV Kwp	Total Energy Cost
75	385.4	0	0.0	1539.51	1.5	0	379.7
75	383.8	0	0.0	1467.67	1.3	0	365.3
75	383.8	0	0.0	1467.67	1.3	0	365.3
75	350.4	0	0.0	1387.55	1.4	0	350.9
75	348.9	0	0.0	1360.68	1.2	0	344.1
75	348.9	0	0.0	1360.68	1.2	0	344.1
75	350.4	-928.1	0.0	905.86	1.4	1.360000014	175.5
75	348.9	-871.55	0.0	908.35	1.2	1.019999981	179.4
75	348.9	-1162.06	0.0	757.57	1.2	1.360000014	124.5
0	350.4	0	0.0	1833.77	1.4	0	609.8
0	348.9	0	0.0	1794.55	1.2	0	594.1
0	348.9	0	0.0	1794.55	1.2	0	594.1
125	350.4	0	0.0	1257.56	1.4	0	333.4
125	348.9	0	0.0	1225.54	1.2	0	325.8
125	348.9	0	0.0	1225.54	1.2	0	325.8

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 *Printed on 25 February 2021 at 14:05:09*

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Detached House

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 81.5m²

Site Reference: WOODWELL Plot Reference: HOUSE C - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.9 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 18.89 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 57.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 54.3 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	OK
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 5.38 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 %

Secondary heating system: None

OK

Regulations Compliance Report

5 Cylinder insulation				
Hot water Storage:	No cylinder			
6 Controls				
Space heating controls	Space heating controls TTZC by plumbing and electrical services			
Hot water controls:	No cylinder thermostat			
	No cylinder			
Boiler interlock:	Yes		OK	
7 Low energy lights				
Percentage of fixed lights with	n low-energy fittings	90.0%		
Minimum		75.0%	OK	
8 Mechanical ventilation				
Not applicable				
9 Summertime temperature				
Overheating risk (South East	England):	Slight	ок	
Based on:	,	, and the second		
Overshading:		Average or unknown		
Windows facing: West		4.86m²		
Windows facing: North		1.62m²		
Windows facing: South		6.08m²		
Windows facing: East		2.14m²		
Roof windows facing: West		2.66m²		
Roof windows facing: East		2.66m²		
Roof windows facing: East		1.1m²		
Roof windows facing: East		0.78m²		
Ventilation rate:		8.00		
Blinds/curtains:		Dark-coloured curtain or roller blind	J.	
		Closed 10% of daylight hours		
10 Key factures				

None

Thermal Bridge Report

Property Details: HOUSE C - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges

Thermal bridges: User-defined = UD

Default = D Approved = A

User-defined (individual PSI-values) Y-Value = 0.0724

External Junctions Details:

Junction Type	PSI-Value	Length F	Reference	Type
Other lintels (including other steel lintels)	0.3	9.97	E2	[A]
Sill	0.04	5.4	E3	[A]
Jamb	0.05	22.8	E4	[A]
Ground floor (normal)	0.1	25.7	E5	[UD]
Intermediate floor within a dwelling	0.07	25.7	E6	[A]
Eaves (insulation at rafter level)	0.04	15.65	E11	[A]
Gable (insulation at rafter level)	0.04	19.28	E13	[A]
Corner (normal)	0.09	15.8	E16	[A]

Roof Junctions Details:				
Head	0.08	9.47	R1	[D]
Sill	0.06	9.47	R2	[D]
Jamb	0.08	17.2	R3	[D]
Ridge (vaulted ceiling)	0.08	9.3	R4	[D]

Predicted Energy Assessment



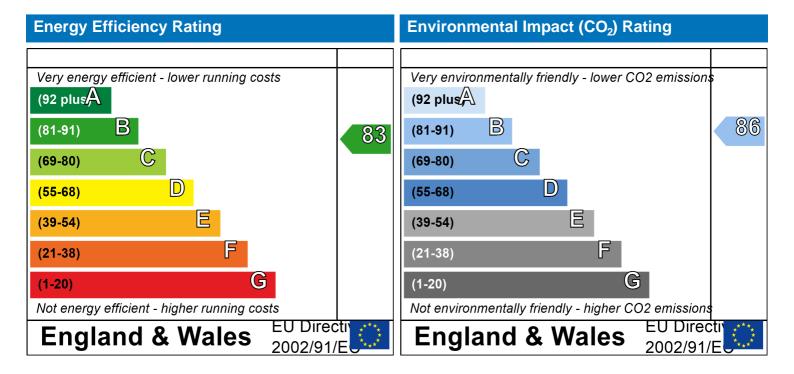
Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Detached House 24 February 2021 Jemma Mclaughlan

Total floor area: 81.5 n

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

SAP Input

Property Details: HOUSE C - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House
Detachment: Detached
Year Completed: 2021

Floor Location: Floor area:

Storey height:

Floor 0 40.75 m^2 2.6 m Floor 1 40.75 m^2 2.24 m

Living area: 18.3 m² (fraction 0.225)

Front of dwelling faces: Wes

Opening types:

Name: FRONT DOOR	Source: Manufacturer	Type: Solid	Glazing:	Argon:	Frame: Wood
W1-3 FRONT	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - SIDE S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W6 - REAR E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 FRONT W	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW3-4 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW5 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW6 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Name:	Gap:	Frame Fa	actor: g-value:	U-value:	Area:	No.
FRONT DOOR	mm	0.8	0	1.4	1.93	1
W1-3 FRONT	16mm or more	0.8	0.63	1.4	1.62	3
W4 - SIDE N	16mm or more	8.0	0.63	1.4	1.62	1
W5 - SIDE S	16mm or more	8.0	0.63	1.4	6.08	1
W6 - REAR E	16mm or more	0.8	0.63	1.4	2.14	1
RW1-2 FRONT W	16mm or more	8.0	0.63	1.4	1.33	2
RW3-4 REAR E	16mm or more	0.8	0.63	1.4	1.33	2
RW5 REAR E	16mm or more	0.8	0.63	1.4	1.1	1
RW6 REAR E	16mm or more	0.8	0.63	1.4	0.78	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	West	0	0
W1-3 FRONT		EXTERNAL WALLS	West	0	0
W4 - SIDE N		EXTERNAL WALLS	North	0	0
W5 - SIDE S		EXTERNAL WALLS	South	0	0
W6 - REAR E		EXTERNAL WALLS	East	0	0
RW1-2 FRONT W		ROOF	West	0.001	0

of Openings:

SAP Input

RW3-4 REAR E	ROOF	East	0.001 0	
RW5 REAR E	ROOF	East	0.001 0	1
RW6 REAR E	ROOF	East	0.001 0	J

Overshading: Average or unknown

40.75

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Element	<u>'S</u>						
EXTERNAL WALLS	102.95	16.63	86.32	0.24	0	False	N/A
DORMER CHEEKS	2	0	2	0.24	0	False	N/A
ROOF	61.3	7.2	54.1	0.15	0		N/A

0.17

Internal Elements Party Elements

GROUND FLOOR

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0724

	Length	Psi-value		
[Approved]	9.97	0.3	E2	Other lintels (including other steel lintels)
[Approved]	5.4	0.04	E3	Sill
[Approved]	22.8	0.05	E4	Jamb
	25.7	0.1	E5	Ground floor (normal)
[Approved]	25.7	0.07	E6	Intermediate floor within a dwelling
[Approved]	15.65	0.04	E11	Eaves (insulation at rafter level)
[Approved]	19.28	0.04	E13	Gable (insulation at rafter level)
[Approved]	15.8	0.09	E16	Corner (normal)
	9.47	0.08	R1	Head
	9.47	0.06	R2	Sill
	17.2	0.08	R3	Jamb
	9.3	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys:0Number of open flues:0Number of fans:3Number of passive stacks:0Number of sides sheltered:0Pressure test:5.38

Main heating system

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

N/A

SAP Input

Boiler interlock: Yes

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

Water heating

Water heating: From main heating system

Water code: 901 Fuel :mains gas No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 90%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No Photovoltaics: None Assess Zero Carbon Home: No

SAP WorkSheet: New dwelling design stage

		User Details:				
Accesses Names	lommo Moloughlan			CTDO	020065	
Assessor Name: Software Name:	Jemma Mclaughlan Stroma FSAP 2012	Stroma Nui Software V			030065 n: 1.0.5.25	
Software Name.		roperty Address: HOU			11. 1.0.3.23	
Address :	Woodwell Cottage P2, Wood	. ,		_		
Overall dwelling dime	•	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
<u> </u>		Area(m²)	Av. Height(m))	Volume(m³)	
Ground floor		40.75 (1a) x	2.6	(2a) =	105.95	(3a)
First floor		40.75 (1b) x	2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1n	81.5 (4)				
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	197.23	(5)
2. Ventilation rate:						
	main secondar heating heating	y other	total		m³ per hour	
Number of chimneys	0 + 0	+ 0 =	0 x	40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0 x	20 =	0	(6b)
Number of intermittent far	ns		3 x	10 =	30	(7a)
Number of passive vents			0 x	10 =	0	(7b)
Number of flueless gas fin	res		0 x	40 =	0	(7c)
				ī	anges per hou	_
•	ys, flues and fans = (6a)+(6b)+(7 een carried out or is intended, proceed		30 from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the		to (17), otherwise continue	110111 (3) 10 (10)	1	0	(9)
Additional infiltration	g (,		[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	.25 for steel or timber frame or	0.35 for masonry cons		, -	0	(11)
if both types of wall are pr deducting areas of openin	resent, use the value corresponding to	the greater wall area (after			-	」 ` '
=	loor, enter 0.2 (unsealed) or 0.	1 (sealed), else enter)		0	(12)
If no draught lobby, ent	ter 0.05, else enter 0				0	(13)
Percentage of windows	and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14) -	- 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metre	s per hour per square	metre of envelope	e area	5.3800001144409	2 (17)
If based on air permeabili	ity value, then $(18) = [(17) \div 20] + (8)$	3), otherwise $(18) = (16)$			0.42	(18)
Air permeability value applies	s if a pressurisation test has been don	e or a degree air permeabili	ty is being used			
Number of sides sheltere	d	(00)	4400		0	(19)
Shelter factor		(20) = 1 - [0.075 x]			1	(20)
Infiltration rate incorporat		$(21) = (18) \times (20) =$	=		0.42	(21)
Infiltration rate modified for				 	1	
Jan Feb	Mar Apr May Jun	Jul Aug Ser	Oct Nov	Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (2	22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infiltr	ation rate	e (allowi	na for sh	nelter an	d wind s	speed) =	: (21a) x	(22a)m				-	
0.54	0.53	0.52	0.46	0.45	0.4	0.4	0.39	0.42	0.45	0.47	0.49	1	
Calculate effect		-	rate for t	he appli	cable ca	se							
If exhaust air h			endix N (2	3h) = (23a	a) × Fmv (equation (N5)) othe	rwise (23h	n) = (23a)			0	(23a)
If balanced with		0 11		, ,	,	. `	,, .	,) = (23a)			0	(23b)
a) If balance		•	•	J		`		,	2h\m + (23h) v [1 – (23c)	0 - 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	L ed mecha	anical ve	ntilation	without	heat red	coverv (I	I MV) (24t	$\frac{1}{1}$	 2b)m + (23b)	<u> </u>	J	, ,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole h	ouse ex	tract ven	tilation o	r positiv	re input	ventilatio	on from (utside	<u> </u>	<u> </u>		J	
,	n < 0.5 ×			•					.5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)n	ventilation								0.5]				
(24d)m= 0.64	0.64	0.63	0.61	0.6	0.58	0.58	0.58	0.59	0.6	0.61	0.62		(24d)
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	ld) in bo	x (25)					
(25)m= 0.64	0.64	0.63	0.61	0.6	0.58	0.58	0.58	0.59	0.6	0.61	0.62		(25)
3. Heat losse	s and he	eat loss p	paramete	er:									
ELEMENT	Gros												
	area	-	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²·		A X k kJ/K
Doors		-				m²				K)			
Doors Windows Type	area	-			ı, A	m² x	W/m2	2K =	(W/	K)			kJ/K
	area	-			A ,ı	m² x	W/m2	2K = - 0.04] =	(W/ 2.702	K)			kJ/K (26)
Windows Type	area e 1 e 2	-			A ,i	m² x x1 x1	W/m2 1.4 /[1/(1.4)+	2K = 0.04] = 0.04] =	(W/ 2.702 2.15	K)			kJ/K (26) (27)
Windows Type	area	-			A ,i 1.93	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & & \\ & & & & \\ \hline & 0.04] & = & \\ 0.04] & = & \\ 0.04] & = & \\ \end{array} $	(W/ 2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
Windows Type Windows Type Windows Type	area = 1 = 2 = 3 = 4	-			A ,1 1.93 1.62 1.62 6.08	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	eK = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	2.702 2.15 2.15 8.06	K)			kJ/K (26) (27) (27) (27) (27)
Windows Type Windows Type Windows Type	area area area area area area area area	-			A ,1 1.93 1.62 1.62 6.08 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] =	(W/ 2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27) (27b)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ	area e 1 e 2 e 3 e 4 e 1 e 2	-			A ,1 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04] =	(W/ 2.702 2.15 2.15 8.06 2.84 1.862	K)			(26) (27) (27) (27) (27) (27b) (27b)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ	area e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4	-			A ,1 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) +	EK = 0.04] = 0	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862	K)			kJ/K (26) (27) (27) (27) (27) (27b) (27b)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ	area e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4	-			A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = 0.04] = 0	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ	area area area area area area area area	(m²)	m		A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.11 0.78	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = 0.04] = 0	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1	area e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4	(m²)	16.6		A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.11 0.78 40.79	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = 0.04] = 0	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b) (28)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1 Walls Type2	area area	95	16.65 0		A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + 0.17 0.24 0.24	EK = 0.04] =	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.54 1.092 6.9275 20.72	K)			(26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof	area area	95 3	16.6		A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32 54.1	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = 0.04] = 0	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1 Walls Type2	area area	95 3 , m ² ows, use e	16.63 0 7.2	3	A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207 alue calculations	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + 0.17 0.24 0.15	EK = 0.04 =	(W/ 2.702 2.15 8.06 2.84 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of ee * for windows and	area area area area area area area area	95 3 , m² ows, use e sides of in	16.63 0 7.2 ffective will ternal wall	3	A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207 alue calculation and a series of the	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + 0.17 0.24 0.15	EK = 0.04 =	(W/ 2.702 2.15 8.06 2.84 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²-	K	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and ** include the area	area area area area area area area area	95 3 , m² ows, use e sides of in = S (A x	16.63 0 7.2 ffective will ternal wall	3	A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207 alue calculation and a series of the	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(EK = 0.04] =	(W/ 2.702 2.15 8.06 2.84 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and ** include the area Fabric heat los	area area area area area area area area	95 3 , m ² ows, use e sides of in = S (A x (A x k)	16.63 0 7.2 ffective winternal walk	3 ndow U-vals and pan	A ,1 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32 2 54.1 207 alue calculatitions	m²	W/m ² 1.4 /[1/(1.4)+ /[1/(EK = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = (1/U-value) + (32) = ((28).	(W/ 2.702 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²•	n 3.2	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)

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an be used														
hermal b	_					-	K						14.98	(36
<i>details of ti</i> otal fabri		0 0	are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			00.00	(37
entilation			lculated	l monthly	./				` '	$= 0.33 \times ($	25)m x (5)		82.96	(3/
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
<u> </u>	1.92	41.56	41.2	39.53	39.21	37.75	37.75	37.48	38.31	39.21	39.85	40.51		(38
eat trans	sfer co	efficier	nt W/K				<u> </u>		(39)m	= (37) + (37)	 38)m		l	
_		124.52	124.16	122.48	122.17	120.71	120.71	120.44	121.27	122.17	122.8	123.47		
		!				<u> </u>	!	!	,	Average =	Sum(39) ₁	12 /12=	122.48	(3
eat loss		<u> </u>				<u> </u>	1	1		= (39)m ÷	·	1	1	
0)m= 1	1.53	1.53	1.52	1.5	1.5	1.48	1.48	1.48	1.49	1.5	1.51	1.51	4.5	(40
umber o	of days	in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.5	(41
J	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
-1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
4. Water	heatir	ng ener	gy requi	rement:								kWh/ye	ear:	
													1	
				[1 - AVD	(<u>-</u> 0 0003	2/0 v /TF	-Δ -13 Q)2)] <u>+</u> 0 (1013 v (Γ Γ Δ -13		49		(4
if TFA >	> 13.9,	N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		49		(4
if TFA >	> 13.9, £ 13.9,	N = 1 N = 1	+ 1.76 x							ΓFA -13.	9)]	Ì
	> 13.9, £ 13.9, verage	N = 1 N = 1 hot wa	+ 1.76 x iter usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	3.35]	
if TFA > if TFA £ nnual av educe the	> 13.9, £ 13.9, verage annual a	N = 1 N = 1 hot wa average	+ 1.76 x iter usag	ge in litre usage by	es per da 5% if the a	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)			Ì
if TFA > if TFA £ nnual av educe the continuous that	> 13.9, £ 13.9, verage annual a at 125 lit	N = 1 N = 1 hot wa average tres per p	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		9)			Ì
if TFA > if TFA £ nnual av educe the continuous that	> 13.9, £ 13.9, verage annual a at 125 lit	N = 1 N = 1 hot wa average tres per p	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	3.35		·
if TFA £ if TFA £ nnual av educe the ot more tha ot water us	> 13.9, £ 13.9, verage annual a at 125 lit	N = 1 N = 1 hot wa average tres per p	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	3.35		·
if TFA sent if TFA for the following in	> 13.9, £ 13.9, verage annual at 125 lit Jan sage in 1	N = 1 N = 1 hot wa average tres per p Feb litres per	+ 1.76 x ater usag hot water person per Mar day for ea 95.22	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49	Oct 95.22 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ =	Dec 102.69	1120.25	(4
if TFA > if TFA £ nnual av educe the tot more that of water us 4)m= 10	> 13.9, £ 13.9, verage annual at 125 lit Jan Sage in 1 02.69	N = 1 N = 1 hot wa average tres per p Feb litres per 98.96	+ 1.76 x Inter usage hot water person per Mar day for ear 95.22	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is not and co Jun ctor from 1 84.02	erage = designed and designed a	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49 c) kWh/mor	Oct 95.22 Total = Su th (see Ta	9) 93 Nov 98.96 m(44)112 = ables 1b, 1	Dec 102.69 = c, 1d)	1120.25	(4
if TFA > if TFA £ nnual aveduce the at more that of water us 4)m= 10	> 13.9, £ 13.9, verage annual at 125 lit Jan Sage in 1 02.69	N = 1 N = 1 hot wa average tres per p Feb litres per	+ 1.76 x ater usag hot water person per Mar day for ea 95.22	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49 0 kWh/mor 106.76	Oct 95.22 Total = Sunth (see Tail 124.42	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81	Dec 102.69 = c, 1d) 147.48		(4
if TFA > if TFA £ nnual av educe the content more than ot water us 4)m= 10 nergy content 5)m= 15	> 13.9, £ 13.9, verage annual at 125 lit Jan Sage in 10 02.69 tent of he	N = 1 N = 1 hot wa average tres per p Feb litres per 98.96 ot water	+ 1.76 x Inter usage hot water person per Mar day for ear 95.22 used - calc 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated me	es per da 5% if the da 5% if th	ay Vd,av lwelling is not and co Jun ctor from 7 84.02 190 x Vd,r	erage = designed and designed a	(25 x N) to achieve Aug (43) 87.75 27m / 3600 105.5	+ 36 a water us Sep 91.49 0 kWh/mor 106.76	Oct 95.22 Total = Su th (see Ta	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81	Dec 102.69 = c, 1d) 147.48	1120.25	(4
if TFA > if TFA £ nnual aveduce the state more than at water us 4)m= 10 nergy contains 5)m= 15	> 13.9, E 13.9, Verage annual at 125 lit sage in 12.69 tent of he 52.29	N = 1 $N = 1$ hot was average tres per p Feb litres per 98.96 ot water 133.19	ter usaghot water person per Mar day for ea 95.22 used - calc 137.44	Apr Apr ach month 91.49 culated mo	es per da 5% if the of rater use, I May Vd,m = far 87.75 onthly = 4.	ay Vd,av lwelling is not and co Jun ctor from 7 84.02 190 x Vd,r 99.21	erage = designed ald) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76	Oct 95.22 Total = Sunth (see Tail 124.42) Total = Sunth (see Tail 124.42)	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	Dec 102.69 = c, 1d) 147.48		(4
if TFA > if TFA £ nnual aveduce the state more than 10 the water us 14)m= 10 nergy contents 15)m= 15 instantane 22	> 13.9, £ 13.9, Verage annual at 125 lit sage in 102.69 tent of he 52.29 eous war 2.84	N = 1 N = 1 hot wa average tres per p Feb litres per 98.96 ot water 133.19	+ 1.76 x Inter usage hot water person per Mar day for ear 95.22 used - calc 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated me	es per da 5% if the da 5% if th	ay Vd,av lwelling is not and co Jun ctor from 7 84.02 190 x Vd,r	erage = designed and designed a	(25 x N) to achieve Aug (43) 87.75 27m / 3600 105.5	+ 36 a water us Sep 91.49 0 kWh/mor 106.76	Oct 95.22 Total = Sunth (see Tail 124.42	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81	Dec 102.69 = c, 1d) 147.48		(4
if TFA > if TFA £ nnual average the set more than but water us 4)m= 10 nergy content instantane 6)m= 22 later store	> 13.9, E 13.9, Verage annual at 125 liting	N = 1 N = 1 hot wa average tres per p Feb litres per 98.96 ot water 133.19 ter heatir 19.98	ter usaghot water berson per Mar day for ea 137.44 ag at point 20.62	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no	es per da 5% if the a rater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 17.25	ay Vd,av lwelling is not and co Jun ctor from 1 84.02 190 x Vd,r 99.21	erage = designed (d) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 15.82	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 16.01	95.22 Total = Su 124.42 Total = Su 18.66	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 = c, 1d) 147.48		(4
if TFA > if TFA £ nnual aveduce the set more than at water us 4)m= 10 nergy content instantane (a)m= 22 dater stores	> 13.9, £ 13.9, Verage annual at 125 lit sage in 102.69 tent of here are 2.84 prage lo volume	N = 1 hot wa average tres per p Feb litres per 98.96 ot water 133.19 ter heatir 19.98 DSS: (litres)	ter usaghot water berson per Mar day for ea 95.22 used - calc 137.44 ag at point 20.62 includin	Apr Apr Ach month 91.49 culated mo 119.82 of use (no	es per da 5% if the of 5% if th	ay Vd,av welling is not and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage),	erage = designed and designed a	(25 x N) to achieve Aug (43) 87.75 77m / 3600 105.5 boxes (46) 15.82 within sa	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 16.01	95.22 Total = Su 124.42 Total = Su 18.66	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 = c, 1d) 147.48 =		(4
if TFA > if TFA £ if	> 13.9, E 13.9, Verage annual at 125 liting	N = 1 N = 1 hot wa average tres per p Feb litres per 98.96 ot water 133.19 ter heatir 19.98 DSS: (litres) eating a	ter usaghot water berson per Mar day for ea 95.22 used - calc 137.44 ag at point 20.62 includin nd no ta	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 17.97 ng any so nk in dw	es per da 5% if the of rater use, I May Vd,m = fat 87.75 onthly = 4. 114.97 o hot water 17.25 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 14.88	erage = designed (d) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79 storage) litres in	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46) 15.82 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 16.01 ame ves	Oct 95.22 Total = Su 124.42 Total = Su 18.66 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 = c, 1d) 147.48 =		(
if TFA > if TFA £ innual avecure the control of the	> 13.9, E 13.9, Verage annual at 125 literature of he cous war at 22.84 prage lo rolume nity he e if no series annual at 125 literature of he cous war at 2.84 prage lo rolume nity he e if no series annual at 125 literature of he cous war at 12.84 prage lo rolume of the cous war at 1	N = 1 $N = 1$ hot was average tres per p Feb litres per 98.96 ot water 133.19 ter heatin 19.98 oss: (litres) eating a stored	ter usaghot water berson per Mar day for ea 95.22 used - calc 137.44 ag at point 20.62 includin nd no ta	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 17.97 ng any so nk in dw	es per da 5% if the of rater use, I May Vd,m = fat 87.75 onthly = 4. 114.97 o hot water 17.25 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 14.88	erage = designed (d) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79 storage) litres in	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46) 15.82 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 16.01 ame ves	Oct 95.22 Total = Su 124.42 Total = Su 18.66 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 = c, 1d) 147.48 =		(4
if TFA > if TFA £ nnual aveduce the content more than at the series of t	> 13.9, E 13.9, Verage annual at 125 lit sage in a 125.69 Leous was 2.84 Leous wa	N = 1 hot wa average tres per p Feb litres per 98.96 ot water 133.19 ter heatin 19.98 DSS: (litres) eating a stored pss:	ter usaghot water berson per Mar day for ea 95.22 used - calc 137.44 ag at point 20.62 including the tot water hot water says and the control of the tot water says at the control of the tot water says at the control of the control	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 17.97 ag any so nk in dw er (this in	es per da 5% if the of water use, I May Vd,m = fact 87.75 onthly = 4. 114.97 o hot water 17.25 olar or W welling, e	ay Vd,av welling is not and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 14.88 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46) 15.82 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 16.01 ame ves	Oct 95.22 Total = Su 124.42 Total = Su 18.66 sel	9) 93 Nov 98.96 m(44)112 = ables 1b, 1 135.81 m(45)112 = 20.37	Dec 102.69 = c, 1d) 147.48 =		(4)
if TFA > if TFA £ nnual aveduce the soft more than at the soft mor	> 13.9, E 13.9, Verage annual at 125 literature of here of here of here of the program of the pr	N = 1 N = 1 hot was average tres per p Feb litres per 98.96 ot water 133.19 ter heatir 19.98 oss: (litres) eating a stored oss: rer's de	ter usaghot water berson per Mar day for ea 95.22 used - calc 137.44 ag at point 20.62 including that water eclared le	Apr ach month 91.49 culated mo 119.82 of use (no 17.97 ag any so nk in dw er (this in	es per da 5% if the of water use, I May Vd,m = fact 87.75 onthly = 4. 114.97 o hot water 17.25 olar or W welling, e	ay Vd,av welling is not and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 14.88 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46) 15.82 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 16.01 ame ves	Oct 95.22 Total = Su 124.42 Total = Su 18.66 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 = c, 1d) 147.48 = 22.12		(4)
if TFA > if TFA £ nnual av educe the cot more than tot water us 4)m= 10 nergy contor 5)m= 15 instantane 6)m= 22 Vater stor torage vo community therwise Vater stor a) If manue	> 13.9, Verage annual at 125 literature facture facture facture factures from	N = 1 N = 1 hot was average tres per p Feb litres per 98.96 ot water 133.19 ter heatir 19.98 oss: (litres) eating a stored oss: rer's decor from water	ter usaghot water berson per Mar day for ear 95.22 used - calc 137.44 ag at point 20.62 includin and no talc hot water eclared lom Table storage	Aproch month 91.49 culated mo 119.82 of use (no 17.97 ag any so nk in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the of water use, I May Vd,m = far 87.75 onthly = 4. 114.97 o hot water 17.25 olar or W welling, e ocludes i or is knowear	ay Vd,av fwelling is foot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 14.88 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46) 15.82 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 16.01 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 18.66 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 c, 1d) 147.48 22.12		(44 (44 (44 (44 (44 (44 (44 (44 (44 (44
if TFA > if TFA £ nnual aveduce the soft more than aver us 4)m= 10 nergy control (5)m= 15 instantane (6)m= 22 / ater storage vocammur otherwise (7) ater storage vocammur othe	> 13.9, E 13.9, Verage annual at 125 literature facture factur	N = 1 N = 1 hot wa average tres per p Feb litres per 98.96 ot water 133.19 ter heatir 19.98 oss: (litres) eating a stored oss: rer's de ctor froi n water	ter usaghot water berson per Mar day for ea 95.22 used - calc 137.44 ag at point 20.62 includin and no talc hot water eclared long at storage eclared of the sto	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 17.97 ag any so nk in dw er (this in coss facto 2b , kWh/ye cylinder l	es per da 5% if the of water use, I May Vd,m = far 87.75 onthly = 4. 114.97 o hot water 17.25 olar or W velling, e ncludes i or is kno	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46 15.82 within sa (47) ombi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 16.01 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 18.66 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 = c, 1d) 147.48 = 22.12 0		(4)
if TFA > if TFA £ nnual aveduce the control of more than average with the state of	> 13.9, E 13.9, Verage annual at 125 lit sage in a 125.69	N = 1 hot wa average tres per properties per proper	tter usaghot water berson per Mar day for ea 95.22 used - calce 137.44 ag at point 20.62 including and no talk that water eclared long at point gelared confidence of factor fr	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 17.97 ag any so nk in dw er (this in oss facto 2b , kWh/ye cylinder l om Tabl	es per da 5% if the of water use, I May Vd,m = far 87.75 onthly = 4. 114.97 o hot water 17.25 olar or W velling, e ncludes i or is kno	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46 15.82 within sa (47) ombi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 16.01 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 18.66 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 = c, 1d) 147.48 = 22.12 0		(4 (4 (4 (4 (4 (5 (5 (5 (4 (4 (4 (4 (4 (4 (4 (4 (4 (4 (4 (4 (4
if TFA > if TFA £ nnual aveduce the soft more than aver us 4)m= 10 nergy control (5)m= 15 instantane (6)m= 22 / ater storage vocammur otherwise (7) ater storage vocammur othe	> 13.9, verage annual at 125 literature facture factur	N = 1 N = 1 hot was average tres per p Feb litres per 98.96 ot water 133.19 ter heatir 19.98 oss: (litres) eating a stored oss: rer's decorror on water rer's decorror on water rer's decorror on water rer's decorrors	ter usage hot water person per day for ear 95.22 used - calc 137.44 ag at point 20.62 including and no tale hot water eclared lenstorage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 17.97 ag any so nk in dw er (this in oss facto 2b , kWh/ye cylinder l om Tabl	es per da 5% if the of water use, I May Vd,m = far 87.75 onthly = 4. 114.97 o hot water 17.25 olar or W velling, e ncludes i or is kno	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 13.79 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46 15.82 within sa (47) ombi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 16.01 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 18.66 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 20.37	Dec 102.69 = c, 1d) 147.48 = 22.12 0		(4 (4 (4 (4 (4 (5 (5 (5 (5 (5 (5 (5 (5 (5 (5 (5 (5 (5

Energy	/ lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0	(54)
Enter	(50) or ((54) in (5	55)									0	(55)
Water	storage	loss cal	culated t	for each	month			((56)m = (55) × (41)	m			•
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)
Primar	y circuit	loss (ar	nual) fro	m Table	3							0	(58)
Primar	y circuit	loss cal	culated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatir	ng and a	cylinde	r thermo	stat)	·	1
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m					
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64	(61)
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	n month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m
(62)m=	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12	(62)
Solar DF	-IW input o	calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•
(add ad	dditiona	l lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)				
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63) (G2)
Output	from w	ater hea	ter										
(64)m=	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12	
•								Outp	out from w	ater heate	(annual)	12	1617.66 (64)
Heat g	ains fro	m water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]
(65)m=	53.8	47.14	48.86	42.9	41.39	36.05	33.73	38.24	38.56	44.53	48.21	52.2	(65)
inclu	ide (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating
5. Int	ternal ga	ains (see	Table 5	and 5a):								
Metabo	olic gain	s (Table	e 5), Wat	ts									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m=	149.44	149.44	149.44	149.44	149.44	149.44	149.44	149.44	149.44	149.44	149.44	149.44	(66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion I 9 o	r L9a), a	leo eoo -		-			
(67)m=	54.56	48.46			, I		,,	130 366	Table 5				
•		46.46	39.41	29.84	22.3	18.83	20.35	26.45	35.5	45.07	52.6	56.08	(67)
Appliar					22.3		20.35	26.45	35.5		52.6	56.08	(67)
Appliar (68)m=	nces ga	ins (calc			22.3	18.83	20.35	26.45	35.5		52.6 295.57	56.08 317.5	(67)
(68)m=	nces ga 332.16	ins (calc 335.61	ulated ir 326.92	308.43	22.3 dix L, eq 285.09	18.83 uation L	20.35 13 or L1 248.49	26.45 3a), also 245.05	35.5 see Ta 253.73	ble 5 272.22			. ′
(68)m=	nces ga 332.16	ins (calc 335.61	ulated ir 326.92	308.43	22.3 dix L, eq 285.09	18.83 uation L 263.15	20.35 13 or L1 248.49	26.45 3a), also 245.05	35.5 see Ta 253.73	ble 5 272.22			. ′
(68)m= Cookin (69)m=	332.16 ng gains 52.43	335.61 (calcula 52.43	ulated ir 326.92 Ited in A	308.43 ppendix 52.43	22.3 dix L, eq 285.09 L, equat	18.83 uation L 263.15 tion L15	20.35 13 or L1 248.49 or L15a)	26.45 3a), also 245.05 , also se	35.5 see Ta 253.73 ee Table	ble 5 272.22	295.57	317.5	(68)
(68)m= Cookin (69)m=	332.16 ng gains 52.43	335.61 (calcula 52.43	326.92 ated in A 52.43	308.43 ppendix 52.43	22.3 dix L, eq 285.09 L, equat	18.83 uation L 263.15 tion L15	20.35 13 or L1 248.49 or L15a)	26.45 3a), also 245.05 , also se	35.5 see Ta 253.73 ee Table	ble 5 272.22	295.57	317.5	(68)
(68)m= Cookin (69)m= Pumps (70)m=	ances ga 332.16 ng gains 52.43 s and fai	ins (calcular (calcular 52.43 ns gains	ulated ir 326.92 ated in A 52.43	308.43 ppendix 52.43 5a)	22.3 dix L, eq 285.09 L, equat 52.43	18.83 uation L 263.15 tion L15 52.43	20.35 13 or L1 248.49 or L15a) 52.43	26.45 3a), also 245.05), also se 52.43	35.5 see Ta 253.73 ee Table 52.43	ble 5 272.22 5 52.43	295.57	317.5 52.43	(68)
(68)m= Cookin (69)m= Pumps (70)m=	ances ga 332.16 ng gains 52.43 s and fai	ins (calcular (calcular 52.43 ns gains	ulated ir 326.92 ated in A 52.43 (Table \$	308.43 ppendix 52.43 5a)	22.3 dix L, eq 285.09 L, equat 52.43	18.83 uation L 263.15 tion L15 52.43	20.35 13 or L1 248.49 or L15a) 52.43	26.45 3a), also 245.05), also se 52.43	35.5 see Ta 253.73 ee Table 52.43	ble 5 272.22 5 52.43	295.57	317.5 52.43	(68)
(68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	332.16 ng gains 52.43 s and fai 3 s e.g. ev	ins (calculars) (c	ulated ir 326.92 ated in A 52.43 (Table \$ 3 on (nega -99.63	Appendix 52.43 5a) 3	22.3 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	18.83 uation L 263.15 tion L15 52.43 3 sle 5)	20.35 13 or L1 248.49 or L15a) 52.43	26.45 3a), also 245.05), also se 52.43	35.5 see Ta 253.73 ee Table 52.43	ble 5 272.22 5 52.43	295.57 52.43	317.5 52.43	(68) (69) (70)
(68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	332.16 ng gains 52.43 s and fai 3 s e.g. ev	ins (calculations) (c	ulated ir 326.92 ated in A 52.43 (Table \$ 3 on (nega -99.63	Appendix 52.43 5a) 3	22.3 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	18.83 uation L 263.15 tion L15 52.43 3 sle 5)	20.35 13 or L1 248.49 or L15a) 52.43	26.45 3a), also 245.05), also se 52.43	35.5 see Ta 253.73 ee Table 52.43	ble 5 272.22 5 52.43	295.57 52.43	317.5 52.43	(68) (69) (70)
(68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	332.16 ng gains 52.43 and fai 3 s e.g. ev -99.63 heating 72.31	ins (calculars) (c	ulated ir 326.92 ated in A 52.43 (Table \$ 3 on (nega -99.63 able 5) 65.67	308.43 ppendix 52.43 5a) 3 tive valu	22.3 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	18.83 uation L 263.15 tion L15 52.43 3 ble 5) -99.63	20.35 13 or L1 248.49 or L15a) 52.43 3 -99.63	26.45 3a), also 245.05), also se 52.43 3 -99.63	35.5 see Ta 253.73 ee Table 52.43 3 -99.63	ble 5 272.22 5 52.43 3 -99.63	295.57 52.43 3 -99.63 66.97	317.5 52.43 3 -99.63	(68) (69) (70) (71)
(68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	332.16 ng gains 52.43 and fai 3 s e.g. ev -99.63 heating 72.31	ins (calculars) (c	ulated ir 326.92 ated in A 52.43 (Table \$ 3 on (nega -99.63 able 5) 65.67	308.43 ppendix 52.43 5a) 3 tive valu	22.3 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	18.83 uation L 263.15 tion L15 52.43 3 ble 5) -99.63	20.35 13 or L1 248.49 or L15a) 52.43 3 -99.63	26.45 3a), also 245.05), also se 52.43 3 -99.63	35.5 see Ta 253.73 ee Table 52.43 3 -99.63	ble 5 272.22 5 52.43 3 -99.63	295.57 52.43 3 -99.63 66.97	317.5 52.43 3 -99.63	(68) (69) (70) (71)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientati	on:	Access Factor Table 6d	7	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	7.81	(74)
North	0.9x	1	X	1.62	x	20.32	х	0.63	X	0.8	=	14.93	(74)
North	0.9x	1	X	1.62	x	34.53	X	0.63	X	0.8	=	25.37	(74)
North	0.9x	1	X	1.62	x	55.46	х	0.63	x	0.8	=	40.76	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	54.9	(74)
North	0.9x	1	x	1.62	x	79.99	x	0.63	x	0.8	=	58.78	(74)
North	0.9x	1	X	1.62	x	74.68	x	0.63	x	0.8	=	54.87	(74)
North	0.9x	1	x	1.62	x	59.25	x	0.63	x	0.8	=	43.54	(74)
North	0.9x	1	x	1.62	x	41.52	x	0.63	x	0.8	=	30.51	(74)
North	0.9x	1	x	1.62	x	24.19	x	0.63	x	0.8	=	17.78	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	9.64	(74)
North	0.9x	1	x	1.62	x	8.86	x	0.63	x	0.8	=	6.51	(74)
East	0.9x	1	x	2.14	x	19.64	x	0.63	x	0.8	=	19.06	(76)
East	0.9x	1	x	2.14	x	38.42	x	0.63	X	0.8	=	37.29	(76)
East	0.9x	1	x	2.14	x	63.27	x	0.63	x	0.8	=	61.42	(76)
East	0.9x	1	x	2.14	x	92.28	x	0.63	x	0.8	=	89.58	(76)
East	0.9x	1	x	2.14	x	113.09	x	0.63	x	0.8	=	109.78	(76)
East	0.9x	1	x	2.14	x	115.77	x	0.63	x	0.8	=	112.38	(76)
East	0.9x	1	x	2.14	x	110.22	x	0.63	x	0.8	=	106.99	(76)
East	0.9x	1	X	2.14	x	94.68	x	0.63	X	0.8	=	91.9	(76)
East	0.9x	1	X	2.14	x	73.59	x	0.63	X	0.8	=	71.43	(76)
East	0.9x	1	X	2.14	x	45.59	x	0.63	X	0.8	=	44.25	(76)
East	0.9x	1	X	2.14	X	24.49	X	0.63	X	0.8	=	23.77	(76)
East	0.9x	1	X	2.14	x	16.15	x	0.63	X	0.8	=	15.68	(76)
South	0.9x	1	X	6.08	x	46.75	X	0.63	X	0.8	=	128.94	(78)
South	0.9x	1	X	6.08	x	76.57	X	0.63	x	0.8	=	211.17	(78)
South	0.9x	1	X	6.08	x	97.53	X	0.63	X	0.8	=	268.99	(78)
South	0.9x	1	X	6.08	x	110.23	X	0.63	X	0.8	=	304.01	(78)
South	0.9x	1	X	6.08	X	114.87	X	0.63	X	0.8	=	316.8	(78)
South	0.9x	1	X	6.08	X	110.55	х	0.63	X	0.8	=	304.88	(78)
South	0.9x	1	X	6.08	x	108.01	X	0.63	X	0.8	=	297.88	(78)
South	0.9x	1	X	6.08	x	104.89	x	0.63	x	0.8	=	289.29	(78)
South	0.9x	1	X	6.08	x	101.89	x	0.63	x	0.8	=	280.99	(78)
South	0.9x	1	X	6.08	x	82.59	x	0.63	x	0.8	=	227.76	(78)
South	0.9x	1	X	6.08	x	55.42	x	0.63	x	0.8	=	152.83	(78)
South	0.9x	1	X	6.08	X	40.4	X	0.63	X	0.8	=	111.41	(78)

West 0.9x		1 .,	1.00	1	40.04	1	0.00	۱.,		1	40.0	7(00)
L	1	X	1.62	X I	19.64] X]	0.63	X	0.8] = 1	43.3	(80)
West 0.9x West 0.9x	1	X	1.62	X	38.42	X	0.63	X	0.8] = _	84.7	(80)
West 0.9x	1	X	1.62	l x	63.27] X] ,	0.63	X	0.8] = 1 _	139.49	╡ .
	1	X	1.62	X 1	92.28	X 1	0.63	X	0.8] = 1	203.43	(80)
	1	X	1.62	X	113.09	X	0.63	X	0.8] = 1	249.31	(80)
	1	X	1.62	X 1	115.77] X]	0.63	X	0.8] = 1	255.22	(80)
	1	X	1.62	X	110.22	X 1	0.63	Χ	0.8] = 1	242.98	(80)
	1	X	1.62	X	94.68	X	0.63	X	0.8] = 1	208.71	(80)
_	<u>1</u>	X	1.62	X 1	73.59] X]	0.63	X	0.8] = 1	162.23	(80)
	1	X	1.62	X	45.59	X	0.63	X	0.8] = 1	100.5	(80)
·	1	X	1.62	X	24.49	X	0.63	X	0.8] = 1	53.99	(80)
West 0.9x	1	X	1.62	X	16.15	X	0.63	X	0.8] = 	35.61	(80)
Rooflights 0.9x	1	X	1.33	X	25.93	X	0.63	X	0.8] = 1	31.28	(82)
Rooflights 0.9x	1	X	1.33	X	25.93	X	0.63	X	0.8] = 1	31.28	(82)
Rooflights 0.9x	1	X	1.1	X	25.93	X	0.63	X	0.8	=	12.94	(82)
Rooflights 0.9x	1	X	0.78	X	25.93	X	0.63	X	0.8	=	9.17	(82)
Rooflights 0.9x	1	X	1.33	X	51.88	X	0.63	X	0.8	=	62.59	(82)
Rooflights _{0.9x}	1	X	1.33	X	51.88	X	0.63	X	0.8	=	62.59	(82)
Rooflights _{0.9x}	1	X	1.1	X	51.88	Х	0.63	X	0.8	=	25.88	(82)
Rooflights _{0.9x}	1	X	0.78	X	51.88	X	0.63	X	0.8	=	18.35	(82)
Rooflights _{0.9x}	1	X	1.33	X	88.38	X	0.63	X	0.8	=	106.64	(82)
Rooflights _{0.9x}	1	X	1.33	X	88.38	X	0.63	X	0.8	=	106.64	(82)
Rooflights _{0.9x}	1	X	1.1	X	88.38	X	0.63	X	0.8	=	44.1	(82)
Rooflights _{0.9x}	1	X	0.78	X	88.38	X	0.63	X	0.8	=	31.27	(82)
Rooflights _{0.9x}	1	X	1.33	X	133.65	х	0.63	X	0.8	=	161.26	(82)
Rooflights _{0.9x}	1	X	1.33	X	133.65	X	0.63	X	0.8	=	161.26	(82)
Rooflights _{0.9x}	1	X	1.1	X	133.65	х	0.63	X	0.8	=	66.69	(82)
Rooflights _{0.9x}	1	X	0.78	X	133.65	X	0.63	X	0.8	=	47.29	(82)
Rooflights _{0.9x}	1	X	1.33	X	168.1	X	0.63	X	0.8	=	202.82	(82)
Rooflights 0.9x	1	X	1.33	X	168.1	X	0.63	x	0.8	=	202.82	(82)
Rooflights _{0.9x}	1	X	1.1	X	168.1	x	0.63	X	0.8	=	83.87	(82)
Rooflights _{0.9x}	1	X	0.78	X	168.1	X	0.63	X	0.8	=	59.47	(82)
Rooflights 0.9x	1	X	1.33	x	174	X	0.63	x	0.8	=	209.95	(82)
Rooflights 0.9x	1	X	1.33	x	174	x	0.63	x	0.8	=	209.95	(82)
Rooflights 0.9x	1	X	1.1	x	174	x	0.63	x	0.8	=	86.82	(82)
Rooflights 0.9x	1	x	0.78	x	174	x	0.63	x	0.8	=	61.56	(82)
Rooflights 0.9x	1	x	1.33	x	164.87	x	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9x	1	X	1.33	x	164.87	x	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9x	1	×	1.1	x	164.87	x	0.63	x	0.8	=	82.26	(82)
Rooflights 0.9x	1	×	0.78	x	164.87	x	0.63	x	0.8] =	58.33	(82)
Rooflights 0.9x	1	×	1.33	x	138.72	x	0.63	x	0.8	<u> </u>	167.38	(82)
_	· · · · · · · · · · · · · · · · · · ·	_		_		_						

Dooflighto o a F			_		_		٦ .		_			Г	— (22)
Rooflights 0.9x	1	X	1.3		-	138.72	X	0.63	×	0.8	=	167.38	(82)
Rooflights 0.9x	1	X	1.	1	X	138.72	X	0.63	X	0.8	=	69.22	(82)
Rooflights 0.9x	1	X	0.7	8	X ·	138.72	X	0.63	X	0.8	=	49.08	(82)
Rooflights 0.9x	1	X	1.3	3	X	104.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights _{0.9x}	1	X	1.3	3	X ·	104.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.	1	X ·	104.33	X	0.63	X	0.8	=	52.05	(82)
Rooflights 0.9x	1	X	0.7	'8	X ·	104.33	X	0.63	X	0.8	=	36.91	(82)
Rooflights 0.9x	1	X	1.3	3	X	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.	1	x	62.32	X	0.63	X	0.8	=	31.1	(82)
Rooflights 0.9x	1	X	0.7	'8	x	62.32	X	0.63	х	0.8	=	22.05	(82)
Rooflights 0.9x	1	x	1.3	3	x	32.54	X	0.63	x	0.8		39.26	(82)
Rooflights 0.9x	1	x	1.3	3	x	32.54	X	0.63	x	0.8	=	39.26	(82)
Rooflights 0.9x	1	X	1.	1	x	32.54	x	0.63	х	0.8	=	16.23	(82)
Rooflights 0.9x	1	X	0.7	'8	х	32.54	X	0.63	х	0.8	=	11.51	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	21.19	X	0.63	x	0.8	_ =	25.57	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	21.19	X	0.63	x	0.8	=	25.57	(82)
Rooflights _{0.9x}	1	x	1.		x	21.19	X	0.63	x	0.8	=	10.57	(82)
Rooflights _{0.9x}	1	x	0.7		x	21.19] x	0.63	×	0.8		7.5	(82)
Solar gains in (83)m= 283.79	watts, ca	lculated 783.91	for eac			1241.16	ì	n = Sum(74)m 6.49 885.88	(<mark>82)m</mark> 593.8	1 346.49	238.42]	(83)
Total gains – ir	nternal a	nd solar	(84)m =	: (73)m ·	+ (83)m	, watts					!	l	
(84)m= 848.07	1076.98	1321.16	1577.37	1748.06	1736.82	1660.59	1514	1.63 1333.91	1076.2	3 866.87	787.41		(84)
7. Mean inter	nal tomp	oraturo	(heating	cascan)		1						
Temperature						from Tal	hle 9	Th1 (°C)				21	(85)
Utilisation fac	Ū	٠.			Ū		DIC 5,	, 1111 (0)				21	(00)
Jan	Feb	Mar	Apr	May	Jun	Jul	ΙΔ	ug Sep	Oct	Nov	Dec		
(86)m= 0.98	0.96	0.9	0.78	0.61	0.44	0.32	0.3		0.86	0.97	0.99		(86)
` ′	Į.				<u> </u>	Ļ		<u> </u>					. ,
Mean interna (87)m= 19.65	19.95	20.35	20.72	20.92	20.98	21	7 IN I		20.63	20.06	19.6]	(87)
` ′					<u> </u>	ļ		<u> </u>	20.03	20.00	19.0		(01)
Temperature					,	-	1	` 				1	(22)
(88)m= 19.66	19.67	19.67	19.69	19.69	19.7	19.7	19.	.7 19.7	19.69	19.68	19.68		(88)
Utilisation fac	tor for ga	ains for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 0.98	0.95	0.88	0.73	0.53	0.35	0.23	0.2	26 0.49	0.82	0.96	0.98		(89)
Mean interna	tempera	ature in 1	the rest	of dwelli	ng T2 (follow ste	eps 3	to 7 in Tab	le 9c)				
(90)m= 17.95	18.38	18.92	19.41	19.62	19.69	19.7	19.	.7 19.66	19.32	18.55	17.88		(90)
	!				=	-	•	•	fLA = Liv	ving area ÷ (4) =	0.22	(91)
Mean interna	temper	ature (fo	r the wh	ole dwe	lling) =	flΔ∨T1	+ (1	_ fl Δ\ ⊻ Τ2					
(92)m= 18.33	18.73	19.24	19.7	19.91	19.98	19.99	19.5	- i 	19.61	18.89	18.26		(92)
Apply adjustn					l	1			<u> </u>		<u> </u>	I	. ,
11 /	••	,		۳٠.			-,		,				

(OC) F	40.05	40.72	40.51	40 =	40.01	40.00	40.00	40.00	40.0-	40.01	40.00	40.00	Ī	(02)
(93)m=	18.33	18.73	19.24	19.7	19.91	19.98	19.99	19.99	19.95	19.61	18.89	18.26		(93)
			uirement	mmoratiu	o obtoin	ad at at	on 11 of	Table O	th	tTim /	76\m an	d ro colo	vuloto	
			ernal ten or gains ι	•		ieu ai sii	ғр і і оі	i able 9i), 50 illa	t 11,111=(rojili ali	u re-caic	uiale	
Γ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisat	tion fact	or for g	ains, hm	:	-								_	
(94)m=	0.97	0.94	0.87	0.73	0.55	0.37	0.25	0.28	0.51	0.81	0.95	0.98		(94)
Useful	gains, l	nmGm ,	W = (94	1)m x (84	4)m								•	
(95)m=	823.78	1009.8	1144.67	1146.87	956.36	642.64	408.44	430.91	683.69	874.53	820.32	769.68		(95)
Г	<u> </u>		rnal tem			able 8		,					Ī	
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			an intern				- ` 	- ` 	``			l	Ī	(07)
` ′ _	1751.93		1581.45	1323.14	1003.3	649.73	409.4	432.66	709.49	1101.23	1447.46	1736.5		(97)
	Ť	•	ement for				l e		<u>`</u>	- `	<u> </u>	740.00	I	
(98)m=	690.55	478.68	324.96	126.92	34.93	0	0	0	0	168.66	451.55	719.32		7(00)
								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2995.56	(98)
Space	heating	require	ement in	kWh/m²	/year								36.76	(99)
9a. Ene	ergy requ	uiremen	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space	heatin	g:										ı		_
Fractio	on of spa	ace hea	it from se	econdar	y/supple	mentary	system						0	(201)
Fraction	on of spa	ace hea	it from m	ain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fractio	on of tota	al heatir	ng from r	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficier	ncy of m	nain spa	ace heati	ng syste	em 1								89.9	(206)
Efficier	ncy of s	econda	ry/supple	ementar	y heating	g system	າ, %						0	(208)
Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	⊒ ar
Space			ement (c	•		l	<u> </u>	, rug	СОР	001	1101	200	i kvvii y ok	ui .
· -	Ť	478.68	324.96	126.92	34.93	0	0	0	0	168.66	451.55	719.32		
(211)m	= {[(98)	m x (20	4)] } x 1	00 ÷ (20	16)	!	ļ.		<u>!</u>		ļ	ı	l .	(211)
` ′ ┌	- <u>```</u>	532.46	361.47	141.18	38.85	0	0	0	0	187.61	502.27	800.13		(=)
L								Tota	l (kWh/yea	nr) =Sum(2	L 211) _{15.1012}	<u></u>	3332.11	(211)
Space	heating	ı fuel (se	econdary	v) kW/h/	month									」 `
	_		00 ÷ (20		111011111									
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
L								Tota	l (kWh/yea	r) =Sum(2	215) _{15,1012}	<u></u>	0	(215)
Water h	neating													_
	_	ter hea	ter (calcı	ulated al	oove)									
	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
Efficien	cy of wa	ater hea	ter										87.3	(216)
(217)m=	89.39	89.28	89.06	88.56	87.85	87.3	87.3	87.3	87.3	88.72	89.24	89.42		(217)
			kWh/mc											
) ÷ (217)		145.07	107.00	110.70	125.00	126.2	154.40	165.00	170.00		
(219)m=	104.51	161.97	168.51	149.12	145.27	127.66	119.79	135.32	136.3	154.49	165.89	179.08		(219)
								I Oto	$I = Silm r^{r_{I}}$					177741
Approx	140401-							Tota	l = Sum(2 ⁻	<u>-</u>	Mb/		1827.91	
Annual Space h		fuel use	ed, main	svstem	1			Tota	ii = Sum(21	<u>-</u>	Wh/year	•	1827.91 kWh/year 3332.11	

Water heating fuel used			1827.91	
Electricity for pumps, fans and electric keep-hot				
central heating pump:		30	(2	230c)
boiler with a fan-assisted flue		45	(2	230e)
Total electricity for the above, kWh/year	sum o	f (230a)(230g) =	75 (2	231)
Electricity for lighting			385.42	232)
Total delivered energy for all uses (211)(221) +	· (231) + (232)(237b) =	=	5707.74 (3	338)
10a. Fuel costs - individual heating systems:				
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating - main system 1	(211) x	3.48 × 0.01	= 115.96 (2	240)
Space heating - main system 2	(213) x	0 x 0.01	= 0 (2	241)
Space heating - secondary	(215) x	13.19 x 0.01	= 0 (2	242)
Water heating cost (other fuel)	(219)	3.48 × 0.01	= 63.61 (2	247)
Pumps, fans and electric keep-hot	(231)	13.19 × 0.01	= 9.89 (2	249)
(if off-peak tariff, list each of (230a) to (230g) sep Energy for lighting	parately as applicable an	d apply fuel price according t		250)
Additional standing charges (Table 12)			120 (2	251)
Appendix Q items: repeat lines (253) and (254) a	is needed			
	17) + (250)(254) =		360.3	255)
11a. SAP rating - individual heating systems				
Energy cost deflator (Table 12)			0.42	256)
Energy cost factor (ECF) [(255) x (2	256)] ÷ [(4) + 45.0] =		1.2	257)
SAP rating (Section 12)			83.31 (2	258)
12a. CO2 emissions – Individual heating system	ns including micro-CHP			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating (main system 1)	(211) x	0.216 =	719.73	261)
Space heating (secondary)	(215) x	0.519 =	0 (2	263)
Water heating	(219) x	0.216	394.83	264)
Space and water heating	(261) + (262) + (263) + (2	64) =	1114.56 (2	265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (2	267)
Electricity for lighting	(232) x	0.519 =	200.03	268)
Total CO2, kg/year		sum of (265)(271) =	1353.52 (2	272)
CO2 emissions per m ²		(272) ÷ (4) =		17 0)
		(272) ÷ (4) =	16.61	273)
El rating (section 14)		(2/2) ÷ (4) –		273) 274)

13a. Primary Energy			
	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22 =	4065.17 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22 =	2230.05 (264)
Space and water heating	(261) + (262) + (263) + (264) =		6295.22 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	1183.25 (268)
'Total Primary Energy	sum	n of (265)(271) =	7708.72 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	94.59 (273)

		User Details:			
Assessor Name:	Jemma Mclaughlan	Stroma Nur	nher ST	RO030065	
Software Name:	Stroma FSAP 2012	Software Vo		rsion: 1.0.5.25	
		Property Address: HOUS	SE C - BASELINE		
Address :	Woodwell Cottage P2, V	Voodwell Road, BRISTOL,	BS11 9XU		
1. Overall dwelling dime	nsions:				
		Area(m²)	Av. Height(m)	Volume(m	³)
Ground floor		40.75 (1a) x	2.6 (2a)	= 105.95	(3a)
First floor		40.75 (1b) x	2.24 (2b)	= 91.28	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 81.5 (4)			
Dwelling volume		(3a)+(3	8b)+(3c)+(3d)+(3e)+(3n)	197.23	(5)
2. Ventilation rate:					
	main secor heating heati		total	m³ per hou	ır
Number of chimneys	0 + 0		0 x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0 x 20 =	0	(6b)
Number of intermittent fa	ns		3 x 10 =	30	(7a)
Number of passive vents			0 x 10 =	0	(7b)
Number of flueless gas fi	res		0 x 40 =	0	(7c)
			Aı	r changes per h	our —
•	ys, flues and fans = (6a)+(6		30 ÷ (5) =	0.15	(8)
Number of storeys in the	een carried out or is intended, pr	oceed to (17), otherwise continue	trom (9) to (16)		
	ne dwelling (ns)			0	(9)
Additional infiltration	ne dwelling (ns)		[(9)-1]x0.	0	(9)
Additional infiltration	3	e or 0.35 for masonry cons	[(9)-1]x0.		(9) (10) (11)
Additional infiltration Structural infiltration: 0 if both types of wall are po	.25 for steel or timber fram	e or 0.35 for masonry cons		1 = 0	(10)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35	ing to the greater wall area (after	truction	1 = 0	(10)
Additional infiltration Structural infiltration: 0 if both types of wall are posterior deducting areas of opening If suspended wooden for	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed)	•	truction	0 0	(10) (11) (12)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the deducting areas of opening areas of opening the suspended wooden for the deduction areas of opening the suspended wooden for the deduction areas of the deduction	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0	ing to the greater wall area (after or 0.1 (sealed), else enter (truction	0 0	(10) (11) (12) (13)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the deducting areas of opening areas of opening the suspended wooden for the deduction areas of opening the suspended wooden for the deduction areas of the deduction	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed)	ing to the greater wall area (after or 0.1 (sealed), else enter (truction	0 0	(10) (11) (12) (13) (14)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the discount of the discou	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0	or 0.1 (sealed), else enter (else of 0.25 - [0.2 x (14) + 1]	truction	0 0 0	(10) (11) (12) (13)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the discount of the discount	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught strippe	or 0.1 (sealed), else enter (else of 0.25 - [0.2 x (14) + 1]	truction (100] = (12) + (13) + (15) =	0 0 0 0 0 0	(10) (11) (12) (13) (14) (15)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the deducting areas of opening If no draught lobby, entire the percentage of windows Window infiltration Infiltration rate Air permeability value,	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught strippe	or 0.1 (sealed), else enter (else of 0.25 - [0.2 x (14) + (10) + (11) + (10) +	truction (100] = (12) + (13) + (15) =	0 0 0 0 0 0	(10) (11) (12) (13) (14) (15) (16)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the suspended woo	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0 is and doors draught stripped q50, expressed in cubic mitty value, then (18) = [(17) ÷ 2 is if a pressurisation test has been	or 0.1 (sealed), else enter (else of 0.25 - [0.2 x (14) + (10) + (11) + (10) +	truction 100] = (12) + (13) + (15) = metre of envelope area	0 0 0 0 0 0 0	(10) (11) (12) (13) (14) (15) (16) (17) (18)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the suspended wo	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0 is and doors draught stripped q50, expressed in cubic mitty value, then (18) = [(17) ÷ 2 is if a pressurisation test has been	ing to the greater wall area (after or 0.1 (sealed), else enter (ed o.25 - [0.2 x (14) ÷ (8) + (10) + (11) + (11) etres per hour per square (20]+(8), otherwise (18) = (16) on done or a degree air permeability	truction 100] = (12) + (13) + (15) = metre of envelope area by is being used	0 0 0 0 0 0 0 0 0 0 0 0	(10) (11) (12) (13) (14) (15) (16) (17) (18)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the suspended wo	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0 is and doors draught stripped at 450, expressed in cubic mitty value, then (18) = [(17) ÷ 2 is if a pressurisation test has been ad	ing to the greater wall area (after or 0.1 (sealed), else enter (and of the dealed), else enter (and of the dealed). 25 - [0.2 × (14) \div (8) + (10) + (11) + (10) etres per hour per square (and of the dealed). (20)+(8), otherwise (18) = (16) on done or a degree air permeability (20) = 1 - [0.075 × (20)]	truction 100] = (12) + (13) + (15) = metre of envelope area 17 is being used (19)] =	0 0 0 0 0 0 0 0 0 5 0.4	(10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the suspended wo	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped at the control of the control	ing to the greater wall area (after or 0.1 (sealed), else enter (ed o.25 - [0.2 x (14) ÷ (8) + (10) + (11) + (11) etres per hour per square (20]+(8), otherwise (18) = (16) on done or a degree air permeability	truction 100] = (12) + (13) + (15) = metre of envelope area 17 is being used (19)] =	0 0 0 0 0 0 0 0 0 0 0 0	(10) (11) (12) (13) (14) (15) (16) (17) (18)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the first of the first of the first opening op	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0 is and doors draught stripped q50, expressed in cubic mitty value, then (18) = [(17) ÷ 2 is if a pressurisation test has been ed in the control or monthly wind speed	ing to the greater wall area (after or 0.1 (sealed), else enter (and one of 0.25 - [0.2 x (14) + (8) + (10) + (11) + (10)	truction 100] = (12) + (13) + (15) = metre of envelope area 1y is being used (19)] =	0 0 0 0 0 0 0 0 0 5 0.4	(10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the suspended wo	.25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0 is and doors draught stripped in the stripped in th	ing to the greater wall area (after or 0.1 (sealed), else enter (and of the dealed), else enter (and of the dealed). 25 - [0.2 × (14) \div (8) + (10) + (11) + (10) etres per hour per square (and of the dealed). (20)+(8), otherwise (18) = (16) on done or a degree air permeability (20) = 1 - [0.075 × (20)]	truction 100] = (12) + (13) + (15) = metre of envelope area 1y is being used (19)] =	0 0 0 0 0 0 0 0 0 5 0.4	(10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

(22)m=

5.1

Wind F	actor (2	22a)m =	(22)m ÷	4										
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjuste	ed infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
	0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47		
		<i>tive air</i> o	change i	rate for t	he appli	cable ca	se	•	•					(220)
			using Appe	endix N. (2	(3b) = (23a	a) × Fmv (e	eguation (N	N5)) . othe	rwise (23b	o) = (23a)			0	(23a) (23b)
			overy: effici		, ,	,	. `	,, .	,	, , ,			0	(23c)
a) If b	palance	d mecha	anical ve	entilation	with he	at recov	erv (MVI	HR) (24a	a)m = (2:	2b)m + (23b) x [1 – (23c)		(200)
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If b	balance	d mecha	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24b	m = (22)	2b)m + (23b)	1	ı	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If v	whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	n from o	outside				•	
if	f (22b)m	า < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	.5 × (23k	o)		_	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
			on or wh							0.51				
Г	<u> </u>	0.63	en (24d) _{0.62}	M = (22)	0.59	0.57	r ´	- ``			0.6	0.61	1	(24d)
(24d)m=					<u> </u>	<u> </u>	0.57	0.57	0.58	0.59	0.6	0.61	J	(240)
(25)m=	0.63	0.63	rate - en	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	1	(25)
` ′ L						0.57	0.57	0.57	0.50	0.59	0.0	0.01		(20)
			eat loss p											
ELEM	IENT	Gros	SS	Openin	as	NIO+ Ar								
		area	(m²)	m		Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-		A X k kJ/K
Doors		area	(m²)				m²							
Doors Window	vs Type		(m²)			A ,r	m ² x	W/m2	2K =	(W/				kJ/K
	,,	e 1	(m²)			A ,r	m² x x1/2	W/m2	eK = 0.04] =	(W/ 1.93				kJ/K (26)
Window	vs Type	: 1 : 2	(m²)			A ,r 1.93	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1 /[1/(1.4)+	= 0.04] = 0.04] =	(W/ 1.93 1.8				kJ/K (26) (27)
Window	vs Type vs Type	2 3	(m²)			A ,r 1.93 1.36	x1/2 x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] =	(W/ 1.93 1.8 1.8				kJ/K (26) (27) (27)
Window Window Window	vs Type vs Type vs Type	2 2 3 4	(m²)			A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/ 1.93 1.8 1.8 6.79	K)			kJ/K (26) (27) (27) (27) (27)
Window Window Window Window	vs Type vs Type vs Type hts Typ	e 1 e 2 e 3 e 4 e 1	(m²)			A ,r 1.93 1.36 1.36 5.12	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K	(W/ 1.93 1.8 1.8 6.79 2.39	K)			kJ/K (26) (27) (27) (27) (27) (27)
Window Window Window Window Roofligh	vs Type vs Type vs Type hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligl Roofligl	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498	K) 99 94 97			kJ/K (26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3			ļ2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4		m	ļ2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh Floor Walls T	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4	95	14.2	9	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75	x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + 0.13 0.18	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28)
Window Window Window Window Roofligh Roofligh Roofligh Roofligh Floor Walls T Roof	vs Type vs Type vs Type hts Typ hts Typ hts Typ ts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4	95	14.2°	9	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66	x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1.7) + /[1.7] +	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

an be u														
	Ū	,	,		using Ap	•	K						13.06	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) ±	(36) =			00.00	
			alculator	l monthly	M					•	25)m x (5)		69.82	(37
Cillia	Jan	Feb	Mar		<u></u>	Jun	Jul	Δυα	Sep	Oct	Nov	Dec	1	
88)m=	41.1	40.76	40.44	Apr 38.91	May 38.62	37.29	37.29	37.05	37.8	38.62	39.2	39.81		(38
,	L I			00.01	00.02	07.20	01.20	01.00		<u> </u>	<u> </u>	00.01		(
19)m=	ansfer c	110.59	11, VV/K	108.73	108.45	107.11	107.11	106.87	107.63	108.45	109.03	109.63	1	
9)111=	110.92	110.59	110.20	100.73	100.45	107.11	107.11	100.07			Sum(39) ₁ .		108.73	(39
leat lo	ss para	meter (H	HLP), W/	m²K						$= (39)m \div$		12712-	100.70	(
0)m=	1.36	1.36	1.35	1.33	1.33	1.31	1.31	1.31	1.32	1.33	1.34	1.35		
		_							,	Average =	Sum(40) ₁ .	12 /12=	1.33	(40
lumbe			nth (Tab	<u> </u>			.		_				1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(4.
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
												40	1	(4
ssum	ea occu	pancy, I	V									44		
if TF	A > 13.9			[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		49	I	
if TF if TF	A > 13.9 A £ 13.9	9, N = 1 9, N = 1	+ 1.76 x							ΓFA -13.	.9)		1	·
if TF if TF nnual	A > 13.9 A £ 13.9 I averag	9, N = 1 9, N = 1 e hot wa	+ 1.76 x ater usaç	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		93	.35]	•
if TF if TF nnual educe	A > 13.9 A £ 13.9 I average the annua	9, N = 1 9, N = 1 e hot wa d average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed		+ 36		93			•
if TF if TF nnual educe	A > 13.9 A £ 13.9 I average the annua	9, N = 1 9, N = 1 e hot wa d average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		93]	•
if TF if TF nnual educe ot more	A > 13.9 A £ 13.9 I average the annual of that 125 Jan	P, N = 1 P, N = 1 P hot was A average Silitres per p Feb	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	.35		·
if TF if TF nnual educe of more	A > 13.9 A £ 13.9 I average the annual of that 125 Jan	P, N = 1 P, N = 1 P hot was A average Silitres per p Feb	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	.35		·
if TF if TF nnual educe ot more ot wate 4)m=	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49	Oct 95.22 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ =	Dec 102.69	1120.25	(4
if TF if TF innual educe of more of wate	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug	+ 36 a water us Sep 91.49	Oct 95.22 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ =	Dec 102.69	1120.25	(4
if TF if TF nnual educe of more of wate 4)m=	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49 0 kWh/mon 106.76	Oct 95.22 Total = Su 124.42	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81	.35 Dec 102.69	1120.25	(4
if TF if TF innual educe of more of wate (4)m= nergy (4)m=	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 102.69 content of 152.29	P, N = 1 P, N = 1 P, N = 1 P hot was all average litres per properties per proper	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - cale 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated me	es per da 5% if the do ater use, l May Vd,m = fa 87.75 onthly = 4.	ay Vd,av lwelling is hot and co Jun ctor from 7 84.02 190 x Vd,r	erage = designed old) Jul Table 1c x 84.02 m x nm x E 91.94	(25 x N) to achieve Aug (43) 87.75 27m / 3600 105.5	+ 36 a water us Sep 91.49 0 kWh/more 106.76	Oct 95.22 Total = Su 124.42	9) 93 Nov 98.96 m(44)112 = ables 1b, 1	.35 Dec 102.69	1120.25	(4
if TF if TF innual educe of more dot wate (4)m= inergy (5)m=	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan er usage in 102.69 content of 152.29	P, N = 1 P, N = 1 P hot was all average litres per p Peb Politres per 98.96 hot water 133.19	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - call 137.44	Apr Apr ach month 91.49 culated mo 119.82	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97	ay Vd,av liwelling is that and co Jun ctor from 7 84.02 190 x Vd,r 99.21 r storage),	erage = designed Id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46)	+ 36 a water us Sep 91.49 0 kWh/mon 106.76	Oct 95.22 Total = Su 124.42 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69		(4
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if TF if TF nnual educe ot more ot wate 4)m= nergy of 5)m= instant 6)m= /ater	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 taneous with a storage in 102.69	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - calc 137.44 ng at point 0	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water	ay Vd,av lwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage),	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0	+ 36 a water us Sep 91.49 0 kWh/more 106.76 0 to (61)	Oct 95.22 Total = Su 124.42 Total = Su 0	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69		(4
if TF if TF innual educe of more of wate 4)m= hergy of instant 6)m= /ater	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 102.69 content of 152.29 taneous with 125 taneous with 152.29 storage e volume	P, N = 1 P,	ter usaghet water usaghet water person per Mar day for ear 95.22 used - call 137.44 and at point 0	ge in litre usage by day (all w Apr ach month 91.49 culated me 119.82 of use (no	es per da 5% if the of vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0	ay Vd,av lwelling is hot and co Jun ctor from 7 84.02 190 x Vd,r 99.21 r storage), 0	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46) 0 within sa	+ 36 a water us Sep 91.49 0 kWh/more 106.76 0 to (61)	Oct 95.22 Total = Su 124.42 Total = Su 0	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69		(44
if TF if TF innual educe of more of wate 4)m= hergy of instant 6)m= /ater torag comr	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 taneous with annual enthat 125 taneous with annual enthat 125 content of 152.29 taneous with annual enthat 125 taneous	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early 137.44 and at point 0 including and no tare.	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or W velling, e	ay Vd,av lwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46) 0 within sa	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44)112 = ables 1b, 1 135.81 m(45)112 =	.35 Dec 102.69		(44
if TF if TF nnual educe of more of wate 4)m= hergy of instant folia foli	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 taneous with annual enthat 125 taneous with annual enthat 125 content of 152.29 taneous with annual enthat 125 taneous	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early 137.44 and at point 0 including and no tare.	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or W velling, e	ay Vd,av lwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44)112 = ables 1b, 1 135.81 m(45)112 =	.35 Dec 102.69		(4
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if TF if TF innual educe of more of wate 4)m= nergy of 5)m= instant torag comr otherw /ater a) If m	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 storage enumity he vise if no storage anufaction	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - calc 137.44 ag at point 0 includir nd no tal hot water	Apr Apr Ach month 91.49 culated mo 119.82 of use (no o and any so ank in dw er (this in	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o loar or W welling, e ancludes i	ay Vd,av lwelling is hot and co Jun ctor from 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	Dec 102.69 c, 1d) 147.48 0		(4)
if TF innual educe of more lot water (14)m= inergy (15)m= lotstant (15)m= lots	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 storage e volume munity he vise if no storage lanufaction anufaction anu	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early sed - cally	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or Water velling, encludes i or is known	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed ild) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69 c, 1d) 147.48 0		(4)
if TF if TF innual educe of more of wate 4)m= hergy of 5)m= instant forms forms forms instant forms fo	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 storage e volume munity h vise if no storage anufactor erature far	P, N = 1 P,	ter usage hot water person per day for early 137.44 137.44 137.44 109 at point of the person per day for early 137.44 137.44 137.44 137.44 137.44 137.44 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw er (this in coss facto 2b , kWh/ye cylinder l	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o loar or W welling, e ncludes i or is kno ear loss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	.35 Dec 102.69 c, 1d) 147.48 0 0 0		(4) (4) (4) (4) (5)
if TF innual educe of more of wate (4)m= instant (6)m= Vater ottorag commotherw vater a) If m empe nergy o) If m lot water	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 content of taneous we annuity he vise if no storage e volume content of taneous we annuity he vise if no storage e volume content of taneous we taneous	P, N = 1 P,	ter usage hot water overson per Mar day for ear 95.22 used - calcate 137.44 ag at point 0 including at point water overson per day for ear day for	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no o ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or Water velling, encludes i or is known	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	Dec 102.69 = c, 1d) 147.48 = 0		(4: (4: (4: (4: (4: (5:
if TF innual educe of more fot water (14)m= instant (15)m= vater vater of torag commotherw vater empe inergy of torag of	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 content of taneous we annuity he vise if no storage e volume content of taneous we annuity he vise if no storage e volume content of taneous we taneous	Poly N = 1	ter usage hot water person per day for early 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no o ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o loar or W welling, e ncludes i or is kno ear loss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 07m / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	.35 Dec 102.69 c, 1d) 147.48 0 0 0		(4- (4- (4- (4- (4- (5- (5- (5- (5-

Energy lost from wa	Ū	e, kWh/y	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54) in Water storage loss of	` '	for each	month			((56)m = (55) v (41)	m		0		(55)
	0	0	0	T 0	0	0	0	0	0	0	1	(56)
(56)m= 0 0 If cylinder contains dedic			_			_	_		_	_] lix H	(30)
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss	annual) fr	om Table	e 3							0		(58)
Primary circuit loss	alculated	for each	month ((59)m = ((58) ÷ 36	65 × (41)	m					
(modified by facto	1	ole H5 if t	here is	1	ter heati		cylinde	·			1	
(59)m = 0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calculate	d for each	n month	(61)m =	(60) ÷ 30	65 × (41)m	_		_		_	
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required t	or water h	eating ca	alculated	d for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 129.44 113.2	1 116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		(62)
Solar DHW input calculat								r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or\	WHRS	applies	, see Ap	pendix (G)	,			1	
(63)m = 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from water h	eater										,	
(64)m= 129.44 113.2	1 116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		_
						Outp	out from w	ater heate	r (annual)₁	12	1248.5	(64)
Heat gains from wat	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 >	k [(46)m	+ (57)m	+ (59)m]	
(65)m= 32.36 28.3	29.21	25.46	24.43	21.08	19.54	22.42	22.69	26.44	28.86	31.34		(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal gains (s	ee Table :	5 and 5a):									
Metabolic gains (Tal	ole 5), Wa	tts										
Jan Fe) Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 124.54 124.5	4 124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54		(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m= 19.84 17.6	14.33	10.85	8.11	6.85	7.4	9.62	12.91	16.39	19.13	20.39		(67)
Appliances gains (ca	lculated in	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m= 222.55 224.8	6 219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03	212.73		(68)
Cooking gains (calc	ılated in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5			_	
(69)m= 35.45 35.4	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45		(69)
Pumps and fans gai	ns (Table	5a)									-	
(70)m= 0 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapora	tion (nega	tive valu	es) (Tab	ole 5)							•	
(71)m= -99.63 -99.6	3 -99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63		(71)
Water heating gains	(Table 5)			•							•	
(72)m= 43.5 42.1	39.26	35.36	32.84	29.28	26.26	30.13	31.51	35.54	40.08	42.12		(72)
Total internal gains	· =	•	•	(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72)	m	•	
(73)m= 346.24 344.9		313.22	292.32	272.8	260.51	264.29	274.78	294.68	317.6	335.6		(73)
	•			•								

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.36	x	10.63	x	0.63	x	0.7	=	4.42	(74)
North	0.9x	0.77	x	1.36	x	20.32	х	0.63	X	0.7	=	8.45	(74)
North	0.9x	0.77	x	1.36	x	34.53	X	0.63	X	0.7	=	14.35	(74)
North	0.9x	0.77	x	1.36	x	55.46	х	0.63	x	0.7	=	23.05	(74)
North	0.9x	0.77	x	1.36	x	74.72	x	0.63	x	0.7	=	31.05	(74)
North	0.9x	0.77	x	1.36	x	79.99	x	0.63	x	0.7	=	33.24	(74)
North	0.9x	0.77	x	1.36	x	74.68	x	0.63	x	0.7	=	31.04	(74)
North	0.9x	0.77	x	1.36	x	59.25	x	0.63	x	0.7	=	24.62	(74)
North	0.9x	0.77	x	1.36	x	41.52	x	0.63	x	0.7	=	17.26	(74)
North	0.9x	0.77	x	1.36	x	24.19	x	0.63	x	0.7	=	10.05	(74)
North	0.9x	0.77	x	1.36	x	13.12	x	0.63	x	0.7	=	5.45	(74)
North	0.9x	0.77	x	1.36	x	8.86	x	0.63	x	0.7	=	3.68	(74)
East	0.9x	0.77	x	1.8	x	19.64	x	0.63	x	0.7	=	10.8	(76)
East	0.9x	0.77	x	1.8	x	38.42	x	0.63	X	0.7	=	21.14	(76)
East	0.9x	0.77	X	1.8	x	63.27	x	0.63	x	0.7	=	34.81	(76)
East	0.9x	0.77	x	1.8	x	92.28	x	0.63	x	0.7	=	50.76	(76)
East	0.9x	0.77	X	1.8	x	113.09	x	0.63	x	0.7	=	62.21	(76)
East	0.9x	0.77	X	1.8	x	115.77	x	0.63	x	0.7	=	63.69	(76)
East	0.9x	0.77	x	1.8	x	110.22	x	0.63	x	0.7	=	60.63	(76)
East	0.9x	0.77	X	1.8	x	94.68	x	0.63	x	0.7	=	52.08	(76)
East	0.9x	0.77	X	1.8	x	73.59	x	0.63	X	0.7	=	40.48	(76)
East	0.9x	0.77	X	1.8	x	45.59	x	0.63	X	0.7	=	25.08	(76)
East	0.9x	0.77	X	1.8	X	24.49	X	0.63	X	0.7	=	13.47	(76)
East	0.9x	0.77	X	1.8	x	16.15	x	0.63	X	0.7	=	8.88	(76)
South	0.9x	0.77	X	5.12	X	46.75	X	0.63	X	0.7	=	73.15	(78)
South	0.9x	0.77	X	5.12	x	76.57	X	0.63	X	0.7	=	119.81	(78)
South	0.9x	0.77	X	5.12	x	97.53	x	0.63	X	0.7	=	152.61	(78)
South	0.9x	0.77	X	5.12	x	110.23	x	0.63	X	0.7	=	172.49	(78)
South	0.9x	0.77	X	5.12	x	114.87	X	0.63	X	0.7	=	179.74	(78)
South	0.9x	0.77	X	5.12	X	110.55	X	0.63	x	0.7	=	172.98	(78)
South	0.9x	0.77	X	5.12	x	108.01	X	0.63	X	0.7	=	169.01	(78)
South	0.9x	0.77	X	5.12	x	104.89	X	0.63	X	0.7	=	164.13	(78)
South	0.9x	0.77	X	5.12	x	101.89	x	0.63	x	0.7	=	159.42	(78)
South	0.9x	0.77	X	5.12	x	82.59	x	0.63	x	0.7	=	129.22	(78)
South	0.9x	0.77	X	5.12	x	55.42	x	0.63	x	0.7	=	86.71	(78)
South	0.9x	0.77	X	5.12	X	40.4	X	0.63	X	0.7	=	63.21	(78)

Woot oo			1		1		1		1		1		٦,,,,,
West 0.9		0.77	X	1.36	X	19.64	X	0.63	X	0.7] = 1	24.49	(80)
West 0.9	_	0.77	X	1.36	X	38.42	X	0.63	X	0.7	=	47.91	(80)
West 0.9		0.77	X	1.36	X	63.27	X	0.63	X	0.7] =	78.9	(80)
West 0.9		0.77	X	1.36	X	92.28	X	0.63	X	0.7	=	115.06	(80)
West 0.9	_	0.77	X	1.36	X	113.09	X	0.63	X	0.7	=	141.02	(80)
West 0.9	_	0.77	X	1.36	X	115.77	X	0.63	X	0.7	=	144.35	(80)
West 0.9	` <u> </u>	0.77	X	1.36	X	110.22	X	0.63	X	0.7	=	137.43	(80)
West 0.9	(0.77	X	1.36	X	94.68	X	0.63	X	0.7	=	118.05	(80)
West 0.9	(0.77	X	1.36	X	73.59	X	0.63	X	0.7	=	91.76	(80)
West 0.9	(0.77	X	1.36	X	45.59	X	0.63	X	0.7	=	56.85	(80)
West 0.9	(0.77	X	1.36	X	24.49	X	0.63	X	0.7	=	30.54	(80)
West 0.9		0.77	X	1.36	X	16.15	X	0.63	X	0.7	=	20.14	(80)
Rooflights 0.9		1	X	1.12	X	25.93	X	0.63	X	0.7	=	23.06	(82)
Rooflights 0.9		1	X	1.12	X	25.93	X	0.63	X	0.7	=	23.06	(82)
Rooflights 0.9	(1	X	0.93	X	25.93	X	0.63	x	0.7	=	9.53	(82)
Rooflights 0.9	(1	X	0.66	X	25.93	X	0.63	x	0.7	=	6.76	(82)
Rooflights 0.9	(1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights 0.9	(1	X	1.12	X	51.88	X	0.63	x	0.7	=	46.13	(82)
Rooflights 0.9	(1	x	0.93	X	51.88	x	0.63	x	0.7	=	19.08	(82)
Rooflights 0.9	•	1	X	0.66	X	51.88	x	0.63	x	0.7	=	13.53	(82)
Rooflights 0.9	(1	X	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights 0.9	<	1	x	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights 0.9	<	1	x	0.93	x	88.38	х	0.63	x	0.7	=	32.5	(82)
Rooflights 0.9	(1	X	0.66	x	88.38	x	0.63	x	0.7	=	23.04	(82)
Rooflights 0.9	(1	x	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights 0.9	(1	x	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights 0.9	(1	x	0.93	x	133.65	x	0.63	x	0.7	j =	49.15	(82)
Rooflights 0.9	(1	x	0.66	x	133.65	x	0.63	x	0.7	=	34.85	(82)
Rooflights 0.9	(1	x	1.12	x	168.1	х	0.63	x	0.7	=	149.47	(82)
Rooflights 0.9	(1	x	1.12	x	168.1	x	0.63	x	0.7	j =	149.47	(82)
Rooflights 0.9	(1	x	0.93	x	168.1	х	0.63	x	0.7	j =	61.81	(82)
Rooflights 0.9	(1	x	0.66	x	168.1	х	0.63	x	0.7	j =	43.83	(82)
Rooflights 0.9x	(1	x	1.12	x	174	x	0.63	X	0.7	j =	154.72	(82)
Rooflights 0.9	•	1	x	1.12	x	174	x	0.63	x	0.7	j =	154.72	(82)
Rooflights 0.9	•	1	x	0.93	x	174	х	0.63	x	0.7	j =	63.98	(82)
Rooflights 0.9	,	1	x	0.66	x	174	x	0.63	x	0.7	=	45.37	(82)
Rooflights 0.9	(1	×	1.12	×	164.87	x	0.63	x	0.7	i =	146.6	(82)
Rooflights 0.9		1	X	1.12	X	164.87	X	0.63	x	0.7	=	146.6	(82)
Rooflights 0.9	(1	X	0.93	X	164.87	X	0.63	X	0.7	=	60.62	(82)
Rooflights 0.9	(1	X	0.66	X	164.87	X	0.63	X	0.7	=	42.99	(82)
Rooflights 0.9		1	X	1.12	X	138.72	X	0.63	x	0.7	, 	123.35	(82)
									ı				_ ′

Pooflighto o o F					_		7						— (00)
Rooflights 0.9x	1	X	1.1			138.72] X	0.63	×	0.7	=	123.35	(82)
Rooflights 0.9x	1	X	0.9	93	—	138.72	X	0.63	X	0.7	_ =	51.01	(82)
Rooflights 0.9x	1	X	0.6	66	X	138.72	X	0.63	X	0.7	_ =	36.17	(82)
Rooflights 0.9x	1	X	1.1	12	X	104.33	X	0.63	X	0.7	=	92.77	(82)
Rooflights 0.9x	1	X	1.1	12	X	104.33	X	0.63	X	0.7	=	92.77	(82)
Rooflights 0.9x	1	X	0.9	93	X	104.33	X	0.63	Х	0.7	=	38.36	(82)
Rooflights 0.9x	1	X	0.6	66	X	104.33	X	0.63	X	0.7	=	27.2	(82)
Rooflights 0.9x	1	X	1.1	12	X	62.32	X	0.63	X	0.7	=	55.42	(82)
Rooflights 0.9x	1	X	1.1	12	x	62.32	X	0.63	X	0.7	=	55.42	(82)
Rooflights 0.9x	1	X	0.9	93	x	62.32	X	0.63	X	0.7	=	22.92	(82)
Rooflights 0.9x	1	X	0.6	66	x	62.32	X	0.63	X	0.7	=	16.25	(82)
Rooflights _{0.9x}	1	x	1.1	12	x	32.54	X	0.63	x	0.7	=	28.93	(82)
Rooflights 0.9x	1	X	1.1	12	x	32.54	X	0.63	X	0.7	=	28.93	(82)
Rooflights _{0.9x}	1	x	0.9	93	x	32.54	j×	0.63	x	0.7		11.96	(82)
Rooflights _{0.9x}	1	x	0.6	66	x	32.54	X	0.63	x	0.7	-	8.48	(82)
Rooflights _{0.9x}	1	x	1.1	12	x	21.19] x	0.63	x	0.7		18.84	(82)
Rooflights _{0.9x}	1	x	1.1	12	x	21.19	X	0.63	x	0.7		18.84	(82)
Rooflights 0.9x	1	x	0.9	_	x	21.19]]	0.63	x	0.7	= =	7.79	(82)
Rooflights 0.9x	<u>·</u> 1	x	0.6			21.19]]	0.63	×	0.7	= =	5.53	(82)
J 11 L	· · · · ·						1	0.00				0.00	(- /
Solar gains in	watts ca	lculated	for eac	h month	1		(83)m	n = Sum(74)n	n (82)m				
(83)m= 175.27	322.15	493.39	683.05	818.61	833.06	794.92	692		- ' ' '		146.93]	(83)
Total gains – ir	nternal a	nd solar	(84)m =	= (73)m	+ (83)m	, watts		·			ļ	1	
(84)m= 521.52	667.11	826.37	996.27	1110.93	1105.86	1055.43	957	.06 834.8	665.8	8 532.08	482.53]	(84)
7. Mean inter	nal temn	erature	(heating	season		1						<u>.</u>	
Temperature						from Tal	hle 9	Th1 (°C)				21	(85)
Utilisation fac	Ū	٠.			Ū		010 0	, , , , , , , , , , , , , , , , , , , ,				21	(00)
Jan	Feb	Mar	Apr	May	Jun	Jul	ΙΔ	ug Sep	Oc	t Nov	Dec	1	
(86)m= 1	0.99	0.97	0.91	0.78	0.59	0.44	0.		0.96		1	1	(86)
				<u> </u>	ļ	<u> </u>			0.00	1 0.00	<u> </u>		, ,
Mean interna	r	i		,	1	i 	1		1 00 4	- 1 400	1 40 40	1	(07)
(87)m= 19.52	19.76	20.12	20.54	20.84	20.96	20.99	20.	99 20.89	20.45	19.9	19.49		(87)
Temperature	during h				dwellin	g from Ta	able 9	9, Th2 (°C))			-	
(88)m= 19.79	19.8	19.8	19.81	19.82	19.83	19.83	19.	83 19.82	19.82	19.81	19.81		(88)
Utilisation fac	tor for ga	ains for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 1	0.99	0.96	0.88	0.71	0.49	0.33	0.3	0.68	0.94	0.99	1		(89)
Mean internal	l temper	ature in t	the rest	of dwell	ina T2 (follow ste	eps 3	to 7 in Ta	ble 9c)	-		-	
(90)m= 18.46	18.7	19.06	19.47	19.72	19.82	19.83	19.			18.85	18.44]	(90)
				<u> </u>	Į	1				ving area ÷ (4) =	0.22	(91)
Maan le trans	- سحمها	ahuna 11		ا- مام	۱۱:م ۱۱۰	41 A T 4	. /4	£1.^\ -	· O				
Mean internal	18.94	19.29	r the wh	19.97	20.07	1LA × 11 20.09	+ (1		1	1 19.09	10.67	1	(92)
	l l			l	l						18.67	J	(34)
Apply adjustn	ieni io ii	ie illegij	miema	remper	ature if	טווו ומטופ	, 4€,	where app	nopriate	7			

(93)m=	18.7	18.94	19.29	19.71	19.97	20.07	20.09	20.09	20.02	19.64	19.09	18.67		(93)
` '			uirement	L										
					re ohtair	ned at st	en 11 of	Table 9	n so tha	t Ti m-(76)m an	d re-calc	rulate	
			or gains	•		ica at st	cp ii oi	Table 5	5, 50 tria	it 11,111—(r Ojiii aii	d ic calc	diato	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm):										
(94)m=	1	0.99	0.96	0.88	0.72	0.52	0.35	0.41	0.69	0.94	0.99	1		(94)
Usefu	l gains,	hmGm	, W = (94	4)m x (8	4)m									
(95)m=	518.97	657.85	792.33	874.48	800.81	570.14	371.55	390.01	579.41	622.9	526.31	480.83		(95)
Month	nly aver	age exte	rnal tem	perature	from T	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for me	an intern	al temp	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]	•			
(97)m=	1597.31	1552.34	1410.64	1175.48	896.69	586.24	373.77	394.2	637.07	979.96	1307.18	1586.67		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m	•		
(98)m=	802.29	601.1	460.02	216.72	71.33	0	0	0	0	265.65	562.23	822.74		
'			•			•		Tota	l per year	(kWh/yea	r) = Sum(9	8)15,912 =	3802.08	(98)
Space	e heatin	a require	ement in	kWh/m²	²/vear								46.65	(99)
•		•			7 y Oui								40.00	
			quiremer											
Calcu			July and				1	۸۰۰۰	Con	Oct	Nov	Doo		
Hoot	Jan	Feb	Mar	Apr	May 5°C into	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(100)m=	0	0 LIII (Ca	0	0	0	1006.88	792.65	and exte	0	o 0	0	0		(100)
` ′		tor for lo			<u> </u>	1000.00	792.03	012.2	0	U				(100)
(101)m=		0	0	0	0	0.91	0.95	0.93	0	0	0	0		(101)
							0.93	0.93	0	0				(101)
(102)m=	0	0	Vatts) = (0	0	915.36	753.23	755.14	0	0	0	0		(102)
								e Table		0				(102)
(103)m=		gairis ca 0	0	101 appli	0	1314.8		1154.83	0	0	0	0		(103)
				L	l			ous (kW		l			 v (41)m	(100)
			(104)m <			iwening,	COMMINA	ous (KVV	(11) — 0.0.	24 X [(1 (<i>)</i> 3)111 — (102)111] 2	x (4 1)111	
(104)m=		0	0	0	0	287.59	375.27	297.37	0	0	0	0		
l		<u> </u>							Total	= Sum(1.0.4)	=	960.24	(104)
Cooled	l fractio	า									area ÷ (4	4) =	1	(105)
Intermi	ttency f	actor (Ta	able 10b)		-	_				-			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
'									Total	l = Sum	(104)	=	0	(106)
		requirer	ment for	month =	(104)m	- ` 	`	1	•	·	1			
(107)m=	0	0	0	0	0	71.9	93.82	74.34	0	0	0	0		
									Total	= Sum((107)	=	240.06	(107)
Space	cooling	requirer	ment in k	رWh/m²/	year				(107)) ÷ (4) =			2.95	(108)
8f. Fab	ric En <u>e</u>	rgy Effi <u>c</u>	iency (ca	alcul <u>ate</u> c	l only un	der spe	cial cond	litions, s	ee s <u>ectic</u>	on 1 <u>1</u>) _				
		y Efficier								+ (108) :	=		49.6	(109)
			y Efficie	encv (TF	EE)				. ,	. ,			57.04	(109)
9			,	- , (- ,								1	 ` '

Assessor Name: Stroma Mclaughland Stroma Number: STRO30065 Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.5.25 **Property Address: HOUSE C - BASELINE** **Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU 1. Overall dwelling dimensions: **Area(m²)** Ground filoor ** **Area(m²)** Ground filoor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)				Hoor D	ataila.					
Software Vame: Stroma FSAP 2012 Software Version: Version: 1.0.5.25								_	_	
### Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU 1. Overall dwelling dimensions: ### Area(m²)			•							
Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU 1. Overall dwelling dimensions: Area(m²)	Software Name:	Stroma FSAP							on: 1.0.5.25	
Area(m²)	A ddrago	Woodwall Catta								
			ige PZ, WOOC	iwell Ro	au, DRIS	STOL, E	5511 970			
First floor 40.75 (1a) x 2.6 (2a) 105.95 (3a)	1. Overall awouning aims	11010110.		Area	(m²)		Av. Heid	ght(m)	Volume(m	³)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)	Ground floor				<u> </u>	(1a) x			· ·	<u> </u>
Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 197.23 (5)	First floor			40).75	(1b) x	2.2	(2b) =	91.28	(3b)
2. Ventilation rate: main secondary other total m³ per hour	Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)	+(1e)+(1n) 8	1.5	(4)				
Number of chimneys	Dwelling volume					(3a)+(3b)+(3c)+(3d)	+(3e)+(3n) =	197.23	(5)
Number of chimneys	2. Ventilation rate:									
Number of chimneys				y (other		total		m³ per hou	ır
Number of intermittent fans 3	Number of chimneys			+	0	= [0	x 40 =	0	(6a)
Number of passive vents 0	Number of open flues	0	+ 0		0	Ī - [0	x 20 =	0	(6b)
Number of flueless gas fires $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Number of intermittent fa	ns				Ī	3	x 10 =	30	(7a)
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 30$ $\div (5) = 0.15$ (8) If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - $(0.2 \times (14) \div 100) = 0.15$ Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0.16 Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - $[0.075 \times (19)] = 0.42$ Infiltration rate modified for monthly wind speed	Number of passive vents					Ī	0	x 10 =	0	(7b)
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 30$ $\div (5) = 0.15$ (8) If a pressurisation test has been carried out or is intended, proceed to (17) , otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 Q (12) If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0.015$ Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0.015$ Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.42$ Infiltration rate modified for monthly wind speed	Number of flueless gas fi	res				Ī	0	x 40 =	0	(7c)
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 30$ $\div (5) = 0.15$ (8) If a pressurisation test has been carried out or is intended, proceed to (17) , otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 Q (12) If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0.015$ Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0.015$ Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.42$ Infiltration rate modified for monthly wind speed						_			hangaa nar h	
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) \div 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) \div 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered O (19) Shelter factor (20) = 1 - [0.075 × (19)] = 0 (19) Infiltration rate modified for monthly wind speed	Lefthant and a standard		(C-) · (Ch) · (7	-\./ 7 L\./7	·-\	г				
Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) \div 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) \div 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0 (19) Infiltration rate modified for monthly wind speed	•	•				ontinue fi			0.15	(8)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 O (12) If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 x (14) ÷ 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0 (19) Shelter factor (21) = (18) x (20) = 0.42 (21) Infiltration rate modified for monthly wind speed			, ,,	(11),			(-) (-)	-/	0	(9)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 x (14) \div 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) \div 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 1 (20) Infiltration rate modified for monthly wind speed	Additional infiltration	3						[(9)-1]x0.1 =		—
deducting areas of openings); if equal user 0.35If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 00(12)If no draught lobby, enter 0.05, else enter 00(13)Percentage of windows and doors draught stripped0(14)Window infiltration $0.25 \cdot [0.2 \times (14) \div 100] =$ 0(15)Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ 0(16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 5.38000011444092 (17)If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.42 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being usedNumber of sides sheltered0(19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 1(20)Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.42 (21)Infiltration rate modified for monthly wind speed	Structural infiltration: 0	.25 for steel or tim	ber frame or	0.35 for	masonr	y const	ruction		0	(11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - $[0.2 \times (14) \div 100] =$ Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = $[(17) \div 20]$ +(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - $[0.075 \times (19)]$ = Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0 (12) (13) 0 (14) 0 (15) 0 (16) 0.42 (18) 0 (19) 1 (20) 1 (19) 1 (20)			-	the greate	er wall area	a (after				
If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - $[0.2 \times (14) \div 100] =$ 0 (14) Window infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = $[(17) \div 20] + (8)$, otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - $[0.075 \times (19)] =$ Infiltration rate incorporating shelter factor (21) = $(18) \times (20) =$ O (19) Infiltration rate modified for monthly wind speed	=			1 (seale	d) else (enter O				(12)
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Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0$ (15) Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ (18) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0$ (19) Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0$ (21) Infiltration rate modified for monthly wind speed										=
Infiltration rate $ (8) + (10) + (11) + (12) + (13) + (15) = 0 $ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$	<u> </u>			(0.25 - [0.2	x (14) ÷ 1	100] =			=
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 1 (20) Infiltration rate incorporating shelter factor (21) = $(18) \times (20) = 1 = (18) \times (20) = 1 = ($				((8) + (10) +	+ (11) + (¹	12) + (13) +	(15) =		=
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = $ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = $ Infiltration rate modified for monthly wind speed		q50, expressed in	cubic metres	s per hoi	ur per so	uare m	netre of er	velope area		== ' '
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speed	•	•		-	•	•		,		=
Shelter factor $ (20) = 1 - [0.075 \times (19)] = $ $ (20) = 1 - [0.075 \times (19)] = $ $ (21) = (18) \times (20) = $ $ (21) = (21) \times $	Air permeability value applie	s if a pressurisation te	st has been don	e or a degi	ree air per	meability	is being use	ed		
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.42 (21) Infiltration rate modified for monthly wind speed	Number of sides sheltere	d							0	(19)
Infiltration rate modified for monthly wind speed	Shelter factor			(20) = 1 - [0.075 x (19)] =		1	(20)
	Infiltration rate incorporat	ing shelter factor		((21) = (18)	x (20) =			0.42	(21)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Infiltration rate modified for	or monthly wind sp	peed						_	
	Jan Feb	Mar Apr N	/lay Jun	Jul	Aug	Sep	Oct	Nov Dec		

4.9

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Monthly average wind speed from Table 7

(22)m=

5.1

Wind F	actor (2	22a)m =	(22)m ÷	4										
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjuste	ed infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
	0.54	0.53	0.52	0.46	0.45	0.4	0.4	0.39	0.42	0.45	0.47	0.49		
		<i>tive air</i> o	change i	rate for t	he appli	cable ca	se	•		•				(23a)
_			using Appe	endix N, (2	(3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23a)
			very: effic		, ,	,	. `	,, .	,	, , ,			0	(23c)
a) If b	balance	d mecha	anical ve	entilation	with hea	at recov	erv (MVI	HR) (24a	a)m = (2)	2b)m + (23b) x [1 – (23c)	-	(200)
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If b	balance	d mecha	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24b	m = (22)	2b)m + (23b)		ı	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If v	whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	n from o	outside	•	•	•	•	
i <u>f</u>	f (22b)m	า < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	.5 × (23b	o)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,			on or wh		•	•				0.51				
г	<u> </u>	0.64	en (24d) _{0.63}	M = (221)	0.6	0.58	'	- `			0.61	0.62	1	(24d)
(24d)m=						<u> </u>	0.58	0.58	0.59	0.6	0.61	0.62		(24u)
(25)m=	0.64	cnange 0.64	rate - er	nter (24a 0.61	0.6	0) or (24 0.58	c) or (24 0.58	0.58	0.59	0.6	0.61	0.62	1	(25)
(25)111=	0.64	0.04	0.03	0.61	0.6	0.36	0.56	0.56	0.59	0.6	0.61	0.02		(23)
3. Hea	at losse	s and he	eat loss p											
ELEM	IENT	Gros	SS	Openin	ne	NIa+ Ar								A 3/ L
		area	(m²)	m		Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
Doors		area	(m²)				m²				K)			
Doors Windov	vs Type		(m²)			A ,r	m ² x	W/m2	2K = [(W/	K)			kJ/K
	,,	e 1	(m²)			A ,r	m² x x1/2	W/m2	eK = [0.04] = [(W/ 2.702	K)			kJ/K (26)
Window	vs Type	: 1 : 2	(m²)			A ,r	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1.4 /[1/(1.4)+	eK = [0.04] = [0.04] = [2.702 2.15	K)			kJ/K (26) (27)
Window	vs Type vs Type	2 3	(m²)			A ,r 1.93 1.62	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} & & & \\ & & & &$	2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
Window Window Window	ws Type ws Type ws Type	2 2 3 4	(m²)			A ,r 1.93 1.62 1.62 6.08	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = 0.04 = 0.0	2.702 2.15 2.15 8.06	K)			kJ/K (26) (27) (27) (27) (27)
Window Window Window Window	vs Type vs Type vs Type hts Typ	e 1 e 2 e 3 e 4 e 1	(m²)			A ,r 1.93 1.62 1.62 6.08 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27) (27b)
Window Window Window Window Roofligl	ws Type ws Type ws Type hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2	(m²)			A ,r 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} & & & & \\ & & & \\ & & $	2.702 2.15 2.15 8.06 2.84 1.862	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligh	ws Type ws Type ws Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3	(m²)			A ,r 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	$ \begin{array}{ccc} $	(W/ 2.702 2.15 2.15 8.06 2.84 1.862	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligl Roofligl	ws Type ws Type ws Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3	(m²)			A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} $	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh	ws Type ws Type ws Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3			ļ2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.37	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh	ws Type ws Type ws Type hts Typ hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4		m	ļ2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	K	2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh Floor Walls T	ws Type ws Type ws Type hts Typ hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4	95	16.6	ļ2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + 0.17 0.24	K	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28)
Window Window Window Window Roofligh Roofligh Roofligh Roofligh Floor Walls T Roof	ws Type ws Type hts Typ hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 2 e 3 e 4	95	16.63 0	ļ2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.24	K	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.54 1.092 6.9275 20.72	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b) (28) (29)
Window Window Window Roofligl Roofligl Roofligl Roofligl Roufligl Roofligl Roofligl Roofligl Roofligl Roofligl Roofligl Roofligl Roofligl Roofligl	ws Type ws Type ws Type hts Typ hts Typ hts Typ cype1 cype2 rea of e	2 2 3 4 4 e 1 e 2 e 3 e 4 102.9 2 61.3 lements	95 3 , m²	16.63 0	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + 0.17 0.24 0.15	EK 0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (28) (29) (30)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Roofligl Tloor Walls T Walls T Roof Total an * for wind ** include	ws Type ws Type ws Type hts Typ hts Typ hts Typ Type1 Type2 rea of e dows and e the area	2 2 3 4 4 e 1 e 2 e 3 e 4 1 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	95 3 , m² ows, use e sides of in	16.63 0 7.2 Iffective winternal walk	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1	$ \begin{array}{cccc} & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & &$	(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (28) (29) (30)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Roofligl Tloor Walls T Walls T Roof Total an * for wind ** include Fabric I	ws Type ws Type ws Type hts Typ hts Typ hts Typ Type1 ype2 rea of e dows and e the area heat los	2 2 3 4 4 e 1 e 2 e 3 e 4 1 102.5 e 4 1 102.5 e 4 1 102.5 e 5 1 10	95 3 , m ² pws, use e sides of in = S (A x	16.63 0 7.2 Iffective winternal walk	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + 0.17 0.24 0.15	$ \begin{array}{cccc} & & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & \\$	(W/ 2.702 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Floor Walls T Walls T Roof Total an *for wind **include Fabric H Heat ca	ws Type ws Type ws Type hts Typ hts Typ hts Typ fype1 Type2 rea of e dows and the area heat los apacity	2 2 3 4 4 e 1 e 2 e 3 e 4 1 102.9 1 10	95 3 , m ² pws, use e sides of in = S (A x	16.63 0 7.2 Iffective winternal walk	3 Indow U-vals and part	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1 207 alue calculatitions	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1	$ \begin{array}{cccc} & & & & & & & \\ & & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & \\$	(W/ 2.702 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²-l	X	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)

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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

and have adjusted		to:lo.d.oo.lo.											
can be used instead Thermal bridge				ısina Ar	nendiy l	K						14.98	(36)
if details of therma	,	,			•							14.90	(30)
Total fabric hea	0 0		()	(-	.,			(33) +	(36) =			82.96	(37)
Ventilation hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5))		_
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 41.92	41.56	41.2	39.53	39.21	37.75	37.75	37.48	38.31	39.21	39.85	40.51		(38)
Heat transfer of	oefficier	nt, W/K	-		-	-		(39)m	= (37) + (37)	38)m	-		
(39)m= 124.88	124.52	124.16	122.48	122.17	120.71	120.71	120.44	121.27	122.17	122.8	123.47		
Heat loss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷		12 /12=	122.48	(39)
(40)m= 1.53	1.53	1.52	1.5	1.5	1.48	1.48	1.48	1.49	1.5	1.51	1.51		
Number of day	s in moi	nth (Tab	le 1a)						Average =	Sum(40) ₁	12 /12=	1.5	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ing ener	rgy requi	irement:								kWh/ye	ear:	
Assumed occu	inancy I	N								2	.49		(42)
if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.49		(42)
Annual averag	e hot wa										3.35		(43)
Reduce the annua not more that 125	_				_	_	to achieve	a water us	se target o	f		•	
Jan	Feb	Mar			Jun	Jul	L	Sep	Oct	Nov	Dec		
Hot water usage in			Apr ach month	May Vd,m = fa			Aug (43)	Sep	Oct	INOV	Dec		
(44)m= 102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49	95.22	98.96	102.69		
` ,		ļ.				ļ			I Total = Su	<u>I</u> m(44) ₁₁₂ =	<u> </u>	1120.25	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48		_
If instantaneous w	ator hoatii	na at noint	of use (no	hot water	r storage)	enter () in	hoves (16		Total = Su	m(45) ₁₁₂ =	=	1468.83	(45)
								. ,	Ι ,		Ι ,	1	(46)
(46)m= 0 Water storage	0 loss:	0	0	0	0	0	0	0	0	0	0		(40)
Storage volum		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	eating a	ınd no ta	ınk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if no		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage		ا لم معمام	ft-	ممامات	/1.\^/1	- /-l-: ·\·						1	(10)
a) If manufact				DI IS KITO	WII (KVVI	i/day).					0		(48)
Temperature for							(40) × (40)				0		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)) =			0		(50)
Hot water stora			-								0		(51)
If community h	_		on 4.3									· I	
Volume factor Temperature fa			2h								0		(52)
romperature in	20101 110	III TADIE	20							<u> </u>	0		(53)

Energy lost from		•	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or	` , ` `	,									0		(55)
Water storage	loss cal	culated t	for each	month			((56)m = (55) × (41)ı	m -			•	
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H -	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circui	t loss (ar	nual) fro	om Table	3							0		(58)
Primary circui				`	•	,	, ,						
(modified by		i							 			1	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m					•	
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water h	eating ca	alculated	for eacl	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 129.44	113.21	116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		(62)
Solar DHW input	calculated	using App	endix G or	· Appendix	H (negati	ve quantity	v) (enter '0	' if no sola	r contribut	on to wate	er heating)		
(add additiona	al lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from w	ater hea	ter											
(64)m= 129.44	113.21	116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		_
							Outp	out from wa	ater heate	r (annual) ₁	12	1248.5	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	د [(46)m	+ (57)m	+ (59)m]	
(65)m= 32.36	28.3	29.21	25.46	24.43	21.08	19.54	22.42	22.69	26.44	28.86	31.34		(65)
include (57)	m in cal	culation	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal g	ains (see	Table 5	and 5a):									
Metabolic gair	ns (Table	. 5). Wat	ts										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54		(66)
Lighting gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	!			•	
(67)m= 19.84	17.62	14.33	10.85	8.11	6.85	7.4	9.62	12.91	16.39	19.13	20.39		(67)
Appliances ga	ins (calc	ulated ir										l	
(68)m= 222.55	`	uiaicu ii	ı Append	dix L. eq	uation L	13 or L1	3a), also	see Ta	ble 5				
(00)111= 222.33	224.86	219.04	206.65	dix L, eq	uation L ²	13 or L1 166.49	3a), also	see Ta	ble 5 182.39	198.03	212.73	1	(68)
` '	ļ	219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03	212.73		(68)
Cooking gains (69)m= 35.45	ļ	219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03 35.45	212.73] 	(68) (69)
Cooking gains (69)m= 35.45	s (calcula 35.45	219.04 Ited in A 35.45	206.65 ppendix 35.45	191.01 L, equat	176.31 tion L15	166.49 or L15a)	164.18 , also se	170 ee Table	182.39]	
Cooking gains	s (calcula 35.45	219.04 Ited in A 35.45	206.65 ppendix 35.45	191.01 L, equat	176.31 tion L15	166.49 or L15a)	164.18 , also se	170 ee Table	182.39				
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0	35.45 ns gains	219.04 Ited in A 35.45 (Table \$	206.65 ppendix 35.45 5a)	191.01 L, equat 35.45	176.31 tion L15 35.45	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45	182.39 5 35.45	35.45	35.45] 	(69)
Cooking gains (69)m= 35.45 Pumps and fa	35.45 ns gains	219.04 Ited in A 35.45 (Table \$	206.65 ppendix 35.45 5a)	191.01 L, equat 35.45	176.31 tion L15 35.45	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45	182.39 5 35.45	35.45	35.45]]]	(69)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -99.63	s (calcula 35.45 ns gains 0 vaporatio	219.04 Ited in A 35.45 (Table 5 0 on (nega	206.65 ppendix 35.45 5a) 0 tive valu	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5)	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45 0	182.39 5 35.45	35.45	35.45		(69) (70)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. e	s (calcula 35.45 ns gains 0 vaporatio	219.04 Ited in A 35.45 (Table 5 0 on (nega	206.65 ppendix 35.45 5a) 0 tive valu	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5)	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45 0	182.39 5 35.45	35.45	35.45		(69) (70)
Cooking gains $(69)m= 35.45$ Pumps and fa $(70)m= 0$ Losses e.g. et $(71)m= -99.63$ Water heating $(72)m= 43.5$	s (calcula 35.45 ns gains 0 vaporatio -99.63 gains (T	219.04 ited in A 35.45 (Table § 0 on (nega -99.63 Table 5) 39.26	206.65 ppendix 35.45 5a) 0 tive valu -99.63	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5) -99.63	166.49 or L15a) 35.45 0 -99.63	164.18 , also se 35.45 0 -99.63	170 ee Table 35.45 0 -99.63	182.39 5 35.45 0	35.45 0 -99.63 40.08	35.45 0 -99.63		(69) (70) (71)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -99.63 Water heating	s (calcula 35.45 ns gains 0 vaporatio -99.63 gains (T 42.12	219.04 ited in A 35.45 (Table § 0 on (nega -99.63 Table 5) 39.26	206.65 ppendix 35.45 5a) 0 tive valu -99.63	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5) -99.63	166.49 or L15a) 35.45 0 -99.63	164.18 , also se 35.45 0 -99.63	170 ee Table 35.45 0 -99.63	182.39 5 35.45 0 -99.63	35.45 0 -99.63 40.08	35.45 0 -99.63		(69) (70) (71)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	6.02	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.8	=	11.5	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	x	0.8	=	19.54	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	31.38	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	42.28	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	45.26	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	42.25	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	33.52	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	23.49	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	13.69	(74)
North	0.9x	0.77	x	1.62	x	13.12	X	0.63	x	0.8	=	7.42	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	5.02	(74)
East	0.9x	0.77	x	2.14	x	19.64	x	0.63	x	0.8	=	14.68	(76)
East	0.9x	0.77	x	2.14	x	38.42	X	0.63	X	0.8	=	28.72	(76)
East	0.9x	0.77	x	2.14	x	63.27	X	0.63	x	0.8	=	47.29	(76)
East	0.9x	0.77	x	2.14	x	92.28	X	0.63	x	0.8	=	68.97	(76)
East	0.9x	0.77	X	2.14	x	113.09	X	0.63	X	0.8	=	84.53	(76)
East	0.9x	0.77	x	2.14	x	115.77	X	0.63	x	0.8	=	86.53	(76)
East	0.9x	0.77	x	2.14	x	110.22	X	0.63	x	0.8	=	82.38	(76)
East	0.9x	0.77	x	2.14	x	94.68	X	0.63	X	0.8	=	70.76	(76)
East	0.9x	0.77	x	2.14	x	73.59	X	0.63	x	0.8	=	55	(76)
East	0.9x	0.77	x	2.14	x	45.59	X	0.63	X	0.8	=	34.08	(76)
East	0.9x	0.77	X	2.14	X	24.49	X	0.63	X	0.8	=	18.3	(76)
East	0.9x	0.77	X	2.14	x	16.15	X	0.63	x	0.8	=	12.07	(76)
South	0.9x	0.77	X	6.08	X	46.75	X	0.63	X	0.8	=	99.28	(78)
South	0.9x	0.77	X	6.08	X	76.57	X	0.63	X	0.8	=	162.6	(78)
South	0.9x	0.77	x	6.08	x	97.53	x	0.63	x	0.8	=	207.12	(78)
South	0.9x	0.77	X	6.08	X	110.23	X	0.63	X	0.8	=	234.09	(78)
South	0.9x	0.77	x	6.08	X	114.87	x	0.63	x	0.8	=	243.94	(78)
South	0.9x	0.77	x	6.08	X	110.55	X	0.63	X	0.8	=	234.76	(78)
South	0.9x	0.77	X	6.08	X	108.01	X	0.63	X	0.8	=	229.37	(78)
South	0.9x	0.77	x	6.08	X	104.89	x	0.63	x	0.8	=	222.75	(78)
South	0.9x	0.77	x	6.08	x	101.89	x	0.63	x	0.8	=	216.36	(78)
South	0.9x	0.77	x	6.08	x	82.59	x	0.63	x	0.8	=	175.38	(78)
South	0.9x	0.77	x	6.08	x	55.42	x	0.63	x	0.8	=	117.68	(78)
South	0.9x	0.77	x	6.08	x	40.4	×	0.63	x	0.8	=	85.79	(78)

\Most	_		1		1		1		l		1		7,000
West 0.9	\vdash	0.77	X	1.62	X	19.64	X	0.63	X	0.8] = 1	33.34	(80)
West 0.9	\vdash	0.77	X	1.62	X	38.42	X	0.63	X	0.8	=	65.22	(80)
West 0.9		0.77	X	1.62	X	63.27	X	0.63	X	0.8	=	107.4	(80)
West 0.9	\vdash	0.77	X	1.62	X	92.28	X	0.63	X	0.8	=	156.64	(80)
West 0.9	×	0.77	X	1.62	X	113.09	X	0.63	X	0.8	=	191.97	(80)
West 0.9	×	0.77	X	1.62	X	115.77	X	0.63	X	0.8	=	196.52	(80)
West 0.9	×	0.77	X	1.62	X	110.22	Х	0.63	X	0.8	=	187.09	(80)
West 0.9	×	0.77	X	1.62	X	94.68	X	0.63	X	0.8	=	160.71	(80)
West 0.9	×	0.77	X	1.62	X	73.59	X	0.63	X	0.8	=	124.91	(80)
West 0.9	x	0.77	X	1.62	X	45.59	X	0.63	X	0.8	=	77.39	(80)
West 0.9	x 🗌	0.77	X	1.62	X	24.49	X	0.63	X	0.8	=	41.57	(80)
West 0.9	x 🗌	0.77	X	1.62	X	16.15	X	0.63	x	0.8	=	27.42	(80)
Rooflights 0.9	x 🗌	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x 🗌	1	X	1.1	X	25.93	x	0.63	X	0.8	=	12.94	(82)
Rooflights 0.9	x 🗌	1	X	0.78	x	25.93	x	0.63	x	0.8	=	9.17	(82)
Rooflights 0.9	x 🗌	1	X	1.33	x	51.88	x	0.63	X	0.8	=	62.59	(82)
Rooflights 0.9	×	1	X	1.33	x	51.88	X	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9	×	1	x	1.1	x	51.88	x	0.63	x	0.8	=	25.88	(82)
Rooflights 0.9	×	1	x	0.78	x	51.88	x	0.63	x	0.8	=	18.35	(82)
Rooflights 0.9	x	1	x	1.33	x	88.38	x	0.63	x	0.8] =	106.64	(82)
Rooflights 0.9	×	1	x	1.33	x	88.38	x	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9	×	1	x	1.1	x	88.38	x	0.63	x	0.8	=	44.1	(82)
Rooflights 0.9	×	1	x	0.78	x	88.38	x	0.63	x	0.8	j =	31.27	(82)
Rooflights 0.9	×	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	x 🔚	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	×	1	x	1.1	x	133.65	х	0.63	x	0.8	j =	66.69	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	0.78	x	133.65	x	0.63	х	0.8	j =	47.29	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	x	0.63	х	0.8	j =	202.82	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	х	0.63	x	0.8	j =	202.82	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	1.1	x	168.1	x	0.63	х	0.8	j =	83.87	(82)
Rooflights 0.9	×	1	x	0.78	x	168.1	x	0.63	x	0.8	=	59.47	(82)
Rooflights 0.9	×	1	×	1.33	x	174	x	0.63	x	0.8	j =	209.95	(82)
Rooflights 0.9	×Ħ	1	x	1.33	x	174	x	0.63	x	0.8	=	209.95	(82)
Rooflights 0.9	×	1	x	1.1	x	174	x	0.63	x	0.8	=	86.82	(82)
Rooflights 0.9	×	1	X	0.78	X	174	X	0.63	x	0.8	=	61.56	(82)
Rooflights 0.9	×	1	X	1.33	X	164.87	X	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9	_	1	X	1.33	X	164.87	X	0.63	x	0.8	, 	198.92	(82)
Rooflights 0.9	_	1	X	1.1	X	164.87	x	0.63	x	0.8	, =	82.26	(82)
Rooflights 0.9		1	X	0.78	X	164.87	X	0.63	x	0.8	, =	58.33	(82)
Rooflights 0.9		1	X	1.33) x	138.72]] x	0.63	x	0.8] =	167.38	(82)
		<u> </u>	J		1		1		I		ı		_ ` ′

										_				
Rooflights _{0.9x}	1	X	1.3	33	X	138.72	2	X	0.63	X	0.8	=	167.38	(82)
Rooflights 0.9x	1	X	1.	1	X	138.72	2	X	0.63	X	0.8	=	69.22	(82)
Rooflights 0.9x	1	X	0.7	'8	x	138.72	2	X	0.63	X	0.8	=	49.08	(82)
Rooflights 0.9x	1	X	1.3	33	x	104.3	3	x	0.63	X	0.8	=	125.88	(82)
Rooflights _{0.9x}	1	X	1.3	33	x	104.3	3	x	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.	1	x	104.3	3	x	0.63	x	0.8	=	52.05	(82)
Rooflights 0.9x	1	X	0.7	'8	x	104.3	3	x	0.63	x	0.8	=	36.91	(82)
Rooflights 0.9x	1	X	1.3	33	x	62.32	2	x	0.63	×	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.3	33	x	62.32	2	x	0.63	x	0.8		75.2	(82)
Rooflights 0.9x	1	X	1.	1	x	62.32	2	x	0.63	×	0.8	_ =	31.1	(82)
Rooflights 0.9x	1	X	0.7	'8	х	62.32	2	x	0.63	×	0.8	=	22.05	(82)
Rooflights 0.9x	1	X	1.3	33	х	32.54		x	0.63	×	0.8	=	39.26	(82)
Rooflights 0.9x	1	x	1.3	33	x	32.54	.	x	0.63	×	0.8	=	39.26	(82)
Rooflights _{0.9x}	1	x	1.	1	x	32.54		x	0.63	×	0.8		16.23	(82)
Rooflights _{0.9x}	1	x	0.7	'8	x	32.54	.	x	0.63	×	0.8		11.51	(82)
Rooflights _{0.9x}	1	x	1.3	33	x	21.19		x	0.63	×	0.8	_ =	25.57	(82)
Rooflights _{0.9x}	1	x	1.3	33	x	21.19		x	0.63	×	0.8	_ =	25.57	(82)
Rooflights _{0.9x}	1	x	1.	1	x	21.19		x	0.63	×	0.8	-	10.57	(82)
Rooflights 0.9x	1	x	0.7	' 8	x	21.19	,	x	0.63	= x	0.8	=	7.5	(82)
Solar gains in (83) m= 238 Total gains – i (84) m= 584.24	437.45	670	927.58	1111.71	11: + (8	33)m , wa	79.54	(83)m 940 1205	!	(82)m 504.0 798.7	7 291.24	199.5 535.11]	(83) (84)
7. Mean inter	nal temp	erature	(heating	season)									
Temperature	during h	eating p	eriods ir	the livi	ng a	area fron	n Tab	le 9,	Th1 (°C)				21	(85)
Utilisation fac	tor for ga	ains for I	iving are	ea, h1,m	ı (se	ee Table	9a)				-		,	
Jan	Feb	Mar	Apr	May	١,	Jun J	Jul	Αι	ug Sep	Oct	: Nov	Dec		
(86)m= 1	0.99	0.96	0.87	0.71	0	0.53 0.	.39	0.4	5 0.71	0.94	0.99	1]	(86)
Mean interna	l tempera	ature in	iving are	ea T1 (fo	ollo	w steps 3	3 to 7	in T	able 9c)				_	
(87)m= 19.38	19.67	20.09	20.56	20.85	20	0.97 20).99	20.9	99 20.89	20.44	19.81	19.34		(87)
Temperature	during h	eating p	eriods ir	rest of	dw	elling fro	m Ta	ble 9), Th2 (°C)					
(88)m= 19.66	19.67	19.67	19.69	19.69	1	9.7	9.7	19.	7 19.7	19.69	19.68	19.68]	(88)
Utilisation fac	tor for a	ains for i	est of d	welling.	h2.i	m (see T	able	9a)	•		_	•	-	
(89)m= 0.99	0.98	0.94	0.83	0.64	1		.28	0.3	3 0.61	0.91	0.99	1]	(89)
Mean interna	l temper	aturo in t	the rest	of dwall	ina	T2 (follo	w eta	nc 3	to 7 in Tabl	0.00		<u>I</u>	J	
(90)m= 18.22	18.51	18.92	19.37	19.6	Ť		9.7	19.		19.27	18.66	18.19	1	(90)
(3-2)		-									ving area ÷ (<u> </u>	0.22	(91)
Marrie	Lance			-11		\ (I A		. /4			,			` ′
Mean interna (92)m= 18.48	1 tempera	19.19	r the wh	ole dwe 19.88	$\overline{}$	· ·	× 11 -	+ (1 19.9		19.53	18.92	18.45	1	(92)
Apply adjustr					<u> </u>							10.40	J	(32)
Apply aujusti	n o ni io li	ie illeali	шеша	remper	aiu	ie iioiii I	abie	+c ,	wilete appli	ρηαιτ	;			

(93)m=	18.48	18.77	19.19	19.63	19.88	19.98	19.99	19.99	19.93	19.53	18.92	18.45		(93)
` '			uirement		13.00	19.50	10.00	13.55	10.00	10.00	10.02	10.43		(00)
					ro obtoir	and at et	on 11 of	Table Or	o co tha	t Ti m_(76\m an	d re-calc	ulato	
				using Ta		ieu ai sii	з р 11 01	i able st), 50 illa	t 11,111=(rojili ali	u re-caic	uiate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac		ains, hm	<u> </u>					•					
(94)m=	0.99	0.98	0.93	0.83	0.65	0.45	0.3	0.36	0.63	0.91	0.98	0.99		(94)
Usefu	ıl gains,	hmGm .	W = (94	4)m x (8	4)m		l .							
(95)m=	579.7	764.49	937.39	1024.56	<u> </u>	634.17	407.1	428.32	652.12	723.65	598.43	532.12		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8		<u> </u>						
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	loss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m-	– (96)m]				
1				1314.82		648.9	409.24	432.35	706.45	1091.46	1451.21	1758.8		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97)	m – (95)m] x (4 ⁻	1)m			
(98)m=	886.38	647.03	474.5	208.99	64.93	0	0	0	0	273.65	614	912.66		
1								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	4082.13	(98)
Snace	a haatin	a require	ment in	kWh/m²	2/vear							·	50.09	(99)
·		•			/yeai							l	50.09	
			uiremer											
Calcu				August.	l .									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		<u> </u>			1			and exte		_		r i		(400)
(100)m=	0	0		0	0	1134.65	893.24	915.32	0	0	0	0		(100)
		tor for lo		I _		T	I	1			_			(404)
(101)m=		0	0	0	0	0.92	0.96	0.94	0	0	0	0		(101)
1				(100)m x	<u> </u>	ı	1	1 1						(400)
(102)m=	0	0	0	0	0	1044.26	853.16	856.69	0	0	0	0		(102)
1								e Table						(4.55)
(103)m=		0	0	0	0	1638.2	l	1424.62	0	0	0	0		(103)
				r month, : 3 × (98		dwelling,	continue	ous (kW	h = 0.02	24 x [(10	03)m – (102)m] x	c (41)m	
(104)m=	04)111 10	0	0	0	0	427.64	530.64	422.54	0	0	0	0		
(104)111	U	Ū				1 427.04	330.04	422.04		= Sum(=	1380.82	(104)
Cooled	I fraction	1								•	area ÷ (4		1300.62	(104)
			able 10b)					, 0 –	oooloa (aroa . (·/	'	(,
(106)m=		0	0	0	0	0.25	0.25	0.25	0	0	0	0		
, ,					<u> </u>	<u> </u>	<u> </u>		Total	' = Sum((104)	=	0	(106)
Space	cooling	requirer	nent for	month =	: (104)m	× (105)	× (106)r	n			-00 - /	l		┛` ′
(107)m=		0	0	0	0	106.91	132.66	105.63	0	0	0	0		
1						!		<u> </u>	Total	= Sum(1,0,7)	=	345.21	(107)
Snace	cooling	requirer	nent in k	:(Wh/m²/	/ear					· (4) =	,	l	4.24	(108)
•		•				dor or	oial acus	litions	` ′	` '			4.24	
			, i	aiculatec	romy un	ider-spec	Jai Cono	litions, se		· ·				7(400)
rabrio	c <u>⊨nerg</u> y	/ Efficier	тсу						(99) -	+ (108) =	=		54.32	(109)

		User Details:		
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber: S	TRO030065
Software Name:	Stroma FSAP 2012	Software V	ersion: Ve	ersion: 1.0.5.25
	Pro	operty Address: HOU	SE C - BASELINE	
Address :	Woodwell Cottage P2, Woodw	well Road, BRISTOL,	BS11 9XU	
1. Overall dwelling dime	ensions:			
		Area(m²)	Av. Height(m)	Volume(m³)
Ground floor		40.75 (1a) x	2.6 (2a) = 105.95 (3a)
First floor		40.75 (1b) x	2.24 (2b) = 91.28 (3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	81.5 (4)		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+(3n)	= 197.23 (5)
2. Ventilation rate:				
	main secondary heating heating	other	total	m³ per hour
Number of chimneys	0 + 0	+ 0 =	0 x 40 =	0 (6a)
Number of open flues	0 + 0	+ 0 =	0 x 20 =	0 (6b)
Number of intermittent fa	ns		3 x 10 =	30 (7a)
Number of passive vents			0 x 10 =	0 (7b)
Number of flueless gas fi	res		0 x 40 =	0 (7c)
				ir changes per hour
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(7a)$)+(7h)+(7c) =		
•	peen carried out or is intended, proceed		30 ÷ (5)	= 0.15 (8)
Number of storeys in the		, ,,	, , , ,	0 (9)
Additional infiltration	- · ·		[(9)-1]x0	
Structural infiltration: 0	.25 for steel or timber frame or 0	0.35 for masonry cons	struction	0 (11)
if both types of wall are pa deducting areas of openia	resent, use the value corresponding to t ngs); if equal user 0.35	he greater wall area (after		
=	floor, enter 0.2 (unsealed) or 0.1	(sealed), else enter	0	0 (12)
If no draught lobby, en	ter 0.05, else enter 0			0 (13)
Percentage of windows	s and doors draught stripped			0 (14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =	0 (15)
Infiltration rate		(8) + (10) + (11) +	- (12) + (13) + (15) =	0 (16)
Air permeability value,	q50, expressed in cubic metres	per hour per square	metre of envelope are	a 5.38000011444092 (17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$		0.42 (18)
	es if a pressurisation test has been done	or a degree air permeabil	ity is being used	
Number of sides sheltere	ed	(00) 4 [0.075]	. (40)]	0 (19)
Shelter factor		(20) = 1 - [0.075)	, , , , ,	1 (20)
Infiltration rate incorporat	_	$(21) = (18) \times (20)$	=	0.42 (21)
Infiltration rate modified f				
Jan Feb	Mar Apr May Jun	Jul Aug Se _l	Oct Nov [Dec
Monthly average wind sp	peed from Table 7			

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Fa	actor (2	2a)m =	(22)m ÷	4										
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted	d infiltra	ation rate	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m	-				
Γ	0.54	0.53	0.52	0.46	0.45	0.4	0.4	0.39	0.42	0.45	0.47	0.49]	
Calculat			_	rate for t	he appli	cable ca	se			!			·	(00-)
		al ventila eat pump (endix N. (2	(3b) = (23a	a) × Fmv (e	eguation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a) (23b)
			0		, ,	,	actor (fron	,, .	,	, (,			0	(23c)
a) If b	alance	d mecha	anical ve	entilation	with hea	at recov	ery (MVI	HR) (24a	a)m = (22	2b)m + ((23b) × [1 – (23c)		(200)
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If b	alance	d mecha	anical ve	ntilation	without	heat red	covery (N	иV) (24k	m = (22)	2b)m + (23b)	·		
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If w	hole h	ouse ext	tract ven	tilation o	or positiv	e input	ventilatio	on from (outside	-	-	-	-	
_	(22b)m	า < 0.5 x	(23b), t	hen (24d	c) = (23b	o); other	wise (24	c) = (22l	o) m + 0.	.5 × (23k	o)	,	1	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,					•	•	ventilatio		loft 2b)m² x	0.51				
(24d)m=	0.64	0.64	0.63	0.61	0.6	0.58	0.58	0.5 + [(2	0.59	0.5]	0.61	0.62	1	(24d)
` ′ _					<u> </u>	<u> </u>	c) or (24	ļ	Į		1	1	J	, ,
(25)m=	0.64	0.64	0.63	0.61	0.6	0.58	0.58	0.58	0.59	0.6	0.61	0.62	1	(25)
2 Hoof	t loogo	and be	eat loss p	oromot	or.		ı	1	ı	ı			1	
J. Heat	1 10336	s and ne	σαι Ιυσο μ	Jaranieu	∵∣.									
ELEM	ENT	Gros	SS	Openin	gs	Net Ar		U-val		A X U		k-value		AXk
ELEM Doors	ENT		SS		gs	A ,r	m²	W/m2	2K	(W/	K)	k-value kJ/m²-l		kJ/K
Doors		Gros area	SS	Openin	gs	A ,r	m² x		2K = [(W/ 2.702	K)			kJ/K (26)
Doors Window	s Type	Gros area	SS	Openin	gs	A ,r	m² x x10	W/m2	2K = [0.04] = [2.702 2.15	K)			kJ/K (26) (27)
Doors Windows	s Type	Gros area	SS	Openin	gs	A ,r 1.93 1.62	m² x x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+		2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
Doors Windows Windows	s Type s Type s Type	Gros area	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & \\ & & 0.04 & = \\ 0.04 & & & \\ 0.04 & & & \\ 0.04 & & & \\ \end{array} $	2.702 2.15 2.15 8.06	K)			kJ/K (26) (27) (27) (27)
Doors Windows Windows Windows	s Type s Type s Type s Type	Gros area	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14	x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Windows Windows Windows Roofligh	s Type s Type s Type s Type s Type ts Type	Gros area 1 2 2 3 4 4 e 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33	x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	(W/ 2.702 2.15 2.15 8.06 2.84 1.862	K) 			kJ/K (26) (27) (27) (27) (27) (27)
Doors Windows Windows Windows Roofligh	s Type s Type s Type s Type s Type ats Typ ats Typ	Gros area 1 2 2 3 4 e 1 e 2	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	$ \begin{array}{ccc} 2K & & & & \\ & & & & \\ & & & & \\ & & & &$	(W/ 2.702 2.15 2.15 8.06 2.84 1.862	K) 			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Windows Windows Roofligh Roofligh	s Type s Type s Type s Type ats Typ ats Typ ats Typ	Gros area	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	$\begin{array}{ccc} 2K & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$	2.702 2.15 2.15 8.06 2.84 1.862 1.862	K) 			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Windows Windows Roofligh Roofligh Roofligh	s Type s Type s Type s Type ats Typ ats Typ ats Typ	Gros area	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.37	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54	K) 			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b)
Doors Windows Windows Windows Roofligh Roofligh Roofligh Roofligh	s Type s Type s Type s Type ats Typ ats Typ ats Typ ats Typ	Gros area 1 1 2 2 3 4 e 1 e 2 e 3 e 4	es (m²)	Openin	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (27b)
Doors Windows Windows Windows Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Walls Ty	s Type s Type s Type s Type ats Typ ats Typ ats Typ ats Typ	Gros area 1 1 2 2 3 4 4 e 1 e 2 e 3 e 4	es (m²)	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28)
Doors Windows Windows Windows Roofligh Roofligh Roofligh Roofligh Roofligh Walls Ty Walls Ty	s Type s Type s Type s Type ats Typ ats Typ ats Typ ats Typ	Gros area 1 1 2 2 3 4 4 e 1 e 2 e 3 e 4	95	16.63 0	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
Doors Windows Windows Windows Roofligh Roofligh Roofligh Roofligh Roofligh Walls Ty Walls Ty Roof	s Type s Type s Type its Typ	Gros area 11 22 33 44 e 1 e 2 e 3 e 4 102.9	95 3	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) +	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Doors Windows Windows Windows Roofligh Roofligh Roofligh Roofligh Floor Walls Ty Walls Ty Roof Total are * for windows	s Type s Type s Type its Typ	Gros area 11 22 33 44 e 1 e 2 e 3 e 4 102.9 1ements roof windo	95 3 , m ² pws, use e	Openin m 16.63 0 7.2	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + 0.17 0.24 0.15	EK = [0.04] =	(W/ 2.702 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)		K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
Doors Windows Windows Windows Windows Roofligh Roofligh Roofligh Roofligh Roofligh Total are * for windo ** include	s Type s Type s Type s Type ats Typ at	Gros area 1 2 3 4 e 1 e 2 e 3 e 4 f 102.9 61.3 lements roof windows on both	95 3 , m ² pws, use e sides of in	16.6: 0 7.2 Iffective winternal wall	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1.	W/m ² 1.4 /[1/(1.4)+ /[1/($ \begin{array}{cccc} 2K & & & & & \\ & & & & & \\ & & & & & \\ & & & &$	(W/ 2.702 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (30) (31)
Doors Windows Windows Windows Roofligh Roofligh Roofligh Roofligh Floor Walls Ty Walls Ty Roof Total are * for windo ** include Fabric h	s Type s Type s Type its Typ ype1 ype2 ea of e ows and the area ieat los	Gros area 11 22 33 44 e 1 e 2 e 3 e 4 102.9 101.3 Ilements roof windows on both as, W/K =	95 3 , m ² pws, use e sides of in = S (A x	16.6: 0 7.2 Iffective winternal wall	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + /[1/(1.4) + 0.17 0.24 0.15	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²-l	n 3.2	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Doors Windows Windows Windows Windows Roofligh Roofligh Roofligh Roofligh Roofligh Total are * for windo ** include	rs Type rs Type rs Type rs Type rts Typ rea of e	Gros area 11 22 34 41 e 1 e 2 e 3 e 4 formal area 102.9 61.3 lements roof windows on both ss, W/K = Cm = S(95 3 , m ² ows, use e sides of in = S (A x A x k)	16.63 0 7.2 Iffective winternal walk	gs 1 ² 3 indow U-va Is and pan	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1 207 alue calculatitions	x1.	W/m ² 1.4 /[1/(1.4)+ /[1/($ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.862 1.862 1.54 1.092 6.9275 20.72 0.48 8.12	K)	kJ/m²-l	K	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)

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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

an be used														
hermal b	_					-	K						14.98	(36
<i>details of ti</i> otal fabri		0 0	are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			00.00	(37
entilation			lculated	l monthly	./				` '	$= 0.33 \times ($	25)m x (5)		82.96	(3/
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
<u> </u>	1.92	41.56	41.2	39.53	39.21	37.75	37.75	37.48	38.31	39.21	39.85	40.51		(38
eat trans	sfer co	efficier	nt W/K				<u> </u>		(39)m	= (37) + (37)	 38)m		l	
_		124.52	124.16	122.48	122.17	120.71	120.71	120.44	121.27	122.17	122.8	123.47		
		!				<u> </u>	!	!	,	Average =	Sum(39) ₁	12 /12=	122.48	(3
eat loss		<u> </u>				<u> </u>	1	1		= (39)m ÷	·	1	1	
0)m= 1	1.53	1.53	1.52	1.5	1.5	1.48	1.48	1.48	1.49	1.5	1.51	1.51	4.5	(40
umber o	of days	in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.5	(41
J	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
-1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
4. Water	heatir	ng ener	gy requi	rement:								kWh/ye	ear:	
													1	
				[1 - AVD	(<u>-</u> 0 0003	2/0 v /TF	-Δ -13 Q)2)] <u>+</u> 0 (1013 v (Γ Γ Δ -13		49		(4
if TFA >	> 13.9,	N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		49		(4
if TFA >	> 13.9, £ 13.9,	N = 1 N = 1	+ 1.76 x							ΓFA -13.	9)]	Ì
	> 13.9, £ 13.9, verage	N = 1 N = 1 hot wa	+ 1.76 x iter usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	3.35]	
if TFA > if TFA £ nnual av educe the	> 13.9, £ 13.9, verage annual a	N = 1 N = 1 hot wa average	+ 1.76 x iter usag	ge in litre usage by	es per da 5% if the a	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)			Ì
if TFA > if TFA £ nnual av educe the continuous that	> 13.9, £ 13.9, verage annual a at 125 lit	N = 1 N = 1 hot wa average tres per p	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		9)			Ì
if TFA > if TFA £ nnual av educe the continuous that	> 13.9, £ 13.9, verage annual a at 125 lit	N = 1 N = 1 hot wa average tres per p	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	3.35		·
if TFA £ if TFA £ nnual av educe the ot more tha ot water us	> 13.9, £ 13.9, verage annual a at 125 lit	N = 1 N = 1 hot wa average tres per p	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	3.35		·
if TFA sent if TFA for the following in	> 13.9, £ 13.9, verage annual at 125 lit Jan sage in 1	N = 1 N = 1 hot wa average tres per p Feb litres per	+ 1.76 x ater usag hot water person per Mar day for ea 95.22	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49	Oct 95.22 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ =	Dec 102.69	1120.25	(4
if TFA > if TFA £ nnual av educe the tot more that of water us 4)m= 10	> 13.9, £ 13.9, verage annual at 125 lit Jan Sage in 1 02.69	N = 1 N = 1 hot wa average tres per p Feb litres per 98.96	+ 1.76 x Inter usage hot water person per Mar day for ear 95.22	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is not and co Jun ctor from 1 84.02	erage = designed and designed a	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49 c) kWh/mor	Oct 95.22 Total = Su th (see Ta	9) 93 Nov 98.96 m(44)112 = ables 1b, 1	Dec 102.69 = c, 1d)	1120.25	(4
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if TFA > if TFA £ nnual av educe the continuous that more that ot water us 4)m= 10 nergy content 5)m= 15	> 13.9, £ 13.9, verage annual at 125 lit Jan Sage in 10 02.69 tent of he	N = 1 N = 1 hot wa average tres per p Feb litres per 98.96 ot water	+ 1.76 x Inter usage hot water person per Mar day for ear 95.22 used - calc 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated me	es per da 5% if the da 5% if th	ay Vd,av lwelling is not and co Jun ctor from 7 84.02 190 x Vd,r	erage = designed and designed a	(25 x N) to achieve Aug (43) 87.75 27m / 3600 105.5	+ 36 a water us Sep 91.49 0 kWh/mor 106.76	Oct 95.22 Total = Su th (see Ta	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81	Dec 102.69 = c, 1d) 147.48	1120.25	(4
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		m water (54) in (5	_	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0	(54 (55	•
		. , .	,	for each	month			((56)m = (55) × (41):	m		0	(55)	,
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56	i)
If cylinde	r contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	I lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57	")
Primary	y circuit	loss (ar	nual) fro	om Table	3		-			_		0	(58)	5)
-		•	•			(59)m = ((58) ÷ 36	55 × (41)	m				•	
` r	lified by	factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		1	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)
Combi	loss cal	culated	for each	month ((61)m =	(60) ÷ 30	65 × (41))m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64	(61))
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12	(62)	2)
										r contributi	on to wate	er heating)		
` r			r	r	i	applies	· ·		_			1	1	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63	•
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63)) (G2)
Output		ater hea	ter		-								1	
(64)m=	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12	1.	
								·		ater heatei			1617.66 (64	.)
Ī				1	i	 	× (45)m	+ (61)m	1] + 0.8 >	k [(46)m		+ (59)m]	
(65)m=	53.8	1711												
		47.14	48.86	42.9	41.39	36.05	33.73	38.24	38.56	44.53	48.21	52.2	(65)
	de (57)ı	m in cald	culation	of (65)m	only if c	ļ	<u> </u>			44.53 rater is fr		ļ	j i)
	de (57)ı	m in cald	culation	<u> </u>	only if c	ļ	<u> </u>			ļ.		ļ	j i)
5. Inte	de (57)ı ernal ga olic gain	m in cald ains (see s (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	rater is fr	om com	munity h	j i	
5. Into	de (57)ı ernal ga blic gain Jan	m in cald ains (see s (Table Feb	culation of Table 5 (5), Wat Mar	of (65)m and 5a ts Apr	only if c	ylinder i	s in the o	dwelling	or hot w	rater is fr	om com	munity h	neating	
5. Inte	de (57)r ernal ga blic gain Jan 124.54	m in cald ains (see s (Table Feb 124.54	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 124.54	only if c : : : : : : : : : : : : : : : : : : :	Jun	Jul 124.54	Aug 124.54	or hot w Sep 124.54	rater is fr	om com	munity h	j i	
5. Intended (66)m=	de (57)ı ernal ga blic gain Jan 124.54 g gains	m in cald	Table 5 2 5), Wat Mar 124.54	of (65)m and 5a ts Apr 124.54 ppendix	only if constructions: May 124.54 L, equat	Jun 124.54	Jul 124.54 r L9a), a	Aug 124.54	Sep 124.54 Table 5	Oct	Nov 124.54	Dec	neating (66	
5. Into	de (57)i ernal ga blic gain Jan 124.54 g gains 21.82	m in calc ains (see s (Table Feb 124.54 (calcula	Table 5 2 5), Wat Mar 124.54 ted in Ap	of (65)m 6 and 5a tts Apr 124.54 opendix 11.93	May 124.54 L, equat 8.92	Jun 124.54 ion L9 o	Jul 124.54 r L9a), a	Aug 124.54 Iso see	Sep 124.54 Table 5	Oct 124.54	om com	munity h	neating	
5. Into	de (57)i ernal ga blic gain Jan 124.54 g gains 21.82	m in calc	Table 5 2 5), Wat Mar 124.54 ted in Ap 15.76	of (65)m 5 and 5a ts Apr 124.54 ppendix 11.93	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction of the construction	Jun 124.54 ion L9 o 7.53 uation L	Jul 124.54 r L9a), a 8.14 13 or L1	Aug 124.54 Iso see 10.58 3a), also	Sep 124.54 Table 5 14.2 see Ta	Oct 124.54 18.03 ble 5	Nov 124.54 21.04	Dec 124.54	neating (66	
5. Into	de (57)i ernal ga blic gain Jan 124.54 g gains 21.82 nces gai 222.55	m in calc ains (see s (Table Feb 124.54 (calcula 19.38 ins (calc	Table 5 2 5), Wat Mar 124.54 ted in Ap 15.76 ulated ir 219.04	of (65)m 5 and 5a ts Apr 124.54 ppendix 11.93 Appendix 206.65	only if construction only if c	Jun 124.54 ion L9 o 7.53 uation L	Jul 124.54 r L9a), a 8.14 13 or L1 166.49	Aug 124.54 Iso see 10.58 3a), also	Sep 124.54 Table 5 14.2 see Ta	Oct 124.54 18.03 ble 5 182.39	Nov 124.54	Dec	neating (66	
5. Into	de (57)i ernal ga blic gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains	m in calc	Table 5 2 5), Wat Mar 124.54 ted in Ap 15.76 ulated ir 219.04	of (65)m and 5a ts Apr 124.54 ppendix 11.93 Append 206.65 ppendix	only if constructions only if constructions only if constructions on the construction of the construction of the construction of the construction on the construction of the construction	Jun 124.54 ion L9 o 7.53 uation L 176.31 tion L15	Jul 124.54 r L9a), a 8.14 13 or L1 166.49 or L15a	Aug 124.54 Iso see 10.58 3a), also 164.18	Sep 124.54 Table 5 14.2 see Ta 170 ee Table	Oct 124.54 18.03 ble 5 182.39	Nov 124.54 21.04 198.03	Dec 124.54 22.43	(66) (67) (68)	
5. Into Metabook (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains 35.45	m in calc ains (see s (Table Feb 124.54 (calcula 19.38 ins (calc 224.86 (calcula 35.45	Table 5 2 5), Wat Mar 124.54 ted in Ap 15.76 ulated ir 219.04 ated in A	of (65)m s and 5a ts Apr 124.54 ppendix 11.93 Append 206.65 ppendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 7.53 uation L	Jul 124.54 r L9a), a 8.14 13 or L1 166.49	Aug 124.54 Iso see 10.58 3a), also	Sep 124.54 Table 5 14.2 see Ta	Oct 124.54 18.03 ble 5 182.39	Nov 124.54 21.04	Dec 124.54	neating (66	
5. Into Metabotic (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps	de (57)i ernal ga blic gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains 35.45 and far	m in calces (Table Feb 124.54 (calcular 19.38 ins (calcular 35.45 ins gains	Table 5 2 5), Wat Mar 124.54 ted in Ap 15.76 ulated ir 219.04 tted in A 35.45 (Table \$	of (65)m 5 and 5a ts Apr 124.54 ppendix 11.93 Appendix 206.65 ppendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 7.53 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 8.14 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 10.58 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 14.2 see Ta 170 ee Table 35.45	Oct 124.54 18.03 ble 5 182.39 5 35.45	Nov 124.54 21.04 198.03	Dec 124.54 22.43 35.45	(66 (67 (68	
5. Into Metabotic (66)m= [Lighting (67)m= [Appliar (68)m= [Cookin (69)m= [Pumps (70)m= [de (57)i ernal ga blic gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains 35.45 and far	m in calc ains (see s (Table Feb 124.54 (calcula 19.38 ins (calc 224.86 (calcula 35.45 ns gains	Mar 124.54 ted in Ap 15.76 ulated ir 219.04 ated in A 35.45 (Table \$	of (65)m 5 and 5a ts Apr 124.54 ppendix 11.93 Appendix 206.65 ppendix 35.45 5a) 3	only if constructions only its constructions only in constructions	Jun 124.54 ion L9 o 7.53 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 8.14 13 or L1 166.49 or L15a	Aug 124.54 Iso see 10.58 3a), also 164.18	Sep 124.54 Table 5 14.2 see Ta 170 ee Table	Oct 124.54 18.03 ble 5 182.39	Nov 124.54 21.04	Dec 124.54 22.43	(66) (67) (68)	
5. Into Metabo (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses	de (57)i ernal ga blic gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains 35.45 and far 3	m in calce s (Table Feb 124.54 (calcula 19.38 ins (calce 224.86 (calcula 35.45 ns gains 3	ted in Apulated in	of (65)m of and 5a ts Apr 124.54 opendix 11.93 Append 206.65 opendix 35.45 opendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 7.53 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 8.14 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 10.58 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 14.2 see Ta 170 ee Table 35.45	Oct 124.54 18.03 ble 5 182.39 5 35.45	Nov 124.54 21.04 198.03 35.45	Dec 124.54 22.43 35.45	(66 (67 (68 (69	
5. Into Metabo (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains 35.45 and far 3 e.g. ev	m in calces (Table Feb 124.54 (calcular 19.38 ins (calcular 35.45 ins gains 3 raporation 199.63	Table 5 2 5), Wat Mar 124.54 ted in Ap 15.76 ulated in 219.04 ted in A 35.45 (Table 5 3 on (nega	of (65)m 5 and 5a ts Apr 124.54 ppendix 11.93 Appendix 206.65 ppendix 35.45 5a) 3	only if constructions only its constructions only in constructions	Jun 124.54 ion L9 o 7.53 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 8.14 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 10.58 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 14.2 see Ta 170 ee Table 35.45	Oct 124.54 18.03 ble 5 182.39 5 35.45	Nov 124.54 21.04 198.03	Dec 124.54 22.43 35.45	(66 (67 (68	
5. Into Metabo (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water H	de (57)i ernal gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains 35.45 and far 3 e.g. ev -99.63 neating	m in calc s (Table Feb 124.54 (calcula 19.38 ins (calc 224.86 (calcula 35.45 ns gains 3 aporatic -99.63 gains (T	ted in Ap 15.76 ulated in Ap 15.45 (Table 5 3 on (nega -99.63	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 11.93 Appendix 206.65 opendix 35.45 oa) 3 tive valu -99.63	only if constructions only in constructions on the construction of	Jun 124.54 ion L9 o 7.53 uation L 176.31 tion L15 35.45 3 ole 5) -99.63	Jul 124.54 r L9a), a 8.14 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 10.58 3a), also 164.18 35.45	Sep 124.54 Table 5 14.2 see Ta 170 ee Table 35.45	Oct 124.54 18.03 ble 5 182.39 5 35.45	Nov 124.54 21.04 198.03 35.45	Dec 124.54 22.43 35.45 3 -99.63	(66 (67 (68 (70	
5. Into Metabo (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	de (57)i ernal gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains 35.45 and far 3 e.g. ev -99.63 neating 72.31	m in calces (Table Feb 124.54 (calcula 19.38 ins (calcula 35.45 ins gains 3 raporatio -99.63 gains (T 70.15	ted in Ap 15.76 ulated in Ap 219.04 (Table 5) (Table 5) ap (negaration of the first test) ap (1.50 first test) a	of (65)m of and 5a ts Apr 124.54 opendix 11.93 Append 206.65 opendix 35.45 opendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 7.53 uation L 176.31 tion L15 35.45 3 ole 5) -99.63	Jul 124.54 r L9a), a 8.14 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 10.58 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 14.2 see Ta 170 ee Table 35.45 3 -99.63	Oct 124.54 18.03 ble 5 182.39 5 35.45 3 -99.63	Nov 124.54 21.04 198.03 35.45 3	Dec 124.54 22.43 35.45 3 -99.63	(66 (67 (68 (69	
5. Into Metabo (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	de (57)i ernal gain Jan 124.54 g gains 21.82 nces gai 222.55 g gains 35.45 and far 3 e.g. ev -99.63 neating 72.31	m in calc s (Table Feb 124.54 (calcula 19.38 ins (calc 224.86 (calcula 35.45 ns gains 3 aporatic -99.63 gains (T	ted in Ap 15.76 ulated in Ap 219.04 (Table 5) (Table 5) ap (negaration of the first test) ap (1.50 first test) a	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 11.93 Appendix 206.65 opendix 35.45 oa) 3 tive valu -99.63	only if constructions only in constructions on the construction of	Jun 124.54 ion L9 o 7.53 uation L 176.31 tion L15 35.45 3 ole 5) -99.63	Jul 124.54 r L9a), a 8.14 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 10.58 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 14.2 see Ta 170 ee Table 35.45 3 -99.63	Oct 124.54 18.03 ble 5 182.39 5 35.45	Nov 124.54 21.04 198.03 35.45 3	Dec 124.54 22.43 35.45 3 -99.63	(66 (67 (68 (70	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.8	=	6.02	(74)
North	0.9x	0.77	x	1.62	x	20.32	X	0.63	x	0.8	=	11.5	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	X	0.8	=	19.54	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	31.38	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	42.28	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	45.26	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	42.25	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	X	0.8	=	33.52	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	23.49	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	X	0.8	=	13.69	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	7.42	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	5.02	(74)
East	0.9x	0.77	x	2.14	x	19.64	x	0.63	x	0.8	=	14.68	(76)
East	0.9x	0.77	x	2.14	x	38.42	x	0.63	x	0.8	=	28.72	(76)
East	0.9x	0.77	x	2.14	x	63.27	x	0.63	x	0.8	=	47.29	(76)
East	0.9x	0.77	x	2.14	x	92.28	x	0.63	x	0.8	=	68.97	(76)
East	0.9x	0.77	x	2.14	x	113.09	x	0.63	x	0.8	=	84.53	(76)
East	0.9x	0.77	x	2.14	x	115.77	x	0.63	x	0.8	=	86.53	(76)
East	0.9x	0.77	x	2.14	x	110.22	x	0.63	x	0.8	=	82.38	(76)
East	0.9x	0.77	x	2.14	x	94.68	X	0.63	x	0.8	=	70.76	(76)
East	0.9x	0.77	x	2.14	x	73.59	x	0.63	x	0.8	=	55	(76)
East	0.9x	0.77	x	2.14	x	45.59	x	0.63	x	0.8	=	34.08	(76)
East	0.9x	0.77	X	2.14	x	24.49	X	0.63	x	0.8	=	18.3	(76)
East	0.9x	0.77	X	2.14	x	16.15	X	0.63	X	0.8	=	12.07	(76)
South	0.9x	0.77	X	6.08	X	46.75	X	0.63	X	0.8	=	99.28	(78)
South	0.9x	0.77	X	6.08	x	76.57	X	0.63	X	0.8	=	162.6	(78)
South	0.9x	0.77	X	6.08	x	97.53	X	0.63	X	0.8	=	207.12	(78)
South	0.9x	0.77	X	6.08	X	110.23	X	0.63	X	0.8	=	234.09	(78)
South	0.9x	0.77	X	6.08	x	114.87	X	0.63	X	0.8	=	243.94	(78)
South	0.9x	0.77	X	6.08	x	110.55	X	0.63	X	0.8	=	234.76	(78)
South	0.9x	0.77	X	6.08	X	108.01	X	0.63	X	0.8	=	229.37	(78)
South	0.9x	0.77	X	6.08	x	104.89	X	0.63	X	0.8	=	222.75	(78)
South	0.9x	0.77	X	6.08	x	101.89	x	0.63	x	0.8	=	216.36	(78)
South	0.9x	0.77	X	6.08	x	82.59	X	0.63	x	0.8	=	175.38	(78)
South	0.9x	0.77	X	6.08	x	55.42	x	0.63	x	0.8	=	117.68	(78)
South	0.9x	0.77	X	6.08	x	40.4	x	0.63	x	0.8	=	85.79	(78)

\Most	_		1		1		1		l		1		7,000
West 0.9	\vdash	0.77	X	1.62	X	19.64	X	0.63	X	0.8] = 1	33.34	(80)
West 0.9	\vdash	0.77	X	1.62	X	38.42	X	0.63	X	0.8	=	65.22	(80)
West 0.9		0.77	X	1.62	X	63.27	X	0.63	X	0.8	=	107.4	(80)
West 0.9	\vdash	0.77	X	1.62	X	92.28	X	0.63	X	0.8	=	156.64	(80)
West 0.9	×	0.77	X	1.62	X	113.09	X	0.63	X	0.8	=	191.97	(80)
West 0.9	×	0.77	X	1.62	X	115.77	X	0.63	X	0.8	=	196.52	(80)
West 0.9	×	0.77	X	1.62	X	110.22	Х	0.63	X	0.8	=	187.09	(80)
West 0.9	×	0.77	X	1.62	X	94.68	X	0.63	X	0.8	=	160.71	(80)
West 0.9	×	0.77	X	1.62	X	73.59	X	0.63	X	0.8	=	124.91	(80)
West 0.9	x	0.77	X	1.62	X	45.59	X	0.63	X	0.8	=	77.39	(80)
West 0.9	x 🗌	0.77	X	1.62	X	24.49	X	0.63	X	0.8	=	41.57	(80)
West 0.9	x 🗌	0.77	X	1.62	X	16.15	X	0.63	x	0.8	=	27.42	(80)
Rooflights 0.9	x 🗌	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x 🗌	1	X	1.1	X	25.93	x	0.63	X	0.8	=	12.94	(82)
Rooflights 0.9	x 🗌	1	X	0.78	x	25.93	x	0.63	x	0.8	=	9.17	(82)
Rooflights 0.9	x 🗌	1	X	1.33	x	51.88	x	0.63	X	0.8	=	62.59	(82)
Rooflights 0.9	×	1	X	1.33	x	51.88	X	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9	×	1	x	1.1	x	51.88	x	0.63	x	0.8	=	25.88	(82)
Rooflights 0.9	×	1	x	0.78	x	51.88	x	0.63	x	0.8	=	18.35	(82)
Rooflights 0.9	x 🗔	1	x	1.33	x	88.38	x	0.63	x	0.8] =	106.64	(82)
Rooflights 0.9	×	1	x	1.33	x	88.38	x	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9	×	1	x	1.1	x	88.38	x	0.63	x	0.8	=	44.1	(82)
Rooflights 0.9	×	1	x	0.78	x	88.38	x	0.63	x	0.8	j =	31.27	(82)
Rooflights 0.9	×	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	x 🔚	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	×	1	x	1.1	x	133.65	х	0.63	x	0.8	j =	66.69	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	0.78	x	133.65	x	0.63	х	0.8	j =	47.29	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	x	0.63	х	0.8	j =	202.82	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	х	0.63	x	0.8	j =	202.82	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	1.1	x	168.1	x	0.63	х	0.8	j =	83.87	(82)
Rooflights 0.9	×	1	x	0.78	x	168.1	x	0.63	x	0.8	=	59.47	(82)
Rooflights 0.9	×	1	x	1.33	x	174	x	0.63	x	0.8	j =	209.95	(82)
Rooflights 0.9	× \sqsubset	1	x	1.33	x	174	x	0.63	x	0.8	=	209.95	(82)
Rooflights 0.9	×	1	x	1.1	x	174	x	0.63	x	0.8	=	86.82	(82)
Rooflights 0.9	×	1	X	0.78	X	174	X	0.63	x	0.8	=	61.56	(82)
Rooflights 0.9	×	1	X	1.33	X	164.87	X	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9	_	1	X	1.33	X	164.87	X	0.63	x	0.8	, 	198.92	(82)
Rooflights 0.9	_	1	X	1.1	X	164.87	x	0.63	x	0.8	, =	82.26	(82)
Rooflights 0.9		1	X	0.78	X	164.87	X	0.63	x	0.8	, =	58.33	(82)
Rooflights 0.9		1	X	1.33) x	138.72]] x	0.63	x	0.8] =	167.38	(82)
		<u> </u>	J		1		1		I		ı		_ ` ′

Rooflight	ts o ov [,	100.70	1 , 1	0.00	ı , , ,	0.0		407.00	(92)
	<u> </u>	1	X	1.3	==	-	138.72	X 1	0.63	×	0.8	_ =	167.38	(82)
Rooflight	<u> </u>	1	X	1.		-	138.72	X	0.63	×	0.8	=	69.22	(82)
Rooflight	<u> </u>	1	X	0.7			138.72	X	0.63	×	0.8	=	49.08	(82)
Rooflight	<u> </u>	1	X	1.3		-	104.33	X	0.63	X	0.8	_ =	125.88	(82)
Rooflight	<u> </u>	1	Х	1.3	33	X	104.33	X	0.63	X	0.8	=	125.88	(82)
Rooflight	<u> </u>	1	X	1.	1	X	104.33	X	0.63	X	0.8	=	52.05	(82)
Rooflight	<u> </u>	1	X	0.7	78	X	104.33	X	0.63	X	0.8	=	36.91	(82)
Rooflight	ts _{0.9x}	1	X	1.3	33	X	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflight	ts _{0.9x}	1	X	1.3	33	X	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflight	ts _{0.9x}	1	X	1.	1	X	62.32	X	0.63	X	0.8	=	31.1	(82)
Rooflight	ts _{0.9x}	1	X	0.7	7 8	X	62.32	x	0.63	X	0.8	_	22.05	(82)
Rooflight	ts _{0.9x}	1	x	1.3	33	x	32.54	X	0.63	x	0.8		39.26	(82)
Rooflight	ts _{0.9x}	1	Х	1.3	33	x	32.54	x	0.63	X	0.8	=	39.26	(82)
Rooflight	ts _{0.9x}	1	х	1.	1	x	32.54	x	0.63	X	0.8		16.23	(82)
Rooflight	ts _{0.9x}	1	X	0.7	78	x	32.54	x	0.63	х	0.8		11.51	(82)
Rooflight	ts _{0.9x}	1	х	1.3	33	х	21.19	х	0.63	x	0.8	<u> </u>	25.57	(82)
Rooflight	ts _{0.9x}	1	Х	1.3	33	x	21.19	х	0.63	x	0.8	_	25.57	(82)
Rooflight	ts _{0.9x}	1	X	1.	1	x	21.19	x	0.63	x	0.8		10.57	(82)
Rooflight	ts _{0.9x}	1	x	0.7	78	x	21.19	X	0.63	X	0.8		7.5	(82)
	_													
Solar ga	ains in v	watts, ca	alculated	for eac	h month			(83)m	n = Sum(74)m .	(82)m				
(83)m=	238	437.45	670	927.58	1111.71	1131.34	1079.54			504.07	291.24	199.5		(83)
Total ga	ains – ir	nternal a	nd solar	(84)m =	= (73)m	+ (83)m	, watts		•		•			
(84)m=	618.03	815.2	1033.83	1269.11	1430.63	1428.61	1362.86	1230	0.32 1061.6	827.7	640.63	568.18		(84)
7. Mea	ın interi	nal temp	erature	(heating	season)								
				`		<i></i>	from Tal	ole 9,	, Th1 (°C)				21	(85)
Utilisat	tion fac	tor for g	ains for I	iving are	ea, h1,m	(see T	able 9a)		, ,					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aı	ug Sep	Oct	Nov	Dec		
(86)m=	0.99	0.98	0.95	0.86	0.7	0.52	0.38	0.4	14 0.7	0.93	0.99	1		(86)
∟ Mean i	internal	temper	ature in	living ar	ea T1 (fo	ollow sta	eps 3 to 7	7 in T	able 9c)					
_	19.42	19.7	20.12	20.58			i	1	1	ı	1	19.37		(87)
			20.12		20.86	20.97	20.99	20.9	99 20.9	20.46	19.84			(01)
T		ما بمصادريات				20.97	20.99	20.9	<u> </u>	20.46	19.84	10.01		(01)
· ·			eating p	eriods ir	rest of	dwellin	g from Ta	able 9	9, Th2 (°C)					
(88)m=	19.66	19.67	neating p	eriods ir 19.69	19.69	dwellin	g from Ta	able 9	9, Th2 (°C)	19.69	19.84	19.68		(88)
(88)m= Utilisat	19.66 tion fac	19.67	neating p 19.67 ains for i	eriods in 19.69 est of d	rest of 19.69 welling,	dwelling 19.7 h2,m (s	g from Ta 19.7 ee Table	able 9 19.	9, Th2 (°C) .7 19.7	19.69	19.68	19.68		(88)
(88)m=	19.66	19.67	neating p	eriods ir 19.69	19.69	dwellin	g from Ta	able 9	9, Th2 (°C) .7 19.7					
(88)m= Utilisat (89)m=	19.66 tion fac 0.99	19.67 tor for ga 0.98	neating p 19.67 ains for 0.94	eriods in 19.69 rest of d	rest of 19.69 welling, 0.63	dwelling 19.7 h2,m (s	g from Ta 19.7 ee Table 0.27	able 9 19. 9a)	9, Th2 (°C) .7 19.7	19.69	19.68	19.68		(88)
(88)m= Utilisat (89)m=	19.66 tion fac 0.99	19.67 tor for ga 0.98	neating p 19.67 ains for 0.94	eriods in 19.69 rest of d	rest of 19.69 welling, 0.63	dwelling 19.7 h2,m (s	g from Ta 19.7 ee Table 0.27	able 9 19. 9a)	9, Th2 (°C) .7 19.7 32 0.6 to 7 in Tabl .7 19.63	19.69 0.9 e 9c)	19.68	19.68 0.99		(88)
Utilisat (89)m= Mean i	19.66 tion fac 0.99 internal	19.67 tor for ga 0.98 temper	neating p 19.67 ains for 1 0.94 ature in	eriods in 19.69 Test of d 0.82 the rest	n rest of 19.69 welling, 0.63 of dwelli	dwelling 19.7 h2,m (s 0.42 ing T2 (g from Ta 19.7 ee Table 0.27 follow ste	19. 9a) 0.3	9, Th2 (°C) .7 19.7 32 0.6 to 7 in Tabl .7 19.63	19.69 0.9 e 9c)	19.68	19.68 0.99	0.22	(88)
Utilisat (89)m= Mean i (90)m=	19.66 tion fac 0.99 internal 17.6	19.67 tor for ga 0.98 temper 18.02	neating p 19.67 ains for I 0.94 ature in	eriods ir 19.69 rest of d 0.82 the rest 19.24	n rest of 19.69 welling, 0.63 of dwelli	dwelling 19.7 h2,m (s 0.42 ng T2 (g from Ta 19.7 ee Table 0.27 follow ste	able 9 19. 9a) 0.3 eps 3	9, Th2 (°C) .7 19.7 32 0.6 to 7 in Tabl .7 19.63	19.69 0.9 e 9c)	19.68	19.68 0.99	0.22	(88) (89) (90)
Utilisat (89)m= Mean i (90)m=	19.66 tion fac 0.99 internal 17.6	19.67 tor for ga 0.98 temper 18.02	neating p 19.67 ains for I 0.94 ature in	eriods ir 19.69 rest of d 0.82 the rest 19.24	n rest of 19.69 welling, 0.63 of dwelli	dwelling 19.7 h2,m (s 0.42 ng T2 (g from Ta 19.7 ee Table 0.27 follow ste	able 9 19. 9a) 0.3 eps 3	9, Th2 (°C) 7 19.7 12 0.6 10 7 in Tabl 7 19.63 1 fLA) × T2	19.69 0.9 e 9c)	19.68	19.68 0.99	0.22	(88) (89) (90)
(88)m= Utilisat (89)m= Mean i (90)m= Mean i (92)m=	19.66 tion fac 0.99 internal 17.6	19.67 tor for ga 0.98 temper 18.02 temper 18.4	neating p 19.67 ains for 1 0.94 ature in 18.61 ature (fo	eriods in 19.69 rest of d 0.82 the rest 19.24 r the wh	rest of 19.69 welling, 0.63 of dwelli 19.57	dwelling 19.7 h2,m (s 0.42 ng T2 (19.68	g from Ta 19.7 ee Table 0.27 follow ste 19.7 fLA × T1 19.99	able 9 9a) 0.3 eps 3 19.	9, Th2 (°C) 7 19.7 12 0.6 10 7 in Tabl 7 19.63 1 fLA) × T2	19.69 0.9 e 9c) 19.11 fLA = Liv	19.68 0.98 18.23 ing area ÷ (4	19.68 0.99 17.55 4) =	0.22	(88) (89) (90) (91)

(02)	40.04	40.4	40.05	40.54	40.00	40.07	40.00	40.00	40.04	40.44	40.50	47.00	1	(93)
(93)m=	18.01	18.4	18.95	19.54	19.86	19.97	19.99	19.99	19.91	19.41	18.59	17.96		(93)
			uirement				44 -4	Table 0	41	4 T: /	70)	-11-	late	
			or gains	•		ed at ste	ер ттог	rable 9	o, so tha	t 11,m=(rojin an	d re-calc	culate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			ains, hm					,						
(94)m=	0.99	0.97	0.92	0.81	0.64	0.44	0.3	0.35	0.62	0.89	0.98	0.99		(94)
Usefu			W = (94)				ı	,			1	1	1	
(95)m=		791.87	956.21	1032.6	914.6	634.64	407.19	428.54	654.73	739.16	626.35	563.71		(95)
	nly avera	age exte	rnal tem	perature			•	,						
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
							=[(39)m	- ` 	– (96)m					
			1546.12		996.58	648.5	409.2	432.28	704.91	1076.67	1411.36	1698.45		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m	1		
(98)m=	818.99	597.5	438.9	194.77	60.99	0	0	0	0	251.11	565.21	844.24		_
								Tota	l per year	(kWh/yeaı	r) = Sum(9	8)15,912 =	3771.71	(98)
Space	e heatin	g require	ement in	kWh/m²	² /year								46.28	(99)
0a En	eray rea	uiremer	nts – Indi	ividual h	eating s	veteme i	ncluding	micro-C	'HDI					
	e heatir		its — Iriui	ividuai II	eating s	y Sterris i	ricidaling	i illicio-c) II <i>)</i>					
•		•	at from s	econdar	v/supple	mentary	svstem						0	(201)
			at from m				•	(202) = 1	- (201) =				1	(202)
			ng from	-	• ,				02) × [1 –	(203)] =				(204)
			ace heat	-				(201) – (2	02) X [1	(200)] -			89.9	(206)
	•	-					. 0/							╣ .
EIIICIE			ry/suppl			-		1	ı			ı	0	(208)
_	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space			ement (c				I -				l	l	I	
	818.99	597.5	438.9	194.77	60.99	0	0	0	0	251.11	565.21	844.24		
(211)m	$1 = \{[(98)]\}$)m x (20	4)] } x 1	00 ÷ (20	6)								•	(211)
	911	664.63	488.21	216.65	67.85	0	0	0	0	279.32	628.71	939.09		_
								Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	<u></u>	4195.45	(211)
Space	e heatin	g fuel (s	econdar	y), kWh/	month									_
= {[(98)m x (20	1)] } x 1	00 ÷ (20	8)							_			
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		_
								Tota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	F	0	(215)
Water	heating	I										<u>'</u>		_
Output	from w	ater hea	ter (calc	ulated a	bove)								•	
	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		_
Efficier	ncy of w	ater hea	iter										87.3	(216)
(217)m=	89.45	89.38	89.22	88.83	88.12	87.3	87.3	87.3	87.3	88.96	89.35	89.48		(217)
		•	kWh/mo			<u> </u>	<u> </u>							
) ÷ (217)				1	ı			ı	ı	I	
(219)m=	184.37	161.79	168.21	148.66	144.81	127.66	119.79	135.32	136.3	154.06	165.69	178.96		٦.
_								I ota	I = Sum(21				1825.62	(219)
	l totals	fuol ···s :	ad masi	overte re-	4					k'	Wh/year	•	kWh/year	7
space	neaung	iuei use	ed, main	system	I								4195.45	J

Water heating fuel used				1825.62]
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30]	(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of	(230a)(230g) =		75	(231)
Electricity for lighting				385.42	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b) =			6568.79	(338)
12a. CO2 emissions – Individual heating system	s including micro-CHP				
	Energy kWh/year	Emission fac kg CO2/kWh		Emissions kg CO2/yea	ır
Space heating (main system 1)	•				ar](261)
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh		kg CO2/yea	_
	kWh/year	kg CO2/kWh	=	kg CO2/yea	(261)
Space heating (secondary)	kWh/year (211) x (215) x	0.216 0.519 0.216	=	kg CO2/yea	(261)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	0.216 0.519 0.216	=	906.22 0 394.33	(261) (263) (264)
Space heating (secondary) Water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (263)	kg CO2/kWh 0.216 0.519 0.216	= = =	906.22 0 394.33 1300.55	(261) (263) (264) (265)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (263) (231) x	kg CO2/kWh 0.216 0.519 0.216 0.519	= = =	kg CO2/yea 906.22 0 394.33 1300.55	(261) (263) (264) (265) (267)

El rating (section 14)

(274)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU		NE		
Address :	Woodwell Cottage P2, Woo	odwell Road, BRISTOL	, BS11 9XU			
Overall dwelling dime	ensions:	A 40.0 (m²)	Av Haimbt/m	m)	Valuma(m3)	
Ground floor		Area(m²) 40.75 (1a) x	Av. Height(n	(2a) =	Volume(m³)	(3a)
First floor		40.75 (1b) x		(2b) =	91.28	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1			`	0.1.20	` ′
Dwelling volume	a, · (· · ·) · (· · · · · · · · · · · · ·	,	(3b)+(3c)+(3d)+(3e)+	⊦(3n) = 「	197.23	(5)
		(3)			197.23	
2. Ventilation rate:	main seconda	ry other	total		m³ per houi	r
Number of chimneys	heating heating bearing + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	一 (6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				L		
				Air ch	anges per ho	ur
	ys, flues and fans = $(6a)+(6b)+(6b)$		30	÷ (5) =	0.15	(8)
·	een carried out or is intended, proce	ed to (17), otherwise continue	e from (9) to (16)	F		٦,۵)
Number of storeys in the Additional infiltration	ie dweiling (ris)		ı	[(9)-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame o	or 0.35 for masonry con		(9)-1]X0.1 = [0	(11)
	resent, use the value corresponding	•		L	0	
	loor, enter 0.2 (unsealed) or (0.1 (sealed), else enter	0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) +	+ (12) + (13) + (15) =	•	0	(16)
Air permeability value,	q50, expressed in cubic metr	es per hour per square	metre of envelo	pe area	5	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] +$	(8), otherwise $(18) = (16)$			0.4	(18)
Air permeability value applie	s if a pressurisation test has been do	one or a degree air permeabil	lity is being used	_		
Number of sides sheltere	ed	(00)	(10)		0	(19)
Shelter factor		(20) = 1 - [0.075]			1	(20)
Infiltration rate incorporat		$(21) = (18) \times (20)$	=		0.4	(21)
Infiltration rate modified f	or monthly wind speed	, , , , , , , , , , , , , , , , , , , 	1 1			
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct No	ov Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor (2	2a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infiltra	ation rat	e (allowi	na for st	nelter an	d wind s	speed) =	(21a) x	(22a)m		-		-	
0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47	1	
Calculate effect		_	rate for t	he appli	cable ca	se							(co.).
If mechanica			endix N. (2	3b) = (23a	a) × Fmv (e	eguation (1	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced with		0		, ,	,	. ,	,, .	,	,, = (20a)			0	(23b) (23c)
a) If balance		•	•	· ·		`		,	2b)m + (23b) x [1 – (23c)		(230)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	d mecha	anical ve	ntilation	without	heat red	covery (N	иV) (24b	m = (22)	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	on from o	outside	•	•	•	•	
if (22b)n	า < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	.5 × (23b)			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)m									0.51				
(24d)m= 0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61]	(24d)
Effective air	change	rate - en	nter (24a	or (24b	o) or (24	c) or (24	·d) in bo	к (25)	!	!	ļ.	J	
(25)m= 0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	1	(25)
3. Heat losse	s and he	eat loss r	paramete	er:		•		•	•			4	
ELEMENT	Gros area	-	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value		A X k kJ/K
Doors		-	Openin	gs		m²				K)			
	area	-	Openin	gs	A ,r	m ² x	W/m2	2K =	(W/I	K)			kJ/K
Doors	area	-	Openin	gs	A ,r	m² x x1	W/m2	eK = 0.04] =	(W/l	K)			kJ/K (26)
Doors Windows Type	area	-	Openin	gs	A ,r 1.93	m² x x1 x1	W/m2 1 /[1/(1.4)+	= 0.04] = 0.04] =	1.93 1.8	K)			kJ/K (26) (27)
Doors Windows Type Windows Type	area	-	Openin	gs	A ,r 1.93 1.36	m ² x x ¹ x ¹ x ¹	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] =	1.93 1.8 1.8	K)			kJ/K (26) (27) (27)
Doors Windows Type Windows Type Windows Type	area	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] =	1.93 1.8 1.8 6.79				kJ/K (26) (27) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type	area 1 2 2 3 4 4 e 1	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	(W/l 1.93 1.8 1.8 6.79 2.39	9			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ	area : 1 : 2 : 3 : 4 : 4 : e 1 : e 2	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201	x1 x1 x1 x1 76 x1 x1	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	0.04] = 0.04]	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429	9			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) +	K	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429	9 9 4			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646	x1 x1 x1 x1 76 x1	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	(m²)	Openin	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/I 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680	9 9 4 7			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ	area 41 42 43 44 61 62 63 64	(m²)	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Walls Type1	area 1 2 3 4 e 1 e 2 e 3 e 4 e 4	95	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75	x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b) (28)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1 Walls Type2	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4 102.9	95 3	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66	x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1.7) + /[1.7] +	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36	9 9 4 7			(26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1 Walls Type2 Roof	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4 102.5 104.5 105.	95 3 , m ² ows, use e	Openin m 14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and	area a 1 a 2 a 3 a 4 b 1 b 2 c 3 b 4 c 1 c 2 c 3 c 4 le 1 c 2 c 3 c 4 le 3 c 4 le 3 c 4 le 3 c 5 c 61.3	95 3 , m² ows, use e sides of in	14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²-	K	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and ** include the area	area a1 a2 a3 a4 e1 e2 e3 e4 e1 e2 e3 e4 lements roof winders on both as on both	95 3 , m² ows, use e sides of in = S (A x	14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²•	K	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and ** include the area Fabric heat los	area a 1 a 2 a 3 a 4 b 1 b 2 c 3 b 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 7 c 61.5 c 7 c of windows as on both	95 3 , m ² ows, use e sides of in = S (A x (A x k)	14.29 0 6.06 effective winternal walk	gs 2 9 Indow U-vals and pan	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculatitions	x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [] as given in	kJ/m²•	1 3.2 56.77	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29) (30) (31)

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oon he used insta	ad of a do	tailed color	ulation										
can be used instead Thermal bridge				usina Ar	nendix l	<						13.06	(36)
if details of therma					-	`						13.00	(30)
Total fabric hea	0 0		()	(-	• /			(33) +	(36) =			69.82	(37)
Ventilation hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5))		_
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 41.1	40.76	40.44	38.91	38.62	37.29	37.29	37.05	37.8	38.62	39.2	39.81		(38)
Heat transfer of	oefficier	nt, W/K	-	-	-	-	-	(39)m	= (37) + (37)	38)m	-		
(39)m= 110.92	110.59	110.26	108.73	108.45	107.11	107.11	106.87	107.63	108.45	109.03	109.63		
Heat loss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ · (4)	12 /12=	108.73	(39)
(40)m= 1.36	1.36	1.35	1.33	1.33	1.31	1.31	1.31	1.32	1.33	1.34	1.35		
Nivershau of day		ath /Tab	la 4a\					,	Average =	Sum(40) ₁	12 /12=	1.33	(40)
Number of day Jan	Feb	Mar		May	Jun	Jul	Δυα	Sep	Oct	Nov	Dec	1	
(41)m= 31	28	31	Apr 30	31	30	31	Aug 31	30 30	31	30	31		(41)
(11)=	20	<u> </u>		<u> </u>		<u> </u>		00	<u> </u>			J	()
4. Water heat	ing once	rav roqui	iromont:								kWh/y	oor:	
4. Water fleat	ing ener	igy requi	nement.								KVVII/y	- -	
Assumed occu	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.49		(42)
if TFA £ 13.9 Annual averag	•	ater usad	ge in litre	es per da	av Vd.av	erage =	(25 x N)	+ 36		93	3.35	1	(43)
Reduce the annua	ıl average	hot water	usage by	5% if the a	lwelling is	designed			se target o			J	(12)
not more that 125				ater use, i	not ana co I		ı				ı	1	
Jan Hot water usage ir	Feb	Mar day for ea	Apr	May	Jun	Jul Table 10 x	Aug	Sep	Oct	Nov	Dec		
	-						· ·	04.40	95.22	00.06	100.60	1	
(44)m= 102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49		98.96 m(44) ₁₁₂ =	102.69	1120.25	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			(,		1120.23	(``)
(45)m= 152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48]	
					l .	l .			Γotal = Su	m(45) ₁₁₂ =	=	1468.83	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)				1	
(46)m= 22.84 Water storage	19.98	20.62	17.97	17.25	14.88	13.79	15.82	16.01	18.66	20.37	22.12		(46)
Storage volum		includin	ng anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	1	(47)
If community h	` ,		•			•						J	(,
Otherwise if no	•			•			` '	ers) ente	er '0' in (47)			
Water storage												•	
a) If manufact				or is kno	wn (kWł	n/day):					0]	(48)
Temperature fa											0		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)) =			0		(50)
Hot water stora			-								0]	(51)
If community h	eating s	ee secti		•									• •
Volume factor			Ol-							-	0		(52)
Temperature fa	acior tro	ın rabie	ZD								0	J	(53)

Lucigy	lost fro	m water	· storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54	1)
Enter	(50) or ((54) in (5	55)									0	(55	5)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56	5)
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57	7)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58	3)
Primar	y circuit	loss cal	culated	for each	month ((59)m = $($	(58) ÷ 36	5 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59	9)
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 36	65 × (41)	m						
(61)m=	50.96	45.55	48.52	45.12	44.72	41.43	42.82	44.72	45.12	48.52	48.8	50.96	(61	1)
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44	(62	2)
Solar DH	HW input of	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	') (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)				_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63	3)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63	3) (G2)
Output	from wa	ater hea	ter											
(64)m=	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44		
·		-	-	-	-	-	-	Outp	out from w	ater heate	r (annual)	12	2026.06 (64	1)
Heat g	ains froi	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	63.37	55.67	57.00	54.40	40.44	40.0-	44.07					1	1	
		00.07	57.83	51.12	49.41	43.35	41.27	46.26	46.78	53.5	57.36	61.78	(65	5)
inclu		<u> </u>	<u> </u>	<u> </u>		ļ	<u> </u>			53.5 rater is fr)	5)
	ıde (57)ı	m in cal	culation	<u> </u>	only if c	ļ	<u> </u>)	5)
5. Int	ide (57)i ernal ga	m in cal	culation of Table 5	of (65)m and 5a	only if c	ļ	<u> </u>)	5)
5. Int	ide (57)i ernal ga	m in cald ains (see	culation of Table 5	of (65)m and 5a	only if c	ļ	<u> </u>)	5)
5. Int	de (57) ernal ga olic gain	m in calo ains (see as (Table	culation Table 5 5), Wat	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	rater is fr	om com	munity h)	
5. Int Metabo (66)m=	ernal ga olic gain Jan 124.54	m in caldains (see	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 124.54	only if c): May 124.54	ylinder i	Jul 124.54	Aug 124.54	or hot w Sep 124.54	rater is fr	om com	munity h	neating	
5. Int Metabo (66)m=	ernal ga olic gain Jan 124.54	m in caldains (see	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 124.54	only if c): May 124.54	Jun	Jul 124.54	Aug 124.54	or hot w Sep 124.54	rater is fr	om com	munity h	neating	5)
5. Int Metabo (66)m= Lightin (67)m=	ernal ga olic gain Jan 124.54 g gains	m in calo	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	of (65)m 6 and 5a ts Apr 124.54 opendix 10.85	only if c): May 124.54 L, equat 8.11	Jun 124.54	Jul 124.54 r L9a), a	Aug 124.54 Iso see	Sep 124.54 Table 5	Oct 124.54	Nov	Dec	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m=	ernal ga olic gain Jan 124.54 g gains 19.84	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	of (65)m 6 and 5a ts Apr 124.54 opendix 10.85	only if c): May 124.54 L, equat 8.11	Jun 124.54 ion L9 o	Jul 124.54 r L9a), a	Aug 124.54 Iso see	Sep 124.54 Table 5	Oct 124.54	Nov	Dec	neating (66	55)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal ga olic gain Jan 124.54 g gains 19.84 nces ga 222.55	m in calconing (See See See See See See See See See Se	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04	of (65)m 5 and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54	neating (66	55)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal ga olic gain Jan 124.54 g gains 19.84 nces ga 222.55	m in calcadins (see Feb 124.54 (calcula 17.62 ins (calcula 224.86	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04	of (65)m 5 and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45	m in calconing in calconing (see Feb 124.54 (calcula 17.62 ins (calconing calconing (calcula calcula c	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45	of (65)m s and 5a ts Apr 124.54 opendix 10.85 n Append 206.65 ppendix 35.45	only if construction only in construction only in construction only in c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45	m in calconains (see Feb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45	of (65)m s and 5a ts Apr 124.54 ppendix 10.85 Append 206.65 ppendix 35.45	only if construction only in construction only in construction only in c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	neating (66	(5) (7) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	plic gain Jan 124.54 g gains 19.84 nces gain 222.55 ng gains 35.45 and far	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc 224.86 (calcula 35.45 ns gains	Table 5 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45 (Table 5	of (65)m 5 and 5a ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66 (67 (68	(5) (7) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	plic gain Jan 124.54 g gains 19.84 nces gain 222.55 ng gains 35.45 and far	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc 224.86 (calcula 35.45 ns gains	Table 5 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45 (Table 5	of (65)m 5 and 5a ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66 (67 (68	55) 7) 3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga plic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 s e.g. ev	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ns gains 3	Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ted in A 35.45 (Table 9 3 on (nega	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 n Append 206.65 opendix 35.45 opendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73 35.45	(66 (68 (69	55) 7) 3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga plic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 s e.g. ev	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ins gains 3 raporatio -99.63	Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ted in A 35.45 (Table 9 3 on (nega	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 n Append 206.65 opendix 35.45 opendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73 35.45	(66 (68 (69	(5) (7) (3) (3) (4)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 e.g. ev -99.63 heating 85.18	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calcula 35.45 ns gains 3 raporatic -99.63 gains (T	ted in April 124.54 ted in	of (65)m 5 and 5a ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3 tive valu -99.63	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3 -99.63	Oct 124.54 16.39 ble 5 182.39 2 5 35.45	Nov 124.54 19.13 198.03 35.45 3	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66 (67 (68 (70	(5) (7) (3) (3) (4)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 e.g. ev -99.63 heating 85.18	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ins gains 3 raporatio -99.63 gains (Table 82.85	ted in April 124.54 ted in	of (65)m 5 and 5a ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3 tive valu -99.63	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3 -99.63	Oct 124.54 16.39 ble 5 182.39 5 35.45 3 -99.63	Nov 124.54 19.13 198.03 35.45 3	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66 (67 (68 (70	(5) (7) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.36	x	10.63	x	0.63	x	0.7	=	4.42	(74)
North	0.9x	0.77	x	1.36	x	20.32	х	0.63	X	0.7	=	8.45	(74)
North	0.9x	0.77	x	1.36	x	34.53	X	0.63	X	0.7	=	14.35	(74)
North	0.9x	0.77	x	1.36	x	55.46	х	0.63	x	0.7	=	23.05	(74)
North	0.9x	0.77	x	1.36	x	74.72	x	0.63	x	0.7	=	31.05	(74)
North	0.9x	0.77	x	1.36	x	79.99	x	0.63	x	0.7	=	33.24	(74)
North	0.9x	0.77	x	1.36	x	74.68	x	0.63	x	0.7	=	31.04	(74)
North	0.9x	0.77	x	1.36	x	59.25	x	0.63	x	0.7	=	24.62	(74)
North	0.9x	0.77	x	1.36	x	41.52	x	0.63	x	0.7	=	17.26	(74)
North	0.9x	0.77	x	1.36	x	24.19	x	0.63	x	0.7	=	10.05	(74)
North	0.9x	0.77	x	1.36	x	13.12	x	0.63	x	0.7	=	5.45	(74)
North	0.9x	0.77	x	1.36	x	8.86	x	0.63	x	0.7	=	3.68	(74)
East	0.9x	0.77	x	1.8	x	19.64	x	0.63	x	0.7	=	10.8	(76)
East	0.9x	0.77	x	1.8	x	38.42	x	0.63	X	0.7	=	21.14	(76)
East	0.9x	0.77	x	1.8	x	63.27	x	0.63	x	0.7	=	34.81	(76)
East	0.9x	0.77	x	1.8	x	92.28	x	0.63	x	0.7	=	50.76	(76)
East	0.9x	0.77	x	1.8	x	113.09	x	0.63	x	0.7	=	62.21	(76)
East	0.9x	0.77	x	1.8	x	115.77	x	0.63	x	0.7	=	63.69	(76)
East	0.9x	0.77	x	1.8	x	110.22	x	0.63	x	0.7	=	60.63	(76)
East	0.9x	0.77	x	1.8	x	94.68	x	0.63	x	0.7	=	52.08	(76)
East	0.9x	0.77	X	1.8	x	73.59	x	0.63	X	0.7	=	40.48	(76)
East	0.9x	0.77	X	1.8	x	45.59	x	0.63	X	0.7	=	25.08	(76)
East	0.9x	0.77	X	1.8	X	24.49	X	0.63	X	0.7	=	13.47	(76)
East	0.9x	0.77	X	1.8	x	16.15	x	0.63	X	0.7	=	8.88	(76)
South	0.9x	0.77	X	5.12	X	46.75	X	0.63	X	0.7	=	73.15	(78)
South	0.9x	0.77	X	5.12	x	76.57	X	0.63	X	0.7	=	119.81	(78)
South	0.9x	0.77	X	5.12	x	97.53	x	0.63	X	0.7	=	152.61	(78)
South	0.9x	0.77	X	5.12	x	110.23	x	0.63	X	0.7	=	172.49	(78)
South	0.9x	0.77	X	5.12	x	114.87	X	0.63	X	0.7	=	179.74	(78)
South	0.9x	0.77	X	5.12	X	110.55	X	0.63	x	0.7	=	172.98	(78)
South	0.9x	0.77	X	5.12	x	108.01	X	0.63	X	0.7	=	169.01	(78)
South	0.9x	0.77	X	5.12	x	104.89	X	0.63	X	0.7	=	164.13	(78)
South	0.9x	0.77	X	5.12	x	101.89	x	0.63	x	0.7	=	159.42	(78)
South	0.9x	0.77	X	5.12	x	82.59	x	0.63	x	0.7	=	129.22	(78)
South	0.9x	0.77	X	5.12	x	55.42	x	0.63	x	0.7	=	86.71	(78)
South	0.9x	0.77	X	5.12	X	40.4	X	0.63	X	0.7	=	63.21	(78)

West	ر م می ا		1		1		1		١		1		7(00)
	0.9x	0.77	X	1.36	X	19.64	X 1	0.63	X	0.7	= 1	24.49	(80)
	0.9x	0.77	X	1.36	X	38.42	X	0.63	X	0.7	=	47.91	(80)
	0.9x	0.77	X	1.36	X	63.27	X I	0.63	X	0.7] = 1	78.9	(80)
	0.9x	0.77	X	1.36	X	92.28	X	0.63	X	0.7	=	115.06	(80)
	0.9x	0.77	X	1.36	X	113.09	X	0.63	X	0.7] = 1	141.02	(80)
	0.9x	0.77	X	1.36	X	115.77	X	0.63	X	0.7] = 1	144.35	(80)
	0.9x	0.77	X	1.36	X	110.22	X	0.63	X	0.7] = 1	137.43	(80)
	0.9x	0.77	X	1.36	X	94.68	X	0.63	X	0.7	=	118.05	(80)
	0.9x	0.77	X	1.36	X	73.59	X	0.63	X	0.7	=	91.76	(80)
	0.9x	0.77	X	1.36	X	45.59	X	0.63	X	0.7	=	56.85	(80)
	0.9x	0.77	X	1.36	X	24.49	X	0.63	X	0.7	=	30.54	(80)
	0.9x	0.77	X	1.36	X	16.15	X	0.63	X	0.7	=	20.14	(80)
Rooflights		1	X	1.12	X	25.93	Х	0.63	X	0.7	=	23.06	(82)
Rooflights	<u> </u>	1	X	1.12	X	25.93	X	0.63	X	0.7	=	23.06	(82)
Rooflights	<u> </u>	1	X	0.93	X	25.93	X	0.63	X	0.7	=	9.53	(82)
Rooflights	<u> </u>	1	X	0.66	X	25.93	X	0.63	X	0.7	=	6.76	(82)
Rooflights		1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights		1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights		1	X	0.93	X	51.88	x	0.63	X	0.7	=	19.08	(82)
Rooflights	0.9x	1	X	0.66	X	51.88	X	0.63	X	0.7	=	13.53	(82)
Rooflights	0.9x	1	X	1.12	X	88.38	X	0.63	X	0.7	=	78.59	(82)
Rooflights	0.9x	1	X	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights	0.9x	1	X	0.93	x	88.38	x	0.63	x	0.7	=	32.5	(82)
Rooflights	0.9x	1	X	0.66	x	88.38	x	0.63	x	0.7	=	23.04	(82)
Rooflights	0.9x	1	X	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights	0.9x	1	X	1.12	X	133.65	X	0.63	X	0.7	=	118.84	(82)
Rooflights	0.9x	1	X	0.93	x	133.65	x	0.63	X	0.7	=	49.15	(82)
Rooflights	0.9x	1	X	0.66	x	133.65	x	0.63	x	0.7	=	34.85	(82)
Rooflights	0.9x	1	X	1.12	x	168.1	x	0.63	x	0.7	=	149.47	(82)
Rooflights	0.9x	1	X	1.12	x	168.1	x	0.63	x	0.7	=	149.47	(82)
Rooflights	0.9x	1	X	0.93	x	168.1	x	0.63	x	0.7	=	61.81	(82)
Rooflights	0.9x	1	X	0.66	x	168.1	x	0.63	X	0.7	=	43.83	(82)
Rooflights	0.9x	1	X	1.12	x	174	x	0.63	x	0.7	=	154.72	(82)
Rooflights	0.9x	1	x	1.12	x	174	x	0.63	x	0.7	=	154.72	(82)
Rooflights	0.9x	1	X	0.93	x	174	x	0.63	x	0.7	=	63.98	(82)
Rooflights	0.9x	1	x	0.66	x	174	x	0.63	x	0.7	=	45.37	(82)
Rooflights	0.9x	1	x	1.12	x	164.87	x	0.63	x	0.7	=	146.6	(82)
Rooflights	0.9x	1	x	1.12	x	164.87	x	0.63	x	0.7	j =	146.6	(82)
Rooflights	0.9x	1	x	0.93	x	164.87	x	0.63	x	0.7	j =	60.62	(82)
Rooflights	0.9x	1	x	0.66	x	164.87	x	0.63	x	0.7	j =	42.99	(82)
Rooflights	0.9x	1	X	1.12	x	138.72	x	0.63	x	0.7	=	123.35	(82)

																_
Rooflights 0.9x	1	X	1.1	2	x	13	38.72	X	0.63	,	x	0.7		=	123.35	(82)
Rooflights 0.9x	1	X	0.9)3	X	13	38.72	X	0.63	,	x	0.7		=	51.01	(82)
Rooflights 0.9x	1	X	0.6	66	x	13	38.72	X	0.63	,	x	0.7		=	36.17	(82)
Rooflights 0.9x	1	X	1.1	2	x	10	04.33	X	0.63	,	x	0.7		=	92.77	(82)
Rooflights 0.9x	1	X	1.1	2	x	10)4.33	x	0.63	,	x	0.7		=	92.77	(82)
Rooflights 0.9x	1	Х	0.9)3	x	10	04.33	X	0.63	,	x	0.7		=	38.36	(82)
Rooflights 0.9x	1	X	0.6	66	x	10	04.33	x	0.63	,	x [0.7		=	27.2	(82)
Rooflights 0.9x	1	X	1.1	2	x	6	2.32	X	0.63	,	x	0.7		=	55.42	(82)
Rooflights 0.9x	1	X	1.1	2	x	6	2.32	x	0.63	,	x	0.7		=	55.42	(82)
Rooflights 0.9x	1	X	0.9)3	x	6	2.32	x	0.63	,	x [0.7		=	22.92	(82)
Rooflights 0.9x	1	х	0.6	66	x	6	2.32	x	0.63	,	x	0.7		=	16.25	(82)
Rooflights 0.9x	1	Х	1.1	2	x	3	2.54	x	0.63	,	x	0.7		=	28.93	(82)
Rooflights 0.9x	1	х	1.1	2	x	3	2.54	x	0.63	,	x [0.7		=	28.93	(82)
Rooflights 0.9x	1	x	0.9)3	x	3	2.54	x	0.63	 ,	x į	0.7		=	11.96	(82)
Rooflights 0.9x	1	X	0.6	66	x	3	2.54	x	0.63	 ,	x i	0.7		=	8.48	(82)
Rooflights 0.9x	1	x	1.1	2	x	2	1.19	x	0.63	,	x İ	0.7	\equiv	=	18.84	(82)
Rooflights 0.9x	1	x	1.1	2	x	2	1.19	x	0.63	,	x İ	0.7	司	=	18.84	(82)
Rooflights 0.9x	1	х	0.9)3	x	2	1.19	x	0.63	,	x İ	0.7		=	7.79	(82)
Rooflights 0.9x	1	X	0.6	66	x	2	1.19	x	0.63		x İ	0.7	司	=	5.53	(82)
Solar gains in (83)m= 175.27 Total gains – in (84)m= 566.2	322.15 nternal a 710.84	493.39 Ind solar 867.85	683.05 (84)m = 1034.91	818.61 = (73)m 1147.5	83 + (8	33.06 33)m ,	794.92	692		2 371	.21	-	146 526			(83)
7. Mean inter			`													_
Temperature	Ū	٠.			•			ole 9	, Th1 (°C)						21	(85)
Utilisation fac					ì							1	_		I	
Jan	Feb	Mar	Apr	May	-	Jun	Jul	_	ug Ser	_	ct oc	+		ec		(06)
(86)m= 1	0.99	0.97	0.9	0.76	<u> </u>).58	0.43	0.4		0.0	95	0.99	1			(86)
Mean interna					_							_			Ī	
(87)m= 19.57	19.8	20.16	20.57	20.85	20	0.97	20.99	20.	99 20.9	20.	.49	19.95	19.	53		(87)
Temperature	during h	eating p	eriods ir	rest of	dw	elling	from Ta	ble 9	9, Th2 (°C	;)						
(88)m= 19.79	19.8	19.8	19.81	19.82	19	9.83	19.83	19.	83 19.82	2 19.	.82	19.81	19.	81		(88)
Utilisation fac	tor for g	ains for	rest of d	welling,	h2,ı	m (se	e Table	9a)								
(89)m= 0.99	0.99	0.96	0.87	0.7	0).48	0.32	0.3	0.66	0.0	93	0.99	1			(89)
Mean interna	l temper	ature in	the rest	of dwell	ing	T2 (fc	ollow ste	eps 3	to 7 in Ta	able 9c	;)					
(90)m= 17.92	18.26	18.77	19.34	19.68	Ť	9.81	19.83	19.		1	_	18.48	17.	87		(90)
					_	!				fLA =	Liv	ring area ÷ (4	4) =		0.22	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwe	llinc	n) = fl	A x T1	+ (1	– fLA) ⊻ T	- 2						_
(92)m= 18.29	18.6	19.08	19.62	19.95	_	0.07	20.09	20.			.53	18.81	18.	25		(92)
Apply adjustn					<u> </u>										1	
,				•				•		•						

(93)m=	18.29	18.6	19.08	19.62	19.95	20.07	20.09	20.09	20.01	19.53	18.81	18.25		(93)
8. Spa	ace heat	ting requ	uirement								•			
				•		ed at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	:ulate	
the uti	T		or gains						I -			I _ 1	l	
<u>[</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Г			ains, hm										l	(0.4)
(94)m=	0.99	0.98	0.95	0.86	0.7	0.5	0.34	0.39	0.67	0.92	0.98	0.99		(94)
			, W = (94	ŕ		574.50	074.70	000.50	505.40	0.40.07	T 505 50	500.40	l	(OE)
(95)m=	561.93	697.24	823.49	892.3	807.5	571.53	371.78	390.52	585.48	649.07	565.56	523.49		(95)
	-		r	. 	from Ta		40.0	404	444	40.0	7.4	4.0		(06)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	I	(96)
					erature, l		- ` 	X [(93)m	<u> </u>	968.46	4070 00	4500.0		(07)
L	1551.47			L	894.17	585.94	373.75	l	636	L	1276.32	1539.8		(97)
	i	•	ı	i	nonth, k\		l e		i i	ŕ	·	75044	l	
(98)m=	736.22	549.89	419.13	196.75	64.49	0	0	0	0	237.63	511.75	756.14		٦
								Tota	l per year	(kWh/yea	r) = Sum(9	8) _{15,912} =	3471.98	(98)
Space	e heating	g require	ement in	kWh/m²	/year								42.6	(99)
9a. Ene	ergy req	uiremer	nts – Indi	ividual h	eating sy	/stems i	ncluding	micro-C	CHP)					_
	e heatin													
-		•	at from s	econdar	y/supple	mentary	system						0	(201)
Fraction	on of sp	ace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
			ng from	-	, ,			(204) = (2	02) x [1 –	(203)] =			1	(204)
			•	-					, -	. /-				(206)
	-	•	ace heat				0.1						93.4	╡
Efficie	ency of s	econda	ry/suppl	ementar	y heating	g system	า, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
			<u> </u>		d above)		•			1			•	
L	736.22	549.89	419.13	196.75	64.49	0	0	0	0	237.63	511.75	756.14		
(211)m	= {[(98)	m x (20	(4)] } x 1	00 ÷ (20	06)									(211)
	788.24	588.74	448.75	210.65	69.05	0	0	0	0	254.42	547.91	809.57		
_	-		-	-	-		-	Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}		3717.33	(211)
Space	e heating	g fuel (s	econdar	y), kWh/	month							'		_
-		-	00 ÷ (20											
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
_	•						•	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water I	heating											1		_
	_		ter (calc	ulated al	bove)						-			
	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44		
Efficien	cy of wa	ater hea	iter		-		-			-	-		80.3	(216)
(217)m=	88.01	87.69	87.04	85.5	82.97	80.3	80.3	80.3	80.3	85.85	87.48	88.1		(217)
Fuel for	r water l	neating,	kWh/mo	onth										
		•	÷ (217)										•	
(219)m=	230.95	203.82	213.66	192.92	192.48	175.15	167.81	187.07	189.13	201.44	211.02	225.25		_
								Tota	I = Sum(2	19a) ₁₁₂ =			2390.71	(219)
Annual										k'	Wh/year	•	kWh/year	_
Space I	heating	fuel use	ed, main	system	1								3717.33	_
												•		

					7
Water heating fuel used				2390.71	╛
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (230a)(230g) =		75	(231)
Electricity for lighting				350.38	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b) =			6613.72	(338)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	Energy kWh/year	Emission fa		Emissions kg CO2/yea	
Space heating (main system 1)	(211) x	0.216	=	802.94	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	516.39	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1319.34	(265)
-					
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
·	(231) x (232) x	0.519	=	38.93 181.85	(267) (268)
Electricity for pumps, fans and electric keep-hot	(232) x				

TER =

(273)

18.9

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Property Details: HOUSE C - BASELINE

Dwelling type:Detached House

Located in: England

Region: South East England

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:West

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters:

Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 520.69 (P1)

Transmission heat loss coefficient: 83

Summer heat loss coefficient: 603.64 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
West (W1-3 FRONT)	0	1
North (W4 - SIDE N)	0	1
South (W5 - SIDE S)	0	1
East (W6 - REAR E)	0	1
West (RW1-2 FRONT W)	0 (1
East (RW3-4 REAR E)	0	1
East (RW5 REAR E)	0	1
East (RW6 REAR E)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
West (W1-3 FRONT)	0.98	1	1	0.98	(P8)
North (W4 - SIDE N)	0.98	1	1	0.98	(P8)
South (W5 - SIDE S)	0.98	1	1	0.98	(P8)
East (W6 - REAR E)	0.98	1	1	0.98	(P8)
West (RW1-2 FRONT W	/) 0.98	1	1	0.98	(P8)
East (RW3-4 REAR E)	0.98	1	1	0.98	(P8)
East (RW5 REAR E)	0.98	1	1	0.98	(P8)
East (RW6 REAR E)	0.98	1	1	0.98	(P8)

Solar gains

Orientation		Area	Flux	\mathbf{g}_{-}	FF	Shading	Gains
West (W1-3 FRONT)	1 x	4.86	124.8	0.63	0.8	0.98	270.99
North (W4 - SIDE N)	1 x	1.62	86.66	0.63	8.0	0.98	62.72
South (W5 - SIDE S)	1 x	6.08	118.4	0.63	8.0	0.98	321.63
East (W6 - REAR E)	1 x	2.14	124.8	0.63	8.0	0.98	119.32
	1 x	2.66	187.8	0.63	8.0	0.98	223.2
	1 x	2.66	187.8	0.63	8.0	0.98	223.2
	1 x	1.1	187.8	0.63	8.0	0.98	92.3
	1 x	0.78	187.8	0.63	0.8	0.98	65.45

SAP 2012 Overheating Assessment

		Total	1378.81 (P3/P4)
Internal gains:			
	June	July	August
Internal gains	434.29	416.42	425.14
Total summer gains	1895.1	1795.24	1642.8 (P5)
Summer gain/loss ratio	3.14	2.97	2.72 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5
Thermal mass temperature increment	0.25	0.25	0.25
Threshold temperature	18.79	20.62	20.47 (P7)
Likelihood of high internal temperature	Not significant	Slight	Not significant
Assessment of likelihood of high internal temperature:	<u>Slight</u>		

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 *Printed on 25 February 2021 at 14:05:05*

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Semi-detached House

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 78.4m²

Site Reference: WOODWELL Plot Reference: HOUSE D - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.72 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 18.72 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 50.0 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	ОК
Party wall	0.00 (max. 0.20)	-	ОК
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	ОК
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 5.38 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	TTZC by plumbing and el	lectrical services	ОК
Hot water controls:	No cylinder thermostat		
	No cylinder		
Boiler interlock:	Yes		ОК
7 Low energy lights			
Percentage of fixed lights with	n low-energy fittings	90.0%	
Minimum	3, 3	75.0%	ОК
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East	England):	Not significant	ОК
Based on:	3 ,	Ŭ	
Overshading:		Average or unknown	
Windows facing: North		3.24m²	
Windows facing: West		2.59m²	
Windows facing: West		0.86m²	
Windows facing: South		2.14m²	
Roof windows facing: South		2.66m²	
Ventilation rate:		8.00	
Blinds/curtains:		Dark-coloured curtain or roller blind	
		Closed 10% of daylight hours	
10 Key features			
Party Walls U-value		0 W/m²K	

Thermal Bridge Report

Property Details: HOUSE D - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges

Thermal bridges: User-defined = UD

Default = D Approved = A

User-defined (individual PSI-values) Y-Value = 0.0583

External Junctions Details:

Junction Type	PSI-Value	Length	Reference	Туре
Other lintels (including other steel lintels)	0.05	6.44	E2	[UD]
Sill	0.04	2.7	E3	[A]
Jamb	0.05	20.7	E4	[A]
Ground floor (normal)	0.08	18.11	E5	[UD]
Intermediate floor within a dwelling	0.07	18.11	E6	[A]
Eaves (insulation at rafter level)	0.04	12.43	E11	[A]
Gable (insulation at rafter level)	0.04	18.49	E13	[A]
Corner (normal)	0.09	12.6	E16	[A]
Staggered party wall between dwellings	0.12	6.4	E25	[D]
Party Junctions Details:				
Ground floor	0.16	6.15	P1	[D]
Roof (insulation at rafter level)	0.08	8.98	P5	[D]
Roof Junctions Details:				
Head	0.08	2.95	R1	[D]
Sill	0.06	2.95	R2	[D]
Jamb	0.08	5.4	R3	[D]
Ridge (vaulted ceiling)	0.08	7.6	R4	[D]

Predicted Energy Assessment



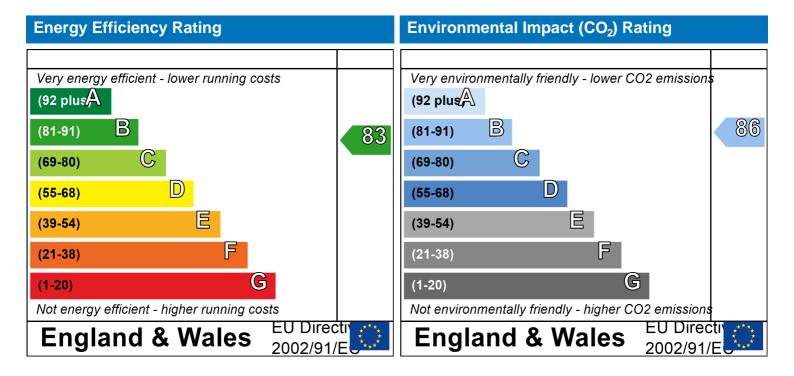
Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Semi-detached House 24 February 2021 Jemma Mclaughlan

Total floor área: 78.4 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

SAP Input

Property Details: HOUSE D - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House

Detachment: Semi-detached

Year Completed: 2021

Floor Location: Floor area:

Storey height:

Floor 0 39.2 m^2 2.6 m Floor 1 39.2 m^2 2.56 m

Living area: 18.35 m² (fraction 0.234)

Front of dwelling faces: North

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
FRONT DOOR	Manufacturer	Solid			Wood
W1-2 FRONT N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W3 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - REAR S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 REAR S	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Name:	Gap:	Frame F	actor: g-value:	U-value:	Area:	No. of Openings:
FRONT DOOR	mm	8.0	0	1.4	2.07	1
W1-2 FRONT N	16mm or more	8.0	0.63	1.4	1.62	2
W3 - SIDE E	16mm or more	8.0	0.63	1.4	2.59	1
W4 - SIDE E	16mm or more	8.0	0.63	1.4	0.86	1
W5 - REAR S	16mm or more	0.8	0.63	1.4	2.14	1
RW1-2 RFAR S	16mm or more	0.8	0.63	1.4	1.33	2

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	North	0	0
W1-2 FRONT N		EXTERNAL WALLS	North	0	0
W3 - SIDE E		EXTERNAL WALLS	West	0	0
W4 - SIDE E		EXTERNAL WALLS	West	0	0
W5 - REAR S		EXTERNAL WALLS	South	0	0
RW1-2 REAR S		ROOF	South	0.001	0

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Element	<u>S</u>						
EXTERNAL WALLS	80.83	10.9	69.93	0.24	0	False	N/A
DORMER CHEEKS	2.12	0	2.12	0.24	0	False	N/A

SAP Input

 ROOF
 57.4
 2.66
 54.74
 0.15
 0
 N/A

 GROUND FLOOR
 39.2
 0.17
 N/A

 Internal Elements
 ...
 ...
 ...
 ...

Party Elements

PARTY WALL 29.73 N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0583

	Length	Psi-value		
	6.44	0.05	E2	Other lintels (including other steel lintels)
[Approved]	2.7	0.04	E3	Sill
[Approved]	20.7	0.05	E4	Jamb
	18.11	0.08	E5	Ground floor (normal)
[Approved]	18.11	0.07	E6	Intermediate floor within a dwelling
[Approved]	12.43	0.04	E11	Eaves (insulation at rafter level)
[Approved]	18.49	0.04	E13	Gable (insulation at rafter level)
[Approved]	12.6	0.09	E16	Corner (normal)
	6.4	0.12	E25	Staggered party wall between dwellings
	6.15	0.16	P1	Ground floor
	8.98	0.08	P5	Roof (insulation at rafter level)
	2.95	0.08	R1	Head
	2.95	0.06	R2	Sill
	5.4	0.08	R3	Jamb
	7.6	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys:0Number of open flues:0Number of fans:3Number of passive stacks:0Number of sides sheltered:1Pressure test:5.38

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

Boiler interlock: Yes

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

SAP Input

Water heating

Water heating: From main heating system

Water code: 901 Fuel :mains gas No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 90%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No Photovoltaics: None Assess Zero Carbon Home: No

		User Details:					
Assessor Name:	Jemma Mclaughlan	Stroma Nui	mher·	STRO	30065		
Software Name:	Stroma FSAP 2012	Software V			ion: 1.0.5.25		
		Property Address: HOU	SE D - BASELINE				
Address :	Woodwell Cottage P2, W	oodwell Road, BRISTOL,	BS11 9XU				
1. Overall dwelling dime	ensions:						
		Area(m²)	Av. Height(m)	. –	Volume(m³)	_	
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)	
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)	
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 78.4 (4)					
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)	
2. Ventilation rate:				_			
	main second heating heating		total		m³ per hour	•	
Number of chimneys	0 + 0	+ 0 =	0 x 4	0 =	0	(6a)	
Number of open flues	0 + 0	+ 0 =	0 x 2	0 =	0	(6b)	
Number of intermittent fa	ns		3 x 1	0 =	30	(7a)	
Number of passive vents			0 x 1	0 =	0	(7b)	
Number of flueless gas fi	res		0 x 4	0 =	0	(7c)	
						_	
				Air cha	anges per ho	ur –	
•	ys, flues and fans = (6a)+(6b			(5) =	0.15	(8)	
Number of storeys in the	een carried out or is intended, prod he dwelling (ns)	seed to (17), otherwise continue	: IIOIII (9) tO (16)	Г	0	(9)	
Additional infiltration	is arraining (ile)		[(9)-	1]x0.1 =	0	(0)	
Structural infiltration: 0	25 for steel or timber frame	0.05 (·		(10)	
	.20 for older or uniber marrie	or 0.35 for masonry cons	struction		0	(10)	
	resent, use the value correspondin	•		L		≓ ``	
deducting areas of opening	resent, use the value correspondin ngs); if equal user 0.35	g to the greater wall area (after		L	0	(11)	
deducting areas of opening	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o	g to the greater wall area (after			0	(11)	
deducting areas of opening of suspended wooden for the suspended wooden	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o	r 0.1 (sealed), else enter		[0	(11)	
deducting areas of opening of suspended wooden for the suspended wooden	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o ter 0.05, else enter 0	r 0.1 (sealed), else enter	0		0 0	(11)	
deducting areas of opening of suspended wooden for the suspended wooden	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o ter 0.05, else enter 0	g to the greater wall area (after r 0.1 (sealed), else enter d d 0.25 - [0.2 x (14) -	0		0 0 0	(11) (12) (13) (14)	
deducting areas of opening of suspended wooden of the	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o ter 0.05, else enter 0	g to the greater wall area (after r 0.1 (sealed), else enter d 0.25 - [0.2 x (14) - (8) + (10) + (11) +	0 ÷ 100] = • (12) + (13) + (15) =	[[[area [0 0 0 0	(11) (12) (13) (14) (15) (16)	
deducting areas of opening of suspended wooden for the suspended wooden	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) oter 0.05, else enter 0 s and doors draught stripped	g to the greater wall area (after r 0.1 (sealed), else enter d 0.25 - [0.2 x (14) - (8) + (10) + (11) + etres per hour per square	0 ÷ 100] = • (12) + (13) + (15) =	[[area	0 0 0 0 0	(11) (12) (13) (14) (15) (16)	
deducting areas of opening of suspended wooden of the	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped in the control of the control	g to the greater wall area (after or 0.1 (sealed), else enter of 0.25 - [0.2 x (14) - (8) + (10) + (11) + (10) + (0 ÷ 100] = • (12) + (13) + (15) = metre of envelope	area [0 0 0 0 0 0 0 5.3800001144409	(11) (12) (13) (14) (15) (16) (16) (18)	
deducting areas of opening of suspended wooden of the	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped in the control of the control	g to the greater wall area (after of 0.1 (sealed), else enter of 0.25 - [0.2 x (14) - (8) + (10) + (11) + (10) + (0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used	area 5	0 0 0 0 0 0 0 3.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18)	
deducting areas of opening of suspended wooden of the	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped in the stripped	In the greater wall area (after or 0.1 (sealed), else enter of 0.25 - $[0.2 \times (14) - (8) + (10) + (11) + (11) + (12) + (13) = (16)$ In the greater wall area (after or 0.14), else enter of 0.25 - $[0.2 \times (14) - (10) + (11) + (11) + (11) + (11) + (11) = (11)$ The property of the greater wall area (after or 0.14), else enter of 0.25 - $[0.2 \times (14) - (10) + (11) + (11) + (11) + (11) + (11) = (10)$ The property of the greater wall area (after wall area (after or 0.14)), else enter of 0.25 - $[0.2 \times (14) - (10) + (11) + (11) + (11) + (11) + (11) = (10)$ The property of the greater wall area (after or 0.14), else enter of 0.25 - $[0.2 \times (14) - (10) + (11$	0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used ((19)] =	area 5	0 0 0 0 0 0 5.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18) (19) (20)	
If suspended wooden if If no draught lobby, en Percentage of windows Window infiltration Infiltration rate Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere Shelter factor Infiltration rate incorporate	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped q50, expressed in cubic meanity value, then (18) = [(17) ÷ 20 is if a pressurisation test has been ed	g to the greater wall area (after of 0.1 (sealed), else enter of 0.25 - [0.2 x (14) - (8) + (10) + (11) + (10) + (0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used ((19)] =	area [0 0 0 0 0 0 0 3.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18)	
If suspended wooden if If no draught lobby, en Percentage of windows Window infiltration Infiltration rate Air permeability value, If based on air permeabil Number of sides sheltered Shelter factor Infiltration rate modified in Infiltration rate	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 s and doors draught stripped q50, expressed in cubic medity value, then (18) = [(17) ÷ 20 ting shelter factor for monthly wind speed	og to the greater wall area (after r 0.1 (sealed), else enter d $0.25 - [0.2 \times (14) - (8) + (10) + (11) + (16)$ etres per hour per square $0.0 + (8)$, otherwise $0.0 + (8)$ done or a degree air permeability $0.00 = 1 - [0.075 \times (21) = (18) \times (20)$	0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used • (19)] = =		0 0 0 0 0 0 5.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18) (19) (20)	
If suspended wooden if If no draught lobby, en Percentage of windows Window infiltration Infiltration rate Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere Shelter factor Infiltration rate incorporate	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped in the stripped	g to the greater wall area (after of 0.1 (sealed), else enter of 0.1 (sealed), else enter of 0.25 - [0.2 x (14) - (8) + (10) + (11) + (10) + (0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used • (19)] = =	area 5	0 0 0 0 0 0 5.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18) (19) (20)	

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor $(22a)m = (22)m \div 4$										
	1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18	1	
A.E. (11.69)				(04.)	(22.)				4	
Adjusted infiltration rate (allowing 0.49 0.48 0.47 0	or shelter a	0.37	speed) =	0.36	(22a)m 0.39	0.41	0.43	0.45	1	
Calculate effective air change rate			1	0.30	0.39	0.41	0.43	0.43	J	
If mechanical ventilation:									0	(23a)
If exhaust air heat pump using Appendi	x N, (23b) = (23	Ba) × Fmv (equation (I	N5)) , othe	rwise (23b) = (23a)			0	(23b)
If balanced with heat recovery: efficience	y in % allowing	for in-use f	actor (fron	n Table 4h) =				0	(23c)
a) If balanced mechanical ventil	lation with h	eat recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24a)
b) If balanced mechanical ventil	lation withou	it heat red	covery (N	MV) (24b	m = (22)	2b)m + (23b)		-	
(24b)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24b)
c) If whole house extract ventila	-	-				5 (00)	`			
if $(22b)m < 0.5 \times (23b)$, then	` ' ' ` `		· ` `	í `	ŕ	<u> </u>	ŕ	Ι.,	1	(240)
(24c)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24c)
d) If natural ventilation or wholeif (22b)m = 1, then (24d)m =						0.51				
	0.59 0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6	1	(24d)
Effective air change rate - enter	 (24a) or (24	1b) or (24	c) or (24	d) in bo	к (25)	l		<u> </u>	1	
	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6]	(25)
3. Heat losses and heat loss para	ameter:	,	•	•	•			•	4	
J. Heat losses allo lleat loss ball										
· ·		Net Ar	ea ·ea	H-val	IIE	ΔΧΙΙ		k-valu	۵	ΔXk
•	penings m²	Net Ar A ,r		U-val W/m2		A X U (W/	K)	k-value		A X k kJ/K
ELEMENT Gross O	penings		m²				K)			
ELEMENT Gross Or area (m²)	penings	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Gross Or area (m²) Doors	penings	A ,r	m ² x	W/m2	eK = [0.04] = [(W/ 2.898	K)			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	penings	A ,r 2.07	m ² x x ¹ x ¹	W/m2 1.4 /[1/(1.4)+	= [0.04] = [0.04] = [2.898 2.15	K)			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	penings	A ,r 2.07 1.62 2.59	m ² x x ¹ x ¹ x ¹	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} & & & \\ & & & &$	2.898 2.15 3.43	K)			kJ/K (26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	penings	A ,r 2.07 1.62 2.59	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = 0.04 = 0.0	2.898 2.15 3.43 1.14	K)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	penings	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = 0.04 = 0.0	2.898 2.15 3.43 1.14 2.84	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights	penings	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = C	2.898 2.15 3.43 1.14 2.84	k)			kJ/K (26) (27) (27) (27) (27) (27) (27b)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664	K)			kJ/K (26) (27) (27) (27) (27b) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.24	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m²	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	EK = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [= [= [= [= [= [= [= [= [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	EK 0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21		kJ/m²-	к 	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	$ \begin{array}{ccc} & & & & & & \\ & & & & & \\ $	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21		kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect ** include the areas on both sides of internal reas of the same area.	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15 0 g formula 1	$ \begin{array}{ccc} & & & & & & \\ & & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & \\ $	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	as given in	kJ/m²-	к 	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect** include the areas on both sides of interm. Fabric heat loss, W/K = S (A x U)	10.9 0 2.66 tive window U-nal walls and pa	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 value calcularitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15 0 g formula 1	$ \begin{array}{cccc} & & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & \\$	(W// 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	as given in [2] + (32a).	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

an be used	d instead of						,							
Thermal b	oridges :	S(L)	(Y) cald	culated i	using Ap	pendix I	K						10.48	(36)
f details of ti		0 0	re not kn	own (36) =	= 0.05 x (3	1)			,,	<i>(</i>)				_
「otal fabri										(36) =			60.77	(37)
entilation/							1			= 0.33 × (1	
J		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m= 41	1.46 41	1.15	40.84	39.39	39.12	37.86	37.86	37.63	38.35	39.12	39.67	40.24		(38
leat trans	sfer coef	fficient	t, W/K	,					(39)m	= (37) + (3	38)m			
39)m= 10)2.23 10°)1.92	101.61	100.17	99.9	98.64	98.64	98.4	99.12	99.9	100.44	101.01		_
Heat loss	paramet	eter (H	LP), W/	m²K						Average = = (39)m ÷		12 /12=	100.16	(39
40)m= 1	1.3 1	1.3	1.3	1.28	1.27	1.26	1.26	1.26	1.26	1.27	1.28	1.29		
Number o	of days in	n mont	th (Tabl	e 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.28	(40)
J	Jan F	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31 2	28	31	30	31	30	31	31	30	31	30	31		(41
	•						-	-					•	
4. Water	heating	energ	gy requi	rement:								kWh/y	ear:	
Assumed	occupar	ncy, N									2.	43		(42
if TFA > if TFA £ Innual av	> 13.9, N E 13.9, N /erage ho	N = 1 + N = 1 not wat	- 1.76 x ter usag	je in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.96]	·
if TFA > if TFA £	> 13.9, N E 13.9, N verage ho annual ave	N = 1 + N = 1 not wat verage h	- 1.76 x ter usag	je in litre usage by	es per da 5% if the a	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)]	•
if TFA > if TFA £ Annual av Reduce the a not more tha	> 13.9, N E 13.9, N verage he annual ave at 125 litres	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		9)			
if TFA > if TFA £ Annual av Reduce the a not more tha	> 13.9, N E 13.9, N verage he annual ave at 125 litres	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		
if TFA \$\int if TFA £\int Annual av Reduce the anot more than I J	> 13.9, N E 13.9, N rerage he annual ave at 125 litres Jan F sage in litre	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		
if TFA £ if TFA £ Annual av Reduce the anot more tha	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre	N = 1 + N = 1 not wat rerage h es per per Feb res per c	ter usag not water the erson per Mar day for ea	ge in litre usage by a day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fa 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Sur	9) Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97	N = 1 + N = 1 not wat verage h es per per Feb Feb Fes per co 7.47	ter usag not water the erson per Mar day for ea	ge in litre usage by a day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fa 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Sur	9) Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97	N = 1 + N = 1 not wat verage h es per per Feb Feb Fes per co 7.47	ter usage of water terson per Mar day for ea	ge in litre usage by s day (all w Apr ach month 90.12	es per da 5% if the a vater use, B May A A A A A A A A A A	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mon 105.16	Oct 93.79 Total = Suith (see Ta	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot to	N = 1 + N = 1 not wat rerage h es per per Feb res per c 7.47 water u	ter usag not water terson per Mar day for ea 93.79 used - calc	ge in litre usage by a day (all w Apr ach month 90.12 culated mo	es per da 5% if the orater use, I May $Vd,m = fa$ 86.44 a a a a a a a	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Total = Sun 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2:	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 tent of hot value in litres 22.5 19	N = 1 + N = 1 not waterage has per per per per per per per per per per	ter usag not water terson per Mar day for ea 93.79 used - calc	ge in litre usage by a day (all w Apr ach month 90.12 culated mo	es per da 5% if the orater use, I May $Vd,m = fa$ 86.44 a a a a a a a	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Total = Sun 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v 150 13 eous water 22.5 19	N = 1 + N = 1 not wat verage h es per per Feb Tes per constant water u 31.19 ver heating 9.68 SS:	ter usage of water of erson per day for ear 93.79 ased - calce 135.38 ag at point 20.31	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the a rater use, I May Vd,m = fa 86.44 201113.25 20 hot water 16.99	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Sunth (see Tail 122.55) Total = Sunth 18.38	9) 91 Nov 97.47 m(44) 112 = ables 1b, 1 133.77 m(45) 112 = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2: Water stor	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot variety in 150 13 Feous water 12.5 19 Trage loss of colume (li	N = 1 + N = 1 not waterage has per per per per per per per per per per	ter usagnot water of erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 includin	Apr Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the of the office of the off	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage),	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Sunth (see Tail 122.55) Total = Sunth 18.38	9) 91 Nov 97.47 m(44) 112 = ables 1b, 1 133.77 m(45) 112 = 20.07	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor Storage vo f community	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v 150 13 eous water 22.5 19 rage loss rolume (li	N = 1 + 1 $N = 1$	ter usage of water is erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no ta	ge in litre usage by a day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 g any so nk in dw	es per da 5% if the of rater use, I May Vd,m = fat 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage) litres in	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2: Water stor	> 13.9, N E 13.9, N Verage he annual average in litres Jan F Sage in litres 11.15 97 Tent of hot in the sage loss Folume (limity heating in steel in no steel in second	N = 1 + 1 $N = 1$	ter usage of water is erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no ta	ge in litre usage by a day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 g any so nk in dw	es per da 5% if the of rater use, I May Vd,m = fat 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage) litres in	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor Storage vo f community	> 13.9, N E 13.9, N Verage had annual average in litres Jan F sage in litres 11.15 97 Tent of hot verage loss rolume (limity heating in the property of the pr	N = 1 + 1	ter usagnot water of erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no tallot water of water of water seed w	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = fact 86.44 2011 13.25 20 hot water 16.99 Color or Water velling, each of the color of water velling, each of the color of t	ay Vd,av Iwelling is that and co Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS nter 110	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43 (44 (45 (46 (47
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us 44)m= 10 Energy conte 45)m= 1 f instantanee 46)m= 2: Water stoi Storage vo f communications Otherwise Water stoi	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot to 150 13 Folume (litres Folume (litres	N = 1 + 1 N = 1 N	ter usage to twater to erson per Mar day for ea 93.79 seed - calc 135.38 g at point 20.31 including and no tale to twater clared local colored	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = fact 86.44 2011 13.25 20 hot water 16.99 Color or Water velling, each of the color of water velling, each of the color of t	ay Vd,av Iwelling is that and co Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS nter 110	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43 (44 (45 (46 (47
if TFA > if TFA £ Annual av Reduce the a not more than that water us 44)m= 10 Energy conte 45)m= 1 finstantane 46)m= 2: Vater stor Storage vo f commur Otherwise Vater stor a) If manual Emperation Emperation Energy los	> 13.9, N E 13.9, N Perage he annual average in litres Jan F sage in litres 11.15 97 Tent of hot v 150 13 Four water 22.5 19 Trage loss of the sage in storage loss of the sage in storage loss of the sage in storage loss of the sage loss	N = 1 + 1 N = 1 N = 1 Not water uses per per per per per per per per per per	ter usage to twater to erson per Mar day for ear 93.79 seed - calculation and no tale to twater to estorage.	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = far 86.44 201113.25 20 hot water 16.99 Color or Water velling, encludes in or is knowner	ay Vd,av fwelling is foot and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(44) (45) (46) (47) (48) (49)
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2: Water stood f community of the stood for the	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 11.15 97 tent of hot v 150 13: teous water 12.5 19 rage loss rolume (li e if no sto arage loss ufacturer storage	N = 1 + 1 N = 1 N	ter usagnot water of erson per Mar day for ea 93.79 seed - calcon 135.38 gat point 20.31 including and no tand the clared long Table estorage clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of the clared of factor from the clared of the	ge in litre usage by a day (all w Apr ach month 90.12 culated mo 17.7 g any so nk in dw er (this in coss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = far 86.44 113.25 hot water 16.99 clar or W welling, e ncludes i or is kno	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(43 (44 (45 (46 (47 (48 (49 (50
if TFA > if TFA £ Annual av Reduce the anot more that anot more that anot water us 44)m= 10 Energy context 45)m= 1 If instantane 46)m= 2: Water storage voor for anotherwise Water storage in anotherwise Water storage in anotherwise by If manual Energy loss by If manual in anotherwise by If manual in anotherwis	> 13.9, N 2 13.9	N = 1 + 1 N = 1 N	ter usage tot water of the storage clared of the section for the section of the s	ge in litre usage by a day (all w Apr ach month 90.12 culated mo 17.7 g any so nk in dw er (this in coss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = far 86.44 113.25 hot water 16.99 clar or W welling, e ncludes i or is kno	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	0]	(54)	
Enter (50) or (54) in (5	55)									0		(55)
Water s	torage	loss cal	culated t	for each	month			((56)m = (55) × (41)ı	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder	contains	dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary	circuit	loss (ar	nual) fro	om Table	e 3							0		(58)
Primary	circuit	loss cal	culated	for each	month ((59)m = ((58) ÷ 36	65 × (41)	m					
(modi	ified by	factor f	om Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi l	oss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total he	eat requ	ired for	water h	eating ca	alculated	for eac	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar DH\	W input o	alculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add ad	ditional	lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (3)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	•	(63) (G2)
Output f	from wa	ater hea	ter											
(64)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
_					•	•		Outp	out from wa	ater heate	r (annual) ₁	12	1595.65	(64)
Heat ga	ains fror	n water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	κ [(46)m	+ (57)m	+ (59)m]	_
(65)m=	53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
includ	de (57)r	n in cald	culation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Inte	ernal ga	ins (see	Table 5	and 5a):	•						·		
Metabol		,			,									
T	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91		(66)
	u dains	(calcula	ted in Ar	nendix	l equat	ion L9 o	r I9a)a	lso see '	Lable 5			ļ	J	
(67)m=	53.3	47.34	38.5	29.14	21.79	18.39	19.87	25.83	34.67	44.03	51.38	54.78]	(67)
_		ns (calc				uation L							I	
· · · –	322.48	325.83	317.4	299.44	276.78	255.48	241.26	237.91	246.34	264.29	286.96	308.25	1	(68)
` ' L				<u> </u>		tion L15		<u> </u>					I	` /
(69)m=	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	1	(69)
Pumps				<u> </u>	02.02	02.02	02.02	02.02	02.02	02.02	02.02	02.02	J	(55)
(70)m=	3	3 3	3	3	3	3	3	3	3	3	3	3	1	(70)
_				l .			3	3	3	3	3		l	(10)
Losses	e.g. ev -97.27	-97.27	n (nega	-97.27	es) (1 ab	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
` ' L				-91.21	-91.21	-91.21	-91.21	-91.21	-91.21	-91.21	-91.21	-91.21		(1-1)
Water h		• •				1,0,00	44.70	F0.00	F0.01	F0.00	00.00	00.47	1	(72)
(70)														(72)
(72)m=	71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17	J	()
Total in				58.75	457.09	ļ		1 + (68)m + 418.09]	(73)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientati	on:	Access Factor Table 6d	7	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	15.63	(74)
North	0.9x	1	X	1.62	x	20.32	x	0.63	X	0.8	=	29.86	(74)
North	0.9x	1	X	1.62	x	34.53	x	0.63	X	0.8	=	50.75	(74)
North	0.9x	1	X	1.62	x	55.46	х	0.63	x	0.8	=	81.51	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	109.81	(74)
North	0.9x	1	x	1.62	x	79.99	x	0.63	x	0.8	=	117.55	(74)
North	0.9x	1	X	1.62	x	74.68	x	0.63	x	0.8	=	109.75	(74)
North	0.9x	1	X	1.62	x	59.25	x	0.63	x	0.8	=	87.07	(74)
North	0.9x	1	x	1.62	x	41.52	x	0.63	x	0.8	=	61.02	(74)
North	0.9x	1	x	1.62	x	24.19	x	0.63	x	0.8	=	35.55	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	19.28	(74)
North	0.9x	1	x	1.62	x	8.86	x	0.63	x	0.8	=	13.03	(74)
South	0.9x	1	x	2.14	x	46.75	x	0.63	x	0.8	=	45.38	(78)
South	0.9x	1	x	2.14	x	76.57	x	0.63	x	0.8	=	74.32	(78)
South	0.9x	1	x	2.14	x	97.53	x	0.63	x	0.8	=	94.68	(78)
South	0.9x	1	x	2.14	x	110.23	x	0.63	x	0.8	=	107.01	(78)
South	0.9x	1	X	2.14	x	114.87	x	0.63	X	0.8	=	111.51	(78)
South	0.9x	1	X	2.14	x	110.55	x	0.63	X	0.8	=	107.31	(78)
South	0.9x	1	x	2.14	x	108.01	x	0.63	x	0.8	=	104.85	(78)
South	0.9x	1	X	2.14	x	104.89	x	0.63	X	0.8	=	101.82	(78)
South	0.9x	1	X	2.14	x	101.89	x	0.63	X	0.8	=	98.9	(78)
South	0.9x	1	X	2.14	x	82.59	x	0.63	X	0.8	=	80.17	(78)
South	0.9x	1	X	2.14	X	55.42	X	0.63	X	0.8	=	53.79	(78)
South	0.9x	1	X	2.14	x	40.4	x	0.63	X	0.8	=	39.21	(78)
West	0.9x	1	X	2.59	x	19.64	X	0.63	X	0.8	=	23.07	(80)
West	0.9x	1	X	0.86	x	19.64	X	0.63	X	0.8	=	7.66	(80)
West	0.9x	1	X	2.59	x	38.42	X	0.63	X	0.8	=	45.14	(80)
West	0.9x	1	X	0.86	x	38.42	x	0.63	X	0.8	=	14.99	(80)
West	0.9x	1	X	2.59	x	63.27	X	0.63	X	0.8	=	74.33	(80)
West	0.9x	1	X	0.86	X	63.27	X	0.63	x	0.8	=	24.68	(80)
West	0.9x	1	X	2.59	x	92.28	X	0.63	X	0.8	=	108.41	(80)
West	0.9x	1	X	0.86	x	92.28	X	0.63	X	0.8	=	36	(80)
West	0.9x	1	X	2.59	x	113.09	x	0.63	X	0.8	=	132.86	(80)
West	0.9x	1	X	0.86	x	113.09	x	0.63	x	0.8	=	44.12	(80)
West	0.9x	1	X	2.59	x	115.77	x	0.63	x	0.8	=	136.01	(80)
West	0.9x	1	X	0.86	X	115.77	X	0.63	X	0.8	=	45.16	(80)

West 0.9x	1	x		-0	X	4.	10.22] x	0.63		, Г	0.0		=	129.49	(80)
West 0.9x		^ ^		==				1		=	F	0.8	\dashv			(80)
West 0.9x	1	^			x x		10.22] x] x	0.63	_	· L · Г	0.8	\dashv	=	43	(80)
West 0.9x	1	^			X		4.68 4.68	」^] x	0.63	=	` L < [0.8	\dashv	_	111.23 36.93	(80)
West 0.9x	1	^			X		3.59	」^]	0.63	=	` L 、 [0.8	\dashv	_	86.45	(80)
West 0.9x	1	^			X		3.59] ^] x	0.63	=	` L , [0.8	\dashv	_	28.71	(80)
West 0.9x	1	^			X		5.59	」^] x	0.63	=	` L < [0.8	\dashv	_	53.56	(80)
West 0.9x	1	^			X		5.59	」 ^] x	0.63	_	, [0.8	=	_	17.78	(80)
West 0.9x	1	^			X		4.49] ^] x	0.63	_	` L < [0.8	=	_	28.77	(80)
West 0.9x	1	^			X		4.49	」 ^] x	0.63	=	` L	0.8	=	_	9.55	(80)
West 0.9x	1				X		6.15] ^] x	0.63	=	, [0.8	\dashv	=	18.97	(80)
West 0.9x	1	^			X		6.15] ^] x	0.63	_	, [0.8	=	_	6.3	(80)
Rooflights 0.9x	1				X		7.01] ^] x	0.63	_	, [0.8	\dashv	=	56.72	(82)
Rooflights 0.9x	1				X		33.9	」 ^] x	0.63	_	` L	0.8	\dashv	_	101.23	(82)
Rooflights 0.9x	1				X		22.73] ^] x	0.63	=	, [0.8	=	_	148.08	(82)
Rooflights 0.9x	1				X		61.74] ^] x	0.63	=	, L	0.8	\dashv	=	195.15	(82)
Rooflights 0.9x	1				X		37.38]	0.63	=	, [0.8	\dashv	=	226.09	(82)
Rooflights 0.9x	1	×			X		38.06] x	0.63	=	· L	0.8	=	_	226.91	(82)
Rooflights 0.9x	1	x			X		30.51] x	0.63	_	, L	0.8	\dashv	_	217.8	(82)
Rooflights 0.9x	1	x			X		61.54] x	0.63	_	· L	0.8	=	_	194.91	(82)
Rooflights 0.9x	1				x		36.5]]	0.63	_	, <u> </u>	0.8	〓	=	164.7	(82)
Rooflights 0.9x	1	x		==	x		5.08]]	0.63	一 ,	ζĽ	0.8	\exists	=	114.72	(82)
Rooflights 0.9x	1	x			x		7.06]] x	0.63	,	,	0.8	Ħ	_	68.85	(82)
Rooflights 0.9x	1	x			x		9.72] x	0.63	<u> </u>	ζĖ	0.8	一	_	47.92	(82)
								_			_					
Solar gains in	watts, ca	alculate	d for eac	h mont	h	_		(83)m	n = Sum(74)n	n(82)	m					
(83)m= 148.47		392.52	528.08	624.38		32.94	604.88	531	.96 439.78	301	.78	180.24	125.4	44		(83)
Total gains –	1		<u> </u>	<u> </u>	<u> </u>										ı	
(84)m= 699.19	811.53	916.82	1019.08	1081.4	7 10)59.85	1014.39	950	.05 877.26	6 772	.77	688.27	661.	3		(84)
7. Mean inte	rnal temp	perature	(heating	seaso	n)											
Temperature	during h	neating	periods i	n the liv	/ing	area f	rom Tal	ble 9	, Th1 (°C)						21	(85)
Utilisation fa	1 	i	living ar	ea, h1,r	n (s	ee Ta	ble 9a)			-		1			l	
Jan	Feb	Mar	Apr	May	+	Jun	Jul	_	ug Sep	_	ct	Nov	De	_		
(86)m= 0.99	0.98	0.95	0.89	0.75		0.57	0.42	0.4	0.71	0.9	92	0.98	0.99	9		(86)
Mean interna	al temper	ature in	living ar	ea T1 (follo	w ste	ps 3 to 7	7 in T	able 9c)						ı	
(87)m= 19.82	20.01	20.3	20.64	20.87	2	20.97	20.99	20.	99 20.93	20.	62	20.16	19.7	8		(87)
Temperature	during h	neating	periods i	n rest o	f dw	elling	from Ta	able 9	9, Th2 (°C))						
(88)m= 19.84	19.84	19.84	19.86	19.86		9.87	19.87	19.	88 19.87	19.	86	19.86	19.8	5		(88)
Utilisation fa	ctor for g	ains for	rest of d	welling	, h2	,m (se	e Table	9a)								
(89)m= 0.99	0.97	0.94	0.85	0.69		0.48	0.32	0.3	0.62	3.0	39	0.97	0.99	9		(89)
Mean interna	al temper	ature in	the rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in Ta	ble 9c	:)					

(00)	40.50	10	40.40	40.74	40.00	40.07	40.07	40.00	40.45	40.04	40.00		(00)
(90)m= 18.3	18.59	19	19.46	19.74	19.86	19.87	19.87	19.82	19.45	18.81	18.26		(90)
								ı	LA = LIVIN	g area ÷ (4	+) =	0.23	(91)
Mean intern	al temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m= 18.66	18.92	19.3	19.74	20.01	20.12	20.13	20.13	20.08	19.72	19.12	18.62		(92)
Apply adjust	ment to t	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate			ı	
(93)m= 18.66	18.92	19.3	19.74	20.01	20.12	20.13	20.13	20.08	19.72	19.12	18.62		(93)
8. Space he	ating requ	uirement											
Set Ti to the the utilisatio			•		ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa	<u> </u>		•				- 3						
(94)m= 0.98	0.97	0.93	0.85	0.7	0.5	0.34	0.38	0.64	0.88	0.97	0.99		(94)
Useful gains	, hmGm	, W = (94	l)m x (84	4)m	ı	ı							
(95)m= 686.45	783.8	853.09	863.33	756.84	532.31	347.1	364.88	557.87	682.36	665.16	651.58		(95)
Monthly ave	rage exte	rnal tem	perature	from Ta	able 8	•		•				l.	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1467.8°	7 1429.09	1300.92	1085.65	829.87	544.29	348.65	367.51	592.49	911.39	1207.64	1456.6		(97)
Space heati	ng require	ement fo	r each m	nonth, k\	Wh/mon	th = 0.02	4 x [(97)m – (95)m] x (4 ⁻	1)m			
(98)m= 581.37	433.64	333.18	160.07	54.34	0	0	0	0	170.4	390.58	598.93		
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2722.52	(98)
Space heati	ng require	ement in	kWh/m²	?/year								34.73	(99)
·	· .				vstems i	ncluding	micro-C	CHP)				34.73	(99)
9a. Energy re	quiremer				ystems i	ncluding	micro-C	CHP)				34.73	(99)
·	quiremer	nts – Indi	vidual h	eating sy			micro-C	CHP)				34.73	
9a. Energy re Space heat Fraction of s	quiremer ing: pace hea	nts – Indi at from se	vidual h	eating sy		system	micro-C	, i					(201
9a. Energy re Space heat Fraction of s	quiremer ing: pace hea pace hea	nts – Indi at from se at from m	vidual he econdary	eating sy y/supple em(s)		system	(202) = 1 ·	, i	(203)] =			0	(201
9a. Energy re Space heat Fraction of s Fraction of t	quirementing: pace head pace head pace head	nts – Indi at from se at from m ng from i	vidual he econdary ain syst main sys	eating sy y/supple em(s) stem 1		system	(202) = 1 ·	- (201) =	(203)] =			0 1 1	(201) (202) (204)
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of	quirementing: pace hea pace hea ptal heati main spa	nts – Indi at from se at from m ng from i ace heati	vidual he econdary ain systemain system	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1 ·	- (201) =	(203)] =			0 1 1 89.9	(201 (202 (204 (206
9a. Energy re Space heat Fraction of s Fraction of t	quirementing: pace hea pace hea ptal heati main spa	at from se at from m at from m ng from i ace heati	vidual he econdary ain systemain system	eating sy y/supple em(s) stem 1	mentary g system	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	` '-			0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of Efficiency of	quirement ing: pace heat pace heat total heat in space seconda	at from set from ming from inace heating/supplement	vidual he econdary ain syst main syst ng syste ementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 ·	- (201) =	(203)] =	Nov	Dec	0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of Efficiency of Jan Space heati	quirementing: pace head pace head potal heatiful main space secondaries Febung require	at from set from ming from it ace heatingly/supplement (c	vidual he econdary ain syst main syst ng syste ementary Apr alculated	eating syy/supple em(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 · (204) = (2	- (201) = 02) × [1 - 1	Oct			0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of Efficiency of	quirementing: pace head pace head pace head main space secondaries Febong require	at from set from ming from inace heating/supplement	vidual he econdary ain syst main syst ng syste ementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	` '-	Nov 390.58	Dec 598.93	0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy respectively. Space heat Fraction of substitution of substitution of the Efficiency of Efficiency of Space heating.	quirementing: pace head pa	at from set at from many from the ace heating many/supplement (co. 333.18	econdary ain systemain systementary Apr alculated	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 54.34	mentary g system Jun	system 1, % Jul	(202) = 1 · (204) = (2	- (201) = 02) × [1 - 1	Oct			0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy respectively. Space heat Fraction of substituting Fraction of the Efficiency of Efficiency of Space heating 581.37	quirement ing: pace hea pace hea patal heati main spa seconda Feb ng require 433.64 8)m x (20	at from set at from many from the ace heating many/supplement (co. 333.18	econdary ain systemain systementary Apr alculated	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 54.34	mentary g system Jun	system 1, % Jul	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 170.4	390.58 434.46	598.93	0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy respectively. Space heat Fraction of substituting Fraction of the Efficiency of Efficiency of Space heating 581.37 (211)m = {[(9)]	quirementing: pace heated pace heated heated main space seconda Febung required 433.64 8)m x (20	at from set from many from the ace heating ry/supplement (compared as 333.18	econdary ain systemain systematary Apr alculated 160.07	eating sylvapple em(s) stem 1 em 1 May dabove 54.34	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - (Oct 170.4	390.58 434.46	598.93	0 1 1 89.9	(201 (202 (204 (206 (208 ear
9a. Energy respectively. Space heat Fraction of substituting Fraction of the Efficiency of Efficiency of Space heating 581.37 (211)m = {[(9)]	quirement ing: pace heat p	at from seat from mace heating/supplement (c 333.18) x 1 370.62	econdary ain systemain systemain systementary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvally/supple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 down the following stems of the followi	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 170.4	390.58 434.46	598.93	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ear
9a. Energy respectively space heat Fraction of substituting Fraction of the Efficiency of Efficiency	quirementing: pace head pa	at from set at from many from the ace heating many supplement (company) and the ace at the ace at the ace at the ace at the ace ace at the ace	econdary ain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvally/supple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 down the following stems of the followi	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 170.4	390.58 434.46	598.93	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ear
9a. Energy respectively space heat Fraction of substituting Fraction of the Efficiency of Efficiency of Efficiency of Space heating 581.37 (211)m = {[(9) 646.69]} Space heating = {[(98) m x (25) 25] 25] 25]	quirementing: pace head pa	at from set at from many from the ace heating many supplement (company) and the ace at the ace at the ace at the ace at the ace ace at the ace	econdary ain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvally/supple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 down the following stems of the followi	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 l (kWh/yea	Oct 170.4 189.55 ar) = Sum(2)	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ear (211
9a. Energy respectively. Space heat Fraction of substitution	quirement ing: pace heat p	at from set from many from in the set from many from in the set from many from in the set from t	econdary ain systemain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvalupple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 em 1 stem 1 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - (201) = 02) × [1 - (201) = 0	Oct 170.4 189.55 ar) = Sum(2)	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ear (211
9a. Energy respectively. Space heat Fraction of substitution	quirement ing: pace heat p	at from set from many from in the set from many from in the set from many from in the set from t	econdary ain systemain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvalupple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 em 1 stem 1 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 l (kWh/yea	Oct 170.4 189.55 ar) = Sum(2)	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ear (211
9a. Energy respectively. Space heat Fraction of selection of selection of the Efficiency of Efficie	quirement ing: pace heat p	at from set from many from in ace heating ry/supplement (c 333.18) (4)] } x 1 (370.62) econdary 00 ÷ (20 0)	econdary ain systemain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06 y), kWh/ 8) 0	eating sylvalupple em(s) stem 1 em 1 y heating May d above 54.34 lb(s) 60.44 lb(s) bove)	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota 0 Tota	- (201) = 02) × [1 - (201) = 02) × [1 - (201) = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Oct 170.4 189.55 ar) = Sum(2 0 ar) = Sum(2	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ear (211)
9a. Energy respectively space heat Fraction of substituting Fraction of the Efficiency of Efficiency of Efficiency of Space heating Space heating Space heating Space heating Efficiency of Efficiency of Space heating Efficiency	quirement ing: pace heat p	at from set at from many from in the secondary of the sec	econdary ain systemain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvy/supple em(s) stem 1 em 1 y heating May d above 54.34 06) 60.44 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 l (kWh/yea	Oct 170.4 189.55 ar) = Sum(2)	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208)

(217)m= 89.32 89.24 89.08	88.71 88.07	87.3	87.3	87.3	87.3	88.73	89.18	89.34]	(217)
Fuel for water heating, kWh/mc										
(219) m = (64) m x $100 \div (217)$ (219)m = 182.09 159.8 166.16	146.83 142.95	125.96	118.21	133.51	134.47	152.36	163.73	176.74]	
<u> </u>		·		Tota	I = Sum(2	19a) ₁₁₂ =	ı	1	1802.82	(219)
Annual totals						k\	Wh/yea	r	kWh/year	-
Space heating fuel used, main	system 1								3028.39	╛
Water heating fuel used									1802.82	
Electricity for pumps, fans and	electric keep-hot	t							_	
central heating pump:								30]	(230c)
boiler with a fan-assisted flue								45		(230e)
Total electricity for the above, k	(Wh/year			sum	of (230a)	(230g) =			75	(231)
Electricity for lighting									376.49	(232)
Total delivered energy for all us	ses (211)(221)	+ (231)	+ (232).	(237b)	=				5370	(338)
10a. Fuel costs - individual he	ating systems:									
		Fue	el			Fuel P	rice		Fuel Cost	
			h/year			(Table			£/year	
Space heating - main system 1		(211) x			3.4	-8	x 0.01 =	105.39	(240)
Space heating - main system 2) -	(213) x			0		x 0.01 =	0	(241)
Space heating - secondary		(215) x			13.	19	x 0.01 =	0	(242)
Water heating cost (other fuel)		(219)			3.4	.8	x 0.01 =	62.74	(247)
Pumps, fans and electric keep-	·hot	(231)			13.	19	x 0.01 =	9.89	(249)
(if off-peak tariff, list each of (23	30a) to (230g) se	parately	as app	licable a	nd apply	fuel pri	ce accoi	rding to	Table 12a	
Energy for lighting		(232)			13.	19	x 0.01 =	49.66	(250)
Additional standing charges (Ta	able 12)								120	(251)
Appendix Q items: repeat lines	(253) and (254)	as need	ed							
Total energy cost	(245)(247) + (250	0)(254)	=					347.68	(255)
11a. SAP rating - individual he	eating systems									
Energy cost deflator (Table 12))								0.42	(256)
Energy cost factor (ECF)	[(255) x	(256)] ÷ [(4	4) + 45.0]	=					1.18	(257)
SAP rating (Section 12)									83.49	(258)
12a. CO2 emissions – Individ	ual heating syste	ems inclu	iding mi	cro-CHP)					
		End	ergy			Emiss	ion fac	tor	Emissions	
		kW	h/year			kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1))	(211) x			0.2	16	=	654.13	(261)
Space heating (secondary)		(215) x			0.5	19	=	0	(263)
Water heating		(219) x			0.2	16	=	389.41	(264)

Space and water heating	(261) + (262) + (263) + (2	64) =	1043.54	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93	(267)
Electricity for lighting	(232) x	0.519 =	195.4	(268)
Total CO2, kg/year		sum of (265)(271) =	1277.86	(272)
CO2 emissions per m ²		(272) ÷ (4) =	16.3	(273)
EI rating (section 14)			86	(274)

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	3694.64 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2199.44 (264)
Space and water heating	(261) + (262) + (263) + (264) =		5894.08 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	1155.82 (268)
'Total Primary Energy	sum	n of (265)(271) =	7280.15 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	92.86 (273)

		User Details:				
A a a a a a a a a Nama a	la garage Malayyahlaya			CTDO	220005	
Assessor Name: Software Name:	Jemma Mclaughlan Stroma FSAP 2012	Stroma Nur Software Vo			030065 n: 1.0.5.25	
Software Name.		roperty Address: HOU			11. 1.0.3.23	
Address :	Woodwell Cottage P2, Woo	· · · · · ·		_		
Overall dwelling dime	•	aweii rtoaa, Brtio i OE,	2011 3/10			
		Area(m²)	Av. Height(m))	Volume(m³)	
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r	78.4 (4)				
Dwelling volume		(3a)+(3	8b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:						
	main secondar heating heating	y other	total		m³ per hour	
Number of chimneys	0 + 0	+ 0 =	0 ×	(40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0 ×	(20 =	0	(6b)
Number of intermittent far	ns		3 ×	(10 =	30	(7a)
Number of passive vents			0 ×	(10 =	0	(7b)
Number of flueless gas fi	res		0 ×	(40 =	0	(7c)
				Air ch	anges per ho	ur
Infiltration due to chimne	/s, flues and fans = (6a)+(6b)+(7	(a)+(7b)+(7c) =	30	÷ (5) =	0.15	الا (8)
•	een carried out or is intended, procee			+ (3) =	0.15	(0)
Number of storeys in the	ne dwelling (ns)			[0	(9)
Additional infiltration			[(9	9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	truction		0	(11)
if both types of wall are pr deducting areas of openir	esent, use the value corresponding to pas): if equal user 0.35	the greater wall area (after				
=	loor, enter 0.2 (unsealed) or 0	1 (sealed), else enter ()	ſ	0	(12)
If no draught lobby, ent	er 0.05, else enter 0				0	(13)
Percentage of windows	and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14) ÷	100] =	Ì	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	<u> </u>	0	(16)
Air permeability value,	q50, expressed in cubic metre	s per hour per square	metre of envelop	e area	5	(17)
	ity value, then (18) = [(17) ÷ 20]+(·	Ī	0.4	(18)
Air permeability value applie	s if a pressurisation test has been dor	e or a degree air permeabili	y is being used			_
Number of sides sheltere	d				1	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =	[0.92	(20)
Infiltration rate incorporat	ing shelter factor	(21) = (18) x (20) =	=	[0.37	(21)
Infiltration rate modified for	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Sep	Oct Nov	Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infilt	tration rat	e (allowi	ng for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		•	rate for t	he appli	cable ca	se	!					· 	(00-)
If exhaust air			andiv N (2	23h) - (23a	a) v Emy (6	aguation (N	NSN othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balance		-	-	_					2h\m + (23h) v [1 _ (23c)	0 ± 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)		l	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	/e input v	ventilatio	n from (outside	l			ı	
if (22b)	m < 0.5 >	< (23b), t	hen (24	c) = (23k	o); other	wise (24	c) = (22l	b) m + 0.	5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura				•	•				0.51				
(24d)m= 0.61	m = 1, th 0.61	en (24d) 0.6	m = (22)	0.58	0.56	4a)m = 0.56	0.5 + [(2)]	0.57	0.5]	0.59	0.59	Ī	(24d)
Effective ai		ļ			ļ.	<u> </u>			0.36	0.59	0.59		(244)
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(25)
` ′					l	l							
0 1141													
3. Heat loss		·			Not Ar	00	Hyal		A V I I		le volue		A V I ₂
3. Heat loss ELEMENT	es and he Gros area	SS	oaramet Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
	Gros	SS	Openin	ıgs									
ELEMENT	Gros area	SS	Openin	ıgs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area oe 1	SS	Openin	ıgs	A ,r	m ² x x x 1.	W/m2	2K = [- 0.04] = [(W/ 2.07				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area oe 1 oe 2	SS	Openin	ıgs	A ,r 2.07	m² x x1. x1.	W/m2 1 /[1/(1.4)+		2.07 2.15				kJ/K (26) (27)
Doors Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43				kJ/K (26) (27) (27)
Doors Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{c} 2K \\ \hline \\ -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $ $ \begin{array}{c} -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $	2.07 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{c} 2K \\ \hline \\ -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $ $ \begin{array}{c} -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $	2.07 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area oe 1 oe 2 oe 3	ss (m²)	Openin	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{ccc} 2K & = & \\ -0.04] & = & \\ -0.04] & = & \\ -0.04] & = & \\ -0.04] & = & \\ 0.04] & = & \\ \end{array} $	2.07 2.15 3.43 1.14 2.84 2.261				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area oe 1 oe 2 oe 3 oe 4	ss (m²)	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096				kJ/K (26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and	Gros area one 1 one 2 one 3 one 4 and 57. elements	33 2 4 5, m ²	10.9 0 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	EK = [- 0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1 57. elements	33 2 4 5, m ² lows, use e	10.9 10.9 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K = [- 0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1 57. elements od roof wind eas on both oss, W/K	33 2 4 5, m ² dows, use e sides of in = S (A x	10.9 10.9 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	$ \begin{array}{cccc} 2K & = & \\ & -0.04 $	(W/ 2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	(26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and ** include the are Fabric heat lo	Gros area De 1 De 2 De 3 De 4	33 2 4 5, m² lows, use end sides of interest and interest	10.9 0 2.66	indow U-valls and par	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	$ \begin{array}{cccc} 2K & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & = & \\$	(W/ 2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	K)	kJ/m²-l	3.2	(26) (27) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

				ulation.										
	ŭ	`	,		using Ap	•	K						10.55	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			52.74	(37
			alculated	l monthly	V						25)m x (5)		53.74	(0,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(3
eat tr	ansfer c	coefficier	nt W/K	<u> </u>	<u> </u>	<u> </u>	!	!	(39)m	= (37) + (37)		ļ	l	
9)m=	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		
oot lo	oo poro	motor (b	JI D) \\\	/m²l/	I	I	l			Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	92.59	(3
)m=	1.21	1.2	HLP), W/	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		
5)111-	1.21	1.2	1.2	1.10	1.10	1.10	1.10	1.10			Sum(40) ₁ .		1.18	(4
umbe	er of day	s in mor	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
eum	ad occu	ipancy, I	NI									40	1	(4
				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43		(
f TF	A £ 13.9	9, N = 1											-	
nnual	OVOROR													
								(25 x N) to achieve		se taraet o		.96		(-
duce	the annua	al average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target o		.96		(4
duce	the annua	al average	hot water	usage by a day (all w	5% if the a	lwelling is	designed	to achieve	a water us	se target o		.96 Dec]	(-
duce t more	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d ater use, l	lwelling is hot and co Jun	designed (Aug		_	,	1		(
duce t more t t wate	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed (Aug	a water us	_	,	1		(
duce t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in 101.15	Feb 197.47	Mar day for ea	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$	Jun ctor from 3	designed and desig	Aug (43)	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	90.12 90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(«
educe It more It wate It wate It may come to the company come to the company come to the company compa	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 DTm / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1	Dec 101.15 = c, 1d) 145.27	1103.46	(«
t water ergy comparisons instant	the annual that 125 Jan ar usage in 101.15 content of 150 taneous w	Feb 11 Per per per per per per per per per per p	Mar day for ea 93.79 used - cale 135.38	Apr ach month 90.12 culated mo 118.03	May Vd,m = fa 86.44 201113.25 20 hot water	Jun ctor from 82.76 190 x Vd,r 97.73	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/more 105.16	Oct 93.79 Total = Su 122.55 Total = Su	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		(
t water length of the control of th	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 DTm / 3600 103.92	90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		
duce the more t	Jan 101.15 content of 150 aneous w 0 storage	Feb 11 per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage),	designed and desig	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		
duce t more t water t water t water t water t water t water t water t water t water t water t water	the annual that 125 Jan ar usage in 101.15 content of 150 faneous w 0 storage e volum	Feb 1/2 Feb 1/	Mar day for ea 93.79 used - call 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03 of use (no	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t water dust i)m= dust in material corage common herw	the annual that 125 Jan ar usage in 101.15 content of 150 storage e volum munity herise if no	Feb 1 litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0 includinated no talcated and no talcated and a calcated and a calcated and a calcated and and and a calcated and and a calcated and and a calcated and a ca	Apr ach month 90.12 culated mo 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 97.73 storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t si)m= mstant oragg commherw ater:	the annual that 125 Jan ar usage in 101.15 content of 150 staneous w 0 storage e volum munity helise if no storage	Feb 11tres per properties per proper	Mar 93.79 used - call 135.38 ng at point o includinate hot water	Apr ach month 90.12 culated mo 118.03 of use (no unk in dw er (this in	May Vd,m = fa 86.44 201113.25 20 hot water 0 colar or Welling, encludes i	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(((
duce t more	the annual that 125 Jan ar usage in 101.15 content of 150 storage e volum munity he vise if no storage anufact	Feb 11 prints per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point o includinate hot water	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		
duce t more literative water ergy of mostant mostant orage commister: in the mostant in the most	Jan 101.15 101.1	Feb 1 litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de	Mar 93.79 used - calc 135.38 ng at point and no tal hot water eclared le m Table	Apr ach month 90.12 culated me 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 colar or Water 20 colar or Water 21 colar or Water 22 colar or Water 23 colar or Water 24 colar or Water 35 colar or Water 36 colar or Water 47 colar or Water 48 colar or Water 59 colar or Water 60 colar or Water 60 colar or Water 61 colar or Water 62 colar or Water 63 colar or Water 64 colar or Water 65 colar or Water 66 colar or Water 67 colar or Water 67 colar or Water 68 colar or Water 69 colar or Water 69 colar or Water 60 colar or Water	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4)
duce to more that water that wate	the annual that 125 Jan 101.15 content of 150 storage e volum munity helise if no storage example anufact example that 125	Feb n litres per p 97.47 hot water 131.19 loss: e (litres) eating a o stored loss: urer's de actor fro m water	Mar day for ea 93.79 used - cale 135.38 ng at point nd no tale hot water eclared le m Table storage	Apr ach month 90.12 culated me 118.03 of use (no	5% if the orater use, I May $Vd,m = fa$ 86.44 0 0 0 0 0 0 0	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		(4)
duce t more	the annual that 125 Jan 101.15 content of 150 storage e volum munity he vise if no storage anufact trature far anufact trature far anufact	Feb plitres per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point nd no tal hot water m Table storage eclared to	Apr ach month 90.12 culated mo 118.03 of use (no ank in dw er (this ir oss facto 2b cylinder l	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 lar or Water 113.25 20 hot water 113.25 21 hot water 22 hot water 33 hot water 34 hot water 45 hot water 56 hot water 67 hot water 77 hot water 113.25	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at wate 4)m= anergy of anstant b)m= atternation att	the annual that 125 Jan 101.15 content of 150 anneous w o storage e volum munity h vise if no storage anufact rature fa to lost fro anufact ter stora	Feb n litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de	Mar day for ea 93.79 used - call 135.38 ng at point nd no tal hot water m Table storage eclared to	Apr ach month 90.12 culated mo 118.03 of use (no ng any so ank in dw er (this ir oss facto 2b cylinder l com Table	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at more at more at more at more at more at more at wate at more	the annual the annual that 125 Jan 101.15 content of 150 storage e volum munity h vise if no storage anufact trature fa v lost fro anufact ter stora munity h e factor	Feb 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	Mar day for ea 93.79 used - calc 135.38 ng at point on includir and no talc hot water eclared left m Table storage eclared of factor free sections	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this ir oss facto 2b cylinder I com Tabl on 4.3	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4) (4) (4) (4) (5) (5) (5) (5)

Energy	/ lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)	x (52) x ((53) =		0] ((54)
Enter	(50) or	(54) in (5	55)									0	((55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	J lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0] ((58)
Primar	y circuit	loss cal	culated	for each	month (59)m =	(58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wa	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	((59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48	((62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	-	
(add a	dditiona	I lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)				_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	((63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	((63) (G2)
Output	from w	ater hea	ter										_	
(64)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		
								Outp	out from w	ater heate	r (annual)	12	1229.79	(64)
Heat g	ains fro	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8	x [(46)m	+ (57)m	+ (59)m	1	
(65)m=	31.88	27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87	((65)
inclu	ıde (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	Table 5	and 5a):									
Metab	olic gair	s (Table	5), Wat	ts									_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	((66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m=	20.26	18	14.64	11.08	8.28	6.99	7.56	9.82	13.18	16.74	19.54	20.83	((67)
Applia	nces ga	ins (calc	ulated ir	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m=	216.06	218.31	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	((68)
Cookir	ng gains	(calcula	ited in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5				
(69)m=	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	((69)
Pumps	and fa	ns gains	(Table	5a)	-	-	-	-			-	-		
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	((70)
Losses	e.g. ev	aporatic	n (nega	tive valu	es) (Tab	ole 5)							-	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water	heating	gains (T	able 5)										-	
(72)m=	42.84	41.49	38.67	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49	((72)
Total i	nternal	gains =	;			(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72))m	-	
(73)m=	338.65	337.27	325.44	306.02	285.55	266.49	254.54	258.38	268.75	288.3	310.76	328.33] ((73)
		•	•	•	•	•	•	•		•		•	•	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	x	20.32	х	0.63	X	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	x	55.46	х	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.7	=	30.58	(78)
South	0.9x	0.77	x	2.14	x	76.57	x	0.63	x	0.7	=	50.08	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	x	0.7	=	63.79	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.7	=	72.09	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	x	0.7	=	75.13	(78)
South	0.9x	0.77	x	2.14	x	110.55	x	0.63	x	0.7	=	72.3	(78)
South	0.9x	0.77	x	2.14	x	108.01	x	0.63	x	0.7	=	70.64	(78)
South	0.9x	0.77	X	2.14	x	104.89	x	0.63	X	0.7	=	68.6	(78)
South	0.9x	0.77	x	2.14	x	101.89	x	0.63	X	0.7	=	66.63	(78)
South	0.9x	0.77	X	2.14	x	82.59	x	0.63	X	0.7	=	54.01	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.7	=	36.24	(78)
South	0.9x	0.77	X	2.14	x	40.4	x	0.63	X	0.7	=	26.42	(78)
West	0.9x	0.77	X	2.59	X	19.64	X	0.63	X	0.7	=	15.55	(80)
West	0.9x	0.77	X	0.86	x	19.64	X	0.63	X	0.7	=	5.16	(80)
West	0.9x	0.77	X	2.59	x	38.42	x	0.63	X	0.7	=	30.41	(80)
West	0.9x	0.77	X	0.86	X	38.42	X	0.63	X	0.7	=	10.1	(80)
West	0.9x	0.77	X	2.59	x	63.27	X	0.63	X	0.7	=	50.08	(80)
West	0.9x	0.77	X	0.86	x	63.27	X	0.63	X	0.7	=	16.63	(80)
West	0.9x	0.77	X	2.59	x	92.28	x	0.63	X	0.7	=	73.04	(80)
West	0.9x	0.77	X	0.86	X	92.28	X	0.63	X	0.7	=	24.25	(80)
West	0.9x	0.77	X	2.59	x	113.09	x	0.63	x	0.7	=	89.52	(80)
West	0.9x	0.77	X	0.86	x	113.09	x	0.63	X	0.7	=	29.72	(80)
West	0.9x	0.77	X	2.59	x	115.77	X	0.63	x	0.7	=	91.64	(80)
West	0.9x	0.77	X	0.86	X	115.77	x	0.63	x	0.7	=	30.43	(80)

West 0.9x	0.77	×	2.59	x	110.22	X	0.63	×	0.7	=	87.24	(80)
West 0.9x	0.77	→ ×	0.86] x	110.22	X	0.63	≓ ×	0.7	= =	28.97	(80)
West 0.9x	0.77	×	2.59	X	94.68	i x	0.63	= x	0.7	-	74.94	(80)
West 0.9x	0.77	×	0.86	X	94.68	X	0.63	×	0.7	-	24.88	(80)
West 0.9x	0.77	×	2.59	i x	73.59	×	0.63	×	0.7		58.25	(80)
West 0.9x	0.77	×	0.86	X	73.59	X	0.63	x	0.7	= =	19.34	(80)
West 0.9x	0.77	×	2.59	X	45.59	×	0.63	×	0.7	= =	36.09	(80)
West 0.9x	0.77	×	0.86	X	45.59	×	0.63	×	0.7	=	11.98	(80)
West 0.9x	0.77	x	2.59	x	24.49	X	0.63	x	0.7	=	19.38	(80)
West 0.9x	0.77	x	0.86	x	24.49	X	0.63	x	0.7	=	6.44	(80)
West 0.9x	0.77	x	2.59	x	16.15	X	0.63	×	0.7	=	12.78	(80)
West 0.9x	0.77	x	0.86	x	16.15	X	0.63	x	0.7	=	4.24	(80)
Rooflights 0.9x	1	x	1.33	x	47.01	X	0.63	x	0.7	=	49.63	(82)
Rooflights 0.9x	1	x	1.33	X	83.9	X	0.63	x	0.7	=	88.58	(82)
Rooflights _{0.9x}	1	X	1.33	X	122.73	X	0.63	×	0.7	=	129.57	(82)
Rooflights 0.9x	1	x	1.33	X	161.74	X	0.63	x	0.7	=	170.76	(82)
Rooflights 0.9x	1	x	1.33	X	187.38	X	0.63	x	0.7	=	197.83	(82)
Rooflights 0.9x	1	x	1.33	X	188.06	X	0.63	×	0.7	=	198.54	(82)
Rooflights _{0.9x}	1	X	1.33	Х	180.51	X	0.63	X	0.7	=	190.58	(82)
Rooflights 0.9x	1	x	1.33	X	161.54	X	0.63	×	0.7	=	170.54	(82)
Rooflights _{0.9x}	1	X	1.33	X	136.5	X	0.63	×	0.7	=	144.11	(82)
Rooflights _{0.9x}	1	X	1.33	X	95.08	x	0.63	X	0.7	=	100.38	(82)
Rooflights _{0.9x}	1	x	1.33	X	57.06	X	0.63	x	0.7	=	60.24	(82)
Rooflights 0.9x	1	X	1.33	X	39.72	X	0.63	X	0.7	=	41.93	(82)
Solar gains in	1	T	ı		70.44 454.07	1	n = Sum(74)m.		1	04.40	1	(93)
(83)m= 111.45 Total gains – i		94.26 solar	$\begin{array}{c c} 395.07 & 466.7 \\ \hline (84)m - (73) \end{array}$		72.11 451.37 83\m watts	397	7.63 329.45	226.4	1 135.29	94.16		(83)
(84)m= 450.1		19.7	701.09 751.7	`	738.6 705.91	656	5.01 598.19	514.7	1 446.05	422.49	1	(84)
` '	LL_				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 000		3 1 1 1 1	. 1			
7. Mean inter	·				araa fram Ta	shlo O	Th1 (°C)				24	7(05)
Utilisation fac	ŭ	٠.		•			, IIII (C)				21	(85)
Jan		Mar	Apr Ma	Ť	Jun Jul		ug Sep	Oct	Nov	Dec]	
(86)m= 1	 	0.99	0.96 0.88		0.72 0.55	0.6	<u> </u>	0.98	1	1		(86)
Mean interna	l tomporatu	ıro in li	ving area T1	(follo	w stops 2 to	7 in 7			<u> </u>		I	
(87)m= 19.66	 	20.11	20.47 20.7		20.94 20.99	20.		20.46	19.99	19.64]	(87)
` ′	<u> </u>		!	!	!		<u> </u>		1		J	, ,
Temperature (88)m= 19.92	 	9.92	19.94 19.9		19.95 19.95	19.		19.94	19.93	19.93	1	(88)
` ′	<u> </u>			!	!		10.34	10.04	10.90	10.00	J	(55)
Utilisation fac	 			Ť	<u>`</u>		10 0 70	0.07	0.00	1	1	(89)
(89)m= 1	<u> </u>	0.98	0.94 0.84		0.63 0.43	0.4		0.97	0.99	1	l	(03)
Mean interna	ıl temperatu	ıre in t	he rest of dw	elling	T2 (follow st	teps 3	to 7 in Tabl	e 9c)				

(90)m=	18.7	18.87	19.15	19.51	19.78	19.92	19.95	19.95	19.86	19.5	19.04	18.68		(90)
(30)111=	10.7	10.07	19.10	19.51	19.70	19.92	19.90	19.90			g area ÷ (4		0.23	(91)
						\ 4					9 (, l	0.20	(01)
	interna 18.92	- _	ature (fo	r	1	· · ·				10.72	10.26	10.01		(02)
(92)m=		19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(92)
(93)m=	18.92	19.1	he mean 19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(93)
			uirement		20.01	20.10	20.10	20.10	20.1	10.70	10.20	10.01		()
•		•	ernal ter		re obtain	ned at ste	ep 11 of	Table 9	o, so tha	t Ti.m=(76)m an	d re-calc	ulate	
			or gains	•				1 4510 01	, ooa		. o, a	u 10 0010	diato	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:										
(94)m=	1	0.99	0.98	0.94	0.84	0.65	0.46	0.52	0.8	0.96	0.99	1		(94)
	<u> </u>		W = (94)	ŕ	·									
(95)m=		532.72	607.76	659.91	631.38	479.8	323.54	337.91	475.61	496.09	443.22	421.57		(95)
	<u> </u>		rnal tem	i 										(0.0)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			an intern		1		<u> </u>		<u> </u>		1100.10	4070.00		(07)
		1337.36		1002.99	767.52	507.12	327.41	344.65	549.56	842.77	1129.49	1373.09		(97)
Space (98)m=	694.08	g require 540.72	ement fo 447.32	247.02	101.29	/vn/mon	$\ln = 0.02$	4 X [(97))m – (95 0)mj x (4° 257.93	494.11	707.93		
(90)111=	094.00	340.72	447.32	247.02	101.29	U	U						3490.42	(98)
_					- /			TUla	l per year	(KVVII/yeai) = Sum(9	O)15,912 =	3490.42	╡``
Space	e heatin	g require	ement in	kWh/m²	²/vear								44.52	(99)
					, , ca.								44.52	(33)
8c. S	pace co	oling rec	quiremen		,,,								44.02	(00)
	lated fo	r June, c	July and	t August.	See Tal					_			44.JZ	(00)
Calcu	lated fo Jan	r June, c Feb	July and Mar	August. Apr	See Tal	Jun	Jul	Aug	Sep	Oct	Nov	Dec	77.02	(00)
Calcu Heat	lated fo Jan loss rate	r June, c Feb e Lm (ca	July and Mar Iculated	August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)	77.02	
Calcu Heat (100)m=	Jan Jan loss rate	r June, c Feb e Lm (ca	July and Mar Iculated	August. Apr	See Tal	Jun							77.02	(100)
Heat (100)m=	Jan Jan loss rate 0 ation fac	r June, C Feb E Lm (ca 0	July and Mar Iculated 0 oss hm	August. Apr using 25	See Tal May 5°C inter	Jun nal temp 857.31	oerature 674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0	77.02	(100)
Calcu Heat (100)m= Utilisa (101)m=	Jan Jan loss rate 0 ation fac	r June, C Feb E Lm (ca 0 tor for lo	July and Mar Ilculated 0 oss hm 0	August. Apr using 25	See Tal May 5°C inter 0	Jun rnal temp 857.31	perature	and exte	ernal ten	nperatur	e from T	able 10)	77.02	
Heat (100)m= Utilisa (101)m= Usefu	Jan loss rate 0 ation fac	r June, C Feb Lm (ca 0 tor for lc 0	July and Mar Ilculated 0 pss hm 0 Vatts) = (August. Apr using 29 0 100)m x	See Tal May 5°C inter 0	Jun rnal temp 857.31	0.92	and exte 691.53	ernal ten 0	o 0	e from T 0	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m=	Jan Jan Joss rate 0 ation fac 0 I loss, h	r June, C Feb E Lm (ca 0 stor for lo mLm (W	July and Mar Ilculated 0 oss hm 0 Vatts) = (August. Apr using 25 0 0 (100)m x	See Tal May 5°C inter 0 0 (101)m	Jun nal temp 857.31 0.86	0.92 622.55	and exte 691.53 0.9	ernal ten 0 0	nperatur 0	e from T	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g	r June, C Feb E Lm (ca 0 stor for lo mLm (W	July and Mar Ilculated 0 pss hm 0 Vatts) = (August. Apr using 25 0 0 (100)m x	See Tal May 5°C inter 0 0 (101)m	Jun nal temp 857.31 0.86	0.92 622.55	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar o	r June, c Feb e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca	July and Mar Ilculated 0 oss hm 0 Vatts) = (0 Iculated 0	August. Apr using 25 0 (100)m x for appli	See Tal May 5°C inter 0 (101)m 0 cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation fact I loss, h 0 s (solar g	r June, c Feb Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0	July and Mar Iculated 0 pss hm 0 Vatts) = (0	August. Apr using 29 0 (100)m x o for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar q 0 e cooling 04)m to	r June, c Feb Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0	July and Mar Journal of the second of the se	August. Apr using 29 0 (100)m x o for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar o e cooling 04)m to	r June, c Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fact outliness, he cooling 04)m to d fraction	r June, c Feb Lm (ca 0 stor for lo 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>	c (41)m	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 cooling 04)m to	r June, C Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Ilculated 0 pss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m < 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun nal temp 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07 continuo	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	c (41)m 478.84	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 cooling 04)m to	r June, c Feb Lm (ca 0 stor for lo 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<i>((41)m</i> 478.84 1	(100) (101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of 0 e cooling 04)m to 0 d fraction ittency fi	r June, C Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar July	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47	0.92 622.55 egion, se 882.07 continuo 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	c (41)m 478.84	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermi (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of the cooling of the coolin	r June, c Feb Lm (ca 0 tor for lo mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 ment for	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<i>((41)m</i> 478.84 1	(100) (101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of the cooling of the coolin	r June, C Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar July	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47	0.92 622.55 egion, se 882.07 continuo 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(100) (101) (102) (103) (104) (105)
Calcul Heat (100)m= Utilisa (101)m= Useful (102)m= Gains (103)m= Space set (1) (104)m= Cooled Intermi (106)m= Space (107)m=	lated fo Jan loss rate 0 ation factor (solar (cooling) 0 cooling 0 cooling	r June, c Feb E Lm (ca 0 Intor for lo 0 Intor for l	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0 (104)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	((41)m 478.84 1	(100) (101) (102) (103) (104) (105) (106)
Calcul Heat (100)m= Utilisa (101)m= Useful (102)m= Gains (103)m= Space set (1) (104)m= Cooled Intermit (106)m= Space (107)m=	lated fo Jan loss rate 0 ation factor (solar (cooling) 0 cooling 0 cooling	r June, c Feb E Lm (ca 0 Intor for lo 0 Intor for l	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 ment for	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0 (104)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(100) (101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11)									
Fabric Energy Efficiency	46.05	(109)							
Target Fabric Energy Efficiency (TFEE)		52.95	(109)						

Stroma Number: STRO030065 Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.5.25	(3a) (3b)
## Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU 1. Overall dwelling dimensions: Area(m²)	(3a) (3b)
Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU 1. Overall dwelling dimensions: Area(m²)	(3a) (3b)
Area(m²)	(3a) (3b)
Area(m²) Av. Height(m) Volume(m²)	(3a) (3b)
Ground filter Ground filte	(3a) (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 202.27 2. Ventilation rate: main heating hea	(5)
Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 202.27 2. Ventilation rate: main heating heating heating heating	
2. Ventilation rate: main heating heating heating heating	
Number of chimneys Number of chimneys	r
Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 Number of open flues 0 + 0 + 0 = 0 x 20 = 0 Number of intermittent fans 3 x 10 = 30 Number of passive vents Number of flueless gas fires 0 x 40 = 0 Air changes per h Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30 x 40 = 0 If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	r
Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 Number of open flues 0 + 0 + 0 = 0 x 20 = 0 Number of intermittent fans 3 x 10 = 30 Number of passive vents Number of flueless gas fires 0 x 40 = 0 Air changes per h Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30 If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	
Number of intermittent fans Number of passive vents Number of flueless gas fires O Air changes per h Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30	(6a)
Number of passive vents 0	(6b)
Number of flueless gas fires O Air changes per h Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	(7a)
Air changes per h Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30	(7b)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30	our
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	(8)
Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	<u> </u>
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	(9)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	(10)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	(11)
If no draught lobby, enter 0.05, else enter 0	(12)
	(13)
Percentage of windows and doors draught stripped 0	(14)
Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0$	(15)
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 5.38000011444	_
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.42	92 (17)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used	(17)
Number of sides sheltered 1 (20) 4 [0.075 x (40)]	=
Shelter factor $ (20) = 1 - [0.075 \times (19)] = 0.92 $ Individual to a reason protein a challenging of a later factor $ (21) = (48) \times (20) = 0.92 $	(18)
Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.39	(18) (19) (20)
Infiltration rate modified for monthly wind speed	(18)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7	(18) (19) (20)

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor (2	22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18	1	
A 11 (11 (11)		· · · ·					(04.)	(00.)					
Adjusted infiltr	ation rat	e (allowi	ng for sr 0.42	0.41	a wina s	speed) =	0.36	(22a)m 0.39	0.41	0.43	0.45	1	
Calculate effe			1	1	1	1	0.30	0.59	0.41	0.43	0.43	J	
If mechanic	al ventila	ation:										0	(23a)
If exhaust air h	eat pump	using Appe	endix N, (2	(23a) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0	(23b)
If balanced with	h heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h	n) =				0	(23c)
a) If balance	ed mech	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (I	MV) (24k	o)m = (22	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h				-	-				5 (00)	,			
		` '	· ` `	ŕ	<u> </u>	· `	í `	b) m + 0.	<u> </u>	í 	Ι ,	1	(240)
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)r								loft 22b)m² x	0.51				
(24d)m= 0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6	1	(24d)
Effective air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)	<u> </u>	!	!	J	
(25)m= 0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6	1	(25)
		•			•	•	•	•		•		-	
3 Heat Insec	e and he	at lose r	naramet	or.									
3. Heat losse		•			Net Ar	·ea	U-val	ue	AXII		k-valu	a	ΑΧk
3. Heat losse	s and he Gros area	SS	oarameto Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-valu kJ/m²·		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K =	(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x	W/m2	2K = - 0.04] =	(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	gs	A ,r 2.07	m ² x x ¹ x ¹	W/m2 1.4 /[1/(1.4)+	$2K$ = $\begin{bmatrix} -0.04 \end{bmatrix}$ = $\begin{bmatrix} -0.04 \end{bmatrix}$ = $\begin{bmatrix} -0.04 \end{bmatrix}$ =	2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Type Windows Type	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	m ² x x1 x1 x1	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	2K = - 0.04] = - 0.04] = - 0.04] =	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = - 0.04] = - 0.04] = - 0.04] = - 0.04] =	2.898 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = - 0.04] = - 0.04] = - 0.04] = - 0.04] =	2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights	Gros area e 1 e 2 e 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = -0.04 = -0.04 = -0.04 = -0.04 = -0.04 =	2.898 2.15 3.43 1.14 2.84 1.862				kJ/K (26) (27) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights Floor	Gros area e 1 e 2 e 3 e 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	2K = -0.04 = -0.0	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights Floor Walls Type1	Gros area 1 2 2 3 4 4 80.8	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24	2K = -0.04 = -0.04 = -0.04 = -0.04 = -0.04 = = -0.04 =	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78				kJ/K (26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights Floor Walls Type1 Walls Type2	Gros area e 1 e 2 e 3 e 4 80.8 2.1: 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.17 0.24 0.24	2K = -0.04 = -0.04 = -0.04 = -0.04 = -0.04 = = -0.04 =	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights Floor Walls Type1 Walls Type2 Roof Total area of e	Gros area e 1 e 2 e 3 e 4 80.8 2.1: 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K = -0.04 = -0.04 = -0.04 = -0.04 = -0.04 = = = = = = = = = =	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21				kJ/K (26) (27) (27) (27) (27b) (28) (29) (29) (30) (31)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area 1 1 2 2 2 3 3 4 4 80.8 2.11 57. elements	33 2 4 0, m ²	Openin m 10.9 0 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculum and a series	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K = -0.04 = -0.04 = -0.04 = -0.04 = -0.04 = = -0.04 = = -0.04 = = -0.04 = = -0.04 = = -0.04	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights Floor Walls Type1 Walls Type2 Roof Total area of e Party wall * for windows and	Gros area e 1 e 2 e 3 e 4 80.8 2.1: 57. elements	33 2 4 ows, use e	10.9 0 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculum and a series	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K = -0.04 = -0.0	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights Floor Walls Type1 Walls Type2 Roof Total area of e Party wall * for windows and ** include the area	Gros area e 1 e 2 e 3 e 4 80.8 2.1: 57. elements d roof wind as on both as on both as s, W/K =	33 2 4 ows, use e sides of in = S (A x	10.9 0 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculum and a series	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15 0 g formula 1	2K = -0.04 = -0.0	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Rooflights Floor Walls Type1 Walls Type2 Roof Total area of e Party wall * for windows and ** include the area Fabric heat los	Gros area e 1 e 2 e 3 e 4 80.8 2.1: 57. elements d roof winder as on both ss, W/K: Cm = S(33 2 4 ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 12 Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculations	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15 0 g formula 1	2K = - 0.04 = - 0.04 = - 0.04 = - 0.04 = - 0.04 = = - 0.04 = = - 0.04 = - 0.04	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

can be u	ised inster	ad of a de	tailed calc	ulation.										
can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K											10.48	(36)		
	_	,	,			•								(\
Total fa	if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss (33) + (36) =											60.77	(37)	
Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 41.46 41.15 40.84 39.39 39.12 37.86 37.86 37.63 38.35 39.12 39.67 40.24												(38)		
Heat transfer coefficient, W/K (39)m = (37) + (38)m											-			
(39)m=	102.23	101.92	101.61	100.17	99.9	98.64	98.64	98.4	99.12	99.9	100.44	101.01		
Heat lo	Average = $Sum(39)_{112}/12=$ Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4)											100.16	(39)	
(40)m=	1.3	1.3	1.3	1.28	1.27	1.26	1.26	1.26	1.26	1.27	1.28	1.29		
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.28	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
•			•								•		•	
4. Wa	ter heat	ing ener	rgy requi	irement:								kWh/ye	ear:	
Λ	مما ممد		N I										1	(40)
if TF.		9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43		(42)
	if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 91.96]	(43)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)												J		
not more					<u> </u>		•		_				1	
Hot water	Jan Tusago ir	Feb	Mar day for ea	Apr	May	Jun	Jul Table 10 x	Aug	Sep	Oct	Nov	Dec		
ı		•		i	· 	i		· <i>'</i>	00.40	00.70	07.47	104.45	1	
(44)m=	101.15	97.47	93.79	90.12	86.44	82.76	82.76	86.44	90.12	93.79	97.47	101.15	1102.46	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1103.46	(44)
(45)m=	150	131.19	135.38	118.03	113.25	97.73	90.56	103.92	105.16	122.55	133.77	145.27		
	Total = $Sum(45)_{112}$ = If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)										1446.81	(45)		
ı	aneous w	ater heatii	ng at point •	of use (no	hot water	r storage),	enter 0 in	boxes (46 ₎) to (61)	·			1	
(46)m=	0 storage	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage e volum		includin	na anv sa	olar or W	/WHRS	storage	within sa	me ves	sel		0]	(47)
_		` ,	ind no ta	•			_					0	J	(,
	-	_			-			ombi boil	ers) ente	er '0' in (47)			
Water	storage	loss:		,					·	·	•			
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature factor from Table 2b 0											(49)			
			storage	-				(48) x (49)	=			0		(50)
•			eclared o	-									1	(54)
		_	factor free section		€ ∠ (KVV	n/ntre/da	ay <i>)</i>					0	J	(51)
	e factor	_										0]	(52)
Tempe	rature fa	actor fro	m Table	2b								0		(53)
											_		-	

Energy lost from wa	•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54) in	, ,									0		(55)
Water storage loss of	alculated	for each	month			((56)m = (55) × (41)	m -			_	
(56)m= 0 0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains dedicate	ted solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss (annual) fr	om Table	e 3							0		(58)
Primary circuit loss of					` '	` '						
(modified by facto	1	1		1	1			1	'	i	1	4
(59)m= 0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calculate	d for eacl	n month ((61)m =	(60) ÷ 30	65 × (41))m						
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required f	or water h	eating ca	alculated	d for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		(62)
Solar DHW input calculat	ed using App	pendix G o	r Appendix	κ Η (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or \	//WHRS	applies	, see Ap	pendix (3)				•	
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from water h	eater										_	
(64)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		_
						Outp	out from w	ater heate	r (annual) ₁	12	1229.79	(64)
Heat gains from wat	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	x [(46)m	+ (57)m	+ (59)m	1	
(65)m= 31.88 27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87		(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains (s	ee Table	5 and 5a):									
Metabolic gains (Tal	ole 5), Wa	tts									_	
Jan Fel		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 121.59 121.5	9 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59		(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	-	-	-		
(67)m= 19.76 17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31		(67)
Appliances gains (ca	lculated i	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5	•		•	
(68)m= 216.06 218.3	1 212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53		(68)
Cooking gains (calc	ılated in A	ppendix	L, equa	tion L15	or L15a	, also se	ee Table	5	•			
(69)m= 35.16 35.10	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16		(69)
Pumps and fans gai	ns (Table	5a)			l					ı	ı	
(70)m= 0 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapora	tion (nega	ative valu	es) (Tab	ole 5)							1	
(71)m= -97.27 -97.2		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water heating gains	(Table 5)	<u> </u>						•			ı	
(72)m= 42.84 41.49	<u>` </u>	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49		(72)
Total internal gains	=		I	(66)	ım + (67)m	ı + (68)m -	L + (69)m + ∈	(70)m + (7	1)m + (72)	m	I	
(73)m= 338.14 336.8		305.74	285.34	266.31	254.35	258.13	268.42	287.88	310.27	327.81		(73)
		1		1	· · · · · ·						I	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	X	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	X	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	10.03	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.8	=	34.94	(78)
South	0.9x	0.77	x	2.14	x	76.57	x	0.63	x	0.8	=	57.23	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	x	0.8	=	72.9	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.8	=	82.39	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	x	0.8	=	85.86	(78)
South	0.9x	0.77	x	2.14	x	110.55	X	0.63	x	0.8	=	82.63	(78)
South	0.9x	0.77	x	2.14	x	108.01	x	0.63	x	0.8	=	80.73	(78)
South	0.9x	0.77	x	2.14	x	104.89	X	0.63	x	0.8	=	78.4	(78)
South	0.9x	0.77	x	2.14	x	101.89	X	0.63	x	0.8	=	76.15	(78)
South	0.9x	0.77	x	2.14	x	82.59	X	0.63	X	0.8	=	61.73	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.8	=	41.42	(78)
South	0.9x	0.77	X	2.14	x	40.4	X	0.63	X	0.8	=	30.2	(78)
West	0.9x	0.77	X	2.59	x	19.64	X	0.63	X	0.8	=	17.77	(80)
West	0.9x	0.77	X	0.86	X	19.64	X	0.63	X	0.8	=	5.9	(80)
West	0.9x	0.77	x	2.59	X	38.42	x	0.63	x	0.8	=	34.76	(80)
West	0.9x	0.77	X	0.86	X	38.42	X	0.63	X	0.8	=	11.54	(80)
West	0.9x	0.77	X	2.59	X	63.27	X	0.63	X	0.8	=	57.24	(80)
West	0.9x	0.77	x	0.86	X	63.27	x	0.63	x	0.8	=	19.01	(80)
West	0.9x	0.77	X	2.59	X	92.28	X	0.63	X	0.8	=	83.48	(80)
West	0.9x	0.77	X	0.86	X	92.28	X	0.63	X	0.8	=	27.72	(80)
West	0.9x	0.77	X	2.59	x	113.09	X	0.63	X	0.8	=	102.31	(80)
West	0.9x	0.77	x	0.86	x	113.09	x	0.63	x	0.8	=	33.97	(80)
West	0.9x	0.77	x	2.59	x	115.77	x	0.63	x	0.8	=	104.73	(80)
West	0.9x	0.77	x	0.86	x	115.77	×	0.63	x	0.8	=	34.77	(80)

West 0.9x	0.77	×	2.59	×	1	10.22] x	0.63	×	0.8		99.71	(80)
West 0.9x	0.77	x	0.86	≓ ×	_	10.22] X	0.63	×	0.8	_ =	33.11	(80)
West 0.9x	0.77	×	2.59	= x		94.68] X	0.63	×	0.8	╡ -	85.65	(80)
West 0.9x	0.77	×	0.86	×		94.68] x	0.63	×	0.8		28.44	(80)
West 0.9x	0.77	×	2.59	×	7	'3.59] x	0.63	×	0.8	=	66.57	(80)
West 0.9x	0.77	×	0.86	×	7	73.59	X	0.63	×	0.8	= =	22.1	(80)
West 0.9x	0.77	×	2.59	×	4	15.59	X	0.63	×	0.8	= =	41.24	(80)
West 0.9x	0.77	×	0.86	×	4	15.59	X	0.63	×	0.8	-	13.69	(80)
West 0.9x	0.77	×	2.59	×	2	24.49	X	0.63	x	0.8	=	22.15	(80)
West 0.9x	0.77	×	0.86	×	2	24.49	X	0.63	×	0.8	=	7.36	(80)
West 0.9x	0.77	×	2.59	×	1	6.15	x	0.63	x	0.8	=	14.61	(80)
West 0.9x	0.77	X	0.86	x	1	6.15	X	0.63	x	0.8	=	4.85	(80)
Rooflights _{0.9x}	1	X	1.33	x	4	17.01	X	0.63	x	0.8	=	56.72	(82)
Rooflights 0.9x	1	X	1.33	X		83.9	X	0.63	X	0.8	=	101.23	(82)
Rooflights _{0.9x}	1	X	1.33	X	1	22.73	X	0.63	X	0.8	=	148.08	(82)
Rooflights 0.9x	1	X	1.33	X	1	61.74	X	0.63	X	0.8	=	195.15	(82)
Rooflights _{0.9x}	1	X	1.33	X	1	87.38	X	0.63	X	0.8	=	226.09	(82)
Rooflights 0.9x	1	X	1.33	X	1	88.06	X	0.63	×	0.8	=	226.91	(82)
Rooflights 0.9x	1	X	1.33	X	1	80.51	X	0.63	x	0.8	=	217.8	(82)
Rooflights 0.9x	1	X	1.33	×	1	61.54	X	0.63	X	0.8	=	194.91	(82)
Rooflights _{0.9x}	1	X	1.33	X	1	36.5	X	0.63	X	0.8	=	164.7	(82)
Rooflights _{0.9x}	1	X	1.33	X	9	5.08	X	0.63	X	0.8	=	114.72	(82)
Rooflights _{0.9x}	1	X	1.33	X	5	57.06	X	0.63	x	0.8	=	68.85	(82)
Rooflights 0.9x	1	X	1.33	X	3	9.72	X	0.63	X	0.8	=	47.92	(82)
Solar gains in	1				700 55	F45.00	T .	n = Sum(74)m			407.04	1	(93)
(83)m= 127.37 Total gains – i		336.3 1 solar	$\frac{451.51}{(84)m} = \frac{532}{(73)}$		39.55 (83)m	515.86	454	.44 376.51	258.7	6 154.62	107.61	J	(83)
(84)m= 465.51		61.37	` 		305.87	770.21	712	.57 644.93	546.6	3 464.89	435.42	1	(84)
` ′	<u> </u>		!				1		0 .0.0		1001.12		
7. Mean inter Temperature					oroo	from Tol	blo O	Th1 (°C)				24	7(05)
Utilisation fac	•	•		_			DIE 9	, IIII (C)				21	(85)
Jan		Mar		lay	Jun	Jul	ΙΔ	ug Sep	Oc	Nov	Dec	1	
(86)m= 1		0.99			0.71	0.55	0.6		0.98	1	1	1	(86)
Mean interna	l tomporati	uro in li	iving area T	1 (folk	ow sto	ne 2 to 7	 7 in T	l		<u> </u>		1	
(87)m= 19.55		20.04	20.43 20	- `	20.93	20.98	20.		20.4	19.91	19.53	1	(87)
` ′		-	!			l .		I		1		J	, ,
Temperature (88)m= 19.84	 -	19.84			veiling 19.87	19.87	19.		19.86	19.86	19.85	1	(88)
` ′		-	!					13.07	13.00	, 10.00	10.00]	(55)
Utilisation fac								17 0 77		0.00	4	1	(89)
(89)m= 1	<u> </u>	0.98	0.94 0.8		0.61	0.42	0.4		0.96	0.99	1]	(03)
Mean interna	ıl temperatu	ure in t	he rest of d	welling	72 (f	ollow ste	eps 3	to 7 in Tab	le 9c)				

90)m=	18.53	18.72	19.02	19.4	19.69	19.84	19.87	19.87	19.78	19.39	18.9	18.51		(90)
									f	LA = Livin	g area ÷ (4	1) =	0.23	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
92)m=	18.77	18.96	19.26	19.64	19.94	20.1	20.13	20.13	20.03	19.63	19.13	18.75		(92)
Apply	adjustn	nent to t	he mean	interna	temper	ature fro	m Table	4e, whe	re appro	opriate				
93)m=	18.77	18.96	19.26	19.64	19.94	20.1	20.13	20.13	20.03	19.63	19.13	18.75		(93)
8. Spa	ace hea	ting requ	uirement											
Set Ti	to the r	mean int	ernal ter	nperatu	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(7	76)m an	d re-calc	ulate	
the uti	ilisation	factor fo	or gains	using Ta	ble 9a									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	:										
94)m=	1	0.99	0.98	0.93	0.82	0.63	0.45	0.5	0.78	0.96	0.99	1		(94)
Usefu	l gains,	hmGm ,	W = (94)	4)m x (8	4)m									
95)m=	463.85	559.65	646.08	705.95	674.92	511.25	343.56	358.76	505.01	524.16	461.39	434.27		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	oss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
97)m=	1479.06	1432.82	1296.34	1076.09	823.08	542.31	348.26	366.86	587.64	902.15	1208.72	1469.56		(97)
Space	heatin	g require	ement fo	r each n	nonth, k\	Wh/mont	th = 0.02	24 x [(97))m – (95)m] x (4°	1)m			
	755.31	586.77	483.8	266.5	110.23	0	0	0	0	281.23	538.08	770.26		
98)m=														
98)m=								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3792.17	(98)
	heatin	a require	ament in	k\\/h/m²	?/vear			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =		╡`゙
Space		g require			²/year			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3792.17 48.37	(98)
Space		g require			²/year			Tota	l per year	(kWh/year) = Sum(9	8)15,912 =		= `
Space 8c. Sp	pace coo	oling rec	uiremen	t August.	See Tal									= ` `
Space 8c. Sp Calcu	pace coolage lated fo	oling red r June, c Feb	uiremen Iuly and Mar	t August. Apr	See Tal	Jun	Jul	Aug	Sep	Oct	Nov	Dec		= ` `
Space 8c. Sp Calcul	lated fo Jan oss rate	oling recording	uiremen luly and Mar lculated	t August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	Aug	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(99)
Space 8c. Sp Calcul	pace coolage lated fo	oling red r June, c Feb	uiremen Iuly and Mar	t August. Apr	See Tal	Jun		Aug	Sep	Oct	Nov	Dec		(99)
Space 8c. Sp Calcul Heat I 100)m=	lated fo Jan oss rate	oling recording	uiremen luly and Mar lculated	t August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	Aug	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(100
Space 8c. Sp Calcul Heat I 100)m=	lated fo Jan oss rate	oling red r June, c Feb e Lm (ca	uiremen luly and Mar lculated	t August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	Aug	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(100
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m=	Jan oss rate o ation fac	oling recording	July and Mar Iculated 0 sss hm	August. Apr using 25	See Tal May 5°C inter	Jun nal temp 927.19 0.85	729.91	Aug and exte 747.87	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(100
Space 8c. Sp Calcu Heat I 100)m= Utilisa 101)m= Usefu	Jan oss rate o ation fac	oling recording	July and Mar Iculated 0 sss hm	August. Apr using 25	See Tak May 5°C inter 0	Jun nal temp 927.19 0.85	729.91	Aug and exte 747.87	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(100)
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m=	Jan oss rate o ation fac 0 I loss, h	oling recording	July and Mar Iculated 0 oss hm 0 /atts) = (August. Apr using 25 0 0 100)m x	See Tak May 5°C inter 0 0 (101)m	Jun nal temp 927.19 0.85	729.91 0.91	Aug and exte 747.87 0.89 663.91	Sep ernal ten 0	Oct nperatur 0	Nov e from T 0	Dec able 10)		(100)
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu Usefu Gains	Jan oss rate o ation fac 0 I loss, h	oling recording	July and Mar Iculated 0 oss hm 0 /atts) = (August. Apr using 25 0 0 100)m x	See Tak May 5°C inter 0 0 (101)m	Jun nal temp 927.19 0.85	0.91 666.92	Aug and exte 747.87 0.89 663.91	Sep ernal ten 0	Oct nperatur 0	Nov e from T 0	Dec able 10)		(100 (101 (102
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (oling red r June, c Feb e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require	luirement for a control of the contr	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37	0.91 666.92 egion, se	Aug and exte 747.87 0.89 663.91 ee Table 890.45	Sepernal ten 0 0 10)	Oct nperatur 0 0 0	Nov e from T 0 0 0	Dec able 10)	48.37	(100 (100 (100
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (oling recording	luirement for a control of the contr	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37	0.91 666.92 egion, se	Aug and exter 747.87 0.89 663.91 ee Table 890.45	Sepernal ten 0 0 10)	Oct nperatur 0 0 0	Nov e from T 0 0 0	Dec able 10) 0 0 0	48.37	(100 (102
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (oling red r June, c Feb e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require	luirement for a control of the contr	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37	0.91 666.92 egion, se	Aug and exter 747.87 0.89 663.91 ee Table 890.45	Sepernal ten 0 0 10)	Oct nperatur 0 0 0	Nov e from T 0 0 0	Dec able 10) 0 0 0	48.37	(100 (102
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar (0 e coollin(04)m to	oling recorder June, control for local control f	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 10) 0 0 10) 0 0 10) 0 0 0 10) 0 0 0 10) 0 0 10 10 10 10 10 10 10 10 10 10 10 10	Oct nperatur 0 0 0 24 x [(10	Nov e from T 0 0 0 0 0 03)m - (**	Dec fable 10) 0 0 0 102)m]	48.37	(100 (100 (100 (100)
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10 104)m=	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar (0 e coollin(04)m to	oling recorded record	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 10) 0 0 Total	Oct nperatur 0 0 0 24 x [(10	Nov e from T 0 0 0 0 0 03)m – (Dec able 10) 0 0 0 102)m]	48.37 x (41)m	(100 (102 (103
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu Usefu 102)m= Gains 103)m= Space set (101)m=	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (0 0 c (solar (0 0 d) m to 0	oling recorded record	Juirement for 104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 10) 0 0 Total	Oct nperature 0 0 0 24 x [(10) 0 = Sum(Nov e from T 0 0 0 0 0 03)m – (Dec able 10) 0 0 0 102)m]	48.37 (41)m 528.45	(100 (102 (103
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10 104)m= Cooled ntermin	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (0 0 c (solar (0 0 d) m to 0	oling record your June, or Jun	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 10) 0 0 Total	Oct nperature 0 0 0 24 x [(10) 0 = Sum(Nov e from T 0 0 0 0 0 03)m – (Dec able 10) 0 0 0 102)m]	48.37 (41)m 528.45	(100 (101 (102 (103
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space set (10 104)m= Cooled ntermin	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar o cooling 04)m to 0 I fraction	oling record June, Car Jun	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement for 104)m < 0	August. Apr using 29 0 100)m x 0 for appli 0 r month, 3 x (98	See Tate May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 0 10) 0 Total f C = 0	Oct nperature 0 0 0 24 x [(10) 0 = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4	Dec Table 10) 0 0 0 102)m]>	48.37 (41)m 528.45	(100 (100 (100 (100 (100
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space set (10 104)m= Cooled ntermin 106)m=	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar (0 04)m to 0 I fraction	oling record of June, or June,	luirement Mar lculated 0 lculated	August. Apr using 29 0 100)m x 0 for appli 0 r month, 3 x (98 0	See Tate May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling, 147.53	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exter 747.87 0.89 663.91 ee Table 890.45 ous (kW 168.54	Sep ernal ten 0 0 0 10) 0 Total f C = 0	Oct nperatur 0 0 0 24 x [(10) = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4	Dec able 10) 0 0 0 102)m] 0 = 1) =	48.37 (41)m 528.45 1	(100 (101 (102 (103 (104 (105
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10 104)m= Cooled ntermin 106)m=	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar (0 04)m to 0 I fraction	oling record of June, or June,	luirement Mar lculated 0 lculated	August. Apr using 29 0 100)m x 0 for appli 0 r month, 3 x (98 0	See Tate May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling, 147.53	0.91 0.91 666.92 egion, se 952.37 continuo 212.38	Aug and exter 747.87 0.89 663.91 ee Table 890.45 ous (kW 168.54	Sep ernal ten 0 0 0 10) 0 Total f C = 0	Oct nperatur 0 0 0 24 x [(10) = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4	Dec able 10) 0 0 0 102)m] 0 = 1) =	48.37 (41)m 528.45 1	(100 (101 (102 (103 (104 (105
8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space set (10 104)m= Cooled ntermin 106)m=	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar g 0 e cooling 04)m to 0 I fraction ttency fac cooling	oling recorder June, control of the Lm (can be control of the later of	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 29 0 100)m x 0 for appli 0 r month, 3 x (98 0	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling, 147.53 0.25 x (105)	0.91 0.91 666.92 egion, se 952.37 continue 212.38 0.25 × (106)r	Aug and exter 747.87 0.89 663.91 ee Table 890.45 ous (kW 168.54) 0.25	Sep ernal ten 0 0 0 10) 0 Total f C = 0 Total 0	Oct nperatur 0 0 0 24 x [(10 0 = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,4)	Dec fable 10) 0 0 0 102)m] >	48.37 (41)m 528.45 1	(100 (101 (102 (103 (104 (105)
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10 104)m= Cooled ntermin 106)m= Space 107)m=	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (0 04)m to 0 I fractior ttency fa 0 cooling 0	oling recorder June, control of the Lm (can be control of the later of	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling, 147.53 0.25 x (105)	0.91 0.91 666.92 egion, se 952.37 continue 212.38 0.25 × (106)r	Aug and exter 747.87 0.89 663.91 ee Table 890.45 ous (kW 168.54) 0.25	Sep ernal ten 0 0	Oct nperatur 0 0 0 0 24 x [(10 0 = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,4)	Dec Table 10) 0 0 0 102)m]> 0 = 1) = 0	48.37 48.37 528.45 1	╡` `

8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11)

Fabric Energy Efficiency

(99) + (108) =

50.05

(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nui	mher·	STRO	30065	
Software Name:	Stroma FSAP 2012	Software V			n: 1.0.5.25	
		Property Address: HOU	SE D - BASELINE			
Address :	Woodwell Cottage P2, W	oodwell Road, BRISTOL,	BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(m)		Volume(m³)	_
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 78.4 (4)				
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:				_		
	main second heating heating		total		m³ per hour	•
Number of chimneys	0 + 0	+ 0 =	0 x 4	0 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0 x 2	0 =	0	(6b)
Number of intermittent fa	ns		3 x 1	0 =	30	(7a)
Number of passive vents			0 x 1	0 =	0	(7b)
Number of flueless gas fi	res		0 x 4	0 =	0	(7c)
						_
				Air cha	anges per ho	ur –
•	ys, flues and fans = (6a)+(6b			(5) =	0.15	(8)
Number of storeys in the	een carried out or is intended, prod he dwelling (ns)	seed to (17), otherwise continue	: IIOIII (9) tO (16)	Г	0	(9)
Additional infiltration	is arraining (ile)		[(9)-	1]x0.1 =	0	(0)
Structural infiltration: 0	25 for steel or timber frame	0.05 (·		(10)
	.20 for older or uniber marrie	or 0.35 for masonry cons	struction		0	(10)
	resent, use the value correspondin	•		L		≓ ``
deducting areas of opening	resent, use the value correspondin ngs); if equal user 0.35	g to the greater wall area (after		L	0	(11)
deducting areas of opening	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o	g to the greater wall area (after			0	(11)
deducting areas of opening of suspended wooden for the suspended wooden	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o	r 0.1 (sealed), else enter		[0	(11)
deducting areas of opening of suspended wooden for the suspended wooden	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o ter 0.05, else enter 0	r 0.1 (sealed), else enter	0		0 0	(11)
deducting areas of opening of suspended wooden for the suspended wooden	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o ter 0.05, else enter 0	g to the greater wall area (after r 0.1 (sealed), else enter d d 0.25 - [0.2 x (14) -	0		0 0 0	(11) (12) (13) (14)
deducting areas of opening of suspended wooden of the	resent, use the value correspondin ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o ter 0.05, else enter 0	g to the greater wall area (after r 0.1 (sealed), else enter d 0.25 - [0.2 x (14) - (8) + (10) + (11) +	0 ÷ 100] = • (12) + (13) + (15) =	[[[area [0 0 0 0	(11) (12) (13) (14) (15) (16)
deducting areas of opening of suspended wooden for the suspended wooden	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) oter 0.05, else enter 0 s and doors draught stripped	g to the greater wall area (after r 0.1 (sealed), else enter d 0.25 - [0.2 x (14) - (8) + (10) + (11) + etres per hour per square	0 ÷ 100] = • (12) + (13) + (15) =	[[area	0 0 0 0 0	(11) (12) (13) (14) (15) (16)
deducting areas of opening of suspended wooden of the	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped in the control of the control	g to the greater wall area (after or 0.1 (sealed), else enter of 0.25 - [0.2 x (14) - (8) + (10) + (11) + (10) + (0 ÷ 100] = • (12) + (13) + (15) = metre of envelope	area [0 0 0 0 0 0 0 5.3800001144409	(11) (12) (13) (14) (15) (16) (16) (18)
deducting areas of opening of suspended wooden of the	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped in the control of the control	g to the greater wall area (after of 0.1 (sealed), else enter of 0.25 - [0.2 x (14) - (8) + (10) + (11) + (10) + (0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used	area 5	0 0 0 0 0 0 0 3.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18)
deducting areas of opening of suspended wooden of the	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped in the stripped	og to the greater wall area (after r 0.1 (sealed), else enter of d $0.25 - [0.2 \times (14) - (8) + (10) + (11) + (11) + (12) + (13) + (14) + (15) + (15) + (16)$	0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used ((19)] =	area 5	0 0 0 0 0 0 5.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
If suspended wooden if If no draught lobby, en Percentage of windows Window infiltration Infiltration rate Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere Shelter factor Infiltration rate incorporate	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped q50, expressed in cubic meanity value, then (18) = [(17) ÷ 20 is if a pressurisation test has been ed	g to the greater wall area (after of 0.1 (sealed), else enter of 0.25 - [0.2 x (14) - (8) + (10) + (11) + (10) + (0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used ((19)] =	area [0 0 0 0 0 0 0 3.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18)
If suspended wooden if If no draught lobby, en Percentage of windows Window infiltration Infiltration rate Air permeability value, If based on air permeabil Number of sides sheltered Shelter factor Infiltration rate modified in Infiltration rate	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 s and doors draught stripped q50, expressed in cubic medity value, then (18) = [(17) ÷ 20 ting shelter factor for monthly wind speed	og to the greater wall area (after r 0.1 (sealed), else enter of d $0.25 - [0.2 \times (14) - (8) + (10) + (11) + (10)$ etres per hour per square 0)+(8), otherwise (18) = (16) done or a degree air permeability $(20) = 1 - [0.075 \times (21) = (18) \times (20)$	0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used • (19)] = =		0 0 0 0 0 0 5.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
If suspended wooden if If no draught lobby, en Percentage of windows Window infiltration Infiltration rate Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere Shelter factor Infiltration rate incorporate	resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) of ter 0.05, else enter 0 is and doors draught stripped in the stripped	g to the greater wall area (after of 0.1 (sealed), else enter of 0.1 (sealed), else enter of 0.25 - [0.2 x (14) - (8) + (10) + (11) + (10) + (0 ÷ 100] = • (12) + (13) + (15) = metre of envelope ity is being used • (19)] = =	area 5	0 0 0 0 0 0 5.3800001144409 0.42	(11) (12) (13) (14) (15) (16) (17) (18) (19) (20)

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infil	tration rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m				_	
0.49	0.48	0.47	0.42	0.41	0.37	0.37	0.36	0.39	0.41	0.43	0.45]	
Calculate eff		-	rate for t	he appli	cable ca	se							
If mechanion			andiv N. (2	3h) _ (22a) v Emy (nauation (N	VEVV otho	rwico (22h) - (232)			0	(23a)
If balanced w) = (23a)			0	(23b)
a) If balance		,	,	J		`		,	26\m . /	22h) v [1 (220)	0	(23c)
(24a)m= 0		0	0	0	0	0	0	$\frac{3)111 = (22)}{0}$	0	0	0]	(24a)
b) If balance						<u> </u>		<u> </u>	l			J	,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input v	ventilatio	n from (utside				J	
,)m < 0.5 ×								5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natura				•	•				-			-	
	m = 1, the	<u> </u>			· · · · ·	_	- `			r	ı	1	(5.4.1)
(24d)m= 0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6		(24d)
Effective a			<u> </u>	<u> </u>	``	ŕ		1 		T	<u> </u>	1	(05)
(25)m= 0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6		(25)
3. Heat loss	es and he	eat loss p	paramete	er:									
3. Heat loss ELEMENT		SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²·		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area oe 1	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [- 0.04] = [(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area pe 1 pe 2	SS	Openin	gs	A ,r 2.07	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14	K)			kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area oe 1 oe 2 oe 3	ss (m²)	Openin	gs ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84	K)			kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area oe 1 oe 2 oe 3 oe 4	ss (m²)	Openin m	gs ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.862 6.664	K)			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area De 1 De 2 De 3 De 4 80.8 2.1: 57.	ss (m²)	Openin m	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.24	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area De 1 De 2 De 3 De 4 80.8 2.1: 57.	ss (m²)	Openin m	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.24	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of	Gros area De 1 De 2 De 3 De 4 80.8 2.1: 57. elements	33 2 4 0, m ²	Openin m 10.9 0 2.66	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows are	Gros area De 1 De 2 De 3 De 4 80.8 2.11 57.4 elements and roof windle eas on both	33 2 4 ows, use e	10.9 10.9 2.66	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [= [= [= [= [= [= [= [= [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows ar ** include the ar	Gros area De 1 De 2 De 3 De 4 80.8 2.11 57. elements and roof windleas on both DSS, W/K:	33 2 4 ows, use e sides of in = S (A x	10.9 10.9 2.66	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows ar ** include the arc Fabric heat to	Gros area De 1 De 2 De 3 De 4 80.8 2.1: 57. elements and roof windle eas on both poss, W/K: y/Cm = S(33 2 4 ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 2 ndow U-va	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculations	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

an be used	d instead of						,							
Thermal b	oridges :	S(L)	(Y) cald	culated i	using Ap	pendix I	K						10.48	(36)
f details of ti		0 0	re not kn	own (36) =	= 0.05 x (3	1)			,,	<i>(</i>)				_
「otal fabri										(36) =			60.77	(37)
entilation/							1			= 0.33 × (1	
J		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m= 41	1.46 41	1.15	40.84	39.39	39.12	37.86	37.86	37.63	38.35	39.12	39.67	40.24		(38
leat trans	sfer coef	fficient	t, W/K	,					(39)m	= (37) + (3	38)m			
39)m= 10)2.23 10°)1.92	101.61	100.17	99.9	98.64	98.64	98.4	99.12	99.9	100.44	101.01		_
Heat loss	paramet	eter (H	LP), W/	m²K						Average = = (39)m ÷		12 /12=	100.16	(39
40)m= 1	1.3 1	1.3	1.3	1.28	1.27	1.26	1.26	1.26	1.26	1.27	1.28	1.29		
Number o	of days in	n mont	th (Tabl	e 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.28	(40)
J	Jan F	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31 2	28	31	30	31	30	31	31	30	31	30	31		(41
	•						-	-					•	
4. Water	heating	energ	gy requi	rement:								kWh/y	ear:	
Assumed	occupar	ncy, N									2.	43		(42
if TFA > if TFA £ Innual av	> 13.9, N E 13.9, N /erage ho	N = 1 + N = 1 not wat	- 1.76 x ter usag	je in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.96]	·
if TFA > if TFA £	> 13.9, N E 13.9, N verage ho annual ave	N = 1 + N = 1 not wat verage h	- 1.76 x ter usag	je in litre usage by	es per da 5% if the a	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)]	•
if TFA > if TFA £ Annual av Reduce the a not more tha	> 13.9, N E 13.9, N verage he annual ave at 125 litres	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		9)			•
if TFA > if TFA £ Annual av Reduce the a not more tha	> 13.9, N E 13.9, N verage he annual ave at 125 litres	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		•
if TFA \$\int if TFA £\int Annual av Reduce the anot more than I J	> 13.9, N E 13.9, N rerage he annual ave at 125 litres Jan F sage in litre	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		
if TFA £ if TFA £ Annual av Reduce the anot more tha	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre	N = 1 + N = 1 not wat rerage h es per per Feb res per c	ter usag not water the erson per Mar day for ea	ge in litre usage by a day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fa 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Sur	9) Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97	N = 1 + N = 1 not wat verage h es per per Feb Feb Fes per c 7.47	ter usag not water the erson per Mar day for ea	ge in litre usage by a day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fa 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Sur	9) Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97	N = 1 + N = 1 not wat verage h es per per Feb Feb Fes per c 7.47	ter usage of water terson per Mar day for ea	ge in litre usage by s day (all w Apr ach month 90.12	es per da 5% if the a vater use, I May $Vd,m = fa$ 86.44 $vater = 4$	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mon 105.16	Oct 93.79 Total = Suith (see Ta	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v	N = 1 + N = 1 not wat rerage h es per per Feb res per c 7.47 water u	ter usag not water terson per Mar day for ea 93.79 used - calc	ge in litre usage by a day (all w Apr ach month 90.12 culated mo	es per da 5% if the orater use, I May $Vd,m = fa$ 86.44 a a a a a a a	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Total = Sun 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2:	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 tent of hot value in litres 22.5 19	N = 1 + N = 1 not waterage has per per Feb res per co 7.47 water u 81.19	ter usag not water terson per Mar day for ea 93.79 used - calc	ge in litre usage by a day (all w Apr ach month 90.12 culated mo	es per da 5% if the orater use, I May $Vd,m = fa$ 86.44 a a a a a a a	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Total = Sun 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v 150 13 eous water 22.5 19	N = 1 + N = 1 not wat verage h es per per Feb Tes per constant water u 31.19 ver heating 9.68 SS:	ter usage of water of erson per day for ear 93.79 ased - calce 135.38 ag at point 20.31	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the a rater use, I May Vd,m = fa 86.44 201113.25 20 hot water 16.99	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Sunth (see Tail 122.55) Total = Sunth 18.38	9) 91 Nov 97.47 m(44) 112 = ables 1b, 1 133.77 m(45) 112 = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us 44)m= 10 Energy conte 45)m= 1 f instantanee 46)m= 2: Water stor Storage vo	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot variety in 150 13 Feous water 12.5 19 Trage loss of colume (li	N = 1 + N = 1 not waterage has per per per per per per per per per per	ter usagnot water of erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 includin	Apr Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the of the office of the off	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage),	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Sunth (see Tail 122.55) Total = Sunth 18.38	9) 91 Nov 97.47 m(44) 112 = ables 1b, 1 133.77 m(45) 112 = 20.07	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor Storage vo f community	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v 150 13 eous water 22.5 19 rage loss rolume (li	N = 1 + 1 $N = 1$	ter usage of water is erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no ta	pe in litre usage by a day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 g any so nk in dw	es per da 5% if the of rater use, I May Vd,m = fat 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage) litres in	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us 44)m= 10 Energy conte 45)m= 1 f instantanee 46)m= 2: Water stor Storage vo	> 13.9, N E 13.9, N Verage he annual average in litres Jan F Sage in litres 11.15 97 Tent of hot in E 22.5 19 Trage loss Folume (litres) Trage loss Folume (litres)	N = 1 + 1 $N = 1$	ter usage of water is erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no ta	pe in litre usage by a day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 g any so nk in dw	es per da 5% if the of rater use, I May Vd,m = fat 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage) litres in	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor Storage vo f community	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot verage loss rolume (limity heating in the program of the p	N = 1 + 1	ter usagnot water of erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no tallot water of water of water seed w	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = fact 86.44 2011 13.25 20 hot water 16.99 Color or Water velling, each of the color of water velling, each of the color of t	ay Vd,av Iwelling is that and co Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS nter 110	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43 (44 (45 (46 (47
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us 44)m= 10 Energy conte 45)m= 1 f instantanee 46)m= 2: Water stoi Storage vo f communications Otherwise Water stoi	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot to 150 13 Folume (litres Folume (litres	N = 1 + 1 N = 1 N	ter usage to twater to erson per Mar day for ea 93.79 seed - calc 135.38 g at point 20.31 including and no tale to twater clared local colored	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = fact 86.44 2011 13.25 20 hot water 16.99 Color or Water velling, eacludes i	ay Vd,av Iwelling is that and co Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS nter 110	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43 (44 (45 (46 (47
if TFA > if TFA £ Annual av Reduce the a not more than that water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Vater stor Storage vo f commur Otherwise Vater stor a) If manual Emperation Emperation Energy los	> 13.9, N E 13.9, N Perage he annual average in litres Jan F sage in litres 11.15 97 Tent of hot v 150 13 Four water 22.5 19 Trage loss of the sage in storage loss of the sage in storage loss of the sage in storage loss of the sage loss	N = 1 + 1 N = 1 N = 1 Not water uses per per per per per per per per per per	ter usage to twater to erson per Mar day for ear 93.79 seed - calculation and no tale to twater to estorage.	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = far 86.44 201113.25 20 hot water 16.99 Color or Water velling, encludes in cor is knowner	ay Vd,av fwelling is foot and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(43 (44 (45 (46 (47 (48 (49
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2: Vater stoil Storage voor f communication of the stoil and	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 11.15 97 tent of hot v 150 13: reous water 12.5 19 rage loss rolume (li e if no sto arage loss ufacturer storage	N = 1 + 1	ter usagnot water of erson per Mar day for ea 93.79 seed - calcon 135.38 gat point 20.31 including and no tand the clared long Table estorage clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of the clared of factor from the clared of the	ge in litre usage by a day (all w Apr ach month 90.12 culated mo 17.7 g any so nk in dw er (this in coss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = far 86.44 113.25 hot water 16.99 clar or W welling, e ncludes i or is knows factors oss factors	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(43 (44 (45 (46 (47 (48 (49 (50
if TFA > if TFA £ Annual av Reduce the anot more that anot more that anot water us 44)m= 10 Energy context 45)m= 1 If instantane 46)m= 2: Water storage voor for anotherwise Water storage in anotherwise Water storage in anotherwise by If manual Energy loss by If manual in anotherwise by If manual in anotherwis	> 13.9, N 2 13.9	N = 1 + 1 N = 1 N = 1 Not water uses per per per per per per per per per per	ter usage tot water of the storage clared of the section for the section of the s	ge in litre usage by a day (all w Apr ach month 90.12 culated mo 17.7 g any so nk in dw er (this in coss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = far 86.44 113.25 hot water 16.99 clar or W welling, e ncludes i or is knows factors oss factors	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

		m water (54) in (5	-	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	-	0		(54) (55)
	,	, ,	•	for each	month			((56)m = (55) × (41)ı	m		U		(55)
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
	r contains	dedicate	d solar sto	rage, (57)ı				0), else (57	7)m = (56)	m where (H11) is fro	m Append	I lix H	. ,
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary	y circuit	loss (ar	nual) fro	om Table	3	-	-	-				0		(58)
-				for each		59)m = ((58) ÷ 36	65 × (41)	m				•	
` r	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss ca	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64		(61)
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91		(62)
				endix G or						r contributi	on to wate	er heating)		
` r			ı —	and/or V	i	- 	· ·	i					1	. \
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output	from w	ater hea	ter		ı		ı						•	
(64)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91		
								Outp	out from wa	ater heater	' (annual)₁	12	1595.65	(64)
Heat ga	ains froi	m water	heating,	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m] + 0.8 x	([(46)m	+ (57)m	+ (59)m	1	
(65)m=	53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46		(65)
	` '			of (65)m		ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
		·		and 5a):									
Metabo			5), Wat	ts										
(0.0)	Jan	Feb				· .							ı	
(66)m=	121.59		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
Lighting		121.59	121.59	Apr 121.59	121.59	121.59	121.59	121.59	121.59	Oct 121.59	Nov 121.59	Dec 121.59		(66)
r	g gains	(calcula	121.59 ted in Ap	Apr 121.59 opendix	121.59 L, equat	121.59 ion L9 o	121.59 r L9a), a	121.59 Iso see	121.59 Table 5	121.59	121.59	121.59		,
(67)m=	g gains 21.73	(calcula	121.59 ted in Ap 15.7	Apr 121.59 opendix 11.88	121.59 L, equat	121.59 ion L9 o	121.59 r L9a), a 8.1	121.59 Iso see	121.59 Table 5	121.59 17.95				(66)
(67)m= [Appliar	g gains 21.73 nces ga	(calcula 19.3 ins (calc	121.59 ted in Ap 15.7 ulated ir	Apr 121.59 opendix 11.88	121.59 L, equat 8.88 dix L, eq	121.59 ion L9 o 7.5 uation L	121.59 r L9a), a 8.1 13 or L1	121.59 Iso see 10.53 3a), also	121.59 Table 5 14.14 see Tal	121.59 17.95 ble 5	121.59 20.95	121.59 22.34		(67)
(67)m= [Appliar (68)m= [g gains 21.73 nces gains 216.06	(calcula 19.3 ns (calc 218.31	121.59 ted in Ap 15.7 ulated in 212.66	Apr 121.59 opendix 11.88 n Append 200.63	121.59 L, equat 8.88 dix L, eq	121.59 ion L9 of 7.5 uation L	121.59 r L9a), a 8.1 13 or L1 161.64	121.59 Iso see 10.53 3a), also	121.59 Table 5 14.14 see Tal 165.05	121.59 17.95 ble 5 177.08	121.59	121.59		,
(67)m= [Appliar (68)m= [Cookin	g gains 21.73 nces ga 216.06 g gains	(calcula 19.3 ins (calc 218.31 (calcula	121.59 ted in Ap 15.7 ulated ir 212.66 tted in A	Apr 121.59 opendix 11.88 Append 200.63 ppendix	121.59 L, equat 8.88 dix L, eq 185.44 L, equat	121.59 ion L9 of 7.5 uation L 171.17 tion L15	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a)	121.59 lso see 10.53 3a), also 159.4	121.59 Table 5 14.14 see Tal 165.05 ee Table	121.59 17.95 ble 5 177.08	121.59 20.95 192.26	121.59 22.34 206.53		(67) (68)
(67)m= Appliar (68)m= Cookin (69)m=	g gains 21.73 nces gains 216.06 g gains 35.16	(calcula 19.3 ins (calc 218.31 (calcula 35.16	121.59 ted in Ap 15.7 ulated ir 212.66 tted in A 35.16	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16	121.59 L, equat 8.88 dix L, eq	121.59 ion L9 of 7.5 uation L	121.59 r L9a), a 8.1 13 or L1 161.64	121.59 Iso see 10.53 3a), also	121.59 Table 5 14.14 see Tal 165.05	121.59 17.95 ble 5 177.08	121.59 20.95	121.59 22.34		(67)
(67)m= Appliar (68)m= Cookin (69)m= Pumps	g gains 21.73 nces ga 216.06 g gains 35.16 and far	(calcula 19.3 ins (calc 218.31 (calcula 35.16 ns gains	121.59 ted in Ap 15.7 ulated ir 212.66 tted in A 35.16 (Table \$	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16	121.59 L, equat 8.88 dix L, eq 185.44 L, equat	121.59 ion L9 o 7.5 uation L 171.17 tion L15 35.16	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16	121.59 17.95 ble 5 177.08 5 35.16	121.59 20.95 192.26 35.16	121.59 22.34 206.53 35.16		(67) (68) (69)
(67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	g gains 21.73 nces ga 216.06 g gains 35.16 and far	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ins gains	121.59 ted in Ap 15.7 ulated ir 212.66 ted in A 35.16 (Table §	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a)	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16	121.59 ion L9 of 7.5 uation L 171.17 tion L15 35.16	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a)	121.59 lso see 10.53 3a), also 159.4	121.59 Table 5 14.14 see Tal 165.05 ee Table	121.59 17.95 ble 5 177.08	121.59 20.95 192.26	121.59 22.34 206.53		(67) (68)
(67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses	g gains 21.73 nces gains 216.06 g gains 35.16 and far 3 e.g. ev	(calcula 19.3 ins (calc 218.31 (calcula 35.16 ns gains 3	ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a) 3	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	121.59 ion L9 o 7.5 uation L 171.17 tion L15 35.16 3 ble 5)	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16	17.95 ble 5 177.08 5 35.16	121.59 20.95 192.26 35.16	121.59 22.34 206.53 35.16		(67) (68) (69)
(67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Cookin	g gains 21.73 nces gains 216.06 g gains 35.16 and far 3 e.g. e.g. ev	(calcula 19.3 ins (calc 218.31 (calcula 35.16 ns gains 3 aporatio	121.59 ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5 3 on (negar	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a)	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16	121.59 ion L9 of 7.5 uation L 171.17 tion L15 35.16	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16	121.59 17.95 ble 5 177.08 5 35.16	121.59 20.95 192.26 35.16	121.59 22.34 206.53 35.16		(67) (68) (69)
(67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water H	g gains 21.73 nces ga 216.06 g gains 35.16 and far 3 e.g. ev -97.27 heating	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ns gains 3 aporatio -97.27 gains (T	121.59 ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5 3 on (negar	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a) 3 tive valu	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	121.59 ion L9 of 7.5 uation L 171.17 tion L15 35.16 3 ole 5) -97.27	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16	121.59 17.95 ble 5 177.08 5 35.16	121.59 20.95 192.26 35.16 3	22.34 206.53 35.16 3		(67) (68) (69) (70)
(67)m= [Appliar (68)m= [Cookin (69)m= [Pumps (70)m= [Losses (71)m= [Water I (72)m= [g gains 21.73 nces gains 216.06 g gains 35.16 and far 3 e.g. ev -97.27 heating 71.29	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ns gains 3 aporatic -97.27 gains (T	121.59 ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5 3 on (negar -97.27 Table 5) 64.75	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a) 3	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	121.59 ion L9 o 7.5 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16 3 -97.27	121.59 Iso see 10.53 3a), also 159.4), also se 35.16 3 -97.27	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16 3 -97.27	17.95 ble 5 177.08 5 35.16 3 -97.27	121.59 20.95 192.26 35.16 3 -97.27	121.59 22.34 206.53 35.16 3 -97.27		(67) (68) (69)
(67)m= [Appliar (68)m= [Cookin (69)m= [Pumps (70)m= [Losses (71)m= [Water I (72)m= [g gains 21.73 nces gains 216.06 g gains 35.16 and far 3 e.g. ev -97.27 heating 71.29	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ns gains 3 aporatio -97.27 gains (T	121.59 ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5 3 on (negar -97.27 Table 5) 64.75	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a) 3 tive valu	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	121.59 ion L9 o 7.5 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16 3 -97.27	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16 3 -97.27	17.95 ble 5 177.08 5 35.16 3 -97.27	121.59 20.95 192.26 35.16 3 -97.27	121.59 22.34 206.53 35.16 3 -97.27		(67) (68) (69) (70)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	x	1.62	x	20.32	х	0.63	X	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	X	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	х	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	х	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	X	0.63	X	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	х	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	X	0.8	=	10.03	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.8	=	34.94	(78)
South	0.9x	0.77	x	2.14	x	76.57	х	0.63	X	0.8	=	57.23	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	X	0.8	=	72.9	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.8	=	82.39	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	X	0.8	=	85.86	(78)
South	0.9x	0.77	x	2.14	x	110.55	x	0.63	x	0.8	=	82.63	(78)
South	0.9x	0.77	x	2.14	x	108.01	х	0.63	x	0.8	=	80.73	(78)
South	0.9x	0.77	x	2.14	x	104.89	x	0.63	X	0.8	=	78.4	(78)
South	0.9x	0.77	x	2.14	x	101.89	x	0.63	x	0.8	=	76.15	(78)
South	0.9x	0.77	x	2.14	x	82.59	x	0.63	x	0.8	=	61.73	(78)
South	0.9x	0.77	x	2.14	x	55.42	x	0.63	x	0.8	=	41.42	(78)
South	0.9x	0.77	x	2.14	x	40.4	x	0.63	X	0.8	=	30.2	(78)
West	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.8	=	17.77	(80)
West	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.8	=	5.9	(80)
West	0.9x	0.77	x	2.59	x	38.42	x	0.63	X	0.8	=	34.76	(80)
West	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.8	=	11.54	(80)
West	0.9x	0.77	x	2.59	x	63.27	X	0.63	X	0.8	=	57.24	(80)
West	0.9x	0.77	x	0.86	x	63.27	x	0.63	X	0.8	=	19.01	(80)
West	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.8	=	83.48	(80)
West	0.9x	0.77	x	0.86	x	92.28	X	0.63	X	0.8	=	27.72	(80)
West	0.9x	0.77	X	2.59	x	113.09	x	0.63	x	0.8	=	102.31	(80)
West	0.9x	0.77	X	0.86	x	113.09	x	0.63	x	0.8	=	33.97	(80)
West	0.9x	0.77	X	2.59	x	115.77	X	0.63	x	0.8	=	104.73	(80)
West	0.9x	0.77	x	0.86	x	115.77	X	0.63	x	0.8	=	34.77	(80)

										_			_					
West	0.9x	0.77		X	2.59	9	X	1	10.22	X	0.	63	X	0.8		= [99.71	(80)
West	0.9x	0.77		x	0.86	6	x	11	10.22	x	0.	63	x	0.8		= [33.11	(80)
West	0.9x	0.77		X	2.59	9	x	9	4.68	X	0.	63	x	0.8		= [85.65	(80)
West	0.9x	0.77		x	0.86	6	x	9	4.68	x	0.	63	x	0.8		= [28.44	(80)
West	0.9x	0.77		X	2.59	9	x	7	3.59	x	0.	63	X	0.8		= [66.57	(80)
West	0.9x	0.77		x	0.86	6	x	7	3.59	X	0.	63	x	0.8		= [22.1	(80)
West	0.9x	0.77		x	2.59	9	x	4	5.59	X	0.	63	x	0.8		= [41.24	(80)
West	0.9x	0.77		x	0.86	3	x	4	5.59	X	0.	63	x	0.8		= [13.69	(80)
West	0.9x	0.77		X	2.59	9	x	2	4.49	x	0.	63	X	0.8		= [22.15	(80)
West	0.9x	0.77		X	0.86	6	x	2	4.49	X	0.	63	X	0.8		= [7.36	(80)
West	0.9x	0.77		X	2.59	9	x	1	6.15	X	0.	63	X	0.8		= [14.61	(80)
West	0.9x	0.77		X	0.86	6	x	1	6.15	X	0.	63	X	0.8		= [4.85	(80)
Rooflight	s 0.9x	1		X	1.33	3	x	4	7.01	X	0.	63	x	0.8		= [56.72	(82)
Rooflight	S 0.9x	1		X	1.33	3	x	8	33.9	X	0.	63	X	0.8		= [101.23	(82)
Rooflight	s _{0.9x}	1		X	1.33	3	x	12	22.73	X	0.	63	X	0.8		= [148.08	(82)
Rooflight	s _{0.9x}	1		X	1.33	3	x	16	61.74	X	0.	63	X	0.8		= [195.15	(82)
Rooflight	<u>L</u>	1		X	1.33	3	x	18	87.38	X	0.	63	X	0.8		= [226.09	(82)
Rooflight	S 0.9x	1		X	1.33	3	x	18	88.06	X	0.	63	X	0.8		= [226.91	(82)
Rooflight	<u> </u>	1		X	1.33	3	x	18	80.51	X	0.	63	x	0.8		= [217.8	(82)
Rooflight	ᆫ	1		X	1.33	3	x	16	61.54	X	0.	63	X	0.8		= [194.91	(82)
Rooflight	S 0.9x	1		X	1.33	3	x	1	36.5	X	0.	63	X	0.8		= [164.7	(82)
Rooflight	L	1		X	1.33	3	x	9	5.08	X	0.	63	X	0.8		= [114.72	(82)
Rooflight	s _{0.9x}	1		X	1.33	3	x	5	7.06	X	0.	63	X	0.8		= [68.85	(82)
Rooflight	S 0.9x	1		X	1.33	3	X	3	9.72	X	0.	63	X	0.8		= [47.92	(82)
Solar ga								20.55	F4F 0C		1 = Sum			154.62	107.0			(83)
(83)m= L Total ga										454	.44 3	76.51	258.76	154.62	107.6	ρΊ		(63)
	498.93	597	691.8		785.25	844.44	- `	30.08	792.8	737	54 6	70.99	575.28	496.34	468.1	13		(84)
` ' L								00.00	702.0	101	.01 0	0.00	070.20	1 100.01	100:1			(-)
		nal temp						oroo f	from Tok	olo O	Th4 /	°C)				Ī	0.1	7(05)
•		during h tor for ga		•			_			ole 9	, 1111 (C)				Į	21	(85)
Cillisat	Jan	Feb	Ma	-	Apr	May	Ť	Jun	Jul	Δ	ug	Sep	Oct	Nov	De			
(86)m=	1	0.99	0.98	$\overline{}$	0.95	0.86	-	0.7	0.53	0.5		0.83	0.97	0.99	1			(86)
` '					ļ						!	<u> </u>		1				, ,
_	nterna 19.59	temper	20.0	-	ving are	20.76		ow ste 20.94	20.99	/ IN I		C) 0.85	20.44	19.94	19.50			(87)
` '											!		20.44	19.94	19.50	0		(07)
· · · · · · · · · · · · · · · · · · ·		during h					\neg			1	-	` 		T				(00)
(88)m=	19.84	19.84	19.8	4	19.86	19.86	11	9.87	19.87	19.	88 1	9.87	19.86	19.86	19.8	5		(88)
		tor for g		-			\neg	<u> </u>		T	-			_				, :
(89)m=	1	0.99	0.98	3	0.93	0.81		0.6	0.4	0.4	16 ().75	0.96	0.99	1			(89)
Mean i	nternal	l temper	ature	in tl	he rest o	of dwe	lling	T2 (fd	ollow ste	eps 3	to 7 ir	Table	9c)					

(00) 47.00	40.05	40.00	40.00	40.00	40.00	40.07	40.07	40.75	40.00	40.5	47.04		(90)
(90)m= 17.98	18.25	18.68	19.23	19.63	19.83	19.87	19.87	19.75	19.22 LA = Livin	18.5	17.94	0.00	¬ `´
								•	LA - LIVIII	y area + (-	-) –	0.23	(91)
Mean interna		 				r	+ (1 – fL						
(92)m= 18.35	18.61	19.01	19.51	19.9	20.09	20.13	20.13	20.01	19.5	18.84	18.32		(92)
Apply adjustr									·				(00)
(93)m= 18.35	18.61	19.01	19.51	19.9	20.09	20.13	20.13	20.01	19.5	18.84	18.32		(93)
8. Space hea						44 . (T-1.1- 0		. T' /-	70)		l- (-	
Set Ti to the the utilisation			•		ied at st	ep 11 of	Table 9	o, so tha	t II,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm		,	<u> </u>	<u> </u>		<u>'</u>					
(94)m= 0.99	0.99	0.97	0.92	0.81	0.62	0.43	0.49	0.76	0.95	0.99	1		(94)
Useful gains,	hmGm	, W = (94	4)m x (84	4)m									
(95)m= 496.27	589.86	671.64	723.43	683.65	513.68	344.02	359.68	512.19	545.74	490.99	466.24		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate			<u>.</u>			-``		<u> </u>					
(97)m= 1436.71	1397.16			l	541.7	348.21	366.78	585.84	889.28	1179.31	1426.58		(97)
Space heatin				1	i	l e		<u> </u>	- `				
(98)m= 699.69	542.5	445.86	244.58	100.58	0	0	0	0	255.59	495.59	714.49		٦
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3498.89	(98)
Space heatin	g require	ement in	$k M/h/m^2$	2/voor								44.63	(00)
	•	511101111111	1	7 y Cai								44.03	(99)
9a. Energy red	•				ystems i	ncluding	micro-C	CHP)				44.03	(99)
Space heating	quiremer ng:	nts – Indi	vidual h	eating sy			micro-C	CHP)				44.03	
	quiremer ng:	nts – Indi	vidual h	eating sy			micro-C	CHP)				0	
Space heating	quiremer ng: pace hea	nts – Indi at from se	vidual h	eating sy		system	micro-C (202) = 1						(201
Space heating Fraction of sp	quiremerng: pace head	nts – Indi at from se at from m	vidual he econdary	eating sy y/supple em(s)		system	(202) = 1 ·		(203)] =			0	(201
Space heating Fraction of spacetion of spacetion of spacetion of spacetion of spaceting spacetin	quirements ng: pace head pace head tal heati	nts – Indi at from se at from m ng from i	vidual h econdary nain syst main sys	eating sy y/supple em(s) stem 1		system	(202) = 1 ·	- (201) =	(203)] =			0	(201) (202) (204)
Space heating Fraction of space Fraction of to	quirement ng: pace hea pace hea tal heati main spa	nts – Indi at from se at from m ng from i ace heati	vidual he econdary nain syst main systen	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1 ·	- (201) =	(203)] =			0 1 1	(201 (202 (204 (206
Space heating Fraction of space of the Efficiency of the Efficienc	quirement ng: pace heat pace heat tal heati main spa	at from se at from m at from m ag from it ace heati	vidual he econdary nain syst main systemain systementary	eating syy/supple em(s) stem 1 em 1	mentary g systen	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	· /-	Nov	Dec	0 1 1 89.9	(201 (202 (204 (206 (208
Space heating Fraction of space fraction of space fraction of to be a specific space of space fraction of the space of space fraction of s	quirement ng: pace heat pace heat tal heati main spa seconda	at from set from ming from it ace heating from Mar	vidual he econdary nain syst main system ing system ementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g systen Jun	system	(202) = 1 ·	- (201) =	(203)] =	Nov	Dec	0 1 1 89.9	(201 (202 (204 (206 (208
Space heating Fraction of space of the Efficiency of the Efficienc	quirement ng: pace heat pace heat tal heati main spa seconda	at from set from ming from it ace heating from Mar	vidual he econdary nain syst main system ing system ementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g systen Jun	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	· /-	Nov 495.59	Dec 714.49	0 1 1 89.9	(201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of a Efficiency of Space heating 699.69	quirements pace heate tal heati main spa seconda Feb g require	at from set at from many from the ace heating ry/supplement (c	econdary nain systemain systementary Apr alculatee	eating sylvy/supple em(s) stem 1 em 1 y heating May d above;	mentary g system Jun	system 1, % Jul	(202) = 1 · (204) = (2	- (201) = 02) × [1 - 1	Oct			0 1 1 89.9	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating G99.69 (211)m = {[(98)	pace heat tal heati main spaceonda Feb g require 542.5	at from set from many from the ace heating ry/supplement (compared to 445.86) [Author of the ace heating ry/supplement (compared to 445.86]]	econdary nain systemain systementary Apr alculated 244.58 00 ÷ (20	eating sylvalupple em(s) stem 1 em 1 May dabove; 100.58	mentary g system Jun	system n, % Jul 0	(202) = 1 · (204) = (2	- (201) = 02) × [1 - 1	Oct 255.59	495.59		0 1 1 89.9	(201 (202 (204 (206 (208 ar
Space heating Fraction of space Fraction of to Efficiency of a Efficiency of Space heating 699.69	quirements pace heate tal heati main spa seconda Feb g require	at from set at from many from the ace heating ry/supplement (c	econdary nain systemain systementary Apr alculatee	eating sylvy/supple em(s) stem 1 em 1 y heating May d above;	g system Jun 0	system 1, % Jul	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 255.59	495.59 551.27	714.49	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of a	pace heat pace heat tal heati main space secondar Feb g require 542.5	at from set from many from the ace heating from the	econdary nain systemain systematary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 100.58	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - (Oct 255.59	495.59 551.27	714.49	0 1 1 89.9	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of a	puirement pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45	at from set at from many from the condary. at from many from the condary. At from many from the condary. At from many from the condary. At from many from the condary. At from many from the condary. At from many from the condary.	econdary nain systemain systemain systematary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 100.58	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 255.59	495.59 551.27	714.49	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating [99.69] Space heating [98.29] Space heating [98] Space heating [98]	puirement pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45	at from set at from many from the condary. at from many from the condary. At from many from the condary. At from many from the condary. At from many from the condary. At from many from the condary. At from many from the condary.	econdary nain systemain systemain systematary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 100.58	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 255.59	495.59 551.27	714.49	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating [99.69] Space heating [198] Space heating [198] Space heating [198]	puirement pace heat pace heat tal heati main spa seconda Feb g require 542.5)m x (20 603.45 g fuel (s	at from set from many from the	vidual he econdary nain systemain systemain systementary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvalupple em(s) stem 1 em 1 y heating May d above; 100.58 06) 111.87	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 1 (kWh/yea	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012}	714.49 794.77	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of space fraction of to be a space fraction of the space fraction of the space fraction of the space fraction of the space fraction f	puirement pace heat pace heat tal heati main spa seconda Feb g require 542.5)m x (20 603.45 g fuel (s 01)] } x 1	at from set from many from the	vidual he econdary nain systemain systemain systementary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvalupple em(s) stem 1 em 1 y heating May d above; 100.58 06) 111.87	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 I (kWh/yea	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012}	714.49 794.77	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Fraction of sp Fraction of sp Fraction of to Efficiency of st Efficiency of st Jan Space heatin 699.69 (211)m = {[(98) 778.29 Space heatin = {[(98)m x (20)	puirement pace head pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45 g fuel (s 01)] } x 1 0	at from set from ming from in ace heating ry/supplement (compared 445.86 at 495.96 at	econdary nain systemain systematry Apr alculated 244.58 00 ÷ (20 272.06 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May d above 100.58 06) 111.87	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 I (kWh/yea	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012}	714.49 794.77	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ar
Space heating Fraction of sp Fraction of sp Fraction of to Efficiency of sp Efficiency of sp Jan Space heating [998.69] Space heating Space heating [198] Space heating Space heating Water heating	puirement pace head pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45 g fuel (s 01)] } x 1 0	at from set from ming from in ace heating ry/supplement (compared 445.86 at 495.96 at	econdary nain systemain systematry Apr alculated 244.58 00 ÷ (20 272.06 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May d above 100.58 06) 111.87	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 I (kWh/yea	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012}	714.49 794.77	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208)
Space heating Fraction of sp Fraction of sp Fraction of to Efficiency of sp Efficiency of sp Space heating (211)m = {[(98) 778.29 Space heating = {[(98)m x (20) (215)m= 0 Water heating Output from w	puirement pace heat pace heat tal heati main spa seconda Feb g require 542.5)m x (20 603.45 g fuel (s 01)] } x 1 0 gater heat	at from set at from many from the secondary of the second	vidual herecondary nain systemain systematry Apr alculated 244.58 00 ÷ (20 272.06 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May dabove 100.58 111.87 month 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota 0 Tota	- (201) = 02) × [1 - (201) = 0	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012} 0	714.49 794.77 =	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ar (211)

							٦	(a)
` '	87.3 87.3	87.3	87.3	88.98	89.29	89.42]	(217)
Fuel for water heating, kWh/month $(219)m = (64)m \times 100 \div (217)m$								
, , ,	25.96 118.21	133.51	134.47	151.93	163.51	176.6	1	
	•	Tota	I = Sum(2	19a) ₁₁₂ =	•		1800.36	(219)
Annual totals				k'	Wh/yea	r	kWh/year	-
Space heating fuel used, main system 1							3891.98	
Water heating fuel used							1800.36	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30]	(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a)	(230g) =			75	(231)
Electricity for lighting							383.81	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b)	=				6238.45	(338)
Total delivered energy for all uses (211)(221) + 12a. CO2 emissions – Individual heating systems	. , , ,	` ′					6238.45	(338)
	. , , ,	` ′		Emiss kg CO	i on fac 2/kWh	tor	6238.45 Emissions kg CO2/yea	
	s including mi	` ′			2/kWh	etor =	Emissions	
12a. CO2 emissions – Individual heating systems	Energy kWh/year	` ′		kg CO	2/kWh		Emissions kg CO2/yea	ar
12a. CO2 emissions – Individual heating systems Space heating (main system 1)	Energy kWh/year	` ′		kg CO	2/kWh	=	Emissions kg CO2/yea	ar (261)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary)	Energy kWh/year (211) x (215) x	cro-CHF		0.2 0.5	2/kWh	=	Emissions kg CO2/yea 840.67	(261) (263)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary) Water heating	Energy kWh/year (211) x (215) x (219) x	cro-CHF		0.2 0.5	2/kWh 16 19 16	=	Emissions kg CO2/yea 840.67 0	(261) (263) (264)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energy kWh/year (211) x (215) x (219) x (261) + (262)	cro-CHF		0.2 0.5 0.2	2/kWh 16 19 16	= = =	Emissions kg CO2/yea 840.67 0 388.88	(261) (263) (264) (265)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	Energy kWh/year (211) x (215) x (219) x (261) + (262) (231) x	cro-CHF	(264) =	0.2 0.5 0.2	2/kWh 16 19 16 19 19	= = =	Emissions kg CO2/yea 840.67 0 388.88 1229.55	(261) (263) (264) (265) (267)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot Electricity for lighting	Energy kWh/year (211) x (215) x (219) x (261) + (262) (231) x	cro-CHF	(264) = sum c	0.2 0.5 0.5 0.5	2/kWh 16 19 16 19 19	= = =	Emissions kg CO2/yea 840.67 0 388.88 1229.55 38.93	(261) (263) (264) (265) (267) (268)

El rating (section 14)

(274)

		User Details:				
A a a a a a a a a Nama a	la garage Malayyahlaya			CTDO	220005	
Assessor Name: Software Name:	Jemma Mclaughlan Stroma FSAP 2012	Stroma Nur Software Vo			030065 n: 1.0.5.25	
Software Name.		roperty Address: HOU			11. 1.0.3.23	
Address :	Woodwell Cottage P2, Woo	· · · · · · · · · · · · · · · · · · ·		_		
Overall dwelling dime	•	awen read, Briterez,	2011 3/10			
		Area(m²)	Av. Height(m))	Volume(m³)	
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r	78.4 (4)				
Dwelling volume		(3a)+(3	8b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:						
	main secondar heating heating	y other	total		m³ per hour	
Number of chimneys	0 + 0	+ 0 =	0 ×	(40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0 ×	(20 =	0	(6b)
Number of intermittent far	ns		3 ×	(10 =	30	(7a)
Number of passive vents			0 ×	(10 =	0	(7b)
Number of flueless gas fi	res		0 ×	(40 =	0	(7c)
				Air ch	anges per ho	ur
Infiltration due to chimne	/s, flues and fans = (6a)+(6b)+(7	(a)+(7b)+(7c) =	30	÷ (5) =	0.15	الا (8)
•	een carried out or is intended, procee			+ (3) =	0.15	(0)
Number of storeys in the	ne dwelling (ns)			[0	(9)
Additional infiltration			[(9	9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	truction		0	(11)
if both types of wall are pr deducting areas of openir	esent, use the value corresponding to pas): if equal user 0.35	the greater wall area (after				
=	loor, enter 0.2 (unsealed) or 0	1 (sealed), else enter ()	ſ	0	(12)
If no draught lobby, ent	er 0.05, else enter 0				0	(13)
Percentage of windows	and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14) ÷	100] =	Ì	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	-	0	(16)
Air permeability value,	q50, expressed in cubic metre	s per hour per square	metre of envelop	e area	5	(17)
	ity value, then (18) = [(17) ÷ 20]+(·	Ī	0.4	(18)
Air permeability value applie	s if a pressurisation test has been dor	e or a degree air permeabili	y is being used			_
Number of sides sheltere	d				1	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =	[0.92	(20)
Infiltration rate incorporat	ing shelter factor	(21) = (18) x (20) =	=	[0.37	(21)
Infiltration rate modified for	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Sep	Oct Nov	Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		-	rate for t	he appli	cable ca	se	-	-	-	-	-		(23a)
If exhaust air h			endix N. (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced wit									, (,			0	(23c)
a) If balance	ed mecha	anical ve	ntilation	with he	at recov	· erv (MVI	HR) (24a	a)m = (22	2b)m + (23b) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	иV) (24t	m = (22)	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from o	outside		•	•	•	
if (22b)	m < 0.5 ×	(23b), t	hen (24)	c) = (23b); other	wise (24	c) = (22k	o) m + 0.	5 × (23b) 		1	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m = 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.51	0.59	0.59	1	(24d)
Effective air					l	l			0.00	1 0.00	0.00	J	,
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(25)
3. Heat losse	oc and he	nat loce r	paramete	or:									
ELEMENT	Gros		Openin		Net Ar	ea	U-val	ue	AXU		k-value	<u>.</u>	ΑΧk
	area	_	m	-	A ,r		W/m2		(W/I	K)	kJ/m²-l		kJ/K
Doors					2.07	Х	1	=	2.07				(26)
Windows Typ	e 1				1.62	x1,	/[1/(1.4)+	0.04] =	2.15				(27)
Windows Typ	e 2				2.59	x1,	/[1/(1.4)+	0.04] =	3.43				(27)
Windows Typ	e 3				0.86	x1,	/[1/(1.4)+	0.04] =	1.14				(27)
Windows Typ	e 4				2.14	x1,	/[1/(1.4)+	0.04] =	2.84				(27)
Rooflights					1.33	x1,	/[1/(1.7) +	0.04] =	2.261				(27b)
Floor					39.2	X	0.13	= [5.096				(28)
Walls Type1	80.8	33	10.9		69.93	3 x	0.18	= [12.59				(29)
Walls Type2	2.12	2	0		2.12	х	0.18	= [0.38				(29)
Daaf		4	2.66	;	54.74	, x	0.13	= [7.12				(30)
Roof	57.4	·											
Total area of					179.5	5							(31)
					179.5 29.73	=	0	= [0				(31)
Total area of o	elements	, m² ows, use e	ffective wi		29.73	x	L			as given in	paragraph	3.2	``
Total area of o	elements d roof winder eas on both	, m² ows, use e sides of ir	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu		as given in	paragraph		(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	L	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)
Total area of o	elements d roof winder eas on both ess, W/K: Cm = S(ows, use e sides of ir = S (A x (A x k)	iffective wi ternal wali U)	ls and par	29.73 alue calcul titions	X ated using	formula 1	/[(1/U-valu) + (32) = ((28)	ie)+0.04] a	2) + (32a).			(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)

an be use	ea instea						,							(26)
Thermal	bridge	s : S (L	x Y) cal	culated i	using Ap	pendix I	1						10.55	(36)
		0 0	are not kn	own (36) =	= 0.05 x (3	1)			(0.0)	(2.5)				_
Total fab									` '	(36) =			53.74	(37
entilatio/			alculated				<u> </u>				25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(38
Heat tran	nsfer c	oefficier	nt, W/K			T		1	(39)m	= (37) + (3	38)m	ı	1	
39)m= 9	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		— ,
leat loss	s parar	meter (H	ILP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	92.59	(39
40)m=	1.21	1.2	1.2	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		_
Number	of day:	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.18	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
													-	
4. Wate	er heati	ing ener	gy requi	rement:								kWh/y	ear:	
			k I											
if TFA if TFA	> 13.9 £ 13.9), N = 1), N = 1	+ 1.76 x)2)] + 0.(ΓFA -13.	.9)	43	1	
if TFA if TFA annual a Reduce the	> 13.9 £ 13.9 average e annual), N = 1), N = 1 e hot wa l average	+ 1.76 x ater usag	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed)2)] + 0.0 (25 x N) to achieve	+ 36		91	.96]	•
if TFA if TFA innual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		91]	·
if TFA if TFA Annual a Reduce the of more th	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96]	·
if TFA if TFA Annual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		•
if TFA if TFA Annual a Reduce the not more the dot water to	> 13.9 £ 13.9 average e annual hat 125 lusage in 101.15	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43)	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the not more th dot water the 44)m= 1	> 13.9 £ 13.9 average e annual hat 125 lusage in 101.15	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the lot more the dot water the 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15 c, 1d) 145.27	1103.46	(4:
if TFA if TFA Annual a Reduce the not more the Hot water to 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= instantan 46)m=	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l 150 neous wa	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19 ater heatin	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(44
if TFA if TFA if TFA annual a Reduce the ot more th lot water th the standard stan	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa	P, N = 1 P, N = 1 P hot was a verage litres per p Peb litres per p 97.47 Phot water 131.19 Pater heatin 19.68	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA Annual a Reduce the bot more the dot water the 44)m= 1 Energy cor 45)m= finstantan 46)m= Vater sto	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 150 150 meous wa 22.5 orage volume	Post N = 1 Post N = 1	ter usaghot water berson per Mar day for ea 93.79 used - calcate 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av Iwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27		(44)
if TFA if TFA if TFA Annual a Reduce the lot more th dot water the start and the start and the finstantan 46)m= Vater start Storage of the start and the finstantan 46)m= Vater start f community	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa 22.5 Iorage volume unity he	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 IWHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA if TFA Annual a Reduce the ot more if dot water i 44)m= 1 Energy cor 45)m= Vater sto Storage value Communication	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the control	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 IWHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= Vater sto Storage of Communication Otherwis Vater sto	> 13.9 £	P, N = 1 P, N = 1 P hot was I average litres per p P hot water 131.19 P hot water 131.19 P hot water 19.68 P litres P cating a stored P stored P stored P stored P stored	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw er (this in	es per da 5% if the d rater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45)
if TFA if TFA if TFA Annual a Reduce the not more if that water if 44)m= Tenergy cor 45)m= Water sta Storage if from to the rwis Vater sta a) If mar	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the state	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	Apr Apr Ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in	es per da 5% if the d vater use, f May Vd,m = fac 86.44 2011 13.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45) (45) (46) (47)
if TFA Annual a Reduce the not more the state of the stat	> 13.9 £	Power of the control	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared lem Table storage	Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the d rater use, I May Vd,m = fat 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e ancludes in or is known	ay Vd,av fwelling is foot and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed and ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(48)
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s From Community Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second of t	ter usage hot water overson per Mar day for ear 93.79 used - calce 135.38 including at point 20.31 including and no talce the water eclared lear to factor fr	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Color or W velling, e acludes in por is knowear	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(44 (45 (46 (47 (48 (49 (50
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s From Community Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second of t	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared less torage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

	/ lost fro	m water	storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54))
•		(54) in (5	_	,								0	(55)	
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56))
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57))
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58))
Primar	y circuit	loss cal	culated	for each	month (59)m = 0	(58) ÷ 36	55 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59))
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41))m						
(61)m=	50.96	44.86	47.8	44.44	44.05	40.81	42.17	44.05	44.44	47.8	48.07	50.96	(61))
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23	(62))
Solar DH	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63))
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63)	(G2)
Output	from w	ater hea	ter											
(64)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23		
'		•	•	•	•	•	•	Outp	out from w	ater heate	r (annual) ₁	12	1997.22 (64))
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	62.62	54.84	56.96	50.35	48.67	42.7	40.65	45.56	46.08	52.7	56.5	61.04	(65)	١
inclu							ı			_			(00)	'
	ıde (57)ı	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling		ater is fr	om com		·	
				of (65)m and 5a	•	ylinder i	s in the	dwelling			om com		·	
5. Int	ernal ga		e Table 5	and 5a	•	eylinder i	s in the o	dwelling			om com		·	
5. Int	ernal ga	ains (see	e Table 5	and 5a	•	ylinder i	s in the o	dwelling Aug			om com		·	
5. Int	ernal ga	ains (see	Table 5	and 5a):				or hot w	rater is fr		munity h	·	
5. Int Metabo (66)m=	olic gain Jan 121.59	rins (see	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m=	olic gain Jan 121.59	rins (see	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun 121.59	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m= Lightin (67)m=	ernal gan Dlic gain Jan 121.59 g gains	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m=	ernal gain Jan 121.59 g gains 20.26	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reins (see Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 16 calcula 17 calcula 18	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	Apr 121.59 pendix 11.08 Appendix 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	and 5a tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a) 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatice gains (see less (Table Feb 121.59) (calcula 18 ins (calcula 35.16) as gains 3 aporatic -97.27 gains (Table Feb 121.59)	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 35.16	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatice gains (see less (Table Feb 121.59) (calcula 18 ins (calcula 35.16) as gains 3 appropriate 97.27 gains (Table Feb 121.59) gains (Table Feb 121.59) (calcula 35.16) as gains (Table Feb 121.59)	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 3 -97.27	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	X	1.62	x	74.72	x	0.63	x	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	X	0.63	X	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	X	0.63	X	0.7	=	8.78	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.7	=	30.58	(78)
South	0.9x	0.77	X	2.14	x	76.57	X	0.63	X	0.7	=	50.08	(78)
South	0.9x	0.77	x	2.14	x	97.53	X	0.63	X	0.7	=	63.79	(78)
South	0.9x	0.77	x	2.14	x	110.23	X	0.63	x	0.7	=	72.09	(78)
South	0.9x	0.77	X	2.14	x	114.87	X	0.63	X	0.7	=	75.13	(78)
South	0.9x	0.77	x	2.14	x	110.55	X	0.63	X	0.7	=	72.3	(78)
South	0.9x	0.77	x	2.14	x	108.01	X	0.63	x	0.7	=	70.64	(78)
South	0.9x	0.77	x	2.14	x	104.89	X	0.63	X	0.7	=	68.6	(78)
South	0.9x	0.77	x	2.14	x	101.89	X	0.63	x	0.7	=	66.63	(78)
South	0.9x	0.77	x	2.14	x	82.59	X	0.63	X	0.7	=	54.01	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.7	=	36.24	(78)
South	0.9x	0.77	x	2.14	x	40.4	x	0.63	x	0.7	=	26.42	(78)
West	0.9x	0.77	X	2.59	X	19.64	X	0.63	X	0.7	=	15.55	(80)
West	0.9x	0.77	x	0.86	X	19.64	x	0.63	x	0.7	=	5.16	(80)
West	0.9x	0.77	x	2.59	X	38.42	X	0.63	x	0.7	=	30.41	(80)
West	0.9x	0.77	x	0.86	X	38.42	x	0.63	X	0.7	=	10.1	(80)
West	0.9x	0.77	x	2.59	X	63.27	X	0.63	x	0.7	=	50.08	(80)
West	0.9x	0.77	x	0.86	X	63.27	X	0.63	X	0.7	=	16.63	(80)
West	0.9x	0.77	X	2.59	X	92.28	X	0.63	X	0.7	=	73.04	(80)
West	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(80)
West	0.9x	0.77	x	2.59	x	113.09	x	0.63	x	0.7	=	89.52	(80)
West	0.9x	0.77	x	0.86	x	113.09	x	0.63	x	0.7	=	29.72	(80)
West	0.9x	0.77	x	2.59	x	115.77	x	0.63	x	0.7	=	91.64	(80)
West	0.9x	0.77	x	0.86	x	115.77	X	0.63	X	0.7	=	30.43	(80)

West 0.9	0.7	7	x	2.5	0	x		10.22] x	0.63		x [0.7	_	_	87.24	(80)
West 0.9] ^] x	0.8		, ^ x	_	10.22	」^] _×	0.63	=	^ [x [0.7	\dashv	_	28.97	(80)
West 0.9] ^] x			x	_		」^] x		_	^ [x [ᅥ	_		(80)
West 0.9]]	2.5		, ^ x	_	4.68	」^] _×	0.63	_	_ L	0.7	ᅥ	_	74.94	(80)
West 0.9) X] ,,	0.8			_	4.68	1	0.63	_	х [., [0.7	=		24.88	=
West 0.9			X	2.5		X	_	3.59	」× 1、	0.63	_	x , [0.7	븜	=	58.25	(80)
West 0.9			X	0.8		X		3.59] X] ,,	0.63	_	x , [0.7	믬	=	19.34	(80)
			X	2.5		X	_	5.59] X]	0.63	=	х [0.7	\dashv	=	36.09	(80)
			X	0.8		X	_	5.59] X]	0.63	=	х [0.7	ᆗ	=	11.98	(80)
			X	2.5		X		4.49	X	0.63	_	X [0.7	픰	=	19.38	(80)
West 0.9			X	0.8		X		4.49	J X	0.63	_	X]	0.7	_	=	6.44	(80)
West 0.9			X	2.5		Х		6.15	」 X ¬	0.63	_	X [0.7	4	=	12.78	(80)
West 0.9		7	X	0.8		X		6.15	X	0.63		X [0.7	4	=	4.24	(80)
Rooflights 0.9			X	1.3	3	X	4	7.01	X	0.63		x [0.7	_	=	49.63	(82)
Rooflights 0.9			X	1.3	3	X		33.9	X	0.63		x	0.7	_	=	88.58	(82)
Rooflights 0.9			X	1.3	3	X	12	22.73	X	0.63		× [0.7		=	129.57	(82)
Rooflights 0.9			X	1.3	3	X	16	61.74	X	0.63		x [0.7		=	170.76	(82)
Rooflights 0.9			X	1.3	3	X	18	87.38	X	0.63		x [0.7		=	197.83	(82)
Rooflights 0.9			X	1.3	3	X	18	88.06	X	0.63		x	0.7		=	198.54	(82)
Rooflights 0.9			X	1.3	3	X	18	80.51	X	0.63		x [0.7		=	190.58	(82)
Rooflights 0.9)x 1		X	1.3	3	X	16	61.54	X	0.63		x [0.7		=	170.54	(82)
Rooflights 0.9)x 1		X	1.3	3	x	1	36.5	X	0.63		x [0.7		=	144.11	(82)
Rooflights 0.9)x 1		x	1.3	3	x	9	5.08	X	0.63		x [0.7		=	100.38	(82)
Rooflights 0.9)x 1		x	1.3	3	x	5	7.06	X	0.63		x	0.7		=	60.24	(82)
Rooflights 0.9)x 1		x	1.3	3	х	3	9.72	X	0.63		x [0.7		=	41.93	(82)
									_								
Solar gains									_	n = Sum(74)r						•	
(83)m= 111.4									397	.63 329.4	5 226	5.41	135.29	94.1	6		(83)
Total gains		and s	olar	(84)m =	: (73)n	า + (83)m	, watts								1	
(84)m= 494.4	41 579.67	660	.59	739.19	787.8	7	72.06	737.69	690	.57 634.1	5 553	3.53	488.04	466.	04		(84)
7. Mean in	ternal ten	nperat	ure (heating	seaso	n)											
Temperatu	ire during	heatir	ng pe	eriods ir	the li	ving	area f	from Tal	ble 9	, Th1 (°C)						21	(85)
Utilisation	factor for	gains	for li	ving are	ea, h1,	m (s	ee Ta	ble 9a)									_
Ja	n Feb	М	lar	Apr	Ma	/	Jun	Jul	А	ug Sep		Oct	Nov	De	ЭС		
(86)m= 1	0.99	0.9	98	0.95	0.87		0.7	0.53	0.5	0.83	0.	97	0.99	1			(86)
Mean inter	nal tempe	erature	e in li	iving are	ea T1	(follo	w ste	ps 3 to 7	7 in T	able 9c)						•	
(87)m= 19.7		20.	$\overline{}$	20.5	20.79	`	20.95	20.99	20.		20).5	20.04	19.6	69		(87)
Temperatu	ıro durina	hootii	20.00	oriode in	roct	of dva	(alling	from To	abla (Th2 (°C	<u> </u>						
(88)m= 19.9		19.		19.94	19.94	\neg	9.95	19.95	19.			.94	19.93	19.9	93		(88)
. ,	ļ					_!_				10.04	1 13		1 . 5.55				(= =)
Utilisation		-				$\overline{}$	<u> </u>		T	10 0 70			1 0 00			1	(90)
(89)m= 1	0.99	0.9		0.93	0.82		0.61	0.41	0.4			96	0.99	1			(89)
Mean inter	nal tempe	erature	e in t	he rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in Ta	ble 9d)					

(90)m= 18.21	18.46	18.85	19.36	19.73	19.92	19.95	19.94	19.85	19.36	18.7	18.18		(90)
10.21	10.10	10.00	10.00	10.70	10.02	10.00	10.01			g area ÷ (4		0.23	(91)
										g aroa . (., –	0.23	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(92)
Apply adjustr	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(93)
8. Space hea	ıting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:				•				•		
(94)m= 1	0.99	0.97	0.93	0.82	0.63	0.44	0.49	0.77	0.95	0.99	1		(94)
Useful gains,	hmGm ,	W = (94	l)m x (84	4)m									
(95)m= 491.97	573.41	643.2	685.66	644.99	483.53	324.19	339.18	486.26	526.41	483.09	464.29		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8		•						
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1347.38	1308.62	1188.81	993.13	764.64	506.81	327.4	344.65	548.62	833.3	1106.17	1338.22		(97)
Space heating	g require	ement fo	r each n	nonth, k\	/Vh/mont	h = 0.02	24 x [(97)m – (95)m] x (4 ⁻	1)m			
98)m= 636.43	494.06	405.93	221.38	89.01	0	0	0	0	228.33	448.62	650.21		
											L		_
							Tota	l per year	(kWh/year) = Sum(9)	8) _{15,912} =	3173.97	(98)
Snace heatin	a require	ement in	k\\/h/m²	!/vear			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Space heatin	• ,			•					(kWh/year) = Sum(9	8)15,912 =	3173.97 40.48	(98)
9a. Energy red	quiremer			•	ystems i	ncluding			(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Pa. Energy red Space heating	quiremer ng:	nts – Indi	vidual h	eating sy					(kWh/year) = Sum(9	8) _{15,912} =	40.48	(99)
Space heating Fraction of sp	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system	micro-C	CHP)	(kWh/year) = Sum(9	8)15.912 =		(99)
Pa. Energy red Space heating	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system		CHP)	(kWh/year) = Sum(9	8)15,912 =	40.48	(99)
Space heating Fraction of sp	quiremenng: Dace head	nts – Indi nt from se nt from m	vidual h econdar ain syst	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15.912 =	40.48	(201
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				1	i		1	(a.a.)
` '	80.3 80.3	80.3	80.3	85.79	87.24	87.84		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m								
` '	72.53 165.29	184.27	186.3	198.57	208.45	223.4		
	•	Tota	I = Sum(2	19a) ₁₁₂ =			2356.83	(219)
Annual totals				k'	Wh/year	•	kWh/year	_
Space heating fuel used, main system 1							3398.26	
Water heating fuel used							2356.83	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a)	(230g) =	:		75	(231)
Electricity for lighting							357.88	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b)	=				6268.27	(338)
12a. CO2 emissions – Individual heating systems	s including mi	icro-CHP)					_
	Energy			Emiss	ion fac	tor	Emissions	
	kWh/year			kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1)	(211) x			0.2	16	=	734.02	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	509.08	(264)
Space and water heating	(261) + (262)	+ (263) + (264) =				1243.1	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	185.74	(268)
				((005)				_
Total CO2, kg/year			sum c	of (265)(271) =		1467.76	(272)

TER =

(273)

18.72

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Property Details: HOUSE D - BASELINE

Dwelling type: Semi-detached House

Located in: England

Region: South East England

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters:

Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 534 (P1)

Transmission heat loss coefficient: 60.8

Summer heat loss coefficient: 594.77 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
North (W1-2 FRONT N)	0	1
West (W3 - SIDE E)	0	1
West (W4 - SIDE E)	0	1
South (W5 - REAR S)	0	1
South (RW1-2 REAR S)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North (W1-2 FRONT N)	0.98	1	1	0.98	(P8)
West (W3 - SIDE E)	0.98	1	1	0.98	(P8)
West (W4 - SIDE E)	0.98	1	1	0.98	(P8)
South (W5 - REAR S)	0.98	1	1	0.98	(P8)
South (RW1-2 REAR S)	0.98	1	1	0.98	(P8)

Solar gains:

Orientation		Area	Flux	g _	FF	Shading	Gains
North (W1-2 FRONT N)	1 x	3.24	86.66	0.63	0.8	0.98	125.45
West (W3 - SIDE E)	1 x	2.59	124.8	0.63	0.8	0.98	144.42
West (W4 - SIDE E)	1 x	0.86	124.8	0.63	0.8	0.98	47.95
South (W5 - REAR S)	1 x	2.14	118.4	0.63	0.8	0.98	113.21
	1 x	2.66	202.31	0.63	0.8	0.98	240.45
						Total	671.47 (P3/P4)

Internal gains:

	June	July	August
Internal gains	423.91	406.51	415.09
Total summer gains	1135.05	1077.98	1010.14 (P5)
Summer gain/loss ratio	1.91	1.81	1.7 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5

SAP 2012 Overheating Assessment

Thermal mass temperature increment 0.25 0.25

Threshold temperature 17.56 19.46 19.45 (P7)

Likelihood of high internal temperature Not significant Not significant

Assessment of likelihood of high internal temperature: Not significant

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 Printed on 25 February 2021 at 14:05:01

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Semi-detached House

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 78.4m²

Site Reference: WOODWELL Plot Reference: HOUSE E - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.72 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 18.72 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 50.0 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.24 (max. 0.30)	0.24 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	OK
Roof	0.15 (max. 0.20)	0.15 (max. 0.35)	OK
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 5.38 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	TTZC by plumbing and el	ectrical services	ок
Hot water controls:	No cylinder thermostat		
	No cylinder		
Boiler interlock:	Yes		OK
7 Low energy lights			
Percentage of fixed lights with	n low-energy fittings	90.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East	England):	Not significant	OK
Based on:			
Overshading:		Average or unknown	
Windows facing: North		3.24m²	
Windows facing: East		2.59m²	
Windows facing: East		0.86m²	
Windows facing: South		2.14m²	
Roof windows facing: South		2.66m²	
Ventilation rate:		8.00	
Blinds/curtains:		Dark-coloured curtain or roller blind	
		Closed 10% of daylight hours	
10 Key features			
Party Walls U-value		0 W/m²K	

Thermal Bridge Report

Property Details: HOUSE E - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges

Thermal bridges: User-defined = UD

Default = D Approved = A

User-defined (individual PSI-values) Y-Value = 0.0583

External Junctions Details:

Junction Type	PSI-Value	Length	Reference	Туре
Other lintels (including other steel lintels)	0.05	6.44	E2	[UD]
Sill	0.04	2.7	E3	[A]
Jamb	0.05	20.7	E4	[A]
Ground floor (normal)	0.08	18.11	E5	[UD]
Intermediate floor within a dwelling	0.07	18.11	E6	[A]
Eaves (insulation at rafter level)	0.04	12.43	E11	[A]
Gable (insulation at rafter level)	0.04	18.49	E13	[A]
Corner (normal)	0.09	12.6	E16	[A]
Staggered party wall between dwellings	0.12	6.4	E25	[D]
Party Junctions Details:				
Ground floor	0.16	6.15	P1	[D]
Roof (insulation at rafter level)	0.08	8.98	P5	[D]
Roof Junctions Details:				
Head	0.08	2.95	R1	[D]
Sill	0.06	2.95	R2	[D]
Jamb	0.08	5.4	R3	[D]
Ridge (vaulted ceiling)	0.08	7.6	R4	[D]

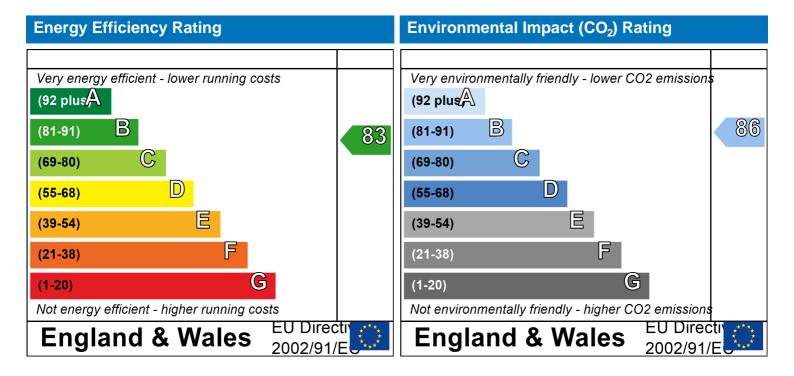
Predicted Energy Assessment



Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type: Date of assessment: Produced by: Total floor area: Semi-detached House 24 February 2021 Jemma Mclaughlan 78.4 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

SAP Input

Property Details: HOUSE E - BASELINE

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House

Detachment: Semi-detached

Year Completed: 2021

Floor Location: Floor area:

Storey height:

Floor 0 39.2 m^2 2.6 m Floor 1 39.2 m^2 2.56 m

Living area: 18.35 m² (fraction 0.234)

Front of dwelling faces: North

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
FRONT DOOR	Manufacturer	Solid			Wood
W1-2 FRONT N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W3 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - REAR S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 REAR S	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Name:	Gap:	Frame F	actor: g-value:	U-value:	Area:	No. of Openings:
FRONT DOOR	mm	8.0	0	1.4	2.07	1
W1-2 FRONT N	16mm or more	8.0	0.63	1.4	1.62	2
W3 - SIDE E	16mm or more	8.0	0.63	1.4	2.59	1
W4 - SIDE E	16mm or more	8.0	0.63	1.4	0.86	1
W5 - REAR S	16mm or more	0.8	0.63	1.4	2.14	1
RW1-2 RFAR S	16mm or more	0.8	0.63	1.4	1.33	2

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	North	0	0
W1-2 FRONT N		EXTERNAL WALLS	North	0	0
W3 - SIDE E		EXTERNAL WALLS	East	0	0
W4 - SIDE E		EXTERNAL WALLS	East	0	0
W5 - REAR S		EXTERNAL WALLS	South	0	0
RW1-2 REAR S		ROOF	South	0.001	0

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Element	<u>S</u>						
EXTERNAL WALLS	80.83	10.9	69.93	0.24	0	False	N/A
DORMER CHEEKS	2.12	0	2.12	0.24	0	False	N/A

SAP Input

 ROOF
 57.4
 2.66
 54.74
 0.15
 0
 N/A

 GROUND FLOOR
 39.2
 0.17
 N/A

 Internal Elements
 ...
 ...
 ...
 ...

Party Elements

PARTY WALL 29.73 N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0583

	Length	Psi-value		
	6.44	0.05	E2	Other lintels (including other steel lintels)
[Approved]	2.7	0.04	E3	Sill
[Approved]	20.7	0.05	E4	Jamb
	18.11	0.08	E5	Ground floor (normal)
[Approved]	18.11	0.07	E6	Intermediate floor within a dwelling
[Approved]	12.43	0.04	E11	Eaves (insulation at rafter level)
[Approved]	18.49	0.04	E13	Gable (insulation at rafter level)
[Approved]	12.6	0.09	E16	Corner (normal)
	6.4	0.12	E25	Staggered party wall between dwellings
	6.15	0.16	P1	Ground floor
	8.98	0.08	P5	Roof (insulation at rafter level)
	2.95	0.08	R1	Head
	2.95	0.06	R2	Sill
	5.4	0.08	R3	Jamb
	7.6	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys:0Number of open flues:0Number of fans:3Number of passive stacks:0Number of sides sheltered:1Pressure test:5.38

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

Boiler interlock: Yes

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

SAP Input

Water heating

Water heating: From main heating system

Water code: 901 Fuel :mains gas No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 90%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No Photovoltaics: None Assess Zero Carbon Home: No

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOL		IE .		
Address :	Woodwell Cottage P2, Wo	odwell Road, BRISTOL	, BS11 9XU			
Overall dwelling dime	ensions:	A (2)	A 11 : 14	`)/ I / 2)	
Ground floor		Area(m²) 39.2 (1a)	Av. Height(n	n) (2a) =	Volume(m³)	(3a)
First floor		39.2 (1b) 3		(2b) =	100.35](3b)
	a)+(1b)+(1c)+(1d)+(1e)+(´		2.30	(20) -	100.33	
·	a)+(1b)+(1c)+(1d)+(1e)+(,				_
Dwelling volume		(3a)+	(3b)+(3c)+(3d)+(3e)+	·(3n) =	202.27	(5)
2. Ventilation rate:			1-1-1			
	main seconda heating heating		total		m³ per hour	
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
						_
				Air ch	anges per ho	ur –
	ys, flues and fans = (6a)+(6b)+ een carried out or is intended, proce		30 from (0) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the	•	eed to (17), Otherwise Continu	e Iroiri (9) to (16)	ĺ	0	(9)
Additional infiltration	is all simily (i.e.,		1	(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 for masonry con		. , -	0	(11)
if both types of wall are pa deducting areas of openia	resent, use the value corresponding	to the greater wall area (after	•			_
	floor, enter 0.2 (unsealed) or	0.1 (sealed), else enter	0	ĺ	0	(12)
If no draught lobby, en	,	, ,,			0	(13)
•	s and doors draught stripped			[0	(14)
Window infiltration	0 11	0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15) =		0	(16)
Air permeability value,	q50, expressed in cubic meti	res per hour per square	metre of envelo	pe area	5.3800001144409	1 12 (17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20]$	+(8), otherwise (18) = (16)		ļ	0.42	(18)
Air permeability value applie	s if a pressurisation test has been d	one or a degree air permeabi	lity is being used			
Number of sides sheltered	ed				1	(19)
Shelter factor		(20) = 1 - [0.075]			0.92	(20)
Infiltration rate incorporat	ing shelter factor	$(21) = (18) \times (20)$	=		0.39	(21)
Infiltration rate modified f	or monthly wind speed	, , , , , , , , , , , , , , , , , , , 	<u>, , , , , , , , , , , , , , , , , , , </u>			
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct No	v Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor $(22a)m = (22)m \div 4$										
	1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18	1	
A.E. (11.69)				(04.)	(22.)				4	
Adjusted infiltration rate (allowing 0.49 0.48 0.47 0	or shelter a	0.37	speed) =	0.36	(22a)m 0.39	0.41	0.43	0.45	1	
Calculate effective air change rate			1	0.30	0.39	0.41	0.43	0.43	J	
If mechanical ventilation:									0	(23a)
If exhaust air heat pump using Appendi	x N, (23b) = (23b)	Ba) × Fmv (equation (I	N5)) , othe	rwise (23b) = (23a)			0	(23b)
If balanced with heat recovery: efficience	y in % allowing	for in-use f	actor (fron	n Table 4h) =				0	(23c)
a) If balanced mechanical ventil	lation with h	eat recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24a)
b) If balanced mechanical ventil	lation withou	it heat red	covery (N	MV) (24b	m = (22)	2b)m + (23b)		-	
(24b)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24b)
c) If whole house extract ventila	-	-				5 (00)	`			
if $(22b)m < 0.5 \times (23b)$, ther	` ' ' ` `		· ` `	í `	ŕ	<u> </u>	ŕ	Ι.,	1	(240)
(24c)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24c)
d) If natural ventilation or wholeif (22b)m = 1, then (24d)m =						0.51				
	0.59 0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6	1	(24d)
Effective air change rate - enter	 (24a) or (24	1b) or (24	c) or (24	d) in bo	к (25)	l		<u> </u>	1	
	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6]	(25)
3. Heat losses and heat loss para	ameter:	,	•	•	•			•	4	
J. Heat losses allo lleat loss ball										
· ·		Net Ar	ea ·ea	H-val	IIE	ΔΧΙΙ		k-valu	۵	ΔXk
•	penings m²	Net Ar A ,r		U-val W/m2		A X U (W/	K)	k-value		A X k kJ/K
ELEMENT Gross O	penings		m²				K)			
ELEMENT Gross Or area (m²)	penings	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Gross Or area (m²) Doors	penings	A ,r	m ² x	W/m2	eK = [0.04] = [(W/ 2.898	K)			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	penings	A ,r 2.07	m ² x x ¹ x ¹	W/m2 1.4 /[1/(1.4)+	= [0.04] = [0.04] = [2.898 2.15	K)			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	penings	A ,r 2.07 1.62 2.59	m ² x x ¹ x ¹ x ¹	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} & & & \\ & & & &$	2.898 2.15 3.43	K)			kJ/K (26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	penings	A ,r 2.07 1.62 2.59	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = 0.04 = 0.0	2.898 2.15 3.43 1.14	K)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	penings	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = 0.04 = 0.0	2.898 2.15 3.43 1.14 2.84	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights	penings	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = C	2.898 2.15 3.43 1.14 2.84	k)			kJ/K (26) (27) (27) (27) (27) (27) (27b)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664	K)			kJ/K (26) (27) (27) (27) (27) (27b) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.17 0.24 0.24	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m²	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	EK 0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21		kJ/m²-	к 	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	$ \begin{array}{ccc} $	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21		kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect ** include the areas on both sides of internal reas of the same areas on both sides of internal reas n reasons reas	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15 0 g formula 1	$ \begin{array}{cccc} & & & & & & & & \\ & & & & & & & \\ & & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & &$	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	as given in	kJ/m²-	к 	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect** include the areas on both sides of interm. Fabric heat loss, W/K = S (A x U)	10.9 0 2.66 tive window U-nal walls and pa	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 value calcularitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15 0 g formula 1	$ \begin{array}{cccc} & & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & \\$	(W// 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	as given in [2] + (32a).	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

an be used	d instead of						,							
Thermal b	oridges :	S(L)	(Y) cald	culated i	using Ap	pendix I	K						10.48	(36)
f details of ti		0 0	re not kn	own (36) =	= 0.05 x (3	1)			,,	<i>(</i>)				_
「otal fabri										(36) =			60.77	(37)
entilation/							1			= 0.33 × (1	
J		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m= 41	1.46 41	1.15	40.84	39.39	39.12	37.86	37.86	37.63	38.35	39.12	39.67	40.24		(38
leat trans	sfer coef	fficient	t, W/K	,					(39)m	= (37) + (3	38)m			
39)m= 10)2.23 10°)1.92	101.61	100.17	99.9	98.64	98.64	98.4	99.12	99.9	100.44	101.01		_
Heat loss	paramet	eter (H	LP), W/	m²K						Average = = (39)m ÷		12 /12=	100.16	(39
40)m= 1	1.3 1	1.3	1.3	1.28	1.27	1.26	1.26	1.26	1.26	1.27	1.28	1.29		
Number o	of days in	n mont	th (Tabl	e 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.28	(40)
J	Jan F	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31 2	28	31	30	31	30	31	31	30	31	30	31		(41
	•						-	-					•	
4. Water	heating	energ	gy requi	rement:								kWh/y	ear:	
Assumed	occupar	ncy, N									2.	43		(42
if TFA > if TFA £ Innual av	> 13.9, N E 13.9, N /erage ho	N = 1 + N = 1 not wat	- 1.76 x ter usag	je in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.96]	·
if TFA > if TFA £	> 13.9, N E 13.9, N verage ho annual ave	N = 1 + N = 1 not wat verage h	- 1.76 x ter usag	je in litre usage by	es per da 5% if the a	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)]	•
if TFA > if TFA £ Annual av Reduce the a not more tha	> 13.9, N E 13.9, N verage he annual ave at 125 litres	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		9)			
if TFA > if TFA £ Annual av Reduce the a not more tha	> 13.9, N E 13.9, N verage he annual ave at 125 litres	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		
if TFA \$\int if TFA £\int Annual av Reduce the anot more than I J	> 13.9, N E 13.9, N rerage he annual ave at 125 litres Jan F sage in litre	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		
if TFA £ if TFA £ Annual av Reduce the anot more tha	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre	N = 1 + N = 1 not wat rerage h es per per Feb res per c	ter usag not water the erson per Mar day for ea	ge in litre usage by a day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fa 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Sur	9) Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97	N = 1 + N = 1 not wat verage h es per per Feb Feb Fes per c 7.47	ter usag not water the erson per Mar day for ea	ge in litre usage by a day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fa 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Sur	9) Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97	N = 1 + N = 1 not wat verage h es per per Feb Feb Fes per c 7.47	ter usage of water terson per Mar day for ea	ge in litre usage by s day (all w Apr ach month 90.12	es per da 5% if the a vater use, I May $Vd,m = fa$ 86.44 $vater = 4$	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mon 105.16	Oct 93.79 Total = Suith (see Tail	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v	N = 1 + N = 1 not wat rerage h es per per Feb res per c 7.47 water u	ter usag not water terson per Mar day for ea 93.79 used - calc	ge in litre usage by a day (all w Apr ach month 90.12 culated mo	es per da 5% if the orater use, I May $Vd,m = fa$ 86.44 a a a a a a a	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Total = Sun 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2:	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 tent of hot value in litres 22.5 19	N = 1 + N = 1 not waterage has per per Feb res per co 7.47 water u 81.19	ter usag not water terson per Mar day for ea 93.79 used - calc	ge in litre usage by a day (all w Apr ach month 90.12 culated mo	es per da 5% if the orater use, I May $Vd,m = fa$ 86.44 a a a a a a a	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Total = Sun 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v 150 13 eous water 22.5 19	N = 1 + N = 1 not wat verage h es per per Feb Tes per constant water u 31.19 ver heating 9.68 SS:	ter usage of water of erson per day for ear 93.79 ased - calce 135.38 ag at point 20.31	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the a rater use, I May Vd,m = fa 86.44 201113.25 20 hot water 16.99	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Sunth (see Tail 122.55) Total = Sunth 18.38	9) 91 Nov 97.47 m(44) 112 = ables 1b, 1 133.77 m(45) 112 = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us 44)m= 10 Energy conte 45)m= 1 f instantanee 46)m= 2: Water stor Storage vo	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot variety in 150 13 Feous water 12.5 19 Trage loss of colume (li	N = 1 + N = 1 not waterage has per per per per per per per per per per	ter usagnot water of erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 includin	Apr Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the of the office of the off	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage),	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Sunth (see Tail 122.55) Total = Sunth 18.38	9) 91 Nov 97.47 m(44) 112 = ables 1b, 1 133.77 m(45) 112 = 20.07	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor Storage vo f community	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v 150 13 eous water 22.5 19 rage loss rolume (li	N = 1 + 1 $N = 1$	ter usage of water is erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no ta	pe in litre usage by a day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 g any so nk in dw	es per da 5% if the of rater use, I May Vd,m = fat 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage) litres in	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us 44)m= 10 Energy conte 45)m= 1 f instantanee 46)m= 2: Water stor Storage vo	> 13.9, N E 13.9, N Verage he annual average in litres Jan F Sage in litres 11.15 97 Tent of hot in E 22.5 19 Trage loss Folume (litres) Trage loss Folume (litres)	N = 1 + 1 $N = 1$	ter usage of water is erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no ta	pe in litre usage by a day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 g any so nk in dw	es per da 5% if the of rater use, I May Vd,m = fat 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage) litres in	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor Storage vo f community	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot verage loss rolume (limity heating in the program of the p	N = 1 + 1	ter usagnot water of erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 including and no tallot water of water of water seed w	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = fact 86.44 2011 13.25 20 hot water 16.99 Color or Water velling, eacludes i	ay Vd,av Iwelling is that and co Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS nter 110	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43 (44 (45 (46 (47
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us 44)m= 10 Energy conte 45)m= 1 f instantanee 46)m= 2: Water stoi Storage vo f communications Otherwise Water stoi	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot to 150 13 Folume (litres Folume (litres	N = 1 + 1 N = 1 N	ter usage to twater to erson per Mar day for ea 93.79 seed - calc 135.38 g at point 20.31 including and no tale to twater clared local colored	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = fact 86.44 2011 13.25 20 hot water 16.99 Color or Water velling, eacludes i	ay Vd,av Iwelling is that and co Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS nter 110	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43 (44 (45 (46 (47
if TFA > if TFA £ Annual av Reduce the a not more than that water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Vater stor Storage vo f commur Otherwise Vater stor a) If manual Emperation Emperation Energy los	> 13.9, N E 13.9, N Perage he annual average in litres Jan F sage in litres 11.15 97 Tent of hot v 150 13 Four water 22.5 19 Trage loss of the sage in storage loss of the sage in storage loss of the sage in storage loss of the sage loss	N = 1 + 1 N = 1 N = 1 Not water uses per per per per per per per per per per	ter usage to twater to erson per Mar day for ear 93.79 seed - calculation and no tale to twater to estorage.	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = far 86.44 201113.25 20 hot water 16.99 Color or Water velling, encludes in cor is knowner	ay Vd,av fwelling is foot and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(43 (44 (45 (46 (47 (48 (49
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2: Vater stoil Storage voor f communication of the stoil and	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 11.15 97 tent of hot v 150 13: reous water 12.5 19 rage loss rolume (li e if no sto arage loss ufacturer storage	N = 1 + 1	ter usagnot water of erson per Mar day for ea 93.79 seed - calcon 135.38 gat point 20.31 including and no tand the clared long Table estorage clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of factor from the clared of the clared of factor from the clared of the	ge in litre usage by a day (all w Apr ach month 90.12 culated mo 17.7 g any so nk in dw er (this in coss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = far 86.44 113.25 hot water 16.99 clar or W welling, e ncludes i or is knows factors oss factors	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(43 (44 (45 (46 (47 (48 (49 (50
if TFA > if TFA £ Annual av Reduce the anot more that anot more that anot water us 44)m= 10 Energy context 45)m= 1 If instantane 46)m= 2: Water storage voor for anotherwise Water storage in anotherwise Water storage in anotherwise by If manual Energy loss by If manual in anotherwise by If manual in anotherwis	> 13.9, N 2 13.9	N = 1 + 1 N = 1 N = 1 Not water uses per per per per per per per per per per	ter usage tot water of the storage clared of the section for the section of the s	ge in litre usage by a day (all w Apr ach month 90.12 culated mo 17.7 g any so nk in dw er (this in coss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = far 86.44 113.25 hot water 16.99 clar or W welling, e ncludes i or is knows factors oss factors	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

Column C
GS m
If cylinder contains dedicated solar storage, (67)m = (56)m x ((50) - (H11)) + (50), else (67)m = (56)m where (H11) is from Appendix H (57)m = (57)m = (56)m where (H11) is from Appendix H (57)m = (58) + (57)m = (56)m where (H11) is from Appendix H (57)m = (58) + (58
(57)ma
Primary circuit loss (annual) from Table 3
Primary circuit loss calculated for each month (59)m = (58) + 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostati (59)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Composition Composition
(59)me
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m (61)m = 12.64 11.42 12.64 12.23 12.64 12.64 12.23 12.64
(61) me
Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m (62)m = 1.62.64 142.61 148.02 130.26 125.89 109.96 103.2 116.56 117.39 135.19 146.01 157.91 (62) Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63)ms 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
(62)me 162.64 142.61 148.02 130.26 125.89 109.96 103.2 116.56 117.39 35.19 146.01 157.91 (62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63)ms 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
(63)m=
(63)me
PHRS 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0
Output from water heater (64)m=
Geometric 162.64 142.61 148.02 130.26 125.89 109.96 103.2 116.56 117.39 135.19 146.01 157.91 1595.65 (64)
Couput from water heater (annual) 1595.65 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 x (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m] (65)m = 53.04
(65)m= 53.04 46.48 48.17 42.3 40.82 35.55 33.27 37.71 38.02 43.91 47.54 51.46 (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 145.91
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(66)m=
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 53.3 47.34 38.5 29.14 21.79 18.39 19.87 25.83 34.67 44.03 51.38 54.78 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 322.48 325.83 317.4 299.44 276.78 255.48 241.26 237.91 246.34 264.29 286.96 308.25 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
(67) m= 53.3 47.34 38.5 29.14 21.79 18.39 19.87 25.83 34.67 44.03 51.38 54.78 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68) m= 322.48 325.83 317.4 299.44 276.78 255.48 241.26 237.91 246.34 264.29 286.96 308.25 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69) m= 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 69 Pumps and fans gains (Table 5a) (70) m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 322.48 325.83 317.4 299.44 276.78 255.48 241.26 237.91 246.34 264.29 286.96 308.25 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 (70) Losses e.g. evaporation (negative values) (Table 5)
(68)m= 322.48 325.83 317.4 299.44 276.78 255.48 241.26 237.91 246.34 264.29 286.96 308.25 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 (70) Losses e.g. evaporation (negative values) (Table 5)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 (70) Losses e.g. evaporation (negative values) (Table 5)
(69)m= 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 52.02 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 (70) Losses e.g. evaporation (negative values) (Table 5)
Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 (70) Losses e.g. evaporation (negative values) (Table 5)
(70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 (70) Losses e.g. evaporation (negative values) (Table 5)
Losses e.g. evaporation (negative values) (Table 5)
$ (71)m = \begin{vmatrix} -97.27 & -97.27 & $
Water heating gains (Table 5)
(72)m= 71.29 69.16 64.75 58.75 54.86 49.38 44.72 50.69 52.81 59.02 66.03 69.17 (72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientation:		Access Factor Table 6d	-	Area m²	Flux Table 6a			g_ Table 6b	FF Table 6c		Gains (W)		
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	15.63	(74)
North	0.9x	1	x	1.62	x	20.32	x	0.63	X	0.8	=	29.86	(74)
North	0.9x	1	x	1.62	x	34.53	X	0.63	X	0.8	=	50.75	(74)
North	0.9x	1	X	1.62	x	55.46	x	0.63	x	0.8	=	81.51	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	109.81	(74)
North	0.9x	1	X	1.62	x	79.99	x	0.63	x	0.8	=	117.55	(74)
North	0.9x	1	x	1.62	x	74.68	x	0.63	x	0.8	=	109.75	(74)
North	0.9x	1	x	1.62	x	59.25	x	0.63	x	0.8	=	87.07	(74)
North	0.9x	1	X	1.62	x	41.52	x	0.63	x	0.8	=	61.02	(74)
North	0.9x	1	X	1.62	x	24.19	x	0.63	x	0.8	=	35.55	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	19.28	(74)
North	0.9x	1	X	1.62	x	8.86	x	0.63	x	0.8	=	13.03	(74)
East	0.9x	1	x	2.59	x	19.64	x	0.63	x	0.8	=	23.07	(76)
East	0.9x	1	X	0.86	x	19.64	x	0.63	X	0.8	=	7.66	(76)
East	0.9x	1	X	2.59	x	38.42	x	0.63	x	0.8	=	45.14	(76)
East	0.9x	1	x	0.86	x	38.42	x	0.63	x	0.8	=	14.99	(76)
East	0.9x	1	X	2.59	x	63.27	x	0.63	X	0.8	=	74.33	(76)
East	0.9x	1	X	0.86	x	63.27	x	0.63	X	0.8	=	24.68	(76)
East	0.9x	1	X	2.59	x	92.28	x	0.63	x	0.8	=	108.41	(76)
East	0.9x	1	X	0.86	x	92.28	x	0.63	X	0.8	=	36	(76)
East	0.9x	1	X	2.59	x	113.09	x	0.63	X	0.8	=	132.86	(76)
East	0.9x	1	X	0.86	x	113.09	x	0.63	X	0.8	=	44.12	(76)
East	0.9x	1	X	2.59	X	115.77	X	0.63	X	0.8	=	136.01	(76)
East	0.9x	1	X	0.86	x	115.77	x	0.63	X	0.8	=	45.16	(76)
East	0.9x	1	X	2.59	x	110.22	X	0.63	X	0.8	=	129.49	(76)
East	0.9x	1	X	0.86	x	110.22	X	0.63	X	0.8	=	43	(76)
East	0.9x	1	X	2.59	x	94.68	x	0.63	X	0.8	=	111.23	(76)
East	0.9x	1	X	0.86	x	94.68	x	0.63	X	0.8	=	36.93	(76)
East	0.9x	1	X	2.59	x	73.59	X	0.63	X	0.8	=	86.45	(76)
East	0.9x	1	X	0.86	x	73.59	x	0.63	X	0.8	=	28.71	(76)
East	0.9x	1	X	2.59	x	45.59	X	0.63	X	0.8	=	53.56	(76)
East	0.9x	1	X	0.86	x	45.59	x	0.63	X	0.8	=	17.78	(76)
East	0.9x	1	X	2.59	x	24.49	x	0.63	x	0.8	=	28.77	(76)
East	0.9x	1	X	0.86	x	24.49	x	0.63	x	0.8	=	9.55	(76)
East	0.9x	1	X	2.59	x	16.15	x	0.63	x	0.8	=	18.97	(76)
East	0.9x	1	X	0.86	X	16.15	X	0.63	X	0.8	=	6.3	(76)

0 11								1		_				
South 0.9x	1	X	2.14		X	46.75		X	0.63	X	0.8	=	45.38	(78)
South 0.9x	1	X	2.1	4	X	76.57		X	0.63	X	0.8	=	74.32	(78)
South 0.9x	1	X	2.1	4	X	97.53		X	0.63	X	0.8	=	94.68	(78)
South 0.9x	1	х	2.1	4	X	110.23		X	0.63	X	0.8	=	107.01	(78)
South 0.9x	1	X	2.1	4	x	11	14.87	X	0.63	X	0.8	=	111.51	(78)
South 0.9x	1	X	2.1	4	x	11	10.55	X	0.63	X	0.8	=	107.31	(78)
South 0.9x	1	X	2.1	4	x	10	08.01	X	0.63	X	0.8	=	104.85	(78)
South 0.9x	1	X	2.1	4	x	10	04.89	x	0.63	X	0.8	=	101.82	(78)
South 0.9x	1	X	2.1	4	x 1		01.89	x	0.63	X	0.8	=	98.9	(78)
South 0.9x	1	X	2.1	4	x	8	2.59	x	0.63	x	0.8	=	80.17	(78)
South 0.9x	1	X	2.1	4	x	5	5.42	х	0.63	х	0.8	=	53.79	(78)
South 0.9x	1	X	2.1	4	x		10.4	x	0.63	х	0.8	=	39.21	(78)
Rooflights 0.9x	oflights 0.9x 1		1.3	33	x	4	7.01	x	0.63	x	0.8	_	56.72	(82)
Rooflights 0.9x 1			1.3	33	x 83		33.9	x	0.63	х	0.8	=	101.23	(82)
Rooflights 0.9x 1			1.3	33	3 x		22.73	x	0.63	x	0.8	=	148.08	(82)
Rooflights 0.9x 1			1.3	33	x	161.74		x	0.63	x	0.8	=	195.15	(82)
Rooflights 0.9x	Rooflights 0.9x 1			33	x	187.38		x	0.63	x	0.8	=	226.09	(82)
Rooflights 0.9x	Rooflights 0.9x 1			33	x	18	38.06	x	0.63	x	0.8	=	226.91	(82)
Rooflights 0.9x	Rooflights 0.9x 1			33	x	18	30.51	x	0.63	x	0.8	=	217.8	(82)
Rooflights 0.9x 1			1.3	33	x	161.54		x	0.63	x	0.8		194.91	(82)
Rooflights 0.9x 1			1.3	33	x	1	36.5	x	0.63	x	0.8		164.7	(82)
Rooflights 0.9x	x	1.3	33	x	9	5.08	x	0.63	x	0.8		114.72	(82)	
Rooflights 0.9x	х	1.3	33	x	5	7.06	x	0.63	х	0.8	=	68.85	(82)	
Rooflights 0.9x 1			1.3	33	x	3	9.72	x	0.63	x	0.8		47.92	(82)
Solar gains i						_		_	n = Sum(74)m			_	_	
(83)m= 148.47			<u> </u>	<u> </u>				531	.96 439.78	301.7	8 180.24	125.44		(83)
Total gains –	internal a	and solai	<u> </u>	è									-	
(84)m= 699.19	9 811.53	916.82	1019.08	1081.4	7 10	059.85	1014.39	950	.05 877.26	772.7	7 688.27	661.3		(84)
7. Mean inte	ernal temp	oerature	(heating	seaso	n)									
Temperatur	e during h	neating p	eriods ir	n the liv	/ing	area f	rom Tab	ole 9	, Th1 (°C)				21	(85)
Utilisation factor for gains for living area, h1,m (see Table 9a)														
Jan	n Feb Mar Apr M		May	y Jun Jul		Jul	Α	ug Sep	Oc	Nov	Dec			
(86)m= 0.99 0.98 0.9		0.95	0.89	0.75	5 0.57		0.42	0.4	17 0.71	0.92	0.98	0.99		(86)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)														
(87)m= 19.82 20.01 20.3		20.64	20.87 20.97		20.97	20.99 20.99		99 20.93	20.62	20.16	19.78		(87)	
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)														
(88)m= 19.84 19.84 19.84 19.86 19.86 19.87 19.8								19.		19.86	19.86	19.85		(88)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)														
(89) m = 0.99 0.97 0.94 0.85 0.69 0.48 0.32 0.36 0.62 0.89 0.97 0.99														
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)														
iviean intern	ıaı temper	ature in	me rest	oi awe	ıııng	1∠ (TC	JIIOW STE	eps 3	ιο / in Tab	ne 9C)				

(00)	40.50	10	40.40	40.74	40.00	40.07	40.07	40.00	40.45	40.04	40.00		(00)
(90)m= 18.3	18.59	19	19.46	19.74	19.86	19.87	19.87	19.82	19.45	18.81	18.26		(90)
								ı	LA = LIVIN	g area ÷ (4	+) =	0.23	(91)
Mean intern	al temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m= 18.66	18.92	19.3	19.74	20.01	20.12	20.13	20.13	20.08	19.72	19.12	18.62		(92)
Apply adjust	ment to t	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate			ı	
(93)m= 18.66	18.92	19.3	19.74	20.01	20.12	20.13	20.13	20.08	19.72	19.12	18.62		(93)
8. Space he	ating requ	uirement											
Set Ti to the the utilisatio			•		ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa	<u> </u>		•				- 3						
(94)m= 0.98	0.97	0.93	0.85	0.7	0.5	0.34	0.38	0.64	0.88	0.97	0.99		(94)
Useful gains	, hmGm	, W = (94	l)m x (84	4)m	ı	ı							
(95)m= 686.45	783.8	853.09	863.33	756.84	532.31	347.1	364.88	557.87	682.36	665.16	651.58		(95)
Monthly ave	rage exte	rnal tem	perature	from Ta	able 8	•		•				l.	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1467.8°	7 1429.09	1300.92	1085.65	829.87	544.29	348.65	367.51	592.49	911.39	1207.64	1456.6		(97)
Space heati	ng require	ement fo	r each m	nonth, k\	Wh/mon	th = 0.02	4 x [(97)m – (95)m] x (4 ⁻	1)m			
(98)m= 581.37	433.64	333.18	160.07	54.34	0	0	0	0	170.4	390.58	598.93		
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2722.52	(98)
Space heati	ng require	ement in	kWh/m²	?/year								34.73	(99)
·	· .				vstems i	ncluding	micro-C	CHP)				34.73	(99)
9a. Energy re	quiremer				ystems i	ncluding	micro-C	CHP)				34.73	(99)
·	quiremer	nts – Indi	vidual h	eating sy			micro-C	CHP)				34.73	
9a. Energy re Space heat Fraction of s	quiremer ing: pace hea	nts – Indi at from se	vidual h	eating sy		system	micro-C	, i					(201
9a. Energy re Space heat Fraction of s	quiremer ing: pace hea pace hea	nts – Indi at from se at from m	vidual he econdary	eating sy y/supple em(s)		system	(202) = 1 ·	, i	(203)] =			0	(201
9a. Energy re Space heat Fraction of s Fraction of t	quirementing: pace head pace head pace head	nts – Indi at from se at from m ng from i	vidual he econdary ain syst main sys	eating sy y/supple em(s) stem 1		system	(202) = 1 ·	- (201) =	(203)] =			0 1 1	(201) (202) (204)
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of	quirementing: pace hea pace hea ptal heati main spa	nts – Indi at from se at from m ng from i ace heati	vidual he econdary ain systemain system	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1 ·	- (201) =	(203)] =			0 1 1 89.9	(201 (202 (204 (206
9a. Energy re Space heat Fraction of s Fraction of t	quirementing: pace hea pace hea ptal heati main spa	at from se at from m at from m ng from i ace heati	vidual he econdary ain systemain system	eating sy y/supple em(s) stem 1	mentary g system	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	` '-			0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of Efficiency of	quirement ing: pace heat pace heat total heat in space seconda	at from set from ming from inace heating/supplement	vidual he econdary ain syst main syst ng syste ementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 ·	- (201) =	(203)] =	Nov	Dec	0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of Efficiency of Jan Space heati	quirementing: pace head pace head potal heati main space secondaries Febong require	at from set from ming from it ace heatingly/supplement (c	vidual he econdary ain syst main syst ng syste ementary Apr alculated	eating syy/supple em(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 · (204) = (2	- (201) = 02) × [1 - 1	Oct			0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of Efficiency of	quirementing: pace head pace head pace head main space secondaries Febong require	at from set from ming from inace heating/supplement	vidual he econdary ain syst main syst ng syste ementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	` '-	Nov 390.58	Dec 598.93	0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy respectively. Space heat Fraction of substitution of substitution of the Efficiency of Efficiency of Space heating.	quirementing: pace head pa	at from set at from many from the ace heating many/supplement (co. 333.18	econdary ain systemain systematary Apr alculated	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 54.34	mentary g system Jun	system 1, % Jul	(202) = 1 · (204) = (2	- (201) = 02) × [1 - 1	Oct			0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy respectively. Space heat Fraction of substitution of substitution of the Efficiency of Efficiency of Space heating.	quirement ing: pace hea pace hea patal heati main spa seconda Feb ng require 433.64 8)m x (20	at from set at from many from the ace heating many/supplement (co. 333.18	econdary ain systemain systematary Apr alculated	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 54.34	mentary g system Jun	system 1, % Jul	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 170.4	390.58 434.46	598.93	0 1 1 89.9	(201 (202 (204 (206 (208
9a. Energy re Space heat Fraction of s Fraction of t Efficiency of Efficiency of Jan Space heati 581.37	quirementing: pace head pace head pace head the pace head pace hea	at from set from many from the ace heating ry/supplement (compared as 333.18	econdary ain systemain systematary Apr alculated 160.07	eating sylvapple em(s) stem 1 em 1 May dabove 54.34	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - (Oct 170.4	390.58 434.46	598.93	0 1 1 89.9	(201 (202 (204 (206 (208 ear
9a. Energy respectively. Space heat Fraction of substitution of substitution of the Efficiency of Efficiency of Space heatitution. [581.37] [211] The Space of Space heatitution of the Efficiency of Space heatitution.	quirement ing: pace heat p	at from set from many from the ace heating many supplement (c. 333.18 at 1)] } x 1	econdary ain systemain systemain systementary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvally/supple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 down the following stems of the followi	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 170.4	390.58 434.46	598.93	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ear
9a. Energy respectively space heat Fraction of substituting Fraction of the Efficiency of Efficiency	quirementing: pace head pa	at from set at from many from the ace heating many supplement (company) and the ace at the ace at the ace at the ace at the ace ace at the ace	econdary ain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvally/supple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 down the following stems of the followi	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 170.4	390.58 434.46	598.93	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ear
9a. Energy respectively space heat Fraction of substituting Fraction of the Efficiency of Efficiency of Efficiency of Space heating 581.37 (211)m = {[(9) 646.69]} Space heating = {[(98) m x (25) 25] 25] 25]	quirementing: pace head pa	at from set at from many from the ace heating many supplement (company) and the ace at the ace at the ace at the ace at the ace ace at the ace	econdary ain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvally/supple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 down the following stems of the followi	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 l (kWh/yea	Oct 170.4 189.55 ar) = Sum(2)	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ear (211
9a. Energy respectively space heat Fraction of substituting Fraction of the Efficiency of Efficiency of Efficiency of Space heating 581.37 (211)m = {[(9) 646.69]} Space heating = {[(98) m x (25) 25] 25] 25]	quirement ing: pace heat p	at from set from many from in the set from many from in the set from many from in the set from t	econdary ain systemain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvalupple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 em 1 stem 1 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - (201) = 02) × [1 - (201) = 0	Oct 170.4 189.55 ar) = Sum(2)	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ear (211
9a. Energy respectively. Space heat Fraction of substitution	quirement ing: pace heat p	at from set from many from in the set from many from in the set from many from in the set from t	econdary ain systemain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvalupple em(s) stem 1 em 1 y heating May d above; 54.34 em 1 em 1 stem 1 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 l (kWh/yea	Oct 170.4 189.55 ar) = Sum(2)	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ear (211
9a. Energy respectively. Space heat Fraction of selection of selection of the Efficiency of Efficie	quirement ing: pace heat p	at from set from many from in ace heating ry/supplement (c 333.18) (4)] } x 1 (370.62) econdary 00 ÷ (20 0)	econdary ain systemain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06 y), kWh/ 8) 0	eating sylvalupple em(s) stem 1 em 1 y heating May d above 54.34 lb(s) 60.44 lb(s) bove)	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota 0 Tota	- (201) = 02) × [1 - (201) = 02) × [1 - (201) = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Oct 170.4 189.55 ar) = Sum(2 0 ar) = Sum(2	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ear (211)
9a. Energy respectively space heat Fraction of substituting Fraction of the Efficiency of Efficiency of Efficiency of Space heating Space heating Space heating Space heating Efficiency of Efficiency of Space heating Efficiency	quirement ing: pace heat p	at from set at from many from in the secondary of the sec	econdary ain systemain systemain systematary Apr alculated 160.07 00 ÷ (20 178.06	eating sylvy/supple em(s) stem 1 em 1 y heating May d above 54.34 06) 60.44 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 l (kWh/yea	Oct 170.4 189.55 ar) = Sum(2)	390.58 434.46 211) _{15,1012}	598.93	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208)

(217)m= 89.32 89.24 89.08	88.71 88.07	87.3	87.3	87.3	87.3	88.73	89.18	89.34]	(217)
Fuel for water heating, kWh/mc										
(219) m = (64) m x $100 \div (217)$ (219)m = 182.09 159.8 166.16	146.83 142.95	125.96	118.21	133.51	134.47	152.36	163.73	176.74]	
<u> </u>		·		Tota	I = Sum(2	19a) ₁₁₂ =	ı	1	1802.82	(219)
Annual totals						k\	Wh/yea	r	kWh/year	-
Space heating fuel used, main	system 1								3028.39	╛
Water heating fuel used									1802.82	
Electricity for pumps, fans and	electric keep-hot	t							_	
central heating pump:								30]	(230c)
boiler with a fan-assisted flue								45		(230e)
Total electricity for the above, k	(Wh/year			sum	of (230a)	(230g) =			75	(231)
Electricity for lighting									376.49	(232)
Total delivered energy for all us	ses (211)(221)	+ (231)	+ (232).	(237b)	=				5370	(338)
10a. Fuel costs - individual he	ating systems:									
		Fue	el			Fuel P	rice		Fuel Cost	
			h/year			(Table			£/year	
Space heating - main system 1		(211) x			3.4	-8	x 0.01 =	105.39	(240)
Space heating - main system 2) -	(213) x			0		x 0.01 =	0	(241)
Space heating - secondary		(215) x			13.	19	x 0.01 =	0	(242)
Water heating cost (other fuel)		(219)			3.4	.8	x 0.01 =	62.74	(247)
Pumps, fans and electric keep-	·hot	(231)			13.	19	x 0.01 =	9.89	(249)
(if off-peak tariff, list each of (23	30a) to (230g) se	parately	as app	licable a	nd apply	fuel pri	ce accoi	rding to	Table 12a	
Energy for lighting		(232)			13.	19	x 0.01 =	49.66	(250)
Additional standing charges (Ta	able 12)								120	(251)
Appendix Q items: repeat lines	(253) and (254)	as need	ed							
Total energy cost	(245)(247) + (250	0)(254)	=					347.68	(255)
11a. SAP rating - individual he	eating systems									
Energy cost deflator (Table 12))								0.42	(256)
Energy cost factor (ECF)	[(255) x	(256)] ÷ [(4	4) + 45.0]	=					1.18	(257)
SAP rating (Section 12)									83.49	(258)
12a. CO2 emissions – Individ	ual heating syste	ems inclu	iding mi	cro-CHP)					
		End	ergy			Emiss	ion fac	tor	Emissions	
		kW	h/year			kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1))	(211) x			0.2	16	=	654.13	(261)
Space heating (secondary)		(215) x			0.5	19	=	0	(263)
Water heating		(219) x			0.2	16	=	389.41	(264)

Space and water heating	(261) + (262) + (263) + (264) =		1043.54 (265)	j)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)	<u>'</u>)
Electricity for lighting	(232) x	0.519	195.4 (268)	3)
Total CO2, kg/year	sun	m of (265)(271) =	1277.86 (272)	<u>?</u>)
CO2 emissions per m ²	(27)	72) ÷ (4) =	16.3 (273)	3)
El rating (section 14)			86 (274)	I)

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	3694.64 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2199.44 (264)
Space and water heating	(261) + (262) + (263) + (264) =		5894.08 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	1155.82 (268)
'Total Primary Energy	sum	n of (265)(271) =	7280.15 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	92.86 (273)

		User Details:			
Assessor Name:	Jemma Mclaughlan	Stroma Nur	nher·	STRO030065	
Software Name:	Stroma FSAP 2012	Software Ve		Version: 1.0.5.25	5
		Property Address: HOUS			
Address :	Woodwell Cottage P2, V	Voodwell Road, BRISTOL,	BS11 9XU		
1. Overall dwelling dime	ensions:				
		Area(m²)	Av. Height(m)	Volume(ı	m³)
Ground floor		39.2 (1a) x	2.6	2a) = 101.92	(3a)
First floor		39.2 (1b) x	2.56	2b) = 100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 78.4 (4)			
Dwelling volume		(3a)+(3	(3c)+(3c)+(3d)+(3e)+(3	3n) = 202.27	(5)
2. Ventilation rate:					
	main secor heating heati		total	m³ per h	our
Number of chimneys	0 + 0		0 x 40	= 0	(6a)
Number of open flues	0 + 0) + 0 =	0 x 20	= 0	(6b)
Number of intermittent fa	ns		3 x 10	= 30	(7a)
Number of passive vents			0 x 10	= 0	(7b)
Number of flueless gas fi	res		0 x 40	= 0	(7c)
				Air changes per	hour
•	ys, flues and fans = $(6a)+(6a)$			5) = 0.15	(8)
	een carried out or is intended, pr	oceed to (17), otherwise continue	from (9) to (16)		
•	ne dwelling (ns)		[(9)-1]	0	(9)
Additional infiltration	ne dwelling (ns)			x0.1 = 0	(10)
Additional infiltration Structural infiltration: 0	ne dwelling (ns) .25 for steel or timber fram	e or 0.35 for masonry cons			
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspond ngs); if equal user 0.35	e or 0.35 for masonry cons	truction	x0.1 = 0 0	(10)
Additional infiltration Structural infiltration: 0 if both types of wall are posterior deducting areas of opening If suspended wooden for	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed)	e or 0.35 for masonry cons	truction	x0.1 = 0 0	(10)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the desired in the desir	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0	e or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0	truction	x0.1 = 0 0 0	(10) (11) (12) (13)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the discount of the discou	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed)	e or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0	truction	x0.1 = 0 0 0	(10) (11) (12) (13) (14)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the draught lobby, encountered windows Window infiltration	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0	ne or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0 ed	truction	x0.1 = 0 0 0 0 0 0	(10) (11) (12) (13) (14) (15)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the draught lobby, encounty Percentage of windows Window infiltration Infiltration rate	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) ter 0.05, else enter 0 s and doors draught stripped	ne or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0 ed 0.25 - [0.2 x (14) ÷ (8) + (10) + (11) +	truction 100] = (12) + (13) + (15) =	x0.1 = 0 0 0 0 0 0 0	(10) (11) (12) (13) (14) (15) (16)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the deducting areas of opening If no draught lobby, entire the percentage of windows Window infiltration Infiltration rate Air permeability value,	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) ter 0.05, else enter 0 s and doors draught stripped	e or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0 ed 0.25 - [0.2 x (14) ÷ (8) + (10) + (11) + etres per hour per square r	truction 100] = (12) + (13) + (15) =	x0.1 = 0 0 0 0 0 0 0	(10) (11) (12) (13) (14) (15)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the suspended woo	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) for 0.05, else enter 0 is and doors draught stripped q50, expressed in cubic mity value, then (18) = [(17) ÷ 2]	e or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0 ed 0.25 - [0.2 x (14) ÷ (8) + (10) + (11) + etres per hour per square r	truction 100] = (12) + (13) + (15) = metre of envelope a	x0.1 = 0 0 0 0 0 0 0 0 rea 5	(10) (11) (12) (13) (14) (15) (16) (17)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening If suspended wooden for the suspended wo	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0 s and doors draught stripped q50, expressed in cubic mitty value, then (18) = [(17) ÷ 2 tes if a pressurisation test has been	e or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0 ed 0.25 - [0.2 × (14) ÷ (8) + (10) + (11) + ettres per hour per square r 20]+(8), otherwise (18) = (16) in done or a degree air permeability	truction 100] = (12) + (13) + (15) = metre of envelope a y is being used	x0.1 = 0 0 0 0 0 0 0 0 rea 5	(10) (11) (12) (13) (14) (15) (16) (17) (18)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the suspended wo	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0 is and doors draught stripped q50, expressed in cubic mitty value, then (18) = [(17) ÷ 2 is if a pressurisation test has been	e or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0 ed 0.25 - [0.2 x (14) ÷ (8) + (10) + (11) + ettres per hour per square recoletes, otherwise (18) = (16) in done or a degree air permeability (20) = 1 - [0.075 x	truction 100] = (12) + (13) + (15) = metre of envelope a y is being used (19)] =	x0.1 = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the suspended wo	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) eter 0.05, else enter 0 is and doors draught stripped and doors draught stripped at the control of	e or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0 ed 0.25 - [0.2 × (14) ÷ (8) + (10) + (11) + ettres per hour per square r 20]+(8), otherwise (18) = (16) in done or a degree air permeability	truction 100] = (12) + (13) + (15) = metre of envelope a y is being used (19)] =	x0.1 = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(10) (11) (12) (13) (14) (15) (16) (17) (18)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the first of the first opening areas of opening. If no draught lobby, entire the percentage of windows window infiltration. Infiltration rate Air permeability value, applied the first open for the first ope	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) for the company of the	the or 0.35 for masonry consisting to the greater wall area (after or 0.1 (sealed), else enter 0 or 0.1 (sealed), else enter 0 or 0.25 - $[0.2 \times (14) \div (8) + (10) + (11) + (11) + (10) + (11) + (11)$ the etres per hour per square in the equation of the e	truction 100] = (12) + (13) + (15) = metre of envelope a y is being used (19)] =	x0.1 = 0 0 0 0 0 0 0 0 0 0 0 1 0.4	(10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)
Additional infiltration Structural infiltration: 0 if both types of wall are producting areas of opening. If suspended wooden for the suspended wo	ne dwelling (ns) .25 for steel or timber fram resent, use the value correspondings); if equal user 0.35 floor, enter 0.2 (unsealed) for the company of the	e or 0.35 for masonry consing to the greater wall area (after or 0.1 (sealed), else enter 0 ed 0.25 - [0.2 x (14) ÷ (8) + (10) + (11) + ettres per hour per square recoletes, otherwise (18) = (16) in done or a degree air permeability (20) = 1 - [0.075 x	truction 100] = (12) + (13) + (15) = metre of envelope a y is being used (19)] =	x0.1 = 0 0 0 0 0 0 0 0 0 0 0 1 0.4	(10) (11) (12) (13) (14) (15) (16) (17) (18)

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infil	tration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43]	
Calculate eff If mechani		-	rate for t	he appli	cable ca	ise	-	-	-	-	-		(23a)
If exhaust air			endix N. (2	(23a) = (23a	a) × Fmv (e	eguation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced w									, (===,			0	(23c)
a) If baland	ced mech	, anical ve	ntilation	with he	at recovi	erv (MVI	HR) (24:	′ a)m = (2)	2b)m + (23h) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balan	ced mech	anical ve	entilation	without	heat red	covery (N	лV) (24k	o)m = (22	2b)m + (23b)	<u> </u>	J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from (outside					
if (22b)m < 0.5 >	< (23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
,	m = 1, th	` ′	<u> </u>		<u>`</u>			- 		0.50	T 0.50	1	(24d)
(24d)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(24u)
Effective a (25)m= 0.61	o.61	rate - er	nter (24a 0.58	0.58	0) or (24)	c) or (24 0.56	0.56	X (25) 0.57	0.58	0.59	0.59	1	(25)
(23)111= 0.01	0.01	0.0	0.50	0.30	0.30	0.30	0.50	0.57	0.30	0.59	0.59		(20)
3. Heat loss	بط لمصم مما												
		•											
ELEMENT		SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [- 0.04] = [(W/				kJ/K (26)
ELEMENT Doors Windows Tyl	Gros area pe 1 pe 2	SS	Openin	gs	A ,r 2.07	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.07 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.07 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.07 2.15 3.43 1.14				kJ/K (26) (27) (27) (27) (27)
Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43 1.14 2.84	K) 			kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights	Gros area oe 1 oe 2 oe 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43 1.14 2.84 2.261	K) 			kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor	Gros area pe 1 pe 2 pe 3 pe 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096	K) 			(26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1	Gros area De 1 De 2 De 3 De 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= = [2.07 2.15 3.43 1.14 2.84 2.261 5.096	K) 			(26) (27) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1/2 x1/2 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.18	2K = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [= [= = [= = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38	K) 			(26) (27) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.18	2K = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [= [= = [= = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38	K) 			(26) (27) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57. Telements	33 2 4 5, m ²	Openin m 10.9 0 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/4 x1/5 x1/5 x1/6 x1/6 x1/6 x1/6 x1/6 x1/6 x1/6 x1/6	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [= [= [= [= [= [= [= [= [= [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	K)	kJ/m²-	K	(26) (27) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows all ** include the all	Gros area De 1 De 2 De 3 De 4	33 2 4 5, m ² lows, use e	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/4 x1/4 x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	$ \begin{array}{cccc} 2K & = & & \\ & -0.04 & = & \\$	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57. Telements and roof wind reas on both poss, W/K =	33 2 4 5, m ² sows, use e sides of in = S (A x	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/4 x1/4 x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12 0	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows all ** include the all Fabric heat le	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57. Telements and roof wind reas on both oss, W/K Ty Cm = Si	33 2 4 5, m² cows, use esides of interest esides (A x k)	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1/2 x1/2 x1/4 x1/5 x x1/4 x x1/5 x x1/6 x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12 0	K)	kJ/m²•	1 3.2 43.19	(26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

				ulation.										
	ŭ	`	,		using Ap	•	K						10.55	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			52.74	(37
			alculated	l monthly	V						25)m x (5)		53.74	(0,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(3
eat tr	ansfer c	coefficier	nt W/K	<u> </u>	<u> </u>	<u> </u>	!	!	(39)m	= (37) + (37)		ļ	l	
9)m=	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		
oot lo	oo poro	motor (b	JI D) \\\	/m²l/	I	I	l			Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	92.59	(3
)m=	1.21	1.2	HLP), W/	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		
5)111-	1.21	1.2	1.2	1.10	1.10	1.10	1.10	1.10			Sum(40) ₁ .		1.18	(4
umbe	er of day	s in mor	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
eum	ad occu	ipancy, I	NI									40	1	(4
				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43		(
f TF	A £ 13.9	9, N = 1											-	
nnual	OVOROR													
								(25 x N) to achieve		se taraet o		.96		(-
duce	the annua	al average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target o		.96		(4
duce	the annua	al average	hot water	usage by a day (all w	5% if the a	lwelling is	designed	to achieve	a water us	se target o		.96 Dec]	(-
duce t more	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d ater use, l	lwelling is hot and co Jun	designed (Aug		_	,	1		(
duce t more t t wate	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed (Aug	a water us	_	,	1		(
duce t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in 101.15	Feb 197.47	Mar day for ea	Apr ach month 90.12	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$	Jun ctor from 3	designed and desig	Aug (43)	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(₍
educe It more It wate It wate It may come to the sergy come to the	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 DTm / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1	Dec 101.15 = c, 1d) 145.27	1103.46	(₍
t water ergy comparisons instant	the annual that 125 Jan ar usage in 101.15 content of 150 taneous w	Feb 11tres per properties per proper	Mar day for ea 93.79 used - cale 135.38	Apr ach month 90.12 culated mo 118.03	May Vd,m = fa 86.44 onthly = 4. 113.25	Jun ctor from 82.76 190 x Vd,r 97.73	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/more 105.16	Oct 93.79 Total = Su 122.55 Total = Su	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		(
ergy constant	Jan er usage ir 101.15	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		
duce the more t	Jan 101.15 content of 150 aneous w 0 storage	Feb 11 per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage),	designed and desig	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		
duce t more t water t water t water t water t water t water t water t water t water t water t water	the annual that 125 Jan ar usage in 101.15 content of 150 faneous w 0 storage e volum	Feb 1/2 Feb 1/	Mar day for ea 93.79 used - call 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03 of use (no	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 0	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t water dust i)m= dust in material corage common herw	the annual that 125 Jan ar usage in 101.15 content of 150 storage e volum munity herise if no	Feb 1 litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0 includinated no talcated and no talcated and a calcated and a calcated and a calcated and and and and and and and and a calcated and and and and and and and and and an	Apr ach month 90.12 culated mo 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 97.73 storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t si)m= mstant oragg commherw ater:	the annual that 125 Jan ar usage in 101.15 content of 150 staneous w 0 storage e volum munity herise if no storage	Feb 11tres per properties per proper	Mar 93.79 used - call 135.38 ng at point 0 includinate the the the the the the the the the t	Apr ach month 90.12 culated mo 118.03 of use (no unk in dw er (this in	May Vd,m = fa 86.44 201113.25 20 hot water 0 colar or Welling, encludes i	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(((
duce t more	the annual that 125 Jan 101.15 content of 150 storage e volum munity h vise if no storage anufact	Feb 11 printer per per per per per per per per per p	Mar day for ea 93.79 used - call 135.38 ng at point o includinate hot water	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		
duce t more literative water ergy of mostant mostant orage commister: in the mostant in the most	Jan 101.15 101.1	Feb 1 litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de	Mar 93.79 used - calc 135.38 ng at point and no tal hot water eclared le m Table	Apr ach month 90.12 culated me 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 colar or Water 20 colar or Water 21 colar or Water 22 colar or Water 23 colar or Water 24 colar or Water 35 colar or Water 36 colar or Water 47 colar or Water 48 colar or Water 59 colar or Water 60 colar or Water 60 colar or Water 60 colar or Water 61 colar or Water 62 colar or Water 63 colar or Water 64 colar or Water 65 colar or Water 66 colar or Water 67 colar or Water 67 colar or Water 68 colar or Water 68 colar or Water 69 colar or Water 69 colar or Water 60 colar or Water	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4)
duce to more that water that wate	the annual that 125 Jan 101.15 content of 150 storage e volum munity helise if no storage example anufact	Feb n litres per p 97.47 hot water 131.19 loss: e (litres) eating a o stored loss: urer's de actor fro m water	Mar day for ea 93.79 used - cale 135.38 ng at point nd no tale hot water eclared le m Table storage	Apr ach month 90.12 culated mo 118.03 of use (no ng any so nk in dw er (this in oss facto 2b	5% if the orater use, I May $Vd,m = fa$ 86.44 0 0 0 0 0 0 0	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		(4)
duce t more	the annual that 125 Jan 101.15 content of 150 storage e volum munity h vise if no storage anufact rature fa	Feb plitres per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point of including and no tall hot water eclared left m Table storage eclared colored	Apr ach month 90.12 culated mo 118.03 of use (no ank in dw er (this ir oss facto 2b cylinder l	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 colar or Water 20 colar or Water 21 colar or Water 22 colar or Water 23 colar or Water 24 colar or Water 35 colar or Water 36 colar or Water 47 colar or Water 48 colar or Water 59 colar or Water 60 colar or Water 60 colar or Water 60 colar or Water 61 colar or Water 62 colar or Water 63 colar or Water 64 colar or Water 65 colar or Water 66 colar or Water 67 colar or Water 67 colar or Water 68 colar or Water 68 colar or Water 69 colar or Water 69 colar or Water 60 colar or Water	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/more 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at wate 4)m= anergy of anstant b)m= atternation att	the annual that 125 Jan 101.15 content of 150 anneous w o storage e volum munity h vise if no storage anufact rature fa to lost fro anufact ter stora	Feb n litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de	Mar day for ea 93.79 used - call 135.38 ng at point of including and no tall hot water eclared left m Table storage eclared colored	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this in oss facto 2b cylinder l com Table	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/more 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at more at more at more at more at more at more at wate at more	the annual that 125 Jan 101.15 content of 150 storage in the annual that 125 content of 150 storage in the annual that is a lost from the annufact in the annufact in the annufact in the factor in the factor in the annual that is a factor in	Feb 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	Mar day for ea 93.79 used - calc 135.38 ng at point on includir and no talc hot water eclared left m Table storage eclared of factor fr ee section	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this ir oss facto 2b cylinder I com Tabl on 4.3	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/more 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4) (4) (4) (4) (5) (5) (5) (5)

Energy	/ lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)	x (52) x ((53) =		0] ((54)
Enter	(50) or	(54) in (5	55)									0	((55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	J lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0] ((58)
Primar	y circuit	loss cal	culated	for each	month (59)m =	(58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wa	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	((59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48	((62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	-	
(add a	dditiona	I lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)				_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	((63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	((63) (G2)
Output	from w	ater hea	ter										_	
(64)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		
								Outp	out from w	ater heate	r (annual)	12	1229.79	(64)
Heat g	ains fro	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8	x [(46)m	+ (57)m	+ (59)m]	
(65)m=	31.88	27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87	((65)
inclu	ıde (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	Table 5	and 5a):									
Metab	olic gair	s (Table	5), Wat	ts									_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	((66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m=	20.26	18	14.64	11.08	8.28	6.99	7.56	9.82	13.18	16.74	19.54	20.83	((67)
Applia	nces ga	ins (calc	ulated ir	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m=	216.06	218.31	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	((68)
Cookir	ng gains	(calcula	ited in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5				
(69)m=	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	((69)
Pumps	and fa	ns gains	(Table	5a)	-	-	-	-			-	-		
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	((70)
Losses	e.g. ev	aporatic	n (nega	tive valu	es) (Tab	ole 5)							-	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water	heating	gains (T	able 5)										-	
(72)m=	42.84	41.49	38.67	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49	((72)
Total i	nternal	gains =	;			(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72))m	-	
(73)m=	338.65	337.27	325.44	306.02	285.55	266.49	254.54	258.38	268.75	288.3	310.76	328.33] ((73)
		•	•	•	•	•	•	•		•		•	•	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	х	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	X	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.7	=	15.55	(76)
East	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.7	=	5.16	(76)
East	0.9x	0.77	x	2.59	x	38.42	x	0.63	x	0.7	=	30.41	(76)
East	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.7	=	10.1	(76)
East	0.9x	0.77	x	2.59	x	63.27	x	0.63	x	0.7	=	50.08	(76)
East	0.9x	0.77	x	0.86	x	63.27	x	0.63	x	0.7	=	16.63	(76)
East	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.7	=	73.04	(76)
East	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.7	=	89.52	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	x	0.7	=	29.72	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.7	=	91.64	(76)
East	0.9x	0.77	X	0.86	x	115.77	x	0.63	X	0.7	=	30.43	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.7	=	87.24	(76)
East	0.9x	0.77	X	0.86	X	110.22	x	0.63	X	0.7	=	28.97	(76)
East	0.9x	0.77	X	2.59	x	94.68	x	0.63	X	0.7	=	74.94	(76)
East	0.9x	0.77	X	0.86	X	94.68	X	0.63	X	0.7	=	24.88	(76)
East	0.9x	0.77	X	2.59	X	73.59	x	0.63	X	0.7	=	58.25	(76)
East	0.9x	0.77	X	0.86	x	73.59	X	0.63	x	0.7	=	19.34	(76)
East	0.9x	0.77	X	2.59	X	45.59	x	0.63	X	0.7	=	36.09	(76)
East	0.9x	0.77	X	0.86	x	45.59	x	0.63	x	0.7	=	11.98	(76)
East	0.9x	0.77	X	2.59	x	24.49	x	0.63	x	0.7	=	19.38	(76)
East	0.9x	0.77	X	0.86	x	24.49	x	0.63	x	0.7	=	6.44	(76)
East	0.9x	0.77	X	2.59	x	16.15	x	0.63	x	0.7	=	12.78	(76)
East	0.9x	0.77	X	0.86	X	16.15	X	0.63	X	0.7	=	4.24	(76)

	_									_						_		_
South 0).9x	0.77		X	2.1	4	X	4	6.75	X	0.	63	x	0.7		= [30.58	(78)
South 0).9x	0.77		X	2.1	4	X	7	6.57	X	0.	63	X	0.7		= [50.08	(78)
South 0).9x	0.77		X	2.1	4	X	9	7.53	X	0.	63	x	0.7		= [63.79	(78)
South 0).9x	0.77		X	2.1	4	X	1	10.23	X	0.	63	x	0.7		= [72.09	(78)
South 0).9x	0.77		X	2.1	4	x	1	14.87	X	0.	63	x	0.7		= [75.13	(78)
South 0).9x	0.77		X	2.1	4	x	1	10.55	X	0.	63	x	0.7		= [72.3	(78)
South 0).9x	0.77		X	2.1	4	x	10	08.01	X	0.	63	x	0.7		= [70.64	(78)
South 0).9x	0.77		X	2.1	4	x	10	04.89	X	0.	63	x	0.7		= [68.6	(78)
South 0).9x	0.77		X	2.1	4	x	10	01.89	X	0.	63	x	0.7		= [66.63	(78)
South 0).9x	0.77		X	2.1	4	x	8	2.59	X	0.	63	x	0.7		= [54.01	(78)
South 0).9x	0.77		X	2.1	4	x	5	5.42	X	0.	63	x	0.7		= [36.24	(78)
South 0).9x	0.77		X	2.1	4	x	4	40.4	X	0.	63	x	0.7		= [26.42	(78)
Rooflights 0).9x	1		X	1.3	3	x	4	7.01	X	0.	63	x	0.7		= [49.63	(82)
Rooflights o).9x	1		X	1.3	3	x	8	33.9	X	0.	63	x	0.7		= [88.58	(82)
Rooflights o).9x	1		X	1.3	3	x	1:	22.73	X	0.	63	x	0.7		= [129.57	(82)
Rooflights 0).9x	1		X	1.3	3	x	10	61.74	X	0.	63	x	0.7		= [170.76	(82)
Rooflights o).9x	1		X	1.3	3	X	18	87.38	X	0.	63	x	0.7		= [197.83	(82)
Rooflights o).9x	1		X	1.3	3	x	18	88.06	X	0.	63	x	0.7		= [198.54	(82)
Rooflights 0).9x	1		X	1.3	3	x	18	80.51	X	0.	63	x	0.7		= [190.58	(82)
Rooflights 0).9x	1		X	1.3	3	X	10	61.54	X	0.	63	x	0.7		= [170.54	(82)
Rooflights o).9x	1		X	1.3	3	x	1	36.5	X	0.	63	x	0.7		= [144.11	(82)
Rooflights 0).9x	1		X	1.3	3	x	9	5.08	X	0.	63	x	0.7		= [100.38	(82)
Rooflights o).9x	1		X	1.3	3	X	5	7.06	X	0.	63	x	0.7		= [60.24	(82)
Rooflights o).9x	1		X	1.3	3	x	3	9.72	X	0.	63	x	0.7		= [41.93	(82)
Solar gain											n = Sum							
					395.07			72.11		397	7.63 32	29.45	226.41	135.29	94.1	6		(83)
Total gains				_	` 	` '				1 050		20.40		140.05	400			(0.4)
(84)m= 45	0.1	536.55	619	./	701.09	751.7	3 1	738.6	705.91	656	5.01 5	98.19	514.71	446.05	422.4	49		(84)
7. Mean i		•		,	Ŭ											_		_
Tempera		•		• .			•			ble 9	, Th1 (°C)					21	(85)
Utilisation	n fact	 _	ains f	or li	ving are	a, h1,	m (s	ee Ta	ble 9a)			-						
	an	Feb	Ma	\rightarrow	Apr	Ma	$\overline{}$	Jun	Jul	_	_	Sep	Oct	Nov	De	C		
(86)m=	1	1	0.9	9	0.96	0.88		0.72	0.55	0.6	61 (0.85	0.98	1	1			(86)
Mean inte	ernal	tempera	ature	in li	ving are	a T1	(follo	w ste	ps 3 to 7	7 in T	able 9	c)						
(87)m= 19	.66	19.83	20.1	1	20.47	20.77	2	20.94	20.99	20.	98 2	0.86	20.46	19.99	19.6	4		(87)
Tempera	ture o	during h	eatin	g pe	eriods in	rest o	of dw	elling/	from Ta	able 9	9, Th2	(°C)						
(88)m= 19	.92	19.92	19.9	2	19.94	19.94	. 1	19.95	19.95	19.	95 1	9.94	19.94	19.93	19.9	3		(88)
Utilisation	n fact	or for ga	ains f	or re	est of dv	velling	, h2	,m (se	e Table	9a)								
	1	0.99	0.9	-	0.94	0.84		0.63	0.43	0.4	49 (0.78	0.97	0.99	1			(89)
Mean inte	ernal	tempera	ature	in t	he rest o	of dwe	ellina	T2 (fc	ollow ste	eps 3	to 7 ir	Table	9c)	-				
		1		-	•		. 9	ν		,			- /					

(90)m=														
	18.7	18.87	19.15	19.51	19.78	19.92	19.95	19.95	19.86	19.5	19.04	18.68		(90) —
									f	LA = Livin	g area ÷ (4	ł) =	0.23	(91)
Mean	internal	temper	ature (fo	r the wh	ole dwel	ling) = fl	_A × T1	+ (1 – fL	.A) × T2					
(92)m=	18.92	19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(92)
Apply	adjustm	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.92	19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(93)
8. Spa	ace heat	ting requ	uirement											
Set Ti	i to the r	nean int	ernal ter	nperatu	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m and	d re-calc	ulate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	ation fac		ains, hm											
(94)m=	1	0.99	0.98	0.94	0.84	0.65	0.46	0.52	8.0	0.96	0.99	1		(94)
Usefu	ıl gains,		W = (94)	4)m x (8	4)m						· · · · · · · · · · · · · · · · · · ·			
(95)m=		532.72	607.76	659.91	631.38	479.8	323.54	337.91	475.61	496.09	443.22	421.57		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
						Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m=	1381.67	1337.36	1209.01	1002.99	767.52	507.12	327.41	344.65	549.56	842.77	1129.49	1373.09		(97)
Space	e heating	g require	ement fo	r each n	nonth, k\	Wh/mont	h = 0.02	4 x [(97)m – (95)m] x (4	1)m			
(98)m=	694.08	540.72	447.32	247.02	101.29	0	0	0	0	257.93	494.11	707.93		_
								Tota	l per year	(kWh/year) = Sum(98	8) _{15,912} =	3490.42	(98)
Space	e heating	g require	ement in	kWh/m²	² /year								44.52	(99)
8c Sr	nace cod	olina rea	uiremen	nt								L		
		Ĭ	July and		See Tak	ole 10h								
Oulou	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug						
Heat				•					l Sepl	Oct	l Nov l	Dec		
(100)m=		0		using Z	o°C inter	nal temp	erature		Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		
Utilisa	ation fac	tor for lo	0	0	o o inter	nal temp 857.31	674.9				Nov e from T			(100)
(101)m=	0							and exte	ernal ten	nperatur	e from T	able 10)		(100)
Usefu	ıl loss. h	0						and exte	ernal ten	nperatur	e from T	able 10)		(100) (101)
1			oss hm	0	0	857.31 0.86	674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0		, ,
(102)m =			ss hm	0	0	857.31 0.86	674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0		, ,
	0	mLm (W	oss hm 0 /atts) = (0 0 (100)m x	0 0 (101)m 0	857.31 0.86 738.17	0.92	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0		(101)
	0 (solar g	mLm (W	oss hm 0 /atts) = (0 0 (100)m x	0 0 (101)m 0	857.31 0.86 738.17	0.92	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0		(101)
Gains (103)m=	0 s (solar g	mLm (W 0 gains cal	oss hm 0 /atts) = (0 culated 0	0 (100)m x 0 for appli	0 (101)m 0 cable we	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0	c (41)m	(101)
Gains (103)m=	0 (solar g	mLm (W 0 gains ca 0 g require	oss hm 0 /atts) = (0 culated 0	0 100)m x 0 for appli	0 0 (101)m 0 cable we 0 whole c	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0	c (41)m	(101)
Gains (103)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains ca 0 g require	oss hm 0 /atts) = (0 culated 0 ement fo	0 100)m x 0 for appli	0 0 (101)m 0 cable we 0 whole c	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0	c (41)m	(101)
Gains (103)m= Space set (1	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W gains cal grequire zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 0/h) = 0.00	0 0 0 0 24 x [(10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 102)m] x	c (41)m 478.84	(101)
Gains (103)m= <i>Space</i> set (1 (104)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains ca 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >		(101) (102) (103)
Gains (103)m= Space set (1 (104)m=	s (solar coling 04)m to 0 d fraction	mLm (W 0 gains cal 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month, 3 x (98	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement for 104)m <	0 (100)m x 0 for appli 0 r month, 3 x (98	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m= Coolec Intermi	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0	oss hm o /atts) = (o culated o ement fo 104)m < o	0 (100)m x 0 for appli 0 r month, : 3 x (98	0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continuo	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta	oss hm o /atts) = (o culated o ement fo 104)m < o	0 100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	0.86 738.17 eather re 920.76 //welling, 131.47	674.9 0.92 622.55 egion, se 882.07 continue 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta	oss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 able 10b	0 100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	0.86 738.17 eather re 920.76 //welling, 131.47	674.9 0.92 622.55 egion, se 882.07 continue 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta 0	oss hm 0 /atts) = (0 culated 0 ement for able 10b 0 ment for	0 (100)m x 0 for appli 0 r month, (3 x (98) 0	0 0 (101)m 0 cable we 0 whole come 0 0	0.86 738.17 eather re 920.76 //welling, 131.47 0.25 × (105)	674.9 0.92 622.55 egion, se 882.07 continue 193.09 0.25 × (106)r	and exte 691.53 0.9 621.41 e Table 828.78 Dus (kW 154.28	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m= Space (107)m=	o (solar coling of solar colin	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta 0 requirer 0	oss hm 0 /atts) = (0 culated 0 ement for able 10b 0 ment for	0 (100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole o)m 0	0.86 738.17 eather re 920.76 //welling, 131.47 0.25 × (105)	674.9 0.92 622.55 egion, se 882.07 continue 193.09 0.25 × (106)r	and exte 691.53 0.9 621.41 e Table 828.78 Dus (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under sp	pecial conditions, see section 11)		
Fabric Energy Efficiency	(99) + (108) =	46.05	(109)
Target Fabric Energy Efficiency (TFEE)		52.95	(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	ımher:	STRC	0030065	
Software Name:	Stroma FSAP 2012	Software \			n: 1.0.5.25	
		Property Address: HOI	JSE E - BASELIN	Е		
Address :	Woodwell Cottage P2, W	oodwell Road, BRISTOI	., BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(m	<u>)</u>	Volume(m³))
Ground floor		39.2 (1a)	x 2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b)	x 2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	.(1n) 78.4 (4)				
Dwelling volume		(3a)+	·(3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:						
	main secon heating heatir		total		m³ per hou	r
Number of chimneys	0 + 0	-	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents	3		0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				A in a l	anges nor he	_
Infiltration due to chimno	ys, flues and fans = (6a)+(6b)_(72)(7h)(7c) =			nanges per ho	_
	peen carried out or is intended, pro		30 ue from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the	he dwelling (ns)				0	(9)
Additional infiltration)]	9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame	e or 0.35 for masonry co	nstruction		0	(11)
if both types of wall are p deducting areas of openi	resent, use the value correspondir ngs); if equal user 0.35	ng to the greater wall area (afte	r			
=	floor, enter 0.2 (unsealed) o	or 0.1 (sealed), else ente	. 0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught strippe	ed			0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15) =		0	(16)
•	q50, expressed in cubic me		metre of envelop	e area	5.3800001144409	92 <mark>(17)</mark>
•	lity value, then $(18) = [(17) \div 20]$				0.42	(18)
	es if a pressurisation test has been	n done or a degree air permeab	ility is being used			7,,0
Number of sides sheltere Shelter factor	eu	(20) = 1 - [0.075	x (19)] =		0.92	(19)
Infiltration rate incorporate	ting shelter factor	$(21) = (18) \times (20)$			0.92	(21)
Infiltration rate modified f	-	(= :) (:3) **(20	,		0.39	(~1)
Jan Feb	Mar Apr May Ju	ın Jul Aug Se	ep Oct Nov	/ Dec]	
Monthly average wind sp		1 1 9	1 221 230	1	1	
oriany avoiago wind sp	TOTAL TUDIO 7		 		1	

4.9

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

5.1

Wind Factor $(22a)m = (22)m \div 4$										
	1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18	1	
A.E. (11.69)				(04.)	(22.)				4	
Adjusted infiltration rate (allowing 0.49 0.48 0.47 0	or shelter a	0.37	speed) =	0.36	(22a)m 0.39	0.41	0.43	0.45	1	
Calculate effective air change rate			1	0.30	0.39	0.41	0.43	0.43	J	
If mechanical ventilation:									0	(23a)
If exhaust air heat pump using Appendi	x N, (23b) = (23b)	Ba) × Fmv (equation (I	N5)) , othe	rwise (23b) = (23a)			0	(23b)
If balanced with heat recovery: efficience	y in % allowing	for in-use f	actor (fron	n Table 4h) =				0	(23c)
a) If balanced mechanical ventil	lation with h	eat recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24a)
b) If balanced mechanical ventil	lation withou	it heat red	covery (N	MV) (24b	m = (22)	2b)m + (23b)		-	
(24b)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24b)
c) If whole house extract ventila	-	-				5 (00)	`			
if $(22b)m < 0.5 \times (23b)$, ther	` ' ' ` `		· ` `	í `	ŕ	<u> </u>	ŕ	Ι.,	1	(240)
(24c)m= 0 0 0	0 0	0	0	0	0	0	0	0]	(24c)
d) If natural ventilation or wholeif (22b)m = 1, then (24d)m =						0.51				
	0.59 0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6	1	(24d)
Effective air change rate - enter	 (24a) or (24	1b) or (24	c) or (24	d) in bo	к (25)	l		<u> </u>	1	
	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6]	(25)
3. Heat losses and heat loss para	ameter:	,	•	•	•			•	4	
J. Heat losses allo lleat loss ball										
· ·		Net Ar	ea ·ea	H-val	IIE	ΔΧΙΙ		k-valu	۵	ΔXk
•	penings m²	Net Ar A ,r		U-val W/m2		A X U (W/	K)	k-value		A X k kJ/K
ELEMENT Gross O	penings		m²				K)			
ELEMENT Gross Or area (m²)	penings	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Gross Or area (m²) Doors	penings	A ,r	m ² x	W/m2	eK = [0.04] = [(W/ 2.898	K)			kJ/K (26)
ELEMENT Gross area (m²) Doors Windows Type 1	penings	A ,r 2.07	m ² x x ¹ x ¹	W/m2 1.4 /[1/(1.4)+	eK = [0.04] = [0.04] = [2.898 2.15	K)			kJ/K (26) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2	penings	A ,r 2.07 1.62 2.59	m ² x x ¹ x ¹ x ¹	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} & & & \\ & & & &$	2.898 2.15 3.43	K)			kJ/K (26) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3	penings	A ,r 2.07 1.62 2.59	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = C	2.898 2.15 3.43 1.14	K)			kJ/K (26) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	penings	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = C	2.898 2.15 3.43 1.14 2.84	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights	penings	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = C	2.898 2.15 3.43 1.14 2.84	k)			kJ/K (26) (27) (27) (27) (27) (27) (27b)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664	K)			kJ/K (26) (27) (27) (27) (27b) (28)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.17 0.24 0.24	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m²	penings m²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	K	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	EK 0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21		kJ/m²-	к 	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	$ \begin{array}{ccc} $	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21		kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect ** include the areas on both sides of internal reas of the same areas on both sides of internal reas n reasons reas	10.9 0 2.66	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15 0 g formula 1	$ \begin{array}{ccc} & & & & & & \\ & & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & \\ $	2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	as given in	kJ/m²-	к 	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Gross area (m²) Doors Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Type1 80.83 Walls Type2 2.12 Roof 57.4 Total area of elements, m² Party wall * for windows and roof windows, use effect** include the areas on both sides of interm. Fabric heat loss, W/K = S (A x U)	10.9 0 2.66 tive window U-nal walls and pa	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 value calcularitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15 0 g formula 1	$ \begin{array}{cccc} & & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & \\$	(W// 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	as given in [2] + (32a).	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

can be u	ısed instea	ad of a de	tailed calci	ulation.										
					using Ap	pendix I	K						10.48	(36)
	_	,	•		= 0.05 x (3	•								(3-7)
Total fa	abric hea	at loss							(33) +	(36) =			60.77	(37)
Ventila	tion hea	it loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	41.46	41.15	40.84	39.39	39.12	37.86	37.86	37.63	38.35	39.12	39.67	40.24		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	102.23	101.92	101.61	100.17	99.9	98.64	98.64	98.4	99.12	99.9	100.44	101.01		
Heat Ic	oss para	meter (H	HLP), W/	′m²K			-			Average = = (39)m ÷		12 /12=	100.16	(39)
(40)m=	1.3	1.3	1.3	1.28	1.27	1.26	1.26	1.26	1.26	1.27	1.28	1.29		
Numbe	er of day	s in mor	nth (Tab	le 1a)					•	Average =	Sum(40) ₁	12 /12=	1.28	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
,						•							•	
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
Λ			\ I										1	(10)
if TF.	ed occu A > 13.9 A £ 13.9	0, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	ΓFA -13.		.43		(42)
Annual	l averag	e hot wa						(25 x N)				.96		(43)
		_			5% if the a ater use, l	_	_	to achieve	a water us	se target o	f			
not more							•	ι.			l	I _	l	
Hot wate	Jan er usage ir	Feb	Mar day for ea	Apr	Vd,m = fa	Jun	Jul Table 1c x	Aug	Sep	Oct	Nov	Dec		
1	101.15	97.47	93.79	90.12	86.44	82.76	82.76	86.44	90.12	93.79	97.47	101.15		
(44)m=	101.15	97.47	93.79	90.12	00.44	02.70	02.70	00.44		<u> </u>	<u> </u>		1103.46	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600		Total = Su oth (see Ta			1103.40	(++)
(45)m=	150	131.19	135.38	118.03	113.25	97.73	90.56	103.92	105.16	122.55	133.77	145.27		
						!				Total = Su	m(45) ₁₁₂ =	-	1446.81	(45)
If instant	taneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)				•	
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage		includin	a any c	olar or M	WHDC	etoraga	within sa	me vec	col			1	(47)
_		,			elling, e		_		arrie ves	361		0		(47)
	•	-			•			mbi boil	ers) ente	er '0' in (47)			
	storage			•					,	`	,			
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature fa	actor fro	m Table	2b								0		(49)
• • • • • • • • • • • • • • • • • • • •			storage	-				(48) x (49)) =			0		(50)
•				-	oss fact								I	(F.1)
		_	tactor fr ee section		e 2 (kW	n/ntre/da	1y <i>)</i>					0		(51)
	e factor	-		1.0								0		(52)
			m Table	2b								0		(53)
													•	

Energy lost from wa	•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54) in	, ,									0		(55)
Water storage loss of	alculated	for each	month			((56)m = (55) × (41)	m -			_	
(56)m= 0 0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains dedicate	ted solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss (annual) fr	om Table	e 3							0		(58)
Primary circuit loss of					` '	` '						
(modified by facto	1	1		1	1			1	'	i	1	4
(59)m= 0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calculate	d for eacl	n month ((61)m =	(60) ÷ 30	65 × (41))m						
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required f	or water h	eating ca	alculated	d for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		(62)
Solar DHW input calculat	ed using App	pendix G o	r Appendix	κ Η (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or \	//WHRS	applies	, see Ap	pendix (3)				•	
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from water h	eater										_	
(64)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		_
						Outp	out from w	ater heate	r (annual) ₁	12	1229.79	(64)
Heat gains from wat	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	x [(46)m	+ (57)m	+ (59)m	1	
(65)m= 31.88 27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87		(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains (s	ee Table	5 and 5a):									
Metabolic gains (Tal	ole 5), Wa	tts									_	
Jan Fel		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 121.59 121.5	9 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59		(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	-	-	-		
(67)m= 19.76 17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31		(67)
Appliances gains (ca	lculated i	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5	•		•	
(68)m= 216.06 218.3	1 212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53		(68)
Cooking gains (calc	ılated in A	ppendix	L, equa	tion L15	or L15a	, also se	ee Table	5	•			
(69)m= 35.16 35.10	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16		(69)
Pumps and fans gai	ns (Table	5a)			l					ı	ı	
(70)m = 0 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapora	tion (nega	ative valu	es) (Tab	ole 5)							1	
(71)m= -97.27 -97.2		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water heating gains	(Table 5)	<u> </u>						•			ı	
(72)m= 42.84 41.49	<u>` </u>	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49		(72)
Total internal gains	=		I	(66)	ım + (67)m	ı + (68)m -	L + (69)m + ∈	(70)m + (7	1)m + (72)	m	I	
(73)m= 338.14 336.8		305.74	285.34	266.31	254.35	258.13	268.42	287.88	310.27	327.81		(73)
		1		1	· · · · · ·						I	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	X	1.62	X	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	X	41.52	X	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	X	13.12	X	0.63	X	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	X	8.86	X	0.63	X	0.8	=	10.03	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.8	=	17.77	(76)
East	0.9x	0.77	X	0.86	X	19.64	X	0.63	X	0.8	=	5.9	(76)
East	0.9x	0.77	x	2.59	X	38.42	X	0.63	X	0.8	=	34.76	(76)
East	0.9x	0.77	x	0.86	X	38.42	x	0.63	x	0.8	=	11.54	(76)
East	0.9x	0.77	X	2.59	X	63.27	X	0.63	X	0.8	=	57.24	(76)
East	0.9x	0.77	x	0.86	X	63.27	X	0.63	x	0.8	=	19.01	(76)
East	0.9x	0.77	x	2.59	X	92.28	x	0.63	x	0.8	=	83.48	(76)
East	0.9x	0.77	x	0.86	X	92.28	x	0.63	X	0.8	=	27.72	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.8	=	102.31	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	X	0.8	=	33.97	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.8	=	104.73	(76)
East	0.9x	0.77	x	0.86	x	115.77	x	0.63	x	0.8	=	34.77	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.8	=	99.71	(76)
East	0.9x	0.77	x	0.86	x	110.22	x	0.63	x	0.8	=	33.11	(76)
East	0.9x	0.77	x	2.59	X	94.68	x	0.63	x	0.8	=	85.65	(76)
East	0.9x	0.77	x	0.86	x	94.68	x	0.63	X	0.8	=	28.44	(76)
East	0.9x	0.77	x	2.59	X	73.59	x	0.63	x	0.8	=	66.57	(76)
East	0.9x	0.77	x	0.86	X	73.59	x	0.63	X	0.8	=	22.1	(76)
East	0.9x	0.77	x	2.59	x	45.59	x	0.63	X	0.8	=	41.24	(76)
East	0.9x	0.77	x	0.86	X	45.59	x	0.63	x	0.8	=	13.69	(76)
East	0.9x	0.77	x	2.59	x	24.49	x	0.63	x	0.8	=	22.15	(76)
East	0.9x	0.77	x	0.86	x	24.49	x	0.63	x	0.8	=	7.36	(76)
East	0.9x	0.77	x	2.59	x	16.15	x	0.63	x	0.8	=	14.61	(76)
East	0.9x	0.77	x	0.86	X	16.15	x	0.63	x	0.8	=	4.85	(76)

South 0.9x	0.77	x	2.14	x	46	5.75	1 x	0.63	×	0.8		34.94	(78)
South 0.9x	0.77	^ x	2.14	$\frac{1}{x}$		5.57] ^] _x	0.63		0.8	_ =	57.23	(78)
South 0.9x	0.77	d x x	2.14	^		53] ^] _x	0.63		0.8	-	72.9	(78)
South 0.9x	0.77	= x	2.14			0.23] ^] _x	0.63		0.8	╡ -	82.39	(78)
South 0.9x	0.77	= x	2.14			4.87] ^] _x	0.63		0.8	╡ =	85.86	(78)
South 0.9x	0.77	×	2.14	x	-	0.55) x	0.63	X	0.8	= =	82.63	(78)
South 0.9x	0.77	= x	2.14	x		8.01]] _x	0.63	= x	0.8	-	80.73	(78)
South 0.9x	0.77	= x	2.14	= x		4.89]] _X	0.63	= x	0.8	╡ -	78.4	(78)
South 0.9x	0.77	= x	2.14	= x		1.89]] x	0.63	= x	0.8	╡ -	76.15	(78)
South 0.9x	0.77	×	2.14	×		2.59	X	0.63	×	0.8		61.73	(78)
South 0.9x	0.77	×	2.14	×		5.42	х	0.63	×	0.8	= =	41.42	(78)
South _{0.9x}	0.77	×	2.14	×	40	0.4	x	0.63	×	0.8	= =	30.2	(78)
Rooflights _{0.9x}	1	×	1.33	×	47	'.01	x	0.63	×	0.8	_ =	56.72	(82)
Rooflights 0.9x	1	x	1.33	×	83	3.9	х	0.63	×	0.8	=	101.23	(82)
Rooflights 0.9x	1	×	1.33	×	12:	2.73	x	0.63	×	0.8	=	148.08	(82)
Rooflights 0.9x	1	×	1.33	×	16	1.74	x	0.63	×	0.8	=	195.15	(82)
Rooflights 0.9x	1	x	1.33	x	18	7.38	x	0.63	x	0.8	=	226.09	(82)
Rooflights 0.9x	1	X	1.33	×	18	8.06	x	0.63	X	0.8	=	226.91	(82)
Rooflights _{0.9x}	1	x	1.33	X	18	0.51	x	0.63	X	0.8	=	217.8	(82)
Rooflights 0.9x	1	X	1.33	X	16	1.54	x	0.63	X	0.8	=	194.91	(82)
Rooflights _{0.9x}	1	X	1.33	X	13	6.5	X	0.63	X	0.8	=	164.7	(82)
Rooflights _{0.9x}	1	X	1.33	X	95	5.08	X	0.63	X	0.8	=	114.72	(82)
Rooflights _{0.9x}	1	X	1.33	X	57	'.06	x	0.63	X	0.8	=	68.85	(82)
Rooflights _{0.9x}	1	X	1.33	X	39).72	X	0.63	X	0.8	=	47.92	(82)
Solar gains in			1		T		i i	n = Sum(74)m.				1	(00)
(83)m= 127.37 Total gains – i	<u> </u>	36.3	$\frac{451.51}{(84)m} = \frac{532}{(73)m}$		39.55 83\m	515.86	454	.44 376.51	258.7	6 154.62	107.61]	(83)
(84)m= 465.51		61.37	757.25 818		305.87	770.21	712	.57 644.93	546.6	3 464.89	435.42	1	(84)
` ′					,00.07	770.21	<u> </u>	.57 044.55	340.0	3 404.03	400.42]	(0.)
7. Mean inter						T. I		TI 4 (00)					7(05)
Temperature	·	٠.		·			oie 9	, In1 (°C)				21	(85)
Utilisation fac	 -			- i		,		Con	0.00	Nov	Daa	1	
(86)m= 1	 	Mar 0.99	Apr N	lay R7	Jun 0.71	Jul 0.55	0.6	ug Sep 61 0.85	Oct 0.98	l Nov	Dec 1	1	(86)
	<u> </u>		<u> </u>		I				0.50		'	J	(00)
Mean interna	 			$\overline{}$					20.44	10.01	10.52	1	(87)
(87)m= 19.55		20.04	!		20.93	20.98	20.	<u> </u>	20.41	19.91	19.53]	(07)
Temperature												1	(00)
(88)m= 19.84	19.84 1	9.84	19.86 19.	86	19.87	19.87	19.	88 19.87	19.86	19.86	19.85]	(88)
Utilisation fac	 -				$\overline{}$		T _				ī	7	
(89)m= 1	0.99	0.98	0.94 0.8	32	0.61	0.42	0.4	17 0.77	0.96	0.99	1]	(89)
Mean interna	ıl temperatu	ıre in t	he rest of d	welling	1 T2 (fo	llow ste	eps 3	to 7 in Tabl	e 9c)				

90)m=	18.53	18.72	19.02	19.4	19.69	19.84	19.87	19.87	19.78	19.39	18.9	18.51		(90)
									f	LA = Livin	g area ÷ (4	1) =	0.23	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
92)m=	18.77	18.96	19.26	19.64	19.94	20.1	20.13	20.13	20.03	19.63	19.13	18.75		(92)
Apply	adjustn	nent to t	he mean	interna	temper	ature fro	m Table	4e, whe	re appro	opriate				
93)m=	18.77	18.96	19.26	19.64	19.94	20.1	20.13	20.13	20.03	19.63	19.13	18.75		(93)
8. Spa	ace hea	ting requ	uirement											
Set Ti	to the r	mean int	ernal ter	nperatu	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(7	76)m an	d re-calc	ulate	
the uti	ilisation	factor fo	or gains	using Ta	ble 9a									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	:										
94)m=	1	0.99	0.98	0.93	0.82	0.63	0.45	0.5	0.78	0.96	0.99	1		(94)
Usefu	l gains,	hmGm ,	W = (94)	4)m x (8	4)m									
95)m=	463.85	559.65	646.08	705.95	674.92	511.25	343.56	358.76	505.01	524.16	461.39	434.27		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat I	oss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
97)m=	1479.06	1432.82	1296.34	1076.09	823.08	542.31	348.26	366.86	587.64	902.15	1208.72	1469.56		(97)
Space	heatin	g require	ement fo	r each n	nonth, k\	Wh/mont	th = 0.02	24 x [(97))m – (95)m] x (4°	1)m			
	755.31	586.77	483.8	266.5	110.23	0	0	0	0	281.23	538.08	770.26		
98)m=														
98)m=								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3792.17	(98)
	heatin	a require	ament in	k\\/h/m²	?/vear			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =		╡`゙
Space		g require			²/year			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3792.17 48.37	(98)
Space		g require			²/year			Tota	l per year	(kWh/year) = Sum(9	8)15,912 =		= `
Space 8c. Sp	pace coo	oling rec	uiremen	t August.	See Tal									= ` `
Space 8c. Sp Calcu	pace coolage lated fo	oling red r June, c Feb	uiremen Iuly and Mar	t August. Apr	See Tal	Jun	Jul	Aug	Sep	Oct	Nov	Dec		= ` `
Space 8c. Sp Calcul	lated fo Jan oss rate	oling recording	uiremen luly and Mar lculated	t August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	Aug	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(99)
Space 8c. Sp Calcul	pace coolage lated fo	oling red r June, c Feb	uiremen Iuly and Mar	t August. Apr	See Tal	Jun		Aug	Sep	Oct	Nov	Dec		(99)
Space 8c. Sp Calcul Heat I 100)m=	lated fo Jan oss rate	oling recording	uiremen luly and Mar lculated	t August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	Aug	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(100
Space 8c. Sp Calcul Heat I 100)m=	lated fo Jan oss rate	oling red r June, c Feb e Lm (ca	uiremen luly and Mar lculated	t August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	Aug	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(100
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m=	Jan oss rate o ation fac	oling recording	July and Mar Iculated 0 sss hm	August. Apr using 25	See Tal May 5°C inter	Jun nal temp 927.19 0.85	729.91	Aug and exte 747.87	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(100
Space 8c. Sp Calcu Heat I 100)m= Utilisa 101)m= Usefu	Jan oss rate o ation fac	oling recording	July and Mar Iculated 0 sss hm	August. Apr using 25	See Tak May 5°C inter 0	Jun nal temp 927.19 0.85	729.91	Aug and exte 747.87	Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		(100)
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m=	Jan oss rate o ation fac 0 I loss, h	oling recording	July and Mar Iculated 0 oss hm 0 /atts) = (August. Apr using 25 0 0 100)m x	See Tak May 5°C inter 0 0 (101)m	Jun nal temp 927.19 0.85	729.91 0.91	Aug and exte 747.87 0.89 663.91	Sep ernal ten 0	Oct nperatur 0	Nov e from T 0	Dec able 10)		(100
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu Usefu Gains	Jan oss rate o ation fac 0 I loss, h	oling recording	July and Mar Iculated 0 oss hm 0 /atts) = (August. Apr using 25 0 0 100)m x	See Tak May 5°C inter 0 0 (101)m	Jun nal temp 927.19 0.85	0.91 666.92	Aug and exte 747.87 0.89 663.91	Sep ernal ten 0	Oct nperatur 0	Nov e from T 0	Dec able 10)		(100 (101 (102
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (oling red r June, c Feb e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require	luirement for a control of the contr	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37	0.91 0.91 666.92 egion, se	Aug and exter 747.87 0.89 663.91 ee Table 890.45	Sepernal ten 0 0 0 10)	Oct nperatur 0 0 0	Nov e from T 0 0 0	Dec able 10)	48.37	(100 (100 (100
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (oling recording	luirement for a control of the contr	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37	0.91 0.91 666.92 egion, se	Aug and exte 747.87 0.89 663.91 ee Table 890.45	Sepernal ten 0 0 0 10)	Oct nperatur 0 0 0	Nov e from T 0 0 0	Dec able 10) 0 0 0	48.37	(100 (102
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (oling red r June, c Feb e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require	luirement for a control of the contr	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37	0.91 0.91 666.92 egion, se	Aug and exte 747.87 0.89 663.91 ee Table 890.45	Sepernal ten 0 0 0 10)	Oct nperatur 0 0 0	Nov e from T 0 0 0	Dec able 10) 0 0 0	48.37	(100 (102
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar (0 e coollin(04)m to	oling recorder June, control for local control f	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 10) 0 0 10) 0 0 10) 0 0 0 10) 0 0 0 10 10 10 10 10 10 10 10 10 10 10	Oct nperatur 0 0 0 24 x [(10	Nov e from T 0 0 0 0 0 03)m - (**	Dec fable 10) 0 0 0 102)m]	48.37	(100 (100 (100 (100)
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10 104)m=	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar (0 e coollin(04)m to	oling recorded record	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 10) 0 0 Total	Oct nperatur 0 0 0 24 x [(10	Nov e from T 0 0 0 0 0 03)m – (Dec able 10) 0 0 0 102)m]	48.37 x (41)m	(100 (102 (103
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu Usefu 102)m= Gains 103)m= Space set (101)04)m=	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (0 0 c (solar (0 0 d) m to 0	oling recorded record	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 10) 0 0 Total	Oct nperature 0 0 0 24 x [(10) 0 = Sum(Nov e from T 0 0 0 0 0 03)m – (Dec able 10) 0 0 0 102)m]	48.37 (41)m 528.45	(100 (102 (103
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10 104)m= Cooled ntermin	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (0 0 c (solar (0 0 d) m to 0	oling record June, of the Lm (care) of the Lm (which is a second of the Lm	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 10) 0 0 Total	Oct nperature 0 0 0 24 x [(10) 0 = Sum(Nov e from T 0 0 0 0 0 03)m – (Dec able 10) 0 0 0 102)m]	48.37 (41)m 528.45	(100 (101 (102 (103
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space set (10 104)m= Cooled ntermin	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar o cooling 04)m to 0 I fraction	oling record of the property o	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement for 104)m < 0	August. Apr using 29 0 100)m x 0 for appli 0 r month, 3 x (98	See Tate May 5°C inter 0 (101)m 0 cable we 0 whole come	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling,	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exte 747.87 0.89 663.91 ee Table 890.45 ous (kW	Sep ernal ten 0 0 0 10) 0 Total f C = 0	Oct nperature 0 0 0 24 x [(10) 0 = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4	Dec able 10) 0 0 0 102)m]>	48.37 (41)m 528.45	(100 (100 (100 (100 (100
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space set (10 104)m= Cooled ntermin 106)m=	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar (0 04)m to 0 I fraction	oling record June, Car Jun	luirement	August. Apr using 29 0 100)m x 0 for appli 0 r month, 3 x (98 0	See Tate May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling, 147.53	0.91 0.91 666.92 egion, se 952.37 continuo	Aug and exter 747.87 0.89 663.91 ee Table 890.45 ous (kW 168.54	Sep ernal ten 0 0 0 10) 0 Total f C = 0	Oct nperatur 0 0 0 24 x [(10) = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4	Dec able 10) 0 0 0 102)m] 0 = 1) =	48.37 (41)m 528.45 1	(100 (101 (102 (103 (104 (105
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10 104)m= Cooled ntermin 106)m=	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar (0 04)m to 0 I fraction	oling record June, Car Jun	luirement	August. Apr using 29 0 100)m x 0 for appli 0 r month, 3 x (98 0	See Tate May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling, 147.53	0.91 0.91 666.92 egion, se 952.37 continuo 212.38	Aug and exter 747.87 0.89 663.91 ee Table 890.45 ous (kW 168.54	Sep ernal ten 0 0 0 10) 0 Total f C = 0	Oct nperatur 0 0 0 24 x [(10) = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4	Dec able 10) 0 0 0 102)m] 0 = 1) =	48.37 (41)m 528.45 1	(100 (101 (102 (103 (104 (105
8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Usefu 102)m= Gains 103)m= Space set (10 104)m= Cooled ntermin 106)m=	lated fo Jan oss rate 0 ation fac 0 I loss, h 0 (solar g 0 e cooling 04)m to 0 I fraction ttency fac cooling	oling recorder June, control of the Lm (can be control of the later of	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 29 0 100)m x 0 for appli 0 r month, 3 x (98 0	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling, 147.53 0.25 x (105)	0.91 0.91 666.92 egion, se 952.37 continue 212.38 0.25 × (106)r	Aug and exter 747.87 0.89 663.91 ee Table 890.45 ous (kW 168.54) 0.25	Sep ernal ten 0 0 10) 0 Total f C = 0 Total 0	Oct nperatur 0 0 0 24 x [(10 0 = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,4)	Dec fable 10) 0 0 0 102)m] >	48.37 (41)m 528.45 1	(100 (101 (102 (103 (104 (105)
Space 8c. Sp Calcul Heat I 100)m= Utilisa 101)m= Gains 103)m= Space set (10 104)m= Cooled ntermin 106)m= Space 107)m=	lated fo Jan loss rate 0 ation fac 0 I loss, h 0 (solar (0 04)m to 0 I fractior ttency fa 0 cooling 0	oling recorder June, control of the Lm (can be control of the later of	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tab May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0	Jun nal temp 927.19 0.85 789.47 eather re 994.37 dwelling, 147.53 0.25 x (105)	0.91 0.91 666.92 egion, se 952.37 continue 212.38 0.25 × (106)r	Aug and exter 747.87 0.89 663.91 ee Table 890.45 ous (kW 168.54) 0.25	Sep ernal ten 0 0	Oct nperatur 0 0 0 0 24 x [(10 0 = Sum(cooled a	Nov e from T 0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,4)	Dec Table 10) 0 0 0 102)m]> 0 = 1) = 0	48.37 48.37 528.45 1	╡``

8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11)

Fabric Energy Efficiency

(99) + (108) =

50.05

(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	ımher:	STRC	0030065	
Software Name:	Stroma FSAP 2012	Software \			n: 1.0.5.25	
		Property Address: HOI	JSE E - BASELIN	Е		
Address :	Woodwell Cottage P2, W	oodwell Road, BRISTOI	., BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(m	<u>)</u>	Volume(m³))
Ground floor		39.2 (1a)	x 2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b)	x 2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	.(1n) 78.4 (4)				
Dwelling volume		(3a)+	·(3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:						
	main secon heating heatir		total		m³ per hou	r
Number of chimneys	0 + 0	-	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents	3		0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				A in a l	anges nor he	_
Infiltration due to chimno	ys, flues and fans = (6a)+(6b)_(72)(7h)(7c) =			nanges per ho	_
	peen carried out or is intended, pro		30 ue from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the	he dwelling (ns)				0	(9)
Additional infiltration)]	9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame	e or 0.35 for masonry co	nstruction		0	(11)
if both types of wall are p deducting areas of openi	resent, use the value correspondir ngs); if equal user 0.35	ng to the greater wall area (afte	r			
=	floor, enter 0.2 (unsealed) o	or 0.1 (sealed), else ente	. 0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught strippe	ed			0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15) =		0	(16)
•	q50, expressed in cubic me		metre of envelop	e area	5.3800001144409	92 <mark>(17)</mark>
•	lity value, then $(18) = [(17) \div 20]$				0.42	(18)
	es if a pressurisation test has been	n done or a degree air permeab	ility is being used			7,,0
Number of sides sheltere Shelter factor	eu	(20) = 1 - [0.075	x (19)] =		0.92	(19)
Infiltration rate incorporate	ting shelter factor	$(21) = (18) \times (20)$			0.92	(21)
Infiltration rate modified f	-	(= :) (:3) **(20	,		0.39	(~1)
Jan Feb	Mar Apr May Ju	ın Jul Aug Se	ep Oct Nov	/ Dec]	
Monthly average wind sp		1 1 9	1 221 230	1	1	
oriany avoiago wind sp	TOTAL TUDIO 7		 		1	

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infil	tration rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m				_	
0.49	0.48	0.47	0.42	0.41	0.37	0.37	0.36	0.39	0.41	0.43	0.45]	
Calculate eff		-	rate for t	he appli	cable ca	se							
If mechanion			andiv N. (2	3h) _ (22a) v Emy (nauation (N	VEVV otho	rwico (22h) - (232)			0	(23a)
If balanced w) = (23a)			0	(23b)
a) If balance		,	,	J		`		,	26\m . /	22h) v [1 (220)	0	(23c)
(24a)m= 0		0	0	0	0	0	0	$\frac{3)111 = (22)}{0}$	0	0	0]	(24a)
b) If balance						<u> </u>		<u> </u>	l			J	,
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input v	ventilatio	n from (utside				J	
,)m < 0.5 ×								5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natura				•	•				-			-	
	m = 1, the	<u> </u>			· · · · ·	_	- `			r	ı	1	(5.4.1)
(24d)m= 0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6		(24d)
Effective a			<u> </u>	<u> </u>	``	ŕ		1 		T	T	1	(05)
(25)m= 0.62	0.62	0.61	0.59	0.59	0.57	0.57	0.56	0.57	0.59	0.59	0.6		(25)
3. Heat loss	es and he	eat loss p	paramete	er:									
3. Heat loss ELEMENT		SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²·		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area oe 1	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [- 0.04] = [(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area pe 1 pe 2	SS	Openin	gs	A ,r 2.07	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14	K)			kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area oe 1 oe 2 oe 3	ss (m²)	Openin	gs ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84	K)			kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area oe 1 oe 2 oe 3 oe 4	ss (m²)	Openin m	gs ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.862 6.664	K)			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area De 1 De 2 De 3 De 4	ss (m²)	Openin m	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area on a 1 on a 2 on a 3 on a 4 on a 2 on a 3 on a 4 on a 57.	ss (m²)	Openin m	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.24	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area on a 1 on a 2 on a 3 on a 4 on a 2 on a 3 on a 4 on a 57.	ss (m²)	Openin m	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.24	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of	Gros area De 1 De 2 De 3 De 4 80.8 2.1: 57. elements	33 2 4 0, m ²	Openin m 10.9 0 2.66	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows are	Gros area De 1 De 2 De 3 De 4 80.8 2.11 57.4 elements and roof windle eas on both	33 2 4 0 ows, use e	10.9 0 2.66	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [= [= [= [= [= [= [= [= [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows ar ** include the ar	Gros area De 1 De 2 De 3 De 4 80.8 2.11 57. elements and roof windleas on both DSS, W/K:	33 2 4 ows, use e sides of in = S (A x	10.9 0 2.66	gs ₁ 2	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows ar ** include the arc Fabric heat to	Gros area De 1 De 2 De 3 De 4 80.8 2.1: 57. elements and roof windle eas on both poss, W/K: y/Cm = S(33 2 4 ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 2 ndow U-va	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculations	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.17 0.24 0.15	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.862 6.664 16.78 0.51 8.21	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

an be used	d instead of						,							一
Thermal b	oridges :	S(L)	(Y) cald	culated i	using Ap	pendix I	K						10.48	(36)
f details of ti		0 0	re not kn	own (36) =	= 0.05 x (3	1)			,,	<i>(</i>)				_
「otal fabri										(36) =			60.77	(37)
entilation/							1			= 0.33 × (1	
J		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m= 41	1.46 41	1.15	40.84	39.39	39.12	37.86	37.86	37.63	38.35	39.12	39.67	40.24		(38
leat trans	sfer coef	fficient	t, W/K	,					(39)m	= (37) + (3	38)m			
39)m= 10)2.23 10°)1.92	101.61	100.17	99.9	98.64	98.64	98.4	99.12	99.9	100.44	101.01		_
Heat loss	paramet	eter (H	LP), W/	m²K						Average = = (39)m ÷		12 /12=	100.16	(39
40)m= 1	1.3 1	1.3	1.3	1.28	1.27	1.26	1.26	1.26	1.26	1.27	1.28	1.29		
Number o	of days in	n mont	th (Tabl	e 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.28	(40)
J	Jan F	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31 2	28	31	30	31	30	31	31	30	31	30	31		(41
	•						-	-					•	
4. Water	heating	energ	gy requi	rement:								kWh/y	ear:	
Assumed	occupar	ncy, N									2.	43		(42
if TFA > if TFA £ Innual av	> 13.9, N E 13.9, N /erage ho	N = 1 + N = 1 not wat	- 1.76 x ter usag	je in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.96]	·
if TFA > if TFA £	> 13.9, N E 13.9, N verage ho annual ave	N = 1 + N = 1 not wat verage h	- 1.76 x ter usag	je in litre usage by	es per da 5% if the a	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)]	•
if TFA > if TFA £ Annual av Reduce the a not more tha	> 13.9, N E 13.9, N verage he annual ave at 125 litres	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		9)			•
if TFA > if TFA £ Annual av Reduce the a not more tha	> 13.9, N E 13.9, N verage he annual ave at 125 litres	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		•
if TFA \$\int if TFA £\int Annual av Reduce the anot more than I J	> 13.9, N E 13.9, N rerage he annual ave at 125 litres Jan F sage in litre	N = 1 + N = 1 not wat verage h es per pe	ter usag not water i erson per	ge in litre usage by a day (all w Apr	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		
if TFA £ if TFA £ Annual av Reduce the anot more that Hot water us	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre	N = 1 + N = 1 not wat rerage h es per per Feb res per c	ter usag not water the erson per Mar day for ea	ge in litre usage by a day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fa 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Sur	9) Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97	N = 1 + N = 1 not wat verage h es per per Feb Feb Fes per c 7.47	ter usag not water the erson per Mar day for ea	ge in litre usage by a day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fa 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Sur	9) Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97	N = 1 + N = 1 not wat verage h es per per Feb Feb Fes per c 7.47	ter usage of water terson per Mar day for ea	ge in litre usage by s day (all w Apr ach month 90.12	es per da 5% if the a vater use, B May A A A A A A A A A A	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mon 105.16	Oct 93.79 Total = Suith (see Tail	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27	1103.46	(43
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us 44)m= 10	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot to	N = 1 + N = 1 not wat rerage h es per per Feb res per c 7.47 water u	ter usag not water terson per Mar day for ea 93.79 used - calc	ge in litre usage by a day (all w Apr ach month 90.12 culated mo	es per da 5% if the orater use, I May $Vd,m = fa$ 86.44 a a a a a a a	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Total = Sun 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2:	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 tent of hot value in litres 150 13.7 eous water	N = 1 + N = 1 not waterage has per per Feb res per co 7.47 water u 81.19	ter usag not water terson per Mar day for ea 93.79 used - calc	ge in litre usage by a day (all w Apr ach month 90.12 culated mo	es per da 5% if the orater use, I May $Vd,m = fa$ 86.44 a a a a a a a	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Total = Sun 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA > if TFA £ Annual av Reduce the a not more than Hot water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Water stor	> 13.9, N E 13.9, N Verage he annual ave at 125 litres Jan F sage in litre 01.15 97 tent of hot v 150 13 eous water 22.5 19	N = 1 + N = 1 not wat verage h es per per Feb Tes per constant water u 31.19 ver heating 9.68 SS:	ter usage of water of erson per day for ear 93.79 ased - calce 135.38 ag at point 20.31	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the a rater use, I May Vd,m = fa 86.44 201113.25 20 hot water 16.99	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Sunth (see Tail 122.55) Total = Sunth 18.38	9) 91 Nov 97.47 m(44) 112 = ables 1b, 1 133.77 m(45) 112 = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(43
if TFA > if TFA £ Annual av Reduce the anot more that anot water us 44)m= 10 Energy context 45)m= 1 f instantanee 46)m= 2: Water stor	> 13.9, N E 13.9, N Verage had annual average in litres Jan F Sage in litres 11.15 97 Tent of hot variety in 150 13 Feous water 12.5 19 Trage loss of colume (li	N = 1 + N = 1 not waterage has per per per per per per per per per per	ter usagnot water of erson per Mar day for ea 93.79 seed - calce 135.38 g at point 20.31 includin	Apr Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the of the office of the off	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage),	erage = designed and designed a	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Sunth (see Tail 122.55) Total = Sunth 18.38	9) 91 Nov 97.47 m(44) 112 = ables 1b, 1 133.77 m(45) 112 = 20.07	.96 Dec 101.15 c, 1d) 145.27		(43
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if TFA > if TFA £ Annual av Reduce the a not more than that water us 44)m= 10 Energy conte 45)m= 1 f instantane 46)m= 2: Vater stor Storage vo f commur Otherwise Vater stor a) If manual Emperation Emperation Energy los	> 13.9, N E 13.9, N Perage he annual average in litres Jan F sage in litres 11.15 97 Tent of hot v 150 13 Four water 22.5 19 Trage loss of the proper in the proper in litres Trage loss of the proper in the properties in the proper in the properties in the proper in the properties in th	N = 1 + 1 N = 1 N = 1 Not water uses per per per per per per per per per per	ter usage to twater to erson per Mar day for ear 93.79 seed - calculation and no tale to twater to estorage.	Apr Apr Apr Apr Apr Apr Apr Apr Apr Apr	es per da 5% if the of water use, I May Vd,m = far 86.44 201113.25 20 hot water 16.99 Color or Water velling, eacludes i cor is knowear	ay Vd,av fwelling is foot and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Sunth (see Tail 122.55 Total = Sunth (see Sun	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(44) (45) (46) (47) (48) (49)
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		m water (54) in (5	-	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	-	0		(54) (55)
	,	, ,	•	for each	month			((56)m = (55) × (41)ı	m		U		(55)
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
	r contains	dedicate	d solar sto	rage, (57)ı				0), else (57	7)m = (56)	m where (H11) is fro	m Append	I lix H	. ,
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary	y circuit	loss (ar	nual) fro	om Table	3	-	-	-				0		(58)
-				for each		59)m = ((58) ÷ 36	65 × (41)	m				•	
` r	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss ca	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64		(61)
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91		(62)
				endix G or						r contributi	on to wate	er heating)		
` r			ı —	and/or V	i	- 	· ·	i 					1	. .
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output	from w	ater hea	ter		ı		ı						•	
(64)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91		
								Outp	out from wa	ater heater	' (annual)₁	12	1595.65	(64)
Heat ga	ains froi	m water	heating,	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m] + 0.8 x	([(46)m	+ (57)m	+ (59)m	1	
(65)m=	53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46		(65)
	` '			of (65)m		ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
		·		and 5a):									
Metabo			5), Wat	ts										
(0.0)	Jan	Feb				· .							ı	
(66)m=	121.59		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
Lighting		121.59	121.59	Apr 121.59	121.59	121.59	121.59	121.59	121.59	Oct 121.59	Nov 121.59	Dec 121.59		(66)
ŗ	g gains	(calcula	121.59 ted in Ap	Apr 121.59 opendix	121.59 L, equat	121.59 ion L9 o	121.59 r L9a), a	121.59 Iso see	121.59 Table 5	121.59	121.59	121.59		,
(67)m=	g gains 21.73	(calcula	121.59 ted in Ap 15.7	Apr 121.59 opendix 11.88	121.59 L, equat	121.59 ion L9 o	121.59 r L9a), a 8.1	121.59 Iso see	121.59 Table 5	121.59 17.95				(66)
(67)m= [Appliar	g gains 21.73 nces ga	(calcula 19.3 ns (calc	121.59 ted in Ap 15.7 ulated ir	Apr 121.59 opendix 11.88	121.59 L, equat 8.88 dix L, eq	121.59 ion L9 o 7.5 uation L	121.59 r L9a), a 8.1 13 or L1	121.59 Iso see 10.53 3a), also	121.59 Table 5 14.14 see Tal	121.59 17.95 ble 5	121.59 20.95	121.59 22.34		(67)
(67)m= [Appliar (68)m= [g gains 21.73 nces gains 216.06	(calcula 19.3 ns (calc 218.31	121.59 ted in Ap 15.7 ulated in 212.66	Apr 121.59 opendix 11.88 n Append 200.63	121.59 L, equat 8.88 dix L, eq	121.59 ion L9 of 7.5 uation L	121.59 r L9a), a 8.1 13 or L1 161.64	121.59 Iso see 10.53 3a), also	121.59 Table 5 14.14 see Tal 165.05	121.59 17.95 ble 5 177.08	121.59	121.59		,
(67)m= [Appliar (68)m= [Cookin	g gains 21.73 nces ga 216.06 g gains	(calcula 19.3 ins (calc 218.31 (calcula	121.59 ted in Ap 15.7 ulated ir 212.66 tted in A	Apr 121.59 opendix 11.88 Append 200.63 ppendix	121.59 L, equat 8.88 dix L, eq 185.44 L, equat	121.59 ion L9 of 7.5 uation L 171.17 tion L15	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a)	121.59 lso see - 10.53 3a), also 159.4), also se	121.59 Table 5 14.14 see Tal 165.05 ee Table	121.59 17.95 ble 5 177.08	121.59 20.95 192.26	121.59 22.34 206.53		(67) (68)
(67)m= Appliar (68)m= Cookin (69)m=	g gains 21.73 nces gains 216.06 g gains 35.16	(calcula 19.3 ins (calc 218.31 (calcula 35.16	121.59 ted in Ap 15.7 ulated ir 212.66 tted in A 35.16	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16	121.59 L, equat 8.88 dix L, eq	121.59 ion L9 of 7.5 uation L	121.59 r L9a), a 8.1 13 or L1 161.64	121.59 Iso see 10.53 3a), also	121.59 Table 5 14.14 see Tal 165.05	121.59 17.95 ble 5 177.08	121.59 20.95	121.59 22.34		(67)
(67)m= Appliar (68)m= Cookin (69)m= Pumps	g gains 21.73 nces ga 216.06 g gains 35.16 and far	(calcula 19.3 ins (calc 218.31 (calcula 35.16 ns gains	121.59 ted in Ap 15.7 ulated ir 212.66 tted in A 35.16 (Table \$	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16	121.59 L, equat 8.88 dix L, eq 185.44 L, equat	121.59 ion L9 of 7.5 uation L 171.17 tion L15 35.16	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16	121.59 17.95 ble 5 177.08 5 35.16	121.59 20.95 192.26 35.16	121.59 22.34 206.53 35.16		(67) (68) (69)
(67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	g gains 21.73 nces ga 216.06 g gains 35.16 and far	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ins gains	121.59 ted in Ap 15.7 ulated ir 212.66 ted in A 35.16 (Table §	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a)	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16	121.59 ion L9 of 7.5 uation L 171.17 tion L15 35.16	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a)	121.59 lso see - 10.53 3a), also 159.4), also se	121.59 Table 5 14.14 see Tal 165.05 ee Table	121.59 17.95 ble 5 177.08	121.59 20.95 192.26	121.59 22.34 206.53		(67) (68)
(67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses	g gains 21.73 nces gains 216.06 g gains 35.16 and far 3 e.g. ev	(calcula 19.3 ins (calc 218.31 (calcula 35.16 ns gains 3	ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a) 3	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	121.59 ion L9 o 7.5 uation L 171.17 tion L15 35.16 3 ble 5)	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16	17.95 ble 5 177.08 5 35.16	121.59 20.95 192.26 35.16	121.59 22.34 206.53 35.16		(67) (68) (69)
(67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Cookin	g gains 21.73 nces gains 216.06 g gains 35.16 and far 3 e.g. e.g. ev	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ns gains 3 aporatio	121.59 ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5 3 on (negar	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a)	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16	121.59 ion L9 of 7.5 uation L 171.17 tion L15 35.16	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16	121.59 17.95 ble 5 177.08 5 35.16	121.59 20.95 192.26 35.16	121.59 22.34 206.53 35.16		(67) (68) (69)
(67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water H	g gains 21.73 nces ga 216.06 g gains 35.16 and far 3 e.g. ev -97.27 heating	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ns gains 3 aporatio -97.27 gains (T	121.59 ted in Ap 15.7 ulated in 212.66 ted in A 35.16 (Table 5 an (negar -97.27	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a) 3 tive valu	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	121.59 ion L9 of 7.5 uation L 171.17 tion L15 35.16 3 ole 5) -97.27	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16	121.59 17.95 ble 5 177.08 5 35.16	121.59 20.95 192.26 35.16 3	22.34 206.53 35.16 3		(67) (68) (69) (70)
(67)m= [Appliar (68)m= [Cookin (69)m= [Pumps (70)m= [Losses (71)m= [Water I (72)m= [g gains 21.73 nces gains 216.06 g gains 35.16 and far 3 e.g. ev -97.27 heating 71.29	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ns gains 3 aporatic -97.27 gains (T	121.59 ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5 3 on (negar -97.27 Table 5) 64.75	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a) 3	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	121.59 ion L9 o 7.5 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16 3 -97.27	121.59 Iso see 10.53 3a), also 159.4), also se 35.16 3 -97.27	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16 3 -97.27	17.95 ble 5 177.08 5 35.16 3 -97.27	121.59 20.95 192.26 35.16 3 -97.27	121.59 22.34 206.53 35.16 3 -97.27		(67) (68) (69)
(67)m= [Appliar (68)m= [Cookin (69)m= [Pumps (70)m= [Losses (71)m= [Water I (72)m= [g gains 21.73 nces gains 216.06 g gains 35.16 and far 3 e.g. ev -97.27 heating 71.29	(calcula 19.3 ins (calcula 218.31 (calcula 35.16 ns gains 3 aporatio -97.27 gains (T	121.59 ted in Ap 15.7 ulated in 212.66 tted in A 35.16 (Table 5 3 on (negar -97.27 Table 5) 64.75	Apr 121.59 opendix 11.88 n Append 200.63 ppendix 35.16 5a) 3 tive valu	121.59 L, equat 8.88 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	121.59 ion L9 o 7.5 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	121.59 r L9a), a 8.1 13 or L1 161.64 or L15a) 35.16 3 -97.27	121.59 Iso see 10.53 3a), also 159.4), also se 35.16	121.59 Table 5 14.14 see Tal 165.05 ee Table 35.16 3 -97.27	17.95 ble 5 177.08 5 35.16 3 -97.27	121.59 20.95 192.26 35.16 3 -97.27	121.59 22.34 206.53 35.16 3 -97.27		(67) (68) (69) (70)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	X	1.62	X	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	X	41.52	X	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	X	13.12	X	0.63	X	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	X	8.86	X	0.63	X	0.8	=	10.03	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.8	=	17.77	(76)
East	0.9x	0.77	X	0.86	X	19.64	X	0.63	X	0.8	=	5.9	(76)
East	0.9x	0.77	x	2.59	X	38.42	X	0.63	X	0.8	=	34.76	(76)
East	0.9x	0.77	x	0.86	X	38.42	x	0.63	x	0.8	=	11.54	(76)
East	0.9x	0.77	X	2.59	X	63.27	X	0.63	X	0.8	=	57.24	(76)
East	0.9x	0.77	x	0.86	X	63.27	X	0.63	X	0.8	=	19.01	(76)
East	0.9x	0.77	x	2.59	X	92.28	x	0.63	x	0.8	=	83.48	(76)
East	0.9x	0.77	x	0.86	X	92.28	x	0.63	X	0.8	=	27.72	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.8	=	102.31	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	X	0.8	=	33.97	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.8	=	104.73	(76)
East	0.9x	0.77	x	0.86	x	115.77	x	0.63	x	0.8	=	34.77	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.8	=	99.71	(76)
East	0.9x	0.77	x	0.86	x	110.22	x	0.63	x	0.8	=	33.11	(76)
East	0.9x	0.77	x	2.59	X	94.68	x	0.63	x	0.8	=	85.65	(76)
East	0.9x	0.77	x	0.86	x	94.68	x	0.63	X	0.8	=	28.44	(76)
East	0.9x	0.77	x	2.59	X	73.59	x	0.63	x	0.8	=	66.57	(76)
East	0.9x	0.77	x	0.86	X	73.59	x	0.63	X	0.8	=	22.1	(76)
East	0.9x	0.77	x	2.59	x	45.59	x	0.63	X	0.8	=	41.24	(76)
East	0.9x	0.77	x	0.86	X	45.59	x	0.63	x	0.8	=	13.69	(76)
East	0.9x	0.77	x	2.59	x	24.49	x	0.63	x	0.8	=	22.15	(76)
East	0.9x	0.77	x	0.86	x	24.49	x	0.63	x	0.8	=	7.36	(76)
East	0.9x	0.77	x	2.59	x	16.15	x	0.63	x	0.8	=	14.61	(76)
East	0.9x	0.77	x	0.86	X	16.15	x	0.63	x	0.8	=	4.85	(76)

South 0.9x	0.77	×	2.14		,	46.75] _x	0.63	x	0.8		34.94	(78)
South 0.9x	0.77	x	2.14	=		76.57] x	0.63	×	0.8	╡ -	57.23	(78)
South 0.9x	0.77	x	2.14	_	-	97.53] x	0.63	×	0.8	╡ -	72.9	(78)
South 0.9x	0.77	x	2.14	=		10.23]]	0.63	×	0.8	= =	82.39	(78)
South 0.9x	0.77	x	2.14	_		14.87]]	0.63	×	0.8	╡ -	85.86	(78)
South 0.9x	0.77	×	2.14	_	-	10.55]]	0.63	×	0.8	╡ -	82.63	(78)
South 0.9x	0.77	x	2.14	=		08.01]]	0.63	x	0.8	╡ -	80.73	(78)
South 0.9x	0.77	x	2.14			04.89]]	0.63	= x	0.8	= =	78.4	(78)
South 0.9x	0.77	×	2.14		-	01.89] X	0.63	×	0.8	= =	76.15	(78)
South 0.9x	0.77	×	2.14		-	32.59] x	0.63	x	0.8	_ =	61.73	(78)
South _{0.9x}	0.77	x	2.14			55.42] x	0.63	x	0.8	=	41.42	(78)
South _{0.9x}	0.77	x	2.14		(40.4	X	0.63	x	0.8	= =	30.2	(78)
Rooflights _{0.9x}	1	×	1.33		,	47.01	X	0.63	x	0.8	= =	56.72	(82)
Rooflights _{0.9x}	1	×	1.33		(83.9	X	0.63	x	0.8	= =	101.23	(82)
Rooflights _{0.9x}	1	x	1.33		(1	22.73	X	0.63	x	0.8	= =	148.08	(82)
Rooflights 0.9x	1	×	1.33		(1	61.74	j×	0.63	×	0.8	_ =	195.15	(82)
Rooflights 0.9x	1	x	1.33		(1	87.38	X	0.63	x	0.8	=	226.09	(82)
Rooflights 0.9x	1	x	1.33		· 1	88.06	X	0.63	x	0.8	=	226.91	(82)
Rooflights 0.9x	1	x	1.33		(1	80.51	X	0.63	x	0.8	=	217.8	(82)
Rooflights _{0.9x}	1	X	1.33		(1	61.54	X	0.63	x	0.8	=	194.91	(82)
Rooflights _{0.9x}	1	X	1.33		(136.5	X	0.63	x	0.8	=	164.7	(82)
Rooflights _{0.9x}	1	X	1.33		(9	95.08	X	0.63	x	0.8	=	114.72	(82)
Rooflights _{0.9x}	1	X	1.33		(;	57.06	X	0.63	х	0.8	=	68.85	(82)
Rooflights _{0.9x}	1	x	1.33		(;	39.72	X	0.63	x	0.8	=	47.92	(82)
Solar gains in						1	T .	n = Sum(74)m	T			1	(00)
(83)m= 127.37 Total gains – i		336.3		532.77	539.55	515.86	454	.44 376.51	258.7	6 154.62	107.61		(83)
		691.88	· / ·	844.44	830.08	792.8	737	.54 670.99	575.2	8 496.34	468.13	1	(84)
` ′		!			030.00	192.0	131	.54 670.99	373.2	6 490.34	400.13		(04)
7. Mean inter	•		`	<i>'</i>		(T.)	0	TI-4 (00)					7(05)
Temperature	•	• .			•		bie 9	, In1 (°C)				21	(85)
Utilisation fac	Feb Feb	Mar	Apr	May	Jun	Jul	Ι	ug Sep	Oc	Nov	Dec	1	
(86)m= 1	0.99	0.98	0.95	0.86	0.7	0.53	0.5		0.97	_	1		(86)
						<u>I</u>			0.07	0.00		J	(00)
Mean interna	 -			`		i 	1		20.44	1 10.04	10.56	1	(87)
(87)m= 19.59		20.07		20.76	20.94	20.99	20.		20.42	19.94	19.56		(07)
Temperature	 -						1		1 40 04	1000	40.05	1	(00)
(88)m= 19.84	19.84	19.84	19.86	19.86	19.87	19.87	19.	88 19.87	19.86	19.86	19.85		(88)
Utilisation fac	 -						–			_		1	(55)
(89)m= 1	0.99	0.98	0.93	0.81	0.6	0.4	0.4	16 0.75	0.96	0.99	1		(89)
Mean interna	ıl temperat	ure in t	he rest of	f dwellir	ng T2 (f	ollow ste	eps 3	to 7 in Tab	le 9c)				

(00) 47.00	40.05	40.00	40.00	40.00	40.00	40.07	40.07	40.75	40.00	40.5	47.04		(90)
(90)m= 17.98	18.25	18.68	19.23	19.63	19.83	19.87	19.87	19.75	19.22 LA = Livin	18.5	17.94	0.00	¬ `´
								•	LA - LIVIII	y area + (-	-) –	0.23	(91)
Mean interna		 				r	+ (1 – fL						
(92)m= 18.35	18.61	19.01	19.51	19.9	20.09	20.13	20.13	20.01	19.5	18.84	18.32		(92)
Apply adjustr									·				(00)
(93)m= 18.35	18.61	19.01	19.51	19.9	20.09	20.13	20.13	20.01	19.5	18.84	18.32		(93)
8. Space hea						44 . (T-1.1- 0		. T' /-	70)		l- (-	
Set Ti to the the utilisation			•		ied at st	ep 11 of	Table 9	o, so tha	t II,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm		,	<u> </u>	<u> </u>		<u>'</u>					
(94)m= 0.99	0.99	0.97	0.92	0.81	0.62	0.43	0.49	0.76	0.95	0.99	1		(94)
Useful gains,	hmGm	, W = (94	4)m x (84	4)m									
(95)m= 496.27	589.86	671.64	723.43	683.65	513.68	344.02	359.68	512.19	545.74	490.99	466.24		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate			<u>.</u>			-``		<u> </u>					
(97)m= 1436.71	1397.16			l	541.7	348.21	366.78	585.84	889.28	1179.31	1426.58		(97)
Space heatin				1	i	l e		<u> </u>	- `				
(98)m= 699.69	542.5	445.86	244.58	100.58	0	0	0	0	255.59	495.59	714.49		٦
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3498.89	(98)
Space heatin	g require	ement in	$k M/h/m^2$	2/voor								44.63	(00)
	•	511101111111	1	7 y Cai								44.03	(99)
9a. Energy red	•				ystems i	ncluding	micro-C	CHP)				44.03	(99)
Space heating	quiremer ng:	nts – Indi	vidual h	eating sy			micro-C	CHP)				44.03	
	quiremer ng:	nts – Indi	vidual h	eating sy			micro-C	CHP)				0	
Space heating	quiremer ng: pace hea	nts – Indi at from se	vidual h	eating sy		system	micro-C (202) = 1						(201
Space heating Fraction of sp	quiremerng: pace head	nts – Indi at from se at from m	vidual he econdary	eating sy y/supple em(s)		system	(202) = 1 ·		(203)] =			0	(201
Space heating Fraction of spacetion of spacetion of spacetion of spacetion of spacetic spacetimes.	quirements ng: pace head pace head tal heati	nts – Indi at from se at from m ng from i	vidual h econdary nain syst main sys	eating sy y/supple em(s) stem 1		system	(202) = 1 ·	- (201) =	(203)] =			0	(201) (202) (204)
Space heating Fraction of space Fraction of to	quirement ng: pace hea pace hea tal heati main spa	nts – Indi at from se at from m ng from i ace heati	vidual he econdary nain syst main systen	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1 ·	- (201) =	(203)] =			0 1 1	(201 (202 (204 (206
Space heating Fraction of space of the Efficiency of the Efficienc	quirement ng: pace heat pace heat tal heati main spa	at from se at from m at from m ag from it ace heati	vidual he econdary nain syst main system ing system ementary	eating syy/supple em(s) stem 1 em 1	mentary g systen	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	· /-	Nov	Dec	0 1 1 89.9	(201 (202 (204 (206 (208
Space heating Fraction of space fraction of space fraction of to the Efficiency of space fraction of space fraction of the Efficiency of space fraction of s	quirement ng: pace heat pace heat tal heati main spa seconda	at from set from ming from it ace heating from Mar	vidual he econdary nain syst main system ing system ementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g systen Jun	system	(202) = 1 ·	- (201) =	(203)] =	Nov	Dec	0 1 1 89.9	(201 (202 (204 (206 (208
Space heating Fraction of space of the Efficiency of the Efficienc	quirement ng: pace heat pace heat tal heati main spa seconda	at from set from ming from it ace heating from Mar	vidual he econdary nain syst main system ing system ementary	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g systen Jun	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	· /-	Nov 495.59	Dec 714.49	0 1 1 89.9	(201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of a Efficiency of Space heating 699.69	quirements pace heate tal heati main spa seconda Feb g require	at from set at from many from the ace heating ry/supplement (c	econdary nain systemain systementary Apr alculatee	eating sylvy/supple em(s) stem 1 em 1 y heating May d above;	mentary g system Jun	system 1, % Jul	(202) = 1 · (204) = (2	- (201) = 02) × [1 - 1	Oct			0 1 1 89.9	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating G99.69 (211)m = {[(98)	pace heat tal heati main space seconda Feb g require 542.5	at from set from many from the ace heating ry/supplement (compared to 445.86) [Author of the ace heating ry/supplement (compared to 445.86]]	econdary nain systemain systementary Apr alculated 244.58 00 ÷ (20	eating sylvalupple em(s) stem 1 em 1 May dabove; 100.58	mentary g system Jun	system n, % Jul 0	(202) = 1 · (204) = (2	- (201) = 02) × [1 - 1	Oct 255.59	495.59		0 1 1 89.9	(201 (202 (204 (206 (208 ar
Space heating Fraction of space Fraction of to Efficiency of a Efficiency of Space heating 699.69	quirements pace heate tal heati main spa seconda Feb g require	at from set at from many from the ace heating ry/supplement (c	econdary nain systemain systementary Apr alculatee	eating sylvy/supple em(s) stem 1 em 1 y heating May d above;	g system Jun 0	system 1, % Jul	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 255.59	495.59 551.27	714.49	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of a	pace heat pace heat tal heati main space secondar Feb g require 542.5	at from set from many from the ace heating from the	econdary nain systemain systematary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 100.58	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - (Oct 255.59	495.59 551.27	714.49	0 1 1 89.9	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of a	puirement pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45	at from set at from many from the condary. at from many from the condary. At from the condary. At	econdary nain systemain systemain systematary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 100.58	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 255.59	495.59 551.27	714.49	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating [99.69] Space heating [98.29] Space heating [98] Space heating [98]	puirement pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45	at from set at from many from the condary. at from many from the condary. At from the condary. At	econdary nain systemain systemain systematary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvy/supple em(s) stem 1 em 1 y heating May d above; 100.58	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - 100] Sep	Oct 255.59	495.59 551.27	714.49	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating [99.69] Space heating [198] Space heating [198] Space heating [198]	puirement pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45 g fuel (s	at from set from many from the set of the se	vidual he econdary nain systemain systemain systementary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvalupple em(s) stem 1 em 1 y heating May d above; 100.58 06) 111.87	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 1 (kWh/yea	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012}	714.49 794.77	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Space heating Fraction of space fraction of space fraction of to be a space fraction of the space fraction of the space fraction of the space fraction of the space fraction f	puirement pace heat pace heat tal heati main spa seconda Feb g require 542.5)m x (20 603.45 g fuel (s 01)] } x 1	at from set from many from the set of the se	vidual he econdary nain systemain systemain systementary Apr alculated 244.58 00 ÷ (20 272.06	eating sylvalupple em(s) stem 1 em 1 y heating May d above; 100.58 06) 111.87	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 I (kWh/yea	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012}	714.49 794.77	0 1 1 89.9 0 kWh/ye	(201 (202 (204 (206 (208 ar
Fraction of sp Fraction of sp Fraction of to Efficiency of se Efficiency of se Jan Space heatin 699.69 (211)m = {[(98) 778.29 Space heatin = {[(98)m x (20)	puirement pace head pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45 g fuel (s 01)] } x 1 0	at from set from ming from in ace heating ry/supplement (compared 445.86) 1495.96 econdary 00 ÷ (20) 0	econdary nain systemain systematry Apr alculated 244.58 00 ÷ (20 272.06 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May d above 100.58 06) 111.87	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 I (kWh/yea	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012}	714.49 794.77	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ar
Space heating Fraction of sp Fraction of sp Fraction of to Efficiency of sp Efficiency of sp Jan Space heating [998.69] Space heating Space heating [198] Space heating Space heating Water heating	puirement pace head pace head pace head tal heati main space seconda Feb g require 542.5)m x (20 603.45 g fuel (s 01)] } x 1 0	at from set from ming from interpolated the set of the	econdary nain systemain systematry Apr alculated 244.58 00 ÷ (20 272.06 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May d above 100.58 06) 111.87	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - 0] Sep 0 0 I (kWh/yea	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012}	714.49 794.77	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208)
Space heating Fraction of sp Fraction of sp Fraction of to Efficiency of sp Efficiency of sp Space heating (211)m = {[(98) 778.29 Space heating = {[(98)m x (20) (215)m= 0 Water heating Output from w	puirement pace heat pace heat tal heati main spa seconda Feb g require 542.5)m x (20 603.45 g fuel (s 01)] } x 1 0 gater heat	at from set at from many from the secondary of the second	vidual herecondary nain systemain systematry Apr alculated 244.58 00 ÷ (20 272.06 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May dabove 100.58 111.87 month 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota 0 Tota	- (201) = 02) × [1 - (201) = 0	Oct 255.59 284.31 ar) = Sum(2	495.59 551.27 211) _{15,1012} 0	714.49 794.77 =	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ar (211)

				1			٦	(a)
` '	87.3 87.3	87.3	87.3	88.98	89.29	89.42]	(217)
Fuel for water heating, kWh/month $(219)m = (64)m \times 100 \div (217)m$								
, , ,	25.96 118.21	133.51	134.47	151.93	163.51	176.6	1	
	•	Tota	I = Sum(2	19a) ₁₁₂ =	•		1800.36	(219)
Annual totals				k'	Wh/yea	r	kWh/year	-
Space heating fuel used, main system 1							3891.98	
Water heating fuel used							1800.36	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30]	(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a)	(230g) =			75	(231)
Electricity for lighting							383.81	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b)	=				6238.45	(338)
Total delivered energy for all uses (211)(221) + 12a. CO2 emissions – Individual heating systems	. , , ,	` ′					6238.45	(338)
	. , , ,	` ′		Emiss kg CO	i on fac 2/kWh	tor	6238.45 Emissions kg CO2/yea	
	s including mi	` ′			2/kWh	etor =	Emissions	
12a. CO2 emissions – Individual heating systems	Energy kWh/year	` ′		kg CO	2/kWh		Emissions kg CO2/yea	ar
12a. CO2 emissions – Individual heating systems Space heating (main system 1)	Energy kWh/year	` ′		kg CO	2/kWh	=	Emissions kg CO2/yea	ar (261)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary)	Energy kWh/year (211) x (215) x	cro-CHF		0.2 0.5	2/kWh	=	Emissions kg CO2/yea 840.67	(261) (263)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary) Water heating	Energy kWh/year (211) x (215) x (219) x	cro-CHF		0.2 0.5	2/kWh 16 19 16	=	Emissions kg CO2/yea 840.67 0	(261) (263) (264)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energy kWh/year (211) x (215) x (219) x (261) + (262)	cro-CHF		0.2 0.5 0.2	2/kWh 16 19 16	= = =	Emissions kg CO2/yea 840.67 0 388.88	(261) (263) (264) (265)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	Energy kWh/year (211) x (215) x (219) x (261) + (262) (231) x	cro-CHF	(264) =	0.2 0.5 0.2	2/kWh 16 19 16 19 19	= = =	Emissions kg CO2/yea 840.67 0 388.88 1229.55	(261) (263) (264) (265) (267)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot Electricity for lighting	Energy kWh/year (211) x (215) x (219) x (261) + (262) (231) x	cro-CHF	(264) = sum c	0.2 0.5 0.5 0.5	2/kWh 16 19 16 19 19	= = =	Emissions kg CO2/yea 840.67 0 388.88 1229.55 38.93	(261) (263) (264) (265) (267) (268)

El rating (section 14)

(274)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V			n: 1.0.5.25	
	Pr	operty Address: HOU	SE E - BASELIN	ΙΕ		
Address :	Woodwell Cottage P2, Wood	lwell Road, BRISTOL	BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(m	1)	Volume(m³)
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1n	78.4 (4)				
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:						
	main secondary heating heating	y other	total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Air ch	anges per ho	
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a	a)+(7h)+(7c) =				_
•	een carried out or is intended, proceed		30 e from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the			, , , ,	[0	(9)
Additional infiltration			[0	(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame or	0.35 for masonry con	struction		0	(11)
if both types of wall are pri deducting areas of openir	resent, use the value corresponding to	the greater wall area (after				
=	floor, enter 0.2 (unsealed) or 0.2	1 (sealed), else enter	0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0			İ	0	(13)
Percentage of windows	s and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) + (- (12) + (13) + (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metres	s per hour per square	metre of envelop	oe area	5	(17)
•	ity value, then $(18) = [(17) \div 20] + (8)$				0.4	(18)
	s if a pressurisation test has been done	e or a degree air permeabil	ity is being used	-		_
Number of sides sheltere Shelter factor	ed	(20) = 1 - [0.075]	v (19)] —	-	1	(19)
	ting shalter factor	$(20) = 1 - [0.073]$ $(21) = (18) \times (20)$		l r	0.92	(20)
Infiltration rate incorporat	_	(21) - (10) x (20)	_	L	0.37	(21)
Infiltration rate modified for		Jul Aug Se	o Oct No	v Dec		
l l		Jul Aug Se	P OCL NO	v Dec		
Monthly average wind sp	eed from Table /					

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		-	rate for t	he appli	cable ca	se	-	-	-	-	-		(23a)
If exhaust air h			endix N. (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced wit									, (,			0	(23c)
a) If balance	ed mecha	anical ve	ntilation	with he	at recov	· erv (MVI	HR) (24a	a)m = (22	2b)m + (23b) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	иV) (24t	m = (22)	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from o	outside		•	•	•	
if (22b)	m < 0.5 ×	(23b), t	hen (24)	c) = (23b); other	wise (24	c) = (22k	o) m + 0.	5 × (23b) 		1	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m = 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.51	0.59	0.59	1	(24d)
Effective air					l	l			0.00	1 0.00	0.00	J	,
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(25)
3. Heat losse	oc and he	nat loce r	paramete	or:									
ELEMENT	Gros		Openin		Net Ar	ea	U-val	ue	AXU		k-value	<u>.</u>	ΑΧk
	area	_	m	-	A ,r		W/m2		(W/I	K)	kJ/m²-l		kJ/K
Doors					2.07	Х	1	=	2.07				(26)
Windows Typ	e 1				1.62	x1,	/[1/(1.4)+	0.04] =	2.15				(27)
Windows Typ	e 2				2.59	x1,	/[1/(1.4)+	0.04] =	3.43				(27)
Windows Typ	e 3				0.86	x1,	/[1/(1.4)+	0.04] =	1.14				(27)
Windows Typ	e 4				2.14	x1,	/[1/(1.4)+	0.04] =	2.84				(27)
Rooflights					1.33	x1,	/[1/(1.7) +	0.04] =	2.261				(27b)
Floor					39.2	X	0.13	= [5.096				(28)
Walls Type1	80.8	33	10.9		69.93	3 x	0.18	= [12.59				(29)
Walls Type2	2.12	2	0		2.12	х	0.18	= [0.38				(29)
Daaf		4	2.66	;	54.74	, x	0.13	= [7.12				(30)
Roof	57.4	·											
Total area of					179.5	5							(31)
					179.5 29.73	=	0	= [0				(31)
Total area of o	elements	, m² ows, use e	ffective wi		29.73	x	L			as given in	paragraph	3.2	``
Total area of o	elements d roof winder eas on both	, m² ows, use e sides of ir	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu		as given in	paragraph		(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	L	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)
Total area of o	elements d roof winder eas on both ess, W/K: Cm = S(ows, use e sides of ir = S (A x (A x k)	iffective wi ternal wali U)	ls and par	29.73 alue calcul titions	X ated using	formula 1	/[(1/U-valu) + (32) = ((28)	ie)+0.04] a	2) + (32a).			(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)

an be use	ea instea						,							(26)
Thermal	bridge	s : S (L	x Y) cal	culated i	using Ap	pendix I	1						10.55	(36)
		0 0	are not kn	own (36) =	= 0.05 x (3	1)			(0.0)	(2.5)				_
Total fab									` '	(36) =			53.74	(37
entilatio/			alculated				<u> </u>				25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(38
Heat tran	nsfer c	oefficier	nt, W/K			T		1	(39)m	= (37) + (3	38)m	ı	1	
39)m= 9	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		— ,
leat loss	s parar	meter (H	ILP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	92.59	(39
40)m=	1.21	1.2	1.2	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		_
Number	of day:	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.18	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
													-	
4. Wate	er heati	ing ener	gy requi	rement:								kWh/y	ear:	
			k I											
if TFA if TFA	> 13.9 £ 13.9), N = 1), N = 1	+ 1.76 x)2)] + 0.(ΓFA -13.	.9)	43	1	
if TFA if TFA annual a Reduce the	> 13.9 £ 13.9 average e annual), N = 1), N = 1 e hot wa l average	+ 1.76 x ater usag	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed)2)] + 0.0 (25 x N) to achieve	+ 36		91	.96]	•
if TFA if TFA innual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		91]	·
if TFA if TFA Annual a Reduce the of more th	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96]	·
if TFA if TFA Annual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		•
if TFA if TFA Annual a Reduce the not more the dot water to	> 13.9 £ 13.9 average e annual hat 125 lusage in 101.15	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43)	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the not more th dot water the 44)m= 1	> 13.9 £ 13.9 average e annual hat 125 lusage in 101.15	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the lot more the Hot water the 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the dater use, has $Vd,m = factorized$ 86.44 $to onthly = 4$.	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15 c, 1d) 145.27	1103.46	(4:
if TFA if TFA Annual a Reduce the not more the Hot water to 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the dater use, has $Vd,m = factorized$ 86.44 $to onthly = 4$.	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
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if TFA if TFA if TFA annual a Reduce the ot more th lot water th the standard stan	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa	P, N = 1 P, N = 1 P hot was a verage litres per p Peb litres per p 97.47 Phot water 131.19 Pater heatin 19.68	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA Annual a Reduce the bot more the dot water the 44)m= 1 Energy cor 45)m= finstantan 46)m= Vater sto	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 150 150 meous wa 22.5 orage volume	Post N = 1 Post N = 1	ter usaghot water berson per Mar day for ea 93.79 used - calcate 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av Iwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27		(44)
if TFA if TFA if TFA Annual a Reduce the lot more th dot water the start and the start and the finstantan 46)m= Vater start Storage of the start and the finstantan 46)m= Vater start f community	> 13.9 £	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
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if TFA if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= Vater sto Storage of Communication Otherwis Vater sto	> 13.9 £	P, N = 1 P, N = 1 P hot was I average litres per p P hot water 131.19 P hot water 131.19 P hot water 19.68 P litres P cating a P stored P stored P stored P stored P stored P stored P stored P stored P stored P stored	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw er (this in	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45)
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if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second of t	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared less torage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

	/ lost fro	m water	storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54))
•		(54) in (5	_	,								0	(55)	
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56))
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57))
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58))
Primar	y circuit	loss cal	culated	for each	month (59)m = 0	(58) ÷ 36	55 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59))
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41))m						
(61)m=	50.96	44.86	47.8	44.44	44.05	40.81	42.17	44.05	44.44	47.8	48.07	50.96	(61))
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23	(62))
Solar DH	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63))
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63)	(G2)
Output	from w	ater hea	ter											
(64)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23		
'		•	•	•	•	•	•	Outp	out from w	ater heate	r (annual) ₁	12	1997.22 (64))
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	62.62	54.84	56.96	50.35	48.67	42.7	40.65	45.56	46.08	52.7	56.5	61.04	(65)	١
inclu							ı			_			(00)	'
	ıde (57)ı	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling		ater is fr	om com		<u> </u>	
				of (65)m and 5a	•	ylinder i	s in the	dwelling			om com		<u> </u>	
5. Int	ernal ga		e Table 5	and 5a	•	eylinder i	s in the	dwelling			om com		<u> </u>	
5. Int	ernal ga	ains (see	e Table 5	and 5a	•	ylinder i	s in the o	dwelling Aug			om com		<u> </u>	
5. Int	ernal ga	ains (see	Table 5	and 5a):				or hot w	rater is fr		munity h	<u> </u>	
5. Int Metabo (66)m=	ernal gain Jan 121.59	rins (see	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m=	ernal gain Jan 121.59	rins (see	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun 121.59	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m= Lightin (67)m=	ernal gan Dlic gain Jan 121.59 g gains	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m=	ernal gain Jan 121.59 g gains 20.26	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
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5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	Apr 121.59 pendix 11.08 Appendix 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	and 5a tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatic	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 35.16	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatice gains (see less (Table Feb 121.59) (calcula 18 ins (calcula 35.16) as gains 3 aporatice 197.27 gains (Table Feb 121.59) gains (Table Feb 121.59) (calcula 35.16 ins gains 3	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 3 -97.27	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	х	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	X	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.7	=	15.55	(76)
East	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.7	=	5.16	(76)
East	0.9x	0.77	x	2.59	x	38.42	x	0.63	x	0.7	=	30.41	(76)
East	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.7	=	10.1	(76)
East	0.9x	0.77	x	2.59	x	63.27	x	0.63	x	0.7	=	50.08	(76)
East	0.9x	0.77	x	0.86	x	63.27	x	0.63	x	0.7	=	16.63	(76)
East	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.7	=	73.04	(76)
East	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(76)
East	0.9x	0.77	x	2.59	X	113.09	x	0.63	x	0.7	=	89.52	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	x	0.7	=	29.72	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.7	=	91.64	(76)
East	0.9x	0.77	X	0.86	x	115.77	x	0.63	X	0.7	=	30.43	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.7	=	87.24	(76)
East	0.9x	0.77	X	0.86	x	110.22	x	0.63	X	0.7	=	28.97	(76)
East	0.9x	0.77	X	2.59	x	94.68	x	0.63	X	0.7	=	74.94	(76)
East	0.9x	0.77	X	0.86	X	94.68	X	0.63	X	0.7	=	24.88	(76)
East	0.9x	0.77	X	2.59	X	73.59	x	0.63	X	0.7	=	58.25	(76)
East	0.9x	0.77	X	0.86	x	73.59	X	0.63	x	0.7	=	19.34	(76)
East	0.9x	0.77	X	2.59	X	45.59	x	0.63	X	0.7	=	36.09	(76)
East	0.9x	0.77	X	0.86	x	45.59	x	0.63	x	0.7	=	11.98	(76)
East	0.9x	0.77	X	2.59	x	24.49	x	0.63	x	0.7	=	19.38	(76)
East	0.9x	0.77	X	0.86	x	24.49	x	0.63	x	0.7	=	6.44	(76)
East	0.9x	0.77	X	2.59	x	16.15	x	0.63	x	0.7	=	12.78	(76)
East	0.9x	0.77	X	0.86	X	16.15	X	0.63	X	0.7	=	4.24	(76)

South 0.9x	0.77	х	2.1	4	x	4	6.75	x	0.63	3	x	0.7		- [30.58	(78)
South 0.9x	0.77	x	2.1	4	x	7	6.57	х	0.63	3	х	0.7	一 .	- Ī	50.08	(78)
South 0.9x	0.77	X	2.1	4	x	9	7.53	x	0.63	3	х	0.7	<u> </u>	= [63.79	(78)
South 0.9x	0.77	X	2.1	4	x	11	10.23	x	0.63	3	x	0.7		- [72.09	(78)
South 0.9x	0.77	X	2.1	4	x	11	14.87	х	0.63	3	x	0.7		- [75.13	(78)
South 0.9x	0.77	X	2.1	4	X	11	10.55	x	0.63	3	X	0.7		= [72.3	(78)
South 0.9x	0.77	X	2.1	4	x	10	08.01	x	0.63	3	x	0.7		= [70.64	(78)
South 0.9x	0.77	X	2.1	4	x	10	04.89	x	0.63	3	x	0.7		= [68.6	(78)
South 0.9x	0.77	X	2.1	4	x	10	01.89	X	0.63	3	X	0.7	=	= [66.63	(78)
South 0.9x	0.77	X	2.1	4	x	8	2.59	x	0.63	3	X	0.7	=	= [54.01	(78)
South 0.9x	0.77	X	2.1	4	X	5	5.42	X	0.63	3	x	0.7	=	= [36.24	(78)
South 0.9x		X	2.1	4	x	4	40.4	x	0.63	3	x	0.7	=	= [26.42	(78)
Rooflights 0.9x	1	X	1.3	33	X	4	7.01	x	0.63	3	x	0.7	=	= [49.63	(82)
Rooflights 0.9x	1	X	1.3	33	x	8	33.9	x	0.63	3	x	0.7	=	= [88.58	(82)
Rooflights 0.9x	1	X	1.3	33	x	12	22.73	X	0.63	3	x	0.7	=	- [129.57	(82)
Rooflights 0.9x	1	X	1.3	33	X	16	61.74	x	0.63	3	X	0.7		= [170.76	(82)
Rooflights 0.9x		X	1.3	33	X	18	87.38	X	0.63	3	X	0.7	=	= [197.83	(82)
Rooflights 0.9x		X	1.3	33	X	18	88.06	X	0.63	3	X	0.7	=	- <u>L</u>	198.54	(82)
Rooflights 0.9x		X	1.3	33	X	18	80.51	X	0.63	3	X	0.7	=	= <u>L</u>	190.58	(82)
Rooflights 0.9x		X	1.3	33	X	16	61.54	X	0.63	3	X	0.7	=	= <u>L</u>	170.54	(82)
Rooflights 0.9x		X	1.3	33	X	1	36.5	Х	0.63	3	X	0.7	=	= <u>L</u>	144.11	(82)
Rooflights 0.9x		X	1.3	33	X	9	5.08	X	0.63	3	X	0.7	=	= <u>L</u>	100.38	(82)
Rooflights 0.9x		X	1.3	33	X	5	7.06	X	0.63	3	X	0.7	=	= <u>L</u>	60.24	(82)
Rooflights 0.9x	1	X	1.3	33	X	3	9.72	X	0.63	3	X	0.7	=	= [41.93	(82)
Solar gains i (83)m= 111.4						72.11	451.37		n = Sum(74) .63 329			135.29	94.16	\Box		(83)
Total gains –								337	.00 020	.40 2	20.41	100.20	34.10			(00)
(84)m= 494.4	1	660.59	739.19	787.8	 	72.06	737.69	690	.57 634	.15 5	553.53	488.04	466.0	4		(84)
7. Mean into	ernal temr	perature	(heating	Seaso	n)				L	<u> </u>						
Temperatur			· ·			area f	from Tab	ole 9	. Th1 (°C	2)				Г	21	(85)
Utilisation fa	ŭ	٠.			•				, (-	,				L		」` ′
Jan	Feb	Mar	Apr	May	7	Jun	Jul	Α	ug S	ер	Oct	Nov	Dec	С		
(86)m= 1	0.99	0.98	0.95	0.87		0.7	0.53	0.5	59 0.8	33	0.97	0.99	1	٦		(86)
Mean intern	al temper	ature in	living ar	ea T1 (follo	w ste	ps 3 to 7	in T	able 9c)	,		•		_		
(87)m= 19.71		20.16	20.5	20.79	`	20.95	20.99	20.			20.5	20.04	19.69	•		(87)
Temperatur	e durina h	neating r	eriods ir	rest c	of dw	/ellina	from Ta	able 9	— 9. Th2 (°	C)		•		_		
(88)m= 19.92		19.92	19.94	19.94	\neg	19.95	19.95	19.			19.94	19.93	19.93	3		(88)
Utilisation fa	actor for a	ains for	rest of d	welling	. h2	.m (se	e Table	9a)								
(89)m= 1	0.99	0.98	0.93	0.82	$\overline{}$	0.61	0.41	0.4	16 0.7	76	0.96	0.99	1	\neg		(89)
Mean intern	al temper	ature in	the rest	of dwe	llina	T2 (fr	ollow ste	ens 3	to 7 in 7	Table '	9c)	!	<u> </u>			
				J. 2 0	9	(,					

(90)m= 18.21	18.46	18.85	19.36	19.73	19.92	19.95	19.94	19.85	19.36	18.7	18.18		(90)
10.21	10.10	10.00	10.00	10.70	10.02	10.00	10.01			g area ÷ (4		0.23	(91)
										g aroa . (., –	0.23	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(92)
Apply adjustr	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(93)
8. Space hea	ıting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:				•				•		
(94)m= 1	0.99	0.97	0.93	0.82	0.63	0.44	0.49	0.77	0.95	0.99	1		(94)
Useful gains,	hmGm ,	W = (94	l)m x (84	4)m									
(95)m= 491.97	573.41	643.2	685.66	644.99	483.53	324.19	339.18	486.26	526.41	483.09	464.29		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8		•						
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1347.38	1308.62	1188.81	993.13	764.64	506.81	327.4	344.65	548.62	833.3	1106.17	1338.22		(97)
Space heating	g require	ement fo	r each n	nonth, k\	/Vh/mont	h = 0.02	24 x [(97)m – (95)m] x (4 ⁻	1)m			
98)m= 636.43	494.06	405.93	221.38	89.01	0	0	0	0	228.33	448.62	650.21		
											L		_
	!						Tota	l per year	(kWh/year) = Sum(9)	8) _{15,912} =	3173.97	(98)
Snace heatin	a require	ement in	k\\/h/m²	!/vear			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Space heatin	• ,			•					(kWh/year) = Sum(9	8)15,912 =	3173.97 40.48	(98)
9a. Energy red	quiremer			•	ystems i	ncluding			(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Pa. Energy red Space heating	quiremer ng:	nts – Indi	vidual h	eating sy					(kWh/year) = Sum(9	8) _{15,912} =	40.48	(99)
Space heating Fraction of sp	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system	micro-C	CHP)	(kWh/year) = Sum(9	8)15.912 =		(99)
Pa. Energy red Space heating	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system		CHP)	(kWh/year) = Sum(9	8)15,912 =	40.48	(99)
Space heating Fraction of sp	quiremenng: Dace head	nts – Indi nt from se nt from m	vidual h econdar ain syst	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15,912	40.48	(201
Space heating Fraction of space Fraction Fraction Of space Fraction Fractio	quiremen ng: pace hea pace hea pace heatin	nts - Indi at from se at from m	vidual h econdary ain syst	eating sy y/supple em(s) stem 1		system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912	0	(99) (201 (202 (204
Space heating Fraction of space Fraction of space Fraction of to	quirement ng: pace hea pace hea patal heatin main spa	nts – Indi at from se at from m ag from i	vidual hecondary ain systemain system	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1	CHP) - (201) =) = Sum(9	8)15.912 =	0 1	(99) (201 (202 (204 (206
Space heating Fraction of space Fraction of to Efficiency of	quirement ng: pace hea pace hea patal heatii main spa seconda	nts – Indi	vidual hecondary ain systemain systemain systementar	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	micro-C (202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 93.4	(201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of Jan	quirement ng: pace heat pace heat tal heatin main spa seconda	nts – Indi at from se at from m ng from i ace heati ry/supple Mar	vidual h econdary ain syst main sys ng syste ementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1	CHP) - (201) =) = Sum(9	8) _{15,912} =	0 1 1 93.4	(99) (201 (202 (204 (206 (208
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating	quirements ng: Dace head bace head tal heatin main space seconda Feb g require	nts – Indi	vidual hecondary ain systemain systemain systementary Apralculated	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system 1, % Jul	micro-C (202) = 1 - (204) = (2	CHP) - (201) = 02) × [1 - ((203)] =	Nov	Dec	0 1 1 93.4	(99) (201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating G36.43	quirements pace heat pace	nts – Indi	econdary ain systemain systemain systementar Apralculated	eating sylv/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system	micro-C (202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 93.4	(99) (201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43	puirement pace hea pace hea pace hea patal heatin main spa seconda Feb g require 494.06	at from set from many from the	econdary eain systemain systemain systementar Apralculated 221.38 00 ÷ (20	eating sylv/supple em(s) stem 1 em 1 May dabove) 89.01	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 - 0]	(203)] = Oct	Nov 448.62	Dec 650.21	0 1 1 93.4	(99) (201 (202 (204 (206 (208
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Space heating Fraction of space heating Fraction of to Efficiency of Efficiency of Space heating 636.43 (211)m = {[(986) 681.4]	quirement of the property of t	at from set from many from the condary. At from many from the	vidual hecondary ain systemain systemantar Apr alculated 221.38 00 ÷ (20 237.02	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 89.01	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating 636.43 [211] m = {[(98)	quirement of the property of t	nts - Indicate from set from many from the from	vidual hecondary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sylv/supple em(s) stem 1 em 1 y heating May d above) 89.01 e6) 95.3 emonth	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	Sep 0 (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(201) (202) (204) (206) (208) ear
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43 (211)m = {[(98)	quirement of the property of t	nts - Indicate from set from many from the from	vidual hecondary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sylv/supple em(s) stem 1 em 1 y heating May d above) 89.01 e6) 95.3 emonth	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
Space heating Fraction of space fraction of space fraction of to Efficiency of Image: Space heating fraction of the Image: Space heating fraction of the Image: Space heating fraction of Image: Space heating from the	puirement of the property of t	ter (calci	vidual hecondary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02 y), kWh/ 8) 0	eating sylv/supple em(s) stem 1 em 1 y heating May d above) 89.01 95.3 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	Sep 0 1 (kWh/yea	Oct 228.33 244.47 ar) =Sum(2	Nov 448.62 480.32 211) _{15,1012} 0	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201 (202 (204 (206 (208 ear (211
Space heating Fraction of space fraction of space fraction of to Efficiency of Efficie	quirement of the property of t	nts – Indi	econdary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 89.01 95.3 month	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208)

				1	i		1	(a.a.)
` '	80.3 80.3	80.3	80.3	85.79	87.24	87.84		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m								
` '	72.53 165.29	184.27	186.3	198.57	208.45	223.4		
	•	Tota	I = Sum(2	19a) ₁₁₂ =			2356.83	(219)
Annual totals				k'	Wh/year	•	kWh/year	_
Space heating fuel used, main system 1							3398.26	
Water heating fuel used							2356.83	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a)	(230g) =	:		75	(231)
Electricity for lighting							357.88	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b)	=				6268.27	(338)
12a. CO2 emissions – Individual heating systems	s including mi	icro-CHP)					_
	Energy			Emiss	ion fac	tor	Emissions	
	kWh/year			kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1)	(211) x			0.2	16	=	734.02	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	509.08	(264)
Space and water heating	(261) + (262)	+ (263) + (264) =				1243.1	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	185.74	(268)
				((005)				_
Total CO2, kg/year			sum c	of (265)(271) =		1467.76	(272)

TER =

(273)

18.72

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Property Details: HOUSE E - BASELINE

Dwelling type: Semi-detached House

Located in: England

Region: South East England

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters:

Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 534 (P1)

Transmission heat loss coefficient: 60.8

Summer heat loss coefficient: 594.77 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
North (W1-2 FRONT N)	0	1
East (W3 - SIDE E)	0	1
East (W4 - SIDE E)	0	1
South (W5 - REAR S)	0	1
South (RW1-2 REAR S)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North (W1-2 FRONT N)	0.98	1	1	0.98	(P8)
East (W3 - SIDE E)	0.98	1	1	0.98	(P8)
East (W4 - SIDE E)	0.98	1	1	0.98	(P8)
South (W5 - REAR S)	0.98	1	1	0.98	(P8)
South (RW1-2 REAR S)	0.98	1	1	0.98	(P8)

Solar gains:

Orientation		Area	Flux	\mathbf{g}_{-}	FF	Shading	Gains
North (W1-2 FRONT N)	1 x	3.24	86.66	0.63	0.8	0.98	125.45
East (W3 - SIDE E)	1 x	2.59	124.8	0.63	0.8	0.98	144.42
East (W4 - SIDE E)	1 x	0.86	124.8	0.63	0.8	0.98	47.95
South (W5 - REAR S)	1 x	2.14	118.4	0.63	0.8	0.98	113.21
	1 x	2.66	202.31	0.63	0.8	0.98	240.45
						Total	671.47 (P3/P4)

Internal gains:

	June	July	August
Internal gains	423.91	406.51	415.09
Total summer gains	1135.05	1077.98	1010.14 (P5)
Summer gain/loss ratio	1.91	1.81	1.7 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5

SAP 2012 Overheating Assessment

Thermal mass temperature increment 0.25 0.25

Threshold temperature 17.56 19.46 19.45 (P7)

Likelihood of high internal temperature Not significant Not significant

Assessment of likelihood of high internal temperature: Not significant

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 Printed on 25 February 2021 at 14:04:58

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Detached House

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 81.5m²

Site Reference: WOODWELL Plot Reference: HOUSE C - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.9 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.03 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 57.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 48.2 kWh/m²

OK

2 Fabric U-values

Element Highest Average External wall 0.20 (max. 0.30) 0.20 (max. 0.70) OK Floor 0.17 (max. 0.25) 0.17 (max. 0.70) **OK** Roof 0.14 (max. 0.20) 0.14 (max. 0.35) OK **Openings** 1.37 (max. 2.00) 1.40 (max. 3.30) OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 4.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

ylinder insulation			
Hot water Storage:	No cylinder		
Controls			
Space heating controls	TTZC by plumbing and e	ectrical services	0
Hot water controls:	No cylinder thermostat		
	No cylinder		
Boiler interlock:	Yes		0
ow energy lights			
Percentage of fixed lights wi	th low-energy fittings	100.0%	
Minimum		75.0%	0
lechanical ventilation			
Not applicable			
Summertime temperature			
Overheating risk (South Eas	t England):	Slight	0
ed on:			
Overshading:		Average or unknown	
Windows facing: West		4.86m²	
Windows facing: North		1.62m²	
Windows facing: South		6.08m²	
Windows facing: East		2.14m²	
Roof windows facing: West		2.66m²	
Roof windows facing: East		2.66m²	
Roof windows facing: East		1.1m²	
Roof windows facing: East		0.78m²	
Ventilation rate:		8.00	
Blinds/curtains:		Dark-coloured curtain or roller b	lind
		Closed 10% of daylight hours	
Vou factures			
Key features			

None

Thermal Bridge Report

Property Details: HOUSE C - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges

Thermal bridges: User-defined = UD

Default = DApproved = A

User-defined (individual PSI-values) Y-Value = 0.0578

External Junctions Details:

Junction Type	PSI-Value	Length	Reference	Type
Other lintels (including other steel lintels)	0.05	9.97	E2	[UD]
Sill	0.04	5.4	E3	[A]
Jamb	0.05	22.8	E4	[A]
Ground floor (normal)	0.08	25.7	E5	[UD]
Intermediate floor within a dwelling	0.07	25.7	E6	[A]
Eaves (insulation at rafter level)	0.04	15.65	E11	[A]
Gable (insulation at rafter level)	0.04	19.28	E13	[A]
Corner (normal)	0.09	15.8	E16	[A]

Roof Junctions Details:					
Head	0.08	9.47	R1	[D]	
Sill	0.06	9.47	R2	[D]	
Jamb	0.08	17.2	R3	[D]	
Ridge (vaulted ceiling)	0.08	9.3	R4	[D]	

Predicted Energy Assessment



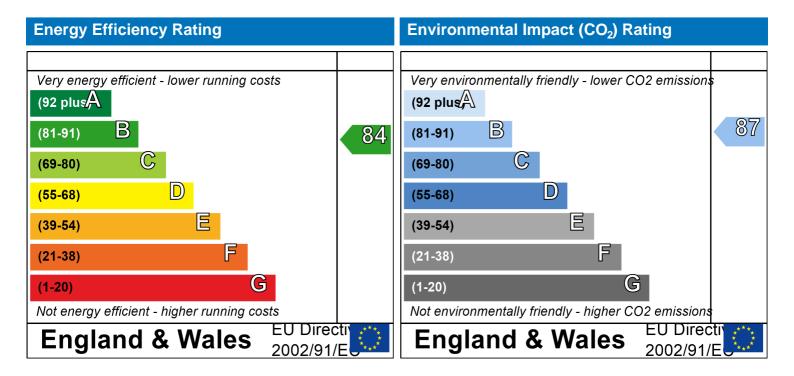
Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type: Date of assessment: Produced by: Total floor area: Detached House 24 February 2021 Jemma Mclaughlan

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is

of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.

completed, an Energy Performance Certificate is required providing information about the energy performance



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

SAP Input

Property Details: HOUSE C - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House
Detachment: Detached
Year Completed: 2021

Floor Location: Floor area:

Storey height:

Floor 0 40.75 m² 2.6 m Floor 1 40.75 m² 2.24 m

Living area: 18.3 m² (fraction 0.225)

Front of dwelling faces: We:

Opening types:

Name: FRONT DOOR	Source: Manufacturer	Type: Solid	Glazing:	Argon:	Frame: Wood
W1-3 FRONT	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - SIDE S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W6 - REAR E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 FRONT W	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW3-4 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW5 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW6 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Name:	Gap:	Frame Factor	: g-value:	U-value:	Area:	No. of Openings:
FRONT DOOR	mm	0.8	0	1.4	1.93	1
W1-3 FRONT	16mm or more	0.8	0.63	1.4	1.62	3
W4 - SIDE N	16mm or more	0.8	0.63	1.4	1.62	1
W5 - SIDE S	16mm or more	0.8	0.63	1.4	6.08	1
W6 - REAR E	16mm or more	0.8	0.63	1.4	2.14	1
RW1-2 FRONT W	16mm or more	0.8	0.63	1.3	1.33	2
RW3-4 REAR E	16mm or more	0.8	0.63	1.3	1.33	2
RW5 REAR E	16mm or more	0.8	0.63	1.3	1.1	1
RW6 REAR E	16mm or more	0.8	0.63	1.3	0.78	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	West	0	0
W1-3 FRONT		EXTERNAL WALLS	West	0	0
W4 - SIDE N		EXTERNAL WALLS	North	0	0
W5 - SIDE S		EXTERNAL WALLS	South	0	0
W6 - REAR E		EXTERNAL WALLS	East	0	0
RW1-2 FRONT W		ROOF	West	0.001	0

SAP Input

RW3-4 REAR E	ROOF	East	0.001	0
RW5 REAR E	ROOF	East	0.001	0
RW6 REAR E	ROOF	East	0.001	0

54.1

Overshading: Average or unknown

61.3

40.75

Typo	Cross areas	Openings	Net area:	U-value:	Ru value:	Curtain wall	Kappa:
Туре:	Gross area:	Openings:	ivet area.	u-value.	Ru value.	Curtain wall:	карра.
External Element	<u>:S</u>						
EXTERNAL WALLS	102.95	16.63	86.32	0.2	0	False	N/A
DORMER CHEEKS	2	0	2	0.2	0	False	N/A

0.14

0.17

0

GROUND FLOOR
Internal Elements
Party Elements

ROOF

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0578

7.2

	Length	Psi-value		
	9.97	0.05	E2	Other lintels (including other steel lintels)
[Approved]	5.4	0.04	E3	Sill
[Approved]	22.8	0.05	E4	Jamb
	25.7	0.08	E5	Ground floor (normal)
[Approved]	25.7	0.07	E6	Intermediate floor within a dwelling
[Approved]	15.65	0.04	E11	Eaves (insulation at rafter level)
[Approved]	19.28	0.04	E13	Gable (insulation at rafter level)
[Approved]	15.8	0.09	E16	Corner (normal)
	9.47	0.08	R1	Head
	9.47	0.06	R2	Sill
	17.2	0.08	R3	Jamb
	9.3	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys: 0
Number of open flues: 0
Number of fans: 3
Number of passive stacks: 0
Number of sides sheltered: 0
Pressure test: 4

Main heating system

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

N/A

N/A

SAP Input

Boiler interlock: Yes Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

Water heating

Water heating: From main heating system

Water code: 901
Fuel :mains gas
No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 100%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No Photovoltaics: None Assess Zero Carbon Home: No

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU		/ED		
Address :	Woodwell Cottage P2, Wo	odwell Road, BRISTOL	, BS11 9XU			
Overall dwelling dime	nsions:	A === (m=2)	Asz Ilaimht/m	\	Val	
Ground floor		Area(m²) 40.75 (1a) x	Av. Height(r	$\frac{\mathbf{n}}{(2a)} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$	Volume(m³)	(3a)
First floor		40.75 (1b) x		(2b) =	91.28](3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1					」 ` ′
Dwelling volume		,,	(3b)+(3c)+(3d)+(3e)	+(3n) =	197.23	(5)
2. Ventilation rate:				<u> </u>	197.23	
2. Ventilation rate.	main seconda		total		m³ per houi	
Number of chimneys	heating heating + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				4		_
1.60	(0.) (01)	(=) (=)			anges per ho	_
•	ys, flues and fans = (6a)+(6b)+ een carried out or is intended, proce		30 e from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the	•	(_/ , ca.e co co	(6) 16 (16)	ſ	0	(9)
Additional infiltration	3 \			[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 for masonry con	struction		0	(11)
if both types of wall are po deducting areas of openir	resent, use the value corresponding	to the greater wall area (after		•		_
	loor, enter 0.2 (unsealed) or	0.1 (sealed), else enter	0	[0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11) +	+ (12) + (13) + (15) =	= [0	(16)
Air permeability value,	q50, expressed in cubic meti	res per hour per square	metre of envelo	pe area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20]$	+(8), otherwise (18) = (16)		Ī	0.35	(18)
Air permeability value applie	s if a pressurisation test has been d	one or a degree air permeabil	ity is being used	-		_
Number of sides sheltere	d				0	(19)
Shelter factor		(20) = 1 - [0.075]			1	(20)
Infiltration rate incorporat	ing shelter factor	$(21) = (18) \times (20)$	=		0.35	(21)
Infiltration rate modified for	or monthly wind speed	, ,				
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct No	ov Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for st	nelter an	d wind s	speed) =	(21a) x	(22a)m	•	•			
0.45	0.44	0.43	0.39	0.38	0.33	0.33	0.33	0.35	0.38	0.4	0.41	1	
Calculate effe		•	rate for t	he appli	cable ca	ise	!	<u>!</u>	!	ļ.	ļ.	J	
If mechanic			andiv N. 72	12h) - (22a) × Emy (nguation (N	VEVV otho	nvico (22h) = (23a)			0	(23a)
If balanced wi		0		, ,	,	. ,	,, .	,) = (23a)			0	(23b)
a) If balance		•	•	J		,		,	Oh)m ı ((22h) v [1 (22a)	0	(23c)
(24a)m= 0		o lical ve	0	0	0	0	0	$\frac{1}{1} = \frac{2}{2}$	0	(230) x [0] - 100j	(24a)
b) If balanc					L					(23h)		J	()
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole I	nouse ex	tract ver	tilation o	r positiv	e input	ventilatio	on from (utside				J	
,	m < 0.5 ×			•	•				.5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m= 0.6	0.6	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59]	(24d)
Effective ai	r change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)	!	ļ.	ļ.	J	
(25)m= 0.6	0.6	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59]	(25)
3. Heat losse	es and he	eat loss r	paramete	er.		•						•	
0													
ELEMENT	Gros	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
		SS	Openin	gs	Net Ar A ,r	m²			A X U (W/	K)			
ELEMENT	Gros area	SS	Openin	gs	A ,r	m ²	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x	W/m2	2K = [0.04] = [(W/ 2.702	K)			kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r	m ² x x1. x1.	W/m2 1.4 /[1/(1.4)+		2.702 2.15	K)			kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 1.93 1.62	m ² x x ¹ x ¹ x ¹ x ¹	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & \\ & & 0.04 & = \\ 0.04 & & & \\ 0.04 & & & \\ 0.04 & & & \\ \end{array} $	2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area e 1 e 2 e 3 e 4	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08	m ² x x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729	K)			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area e 1 e 2 e 3 e 4 be 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14	m² x x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	$ \begin{array}{ccc} 2K & & & & \\ & & & & \\ & & & & \\ & & & &$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} 2K & & & & \\ \hline & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & & & \\ \end{array} $	2.702 2.15 2.15 8.06 2.84 1.729 1.729	K) 			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.37	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} 2K & & & & \\ \hline & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & & & \\ \end{array} $	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43	K) 			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4	ss (m²)	Openin	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78	m² x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	EK = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4	ss (m²)	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102.	95	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Type2 Roof	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61.	95 3	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of *for windows and	Gros area e 1 e 2 e 3 e 4 De 1 De 2 De 3 De 4 102. 2 elements	95 3 , m ² ows, use e	Openin m 16.6 0 7.2	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculations and a calculations are all the calculati	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	EK = [0.04] =	(W/ 2.702 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of * for windows an ** include the area	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61. elements d roof winders on both	95 3 , m ² ows, use e sides of in	16.6. 0 7.2 effective winternal wal	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculations and a calculations are all the calculati	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3] + /	$ \begin{array}{cccc} 2K & & & & & \\ & & & & & \\ & & & & & \\ & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of *for windows an **include the are Fabric heat lo	Gros area e 1 e 2 e 3 e 4 De 1 De 2 De 3 De 4 102. 2 elements d roof wind as on both	95 3 , m ² ows, use e sides of in = S (A x	16.6. 0 7.2 effective winternal wal	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculations and a calculations are all the calculati	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	n 3.2	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of * for windows an ** include the area	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61. elements d roof wind as on both ss, W/K: Cm = S(95 95 3 , m ² ows, use e sides of in = S (A x (A x k)	16.6. 0 7.2 effective winternal wall	gs 1 ² 3 indow U-va Is and pan	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1 207 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3] + /	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)

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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

can be used inste	ad of a dei	tailed calci	ulation.										
Thermal bridge				using Ap	pendix I	K						11.97	(36)
if details of therma	al bridging	are not kn	own (36) =	= 0.05 x (3	1)								
Total fabric he	at loss							(33) +	(36) =			75.23	(37)
Ventilation hea	at loss ca	alculated	monthly	У		,		(38)m	= 0.33 × (25)m x (5))	ı	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 39.1	38.85	38.6	37.42	37.21	36.18	36.18	36	36.58	37.21	37.65	38.11		(38)
Heat transfer of	coefficier	nt, W/K					_	(39)m	= (37) + (3	38)m		•	
(39)m= 114.33	114.08	113.83	112.65	112.43	111.41	111.41	111.22	111.81	112.43	112.88	113.34		_
Heat loss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷		12 /12=	112.65	(39)
(40)m= 1.4	1.4	1.4	1.38	1.38	1.37	1.37	1.36	1.37	1.38	1.38	1.39		
Number of day	e in moi	oth (Tab	lo 1a)						Average =	Sum(40) ₁	12 /12=	1.38	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
	<u> </u>	<u> </u>	<u> </u>			!	<u>!</u>		<u>!</u>	<u> </u>			
4. Water heat	ting ener	rgy requi	irement:								kWh/ye	ear:	
	J											ı	()
Assumed occu	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.49		(42)
if TFA £ 13.9 Annual average	•	ater usad	ae in litre	es per da	ıv Vd.av	erage =	(25 x N)	+ 36		93	3.35		(43)
Reduce the annua	al average	hot water	usage by	5% if the a	lwelling is	designed			se target o				(10)
not more that 125	litres per p	person per	r day (all w r	ater use, f	not and co	ld) 						ı	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in	,	,	1				· <i>'</i>					l	
(44)m= 102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49	95.22	98.96	102.69	1400.05	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600		Total = Su oth (see Ta		c, 1d)	1120.25	(44)
(45)m= 152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48		
			Į.			!	!		Total = Su	m(45) ₁₁₂ =	=	1468.83	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)	-				
(46)m= 22.84	19.98	20.62	17.97	17.25	14.88	13.79	15.82	16.01	18.66	20.37	22.12		(46)
Water storage Storage volum		includin	na anv so	olar or M	///HRS	storana	within s	ame ves	امء		0		(47)
If community h	, ,		•			_		arric ves	001		U		(47)
Otherwise if no	-			•			, ,	ers) ente	er '0' in (47)			
Water storage			`					,	,	•			
a) If manufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature fa	actor fro	m Table	2b								0		(49)
Energy lost fro		_	-				(48) x (49)) =			0		(50)
b) If manufactHot water stora			-								0		(51)
If community h	•			- (NVVI	, C /Uc	^У <i>)</i>					0		(51)
Volume factor	•										0		(52)
Temperature f	actor fro	m Table	2b								0		(53)

Liloigy io	Energy lost from water storage, kWh/year Enter (50) or (54) in (55)								x (52) x (53) =	0			(54)
Enter (50	0) or (5	4) in (5	55)									0		(55)
Water sto	orage lo	oss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinder co	ontains o	dedicated	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (57	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary c	circuit le	oss (an	nual) fro	m Table	3							0		(58)
Primary c		`	,			59)m = ((58) ÷ 36	5 × (41)	m				•	
(modifie	ed by f	actor fr	om Tab	le H5 if t	here is s	olar wat	er heatir	ng and a	cylinde	r thermo	stat)	_	_	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi los	ss calc	ulated	for each	month ((61)m =	(60) ÷ 36	65 × (41)	m						
(61)m= 1	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total hea	at requi	red for	water he	eating ca	alculated	for eacl	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
_		144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12	1 ` ′ ′	(62)
Solar DHW	input ca	lculated	using App	endix G oı	· Appendix	H (negati	ve quantity	') (enter '0'	if no sola	r contributi	on to wate	er heating)	1	
(add addi	itional l	ines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix G	€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	•	(63) (G2)
Output fro	om wat	ter heat	ter											
(64)m= 16	64.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
								Outp	out from wa	ater heater	(annual)	12	1617.66	(64)
Heat gain	ns from	water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m	 :1	
	53.8	47.14	48.86	42.9	41.39	36.05	33.73	38.24	38.56	44.53	48.21	52.2	1	(65)
include	e (57)m	in calc	ulation o	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Interr	nal gai	ns (see	Table 5	and 5a):	•						•		
Metabolio		•			,									
	Jan J	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	r	1	
_	-	149.44	149.44	149.44	149.44	149.44		- 3				l Dec		
Lighting o	gains (d	 calculat	l : A		l		149.44	149.44	149.44	149.44	149.44	Dec 149.44		(66)
	'		ea in Ar	pendix	L. eguat					149.44				(66)
	49.6	44.05	35.83	pendix 27.12	L, equat 20.28			149.44 Iso see		149.44]	(66) (67)
` '			35.83	27.12	20.28	ion L9 oi	r L9a), a 18.5	lso see 24.04	Table 5 32.27	40.97	149.44	149.44]	,
Appliance	es gain	s (calc	35.83 ulated in	27.12 Append	20.28 dix L, eq	ion L9 or 17.12 uation L	18.5 13 or L1	lso see 24.04 3a), also	Table 5 32.27 see Tal	40.97 ble 5	149.44 47.82	149.44 50.98]	(67)
Appliance (68)m= 33	es gain 32.16	s (calc 335.61	35.83 ulated in 326.92	27.12 Append 308.43	20.28 dix L, eq 285.09	17.12 uation L	18.5 13 or L1 248.49	24.04 3a), also 245.05	Table 5 32.27 see Tal 253.73	40.97 ble 5 272.22	149.44	149.44]	,
Appliance (68)m= 33	es gain 32.16 gains (s (calc 335.61 calcula	35.83 ulated in 326.92 ted in A	27.12 Append 308.43 opendix	20.28 dix L, eq 285.09 L, equat	17.12 uation L 263.15 ion L15	r L9a), a 18.5 13 or L1 248.49 or L15a)	24.04 3a), also 245.05 , also se	Table 5 32.27 see Table 253.73	40.97 ble 5 272.22	149.44 47.82 295.57	149.44 50.98 317.5		(67) (68)
Appliance (68) m= 33 Cooking (69) m= 5	es gain 32.16 gains (s (calc 335.61 calcula 52.43	35.83 ulated in 326.92 ted in A ₁ 52.43	27.12 Append 308.43 opendix 52.43	20.28 dix L, eq 285.09	17.12 uation L	18.5 13 or L1 248.49	24.04 3a), also 245.05	Table 5 32.27 see Tal 253.73	40.97 ble 5 272.22	149.44 47.82	149.44 50.98		(67)
Appliance $(68)m = 33$ Cooking $(69)m = 5$ Pumps ar	es gain 32.16 gains (52.43 nd fans	s (calc 335.61 calcula 52.43 s gains	35.83 ulated in 326.92 ted in Ap 52.43 (Table 5	27.12 Append 308.43 opendix 52.43	20.28 dix L, eq 285.09 L, equat 52.43	17.12 uation L 263.15 ion L15 52.43	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43	24.04 3a), also 245.05 , also se 52.43	Table 5 32.27 see Tal 253.73 ee Table 52.43	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43	149.44 50.98 317.5 52.43		(67) (68) (69)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m=	es gain 32.16 gains (52.43 nd fans	s (calcostates) s (calculas 52.43 s gains 3	35.83 ulated in 326.92 ted in A 52.43 (Table 5	27.12 Append 308.43 Appendix 52.43 5a) 3	20.28 dix L, eq 285.09 L, equat 52.43	17.12 uation L 263.15 ion L15 52.43	r L9a), a 18.5 13 or L1 248.49 or L15a)	24.04 3a), also 245.05 , also se	Table 5 32.27 see Table 253.73	40.97 ble 5 272.22	149.44 47.82 295.57	149.44 50.98 317.5		(67) (68)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m= Losses e.	es gains (gains (52.43 nd fans 3	s (calcula 335.61 calcula 52.43 s gains 3	35.83 ulated in 326.92 ted in A 52.43 (Table 5 3 n (negation)	27.12 Append 308.43 Expendix 52.43 Sa) 3 Exive value	20.28 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	17.12 uation L 263.15 ion L15 52.43 3 le 5)	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43	24.04 3a), also 245.05 , also se 52.43	Table 5 32.27 see Tal 253.73 ee Table 52.43	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43	149.44 50.98 317.5 52.43		(67) (68) (69) (70)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m= Losses e. (71)m= -9	es gain 32.16 gains (52.43 nd fans 3 .g. eva	s (calcula 335.61 calcula 52.43 s gains 3 poratio	35.83 ulated in 326.92 ted in Ap 52.43 (Table 5 3 n (negation 199.63)	27.12 Append 308.43 Appendix 52.43 5a) 3	20.28 dix L, eq 285.09 L, equat 52.43	17.12 uation L 263.15 ion L15 52.43	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43	24.04 3a), also 245.05 , also se 52.43	Table 5 32.27 see Tal 253.73 ee Table 52.43	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43	149.44 50.98 317.5 52.43		(67) (68) (69)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m= Losses e. (71)m= -9 Water hea	es gains (gains (52.43 nd fans 3 .g. eva 99.63 eating g	s (calcula 335.61 calcula 52.43 s gains 3 poratio -99.63 ains (T	35.83 ulated in 326.92 ted in A 52.43 (Table 5 3 n (negation 199.63) fable 5)	27.12 Append 308.43 Appendix 52.43 Sa) 3 tive valu -99.63	20.28 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	17.12 uation L 263.15 ion L15 52.43 3 le 5)	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43	24.04 3a), also 245.05 , also se 52.43 3	Table 5 32.27 see Tal 253.73 ee Table 52.43 3 -99.63	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43 3	149.44 50.98 317.5 52.43 3		(67) (68) (69) (70)
Appliance $(68)m = 33$ Cooking ($(69)m = 5$ Pumps ar $(70)m = $ Losses e. $(71)m = -9$ Water hea $(72)m = 7$	es gains (gains (52.43 nd fans 3 .g. eva 99.63 eating g	s (calcula 335.61 calcula 52.43 s gains 3 poratio -99.63 ains (T	35.83 ulated in 326.92 ted in A 52.43 (Table 5 3 n (negation of the second of the s	27.12 Append 308.43 Expendix 52.43 Sa) 3 Exive value	20.28 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	17.12 uation L 263.15 ion L15 52.43 3 le 5) -99.63	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43 3 -99.63	24.04 3a), also 245.05 , also se 52.43 3 -99.63	Table 5 32.27 see Tal 253.73 ee Table 52.43 3 -99.63	40.97 ble 5 272.22 5 52.43 3 -99.63	149.44 47.82 295.57 52.43 3 -99.63	149.44 50.98 317.5 52.43 3 -99.63		(67) (68) (69) (70)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m= Losses e. (71)m= -9 Water hea (72)m= 7 Total inter	es gains (gains (52.43 nd fans 3 .g. eva 99.63 eating g	s (calcula 335.61 calcula 52.43 s gains 3 poratio -99.63 ains (T	35.83 ulated in 326.92 ted in A 52.43 (Table 5 3 n (negation of the second of the s	27.12 Append 308.43 Appendix 52.43 Sa) 3 tive valu -99.63	20.28 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	17.12 uation L 263.15 ion L15 52.43 3 le 5) -99.63	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43 3 -99.63	24.04 3a), also 245.05 , also se 52.43 3 -99.63	Table 5 32.27 see Tal 253.73 ee Table 52.43 3 -99.63	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43 3 -99.63	149.44 50.98 317.5 52.43 3 -99.63		(67) (68) (69) (70)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientati	on:	Access Factor Table 6d	7	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	7.81	(74)
North	0.9x	1	X	1.62	x	20.32	х	0.63	X	0.8	=	14.93	(74)
North	0.9x	1	X	1.62	x	34.53	X	0.63	X	0.8	=	25.37	(74)
North	0.9x	1	X	1.62	x	55.46	х	0.63	x	0.8	=	40.76	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	54.9	(74)
North	0.9x	1	x	1.62	x	79.99	x	0.63	x	0.8	=	58.78	(74)
North	0.9x	1	X	1.62	x	74.68	x	0.63	x	0.8	=	54.87	(74)
North	0.9x	1	x	1.62	x	59.25	x	0.63	x	0.8	=	43.54	(74)
North	0.9x	1	x	1.62	x	41.52	x	0.63	x	0.8	=	30.51	(74)
North	0.9x	1	x	1.62	x	24.19	x	0.63	x	0.8	=	17.78	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	9.64	(74)
North	0.9x	1	x	1.62	x	8.86	x	0.63	x	0.8	=	6.51	(74)
East	0.9x	1	x	2.14	x	19.64	x	0.63	x	0.8	=	19.06	(76)
East	0.9x	1	x	2.14	x	38.42	x	0.63	x	0.8	=	37.29	(76)
East	0.9x	1	x	2.14	x	63.27	x	0.63	x	0.8	=	61.42	(76)
East	0.9x	1	x	2.14	x	92.28	x	0.63	x	0.8	=	89.58	(76)
East	0.9x	1	x	2.14	x	113.09	x	0.63	x	0.8	=	109.78	(76)
East	0.9x	1	x	2.14	x	115.77	x	0.63	x	0.8	=	112.38	(76)
East	0.9x	1	x	2.14	x	110.22	x	0.63	x	0.8	=	106.99	(76)
East	0.9x	1	X	2.14	x	94.68	x	0.63	X	0.8	=	91.9	(76)
East	0.9x	1	X	2.14	x	73.59	x	0.63	X	0.8	=	71.43	(76)
East	0.9x	1	X	2.14	x	45.59	x	0.63	X	0.8	=	44.25	(76)
East	0.9x	1	X	2.14	X	24.49	X	0.63	X	0.8	=	23.77	(76)
East	0.9x	1	X	2.14	x	16.15	X	0.63	X	0.8	=	15.68	(76)
South	0.9x	1	X	6.08	x	46.75	X	0.63	X	0.8	=	128.94	(78)
South	0.9x	1	X	6.08	x	76.57	X	0.63	x	0.8	=	211.17	(78)
South	0.9x	1	X	6.08	x	97.53	X	0.63	X	0.8	=	268.99	(78)
South	0.9x	1	X	6.08	x	110.23	X	0.63	X	0.8	=	304.01	(78)
South	0.9x	1	X	6.08	X	114.87	X	0.63	X	0.8	=	316.8	(78)
South	0.9x	1	X	6.08	X	110.55	х	0.63	X	0.8	=	304.88	(78)
South	0.9x	1	X	6.08	x	108.01	X	0.63	X	0.8	=	297.88	(78)
South	0.9x	1	X	6.08	x	104.89	x	0.63	x	0.8	=	289.29	(78)
South	0.9x	1	X	6.08	x	101.89	x	0.63	x	0.8	=	280.99	(78)
South	0.9x	1	X	6.08	x	82.59	x	0.63	x	0.8	=	227.76	(78)
South	0.9x	1	X	6.08	x	55.42	x	0.63	x	0.8	=	152.83	(78)
South	0.9x	1	X	6.08	X	40.4	X	0.63	X	0.8	=	111.41	(78)

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West 0.9x	1	X	1.62	X	19.64	X	0.63	X	0.8	=	43.3	(80)
West 0.9x	1	X	1.62	X	38.42	X	0.63	X	0.8	=	84.7	(80)
West 0.9x	1	X	1.62	X	63.27	X	0.63	X	0.8	=	139.49	(80)
West 0.9x	1	X	1.62	X	92.28	X	0.63	X	0.8	=	203.43	(80)
West 0.9x	1	X	1.62	X	113.09	X	0.63	X	0.8	=	249.31	(80)
West 0.9x	1	X	1.62	X	115.77	X	0.63	X	0.8	=	255.22	(80)
West 0.9x	1	X	1.62	X	110.22	X	0.63	x	0.8	=	242.98	(80)
West 0.9x	1	X	1.62	X	94.68	X	0.63	X	0.8	=	208.71	(80)
West 0.9x	1	X	1.62	X	73.59	X	0.63	X	0.8	=	162.23	(80)
West 0.9x	1	X	1.62	x	45.59	X	0.63	X	0.8	=	100.5	(80)
West 0.9x	1	X	1.62	x	24.49	x	0.63	x	0.8	=	53.99	(80)
West 0.9x	1	X	1.62	x	16.15	X	0.63	x	0.8	=	35.61	(80)
Rooflights 0.9x	1	X	1.33	x	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9x	1	x	1.33	x	25.93	x	0.63	x	0.8	=	31.28	(82)
Rooflights 0.9x	1	x	1.1	x	25.93	x	0.63	x	0.8	=	12.94	(82)
Rooflights 0.9x	1	X	0.78	x	25.93	X	0.63	x	0.8	=	9.17	(82)
Rooflights 0.9x	1	X	1.33	x	51.88	X	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9x	1	x	1.33	x	51.88	X	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9x	1	X	1.1	x	51.88	X	0.63	x	0.8] =	25.88	(82)
Rooflights 0.9x	1	X	0.78	x	51.88	X	0.63	x	0.8	=	18.35	(82)
Rooflights 0.9x	1	x	1.33	x	88.38	X	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9x	1	x	1.33	x	88.38	x	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9x	1	x	1.1	x	88.38	x	0.63	x	0.8] =	44.1	(82)
Rooflights 0.9x	1	x	0.78	x	88.38	X	0.63	x	0.8] =	31.27	(82)
Rooflights 0.9x	1	x	1.33	x	133.65	x	0.63	x	0.8] =	161.26	(82)
Rooflights 0.9x	1	x	1.33	x	133.65	x	0.63	x	0.8] =	161.26	(82)
Rooflights 0.9x	1	x	1.1	x	133.65	X	0.63	x	0.8] =	66.69	(82)
Rooflights 0.9x	1	x	0.78	x	133.65	x	0.63	x	0.8	=	47.29	(82)
Rooflights 0.9x	1	x	1.33	x	168.1	x	0.63	x	0.8	=	202.82	(82)
Rooflights 0.9x	1	x	1.33	x	168.1	x	0.63	x	0.8	j =	202.82	(82)
Rooflights 0.9x	1	x	1.1	x	168.1	х	0.63	x	0.8	j =	83.87	(82)
Rooflights 0.9x	1	x	0.78	x	168.1	x	0.63	x	0.8	j =	59.47	(82)
Rooflights 0.9x	1	x	1.33	x	174	x	0.63	x	0.8	j =	209.95	(82)
Rooflights 0.9x	1	x	1.33	x	174	х	0.63	x	0.8	j =	209.95	(82)
Rooflights 0.9x	1	x	1.1	х	174	x	0.63	x	0.8	j =	86.82	(82)
Rooflights 0.9x	1	x	0.78	x	174	x	0.63	x	0.8	=	61.56	(82)
Rooflights _{0.9x}	1	x	1.33	x	164.87	x	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9x	1	x	1.33	x	164.87	x	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9x	1	x	1.1	x	164.87	X	0.63	X	0.8	=	82.26	(82)
Rooflights 0.9x	1	X	0.78	x	164.87	X	0.63	x	0.8	=	58.33	(82)
Rooflights 0.9x		X	1.33	x	138.72	X	0.63	X	0.8	 =	167.38	(82)
	•					_		ı	•			_

Dooflighto o a					_		٦ .		_				— (22)
Rooflights 0.9x	1	X	1.3		×	138.72	X	0.63	X	0.8	=	167.38	(82)
Rooflights 0.9x	1	X	1.	1	X	138.72	X	0.63	×	0.8	=	69.22	(82)
Rooflights 0.9x	1	X	0.7	8	X	138.72	X	0.63	X	0.8	=	49.08	(82)
Rooflights 0.9x	1	X	1.3	3	X	104.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.3	3	x	104.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.	1	X	104.33	X	0.63	X	0.8	=	52.05	(82)
Rooflights 0.9x	1	X	0.7	'8	x	104.33	×	0.63	X	0.8	=	36.91	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.	1	x	62.32	X	0.63	X	0.8	=	31.1	(82)
Rooflights 0.9x	1	x	0.7	'8	x	62.32	X	0.63	x	0.8		22.05	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	32.54	X	0.63	x	0.8	=	39.26	(82)
Rooflights 0.9x	1	X	1.3	3	x	32.54	i x	0.63	x	0.8	-	39.26	(82)
Rooflights _{0.9x}	1	x	1.	1	x	32.54	X	0.63	×	0.8	-	16.23	(82)
Rooflights _{0.9x}	1	X	0.7	8	x	32.54	X	0.63	×	0.8	= =	11.51	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	21.19	J X	0.63	×	0.8		25.57	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	21.19	X	0.63	×	0.8		25.57	(82)
Rooflights 0.9x	1	X	1.		x	21.19	」 】 x	0.63	=	0.8	╡ -	10.57	(82)
Rooflights 0.9x	<u>·</u> 1	x	0.7		x	21.19] x	0.63	X	0.8	╡ -	7.5	(82)
	· ·		<u> </u>		<u> </u>			0.00		0.0			
Solar gains in	watte ca	alculated	for eac	n month			(83)m	n = Sum(74)m	(82)m				
(83)m= 283.79	517.51	783.91	1074.27		1	3 1241.16	`		593.8	4 346.49	238.42]	(83)
Total gains – ir	nternal a	nd solar	(84)m =	= (73)m ·	+ (83)n	n , watts	!	Į.	<u> </u>	_!		ı	
(84)m= 843.11	1072.57	1317.58	1574.66	1746.04	1735.1	1 1658.74	1512	2.22 1330.68	1072.1	3 862.09	782.31]	(84)
7. Mean inter	nal temn	erature	(heating	season)								
Temperature						from Ta	hle 9	Th1 (°C)				21	(85)
Utilisation fac	ŭ	٠.			Ū		DIC O,	, 1111 (0)				21	
Jan	Feb	Mar	Apr	May	Jun	Jul	ΤΔ	ug Sep	Oct	Nov	Dec]	
(86)m= 0.98	0.96	0.89	0.75	0.57	0.41	0.29	0.3		0.85	0.97	0.99		(86)
` ′						_!		!	0.00	1 0.01	0.00		, ,
Mean interna				· •	ı	-i	1		T 00.74	1 00 40	10.75	1	(07)
(87)m= 19.81	20.11	20.47	20.8	20.95	20.99	21	2	1 20.97	20.71	20.19	19.75		(87)
Temperature	during h					g from Ta	able 9	9, Th2 (°C)			1	1	
(88)m= 19.76	19.76	19.77	19.78	19.78	19.79	19.79	19.	79 19.78	19.78	19.77	19.77		(88)
Utilisation fac	tor for ga	ains for ı	est of d	welling,	h2,m (s	see Table	9a)						
(89)m= 0.98	0.94	0.86	0.7	0.51	0.33	0.21	0.2	25 0.47	0.8	0.95	0.98		(89)
Mean interna	temper	ature in	the rest	of dwelli	ina T2	follow ste	eps 3	to 7 in Tab	le 9c)		-		
(90)m= 18.24	18.66	19.16	19.58	19.74	19.78	19.79	19.		19.49	18.79	18.16]	(90)
						<u> </u>			fLA = Liv	/ing area ÷ (ļ	0.22	(91)
Maan !mt=======	tomer = -	oturo /t-	n 4la a · · · · ·	احمام	llin a'	fl A T 4	. /4	fl A\ . TO					
Mean interna (92)m= 18.59	18.99	19.46	r the wh	ole dwe 20.01	lling) =	1LA × 11 20.06	+ (1		19.77	19.1	18.52	1	(92)
							1				10.52		(34)
Apply adjustn	iciil lo li	ie illean	ппеша	remper	ature II	om rable	± 4€,	wilete appr	opnate				

(00)	40.44	40.04	40.04	40.7	40.00	40.0	10.04	1004	40.00	40.00	40.05	40.07		(93)
(93)m=	18.44	18.84	19.31	19.7	19.86	19.9	19.91	19.91	19.88	19.62	18.95	18.37		(93)
			uirement				44 -4	Table 0	41	4 T: /	70\	-11-	lata	
			or gains	•		ed at ste	ер ттог	rable 9	b, so tha	t 11,m=(rojm an	d re-caid	culate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			ains, hm					,						
(94)m=	0.97	0.93	0.85	0.7	0.51	0.34	0.22	0.26	0.48	0.79	0.94	0.98		(94)
Usefu	ıl gains,		W = (94)				ı	,			ı	ı	ı	
(95)m=	817.77	999.45	1120.57	1096.36	890.05	587.53	368.37	389.7	632.15	846.78	811.82	764.08		(95)
	nly avera	age exte	rnal tem	perature	r		•	,						
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			i				-``	- ` 	– (96)m					
	1616.85		1457.8	1216.79	917.29	591	368.76	390.45	646.59		<u> </u>	1605.8		(97)
Space		· · ·	ı	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m	1	1	
(98)m=	594.51	396.63	250.9	86.71	20.27	0	0	0	0	124.18	378.75	626.24		_
								Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	2478.19	(98)
Space	e heatin	g require	ement in	kWh/m²	²/year								30.41	(99)
9a En	erav rec	wiremer	nts – Indi	vidual h	eating s	vstems i	ncluding	ı micro-C	:HP)					
	e heatir		no ma	rradai ii	oamig oʻ	y otorno r	noraanig	, moro c)					
•		•	at from s	econdar	v/supple	mentary	system						0	(201)
	•		at from m			,	•	(202) = 1	- (201) =				1	(202)
	•		ng from	-	, ,			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficie	ency of r	nain spa	ace heat	ing syste	em 1								89.9	(206)
Efficie	ency of s	seconda	ry/supple	ementar	y heating	g systen	າ, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space	e heatin	g require	ement (c	alculate	d above)								
	594.51	396.63	250.9	86.71	20.27	0	0	0	0	124.18	378.75	626.24		
(211)m	n = {[(98)m x (20	(4)] } x 1	00 ÷ (20)6)			•	•		•			(211)
(/	661.3	441.2	279.09	96.45	22.55	0	0	0	0	138.13	421.3	696.6		
								Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	<u> </u>	2756.61	(211)
Space	e heatin	a fuel (s	econdar	v) kWh/	month									J
•		•	00 ÷ (20	• , .										
(215)m=		0	0	0	0	0	0	0	0	0	0	0		
					<u> </u>		Į.	Tota	ıl (kWh/yea	ar) =Sum(2	1 215) _{15,1012}	<u> </u>	0	(215)
Water	heating	1												_
	_		ter (calc	ulated a	bove)									
	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
Efficier	ncy of w	ater hea	ıter										87.3	(216)
(217)m=	89.32	89.19	88.91	88.31	87.65	87.3	87.3	87.3	87.3	88.52	89.15	89.36		(217)
Fuel fo	r water	heating,	kWh/mo	onth				•	•		•		•	
, ,) ÷ (217)										ı	
(219)m=	184.64	162.13	168.8	149.53	145.6	127.66	119.79	135.32	136.3	154.84	166.05	179.19		7
								Tota	I = Sum(2	19a) ₁₁₂ =			1829.87	(219)
	l totals									k'	Wh/year	•	kWh/year	7
Space	neating	tuel use	ed, main	system	1								2756.61	

Water heating fuel used			1829.87
Electricity for pumps, fans and electric keep-hot			
central heating pump:		30	(230c)
boiler with a fan-assisted flue		45	(230e)
Total electricity for the above, kWh/year	sum (of (230a)(230g) =	75 (231)
Electricity for lighting			350.38 (232)
Total delivered energy for all uses (211)(221) +	+ (231) + (232)(237b) =	=	5099.16 (338)
10a. Fuel costs - individual heating systems:			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating - main system 1	(211) x	3.48 × 0.01	
Space heating - main system 2	(213) x	0 x 0.01	(= 10)
Space heating - secondary	(215) x	13.19 × 0.01	<u> </u>
Water heating cost (other fuel)	(219)	3.48 x 0.01	0 (= :=)
Pumps, fans and electric keep-hot	(231)	13.19 x 0.01	
(if off-peak tariff, list each of (230a) to (230g) sep			
Energy for lighting	(232)	13.19 × 0.01	
Additional standing charges (Table 12)			120 (251)
Appendix Q items: repeat lines (253) and (254) a	as needed		
Total energy cost (245)(245)(245)	47) + (250)(254) =		335.72 (255)
11a. SAP rating - individual heating systems			
Energy cost deflator (Table 12)			0.42 (256)
Energy cost factor (ECF) [(255) x (2	256)] ÷ [(4) + 45.0] =		1.11 (257)
SAP rating (Section 12)			84.45 (258)
12a. CO2 emissions – Individual heating syster	ns including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	595.43 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216	395.25 (264)
Space and water heating	(261) + (262) + (263) + (2	264) =	990.68 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519	181.85 (268)
Total CO2, kg/year		sum of (265)(271) =	1211.45 (272)
CO2 emissions per m²		(272) ÷ (4) =	14.86 (273)
		(===/ : (:)	14.86 (273)
El rating (section 14)		(=, -, (, ,	87 (274)

13a. Primary Energy			
	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22 =	3363.07 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2232.44 (264)
Space and water heating	(261) + (262) + (263) + (264) =		5595.5 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	1075.68 (268)
'Total Primary Energy	sum	n of (265)(271) =	6901.43 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	84.68 (273)

		User Details:		
Assessor Name:	Jemma Mclaughlan	Stroma Nur	nber: STRC	030065
Software Name:	Stroma FSAP 2012	Software Ve	ersion: Version	on: 1.0.5.25
	Pro	operty Address: HOUS	SE C - IMPROVED	
Address :	Woodwell Cottage P2, Wood	well Road, BRISTOL,	BS11 9XU	
1. Overall dwelling dime	ensions:			
		Area(m²)	Av. Height(m)	Volume(m³)
Ground floor		40.75 (1a) x	2.6 (2a) =	105.95 (3a)
First floor		40.75 (1b) x	2.24 (2b) =	91.28 (3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	81.5 (4)		
Dwelling volume		(3a)+(3	(3c)+(3c)+(3d)+(3e)+(3n) =	197.23 (5)
2. Ventilation rate:				
	main secondary heating heating	other	total	m³ per hour
Number of chimneys	0 + 0	+ 0 =	0 x 40 =	0 (6a)
Number of open flues	0 + 0	+ 0 =	0 x 20 =	0 (6b)
Number of intermittent fa	ins		3 x 10 =	30 (7a)
Number of passive vents	;		0 x 10 =	0 (7b)
Number of flueless gas fi	ires		0 x 40 =	0 (7c)
			Air al	
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a))+(7h)+(7c) =		nanges per hour
	peen carried out or is intended, proceed		\div (5) = from (9) to (16)	0.15 (8)
Number of storeys in the		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(-) (-)	0 (9)
Additional infiltration	3		[(9)-1]x0.1 =	0 (10)
Structural infiltration: 0	.25 for steel or timber frame or 0	0.35 for masonry cons	truction	0 (11)
if both types of wall are podeducting areas of openia	resent, use the value corresponding to t ngs): if equal user 0.35	the greater wall area (after		
•	floor, enter 0.2 (unsealed) or 0.1	l (sealed), else enter ()	0 (12)
If no draught lobby, en	ter 0.05, else enter 0			0 (13)
Percentage of windows	s and doors draught stripped			0 (14)
Window infiltration		0.25 - [0.2 x (14) ÷	100] =	0 (15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	0 (16)
Air permeability value,	q50, expressed in cubic metres	per hour per square r	metre of envelope area	5 (17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (8)$), otherwise (18) = (16)		0.4 (18)
Air permeability value applie	es if a pressurisation test has been done	e or a degree air permeabilit	y is being used	
Number of sides sheltered	ed			0 (19)
Shelter factor		(20) = 1 - [0.075 x]		1 (20)
Infiltration rate incorporat	_	$(21) = (18) \times (20) =$	=	0.4 (21)
Infiltration rate modified f	or monthly wind speed	, ,	, , ,	1
Jan Feb	Mar Apr May Jun	Jul Aug Sep	Oct Nov Dec]
Monthly average wind sp	peed from Table 7			_

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind F	actor (2	22a)m =	(22)m ÷	4										
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjuste	ed infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
	0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47		
		<i>tive air</i> o	change i	rate for t	he appli	cable ca	se	•	•					(220)
			using Appe	endix N. (2	(3b) = (23a	a) × Fmv (e	eguation (N	N5)) . othe	rwise (23b	o) = (23a)			0	(23a) (23b)
			overy: effici		, ,	,	. `	,, .	,	, , ,			0	(23c)
a) If b	palance	d mecha	anical ve	entilation	with he	at recov	erv (MVI	HR) (24a	a)m = (2:	2b)m + (23b) x [1 – (23c)		(200)
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If b	balance	d mecha	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24b	m = (22)	2b)m + (23b)	1	ı	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If v	whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	n from o	outside				•	
i <u>f</u>	f (22b)m	า < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	.5 × (23k	o)		_	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
			on or wh							0.51				
Г	<u> </u>	0.63	en (24d) _{0.62}	M = (22)	0.59	0.57	r ´	- ``			0.6	0.61	1	(24d)
(24d)m=					<u> </u>	<u> </u>	0.57	0.57	0.58	0.59	0.6	0.61	J	(240)
(25)m=	0.63	0.63	rate - en	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	1	(25)
` ′ L						0.57	0.57	0.57	0.50	0.59	0.0	0.01		(20)
			eat loss p											
ELEM	IENT	Gros	SS	Openin	as	NIO+ Ar								
		area	(m²)	m		Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-		A X k kJ/K
Doors		area	(m²)				m²							
Doors Window	vs Type		(m²)			A ,r	m ² x	W/m2	2K =	(W/				kJ/K
	,,	e 1	(m²)			A ,r	m² x x1/2	W/m2	eK = 0.04] =	(W/ 1.93				kJ/K (26)
Window	vs Type	: 1 : 2	(m²)			A ,r 1.93	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1 /[1/(1.4)+	= 0.04] = 0.04] =	(W/ 1.93 1.8				kJ/K (26) (27)
Window	vs Type vs Type	2 3	(m²)			A ,r 1.93 1.36	x1/2 x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] =	(W/ 1.93 1.8 1.8				kJ/K (26) (27) (27)
Window Window Window	vs Type vs Type vs Type	2 2 3	(m²)			A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/ 1.93 1.8 1.8 6.79	K)			kJ/K (26) (27) (27) (27) (27)
Window Window Window Window	vs Type vs Type vs Type hts Typ	e 1 e 2 e 3 e 4 e 1	(m²)			A ,r 1.93 1.36 1.36 5.12	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K	(W/ 1.93 1.8 1.8 6.79 2.39	K)			kJ/K (26) (27) (27) (27) (27) (27)
Window Window Window Window Roofligh	vs Type vs Type vs Type hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligl Roofligl	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498	K) 99 94 97			kJ/K (26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3			ļ2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4		m	ļ2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh Floor Walls T	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4	95	14.2	9	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75	x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + 0.13 0.18	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28)
Window Window Window Window Roofligh Roofligh Roofligh Roofligh Floor Walls T Roof	vs Type vs Type vs Type hts Typ hts Typ hts Typ ts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4	95	14.2°	9	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66	x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x1/x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1.7) + /[1.7] +	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

an be u														
	Ū	,	,		using Ap	•	K						13.06	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) ±	(36) =			00.00	
			alculator	l monthly	M					•	25)m x (5)		69.82	(37
Cillia	Jan	Feb	Mar		<u></u>	Jun	Jul	Δυα	Sep	Oct	Nov	Dec	1	
88)m=	41.1	40.76	40.44	Apr 38.91	May 38.62	37.29	37.29	37.05	37.8	38.62	39.2	39.81		(38
,	L			00.01	00.02	07.20	01.20	01.00		<u> </u>	<u> </u>	00.01		(
19)m=	ansfer c	110.59	11, VV/K	108.73	108.45	107.11	107.11	106.87	107.63	108.45	109.03	109.63	1	
9)111=	110.92	110.59	110.20	100.73	100.45	107.11	107.11	100.07			Sum(39) ₁ .		108.73	(39
leat lo	ss para	meter (H	HLP), W/	m²K						$= (39)m \div$		12712-	100.70	(
0)m=	1.36	1.36	1.35	1.33	1.33	1.31	1.31	1.31	1.32	1.33	1.34	1.35		
		_							,	Average =	Sum(40) ₁ .	12 /12=	1.33	(40
lumbe			nth (Tab	<u> </u>			.		_				1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(4.
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
												40	1	(4
ssum	ea occu	pancy, I	V									44		
if TF	A > 13.9			[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		49	I	
if TF if TF	A > 13.9 A £ 13.9	9, N = 1 9, N = 1	+ 1.76 x							ΓFA -13.	.9)		1	·
if TF if TF nnual	A > 13.9 A £ 13.9 I averag	9, N = 1 9, N = 1 e hot wa	+ 1.76 x ater usaç	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		93	.35]	•
if TF if TF nnual educe	A > 13.9 A £ 13.9 I average the annua	9, N = 1 9, N = 1 e hot wa d average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed		+ 36		93			•
if TF if TF nnual educe	A > 13.9 A £ 13.9 I average the annua	9, N = 1 9, N = 1 e hot wa d average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		93]	•
if TF if TF nnual educe ot more	A > 13.9 A £ 13.9 I average the annual of that 125 Jan	P, N = 1 P, N = 1 P hot was I average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	.35		·
if TF if TF nnual educe of more	A > 13.9 A £ 13.9 I average the annual of that 125 Jan	P, N = 1 P, N = 1 P hot was I average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	.35		·
if TF if TF nnual educe ot more ot wate 4)m=	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49	Oct 95.22 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ =	Dec 102.69	1120.25	(4
if TF if TF innual educe of more of wate	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug	+ 36 a water us Sep 91.49	Oct 95.22 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ =	Dec 102.69	1120.25	(4
if TF if TF nnual educe of more of wate 4)m=	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49 0 kWh/mon 106.76	Oct 95.22 Total = Su 124.42	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81	.35 Dec 102.69	1120.25	(4
if TF if TF innual educe of more of wate (4)m= nergy (4)m=	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 102.69 content of 152.29	P, N = 1 P, N = 1 P, N = 1 P hot was all average litres per properties per proper	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - cale 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated me	es per da 5% if the do ater use, l May Vd,m = fa 87.75 onthly = 4.	ay Vd,av lwelling is hot and co Jun ctor from 7 84.02 190 x Vd,r 99.21	erage = designed old) Jul Table 1c x 84.02 m x nm x E 91.94	(25 x N) to achieve Aug (43) 87.75 27m / 3600 105.5	+ 36 a water us Sep 91.49 0 kWh/more 106.76	Oct 95.22 Total = Su 124.42	9) 93 Nov 98.96 m(44)112 = ables 1b, 1	.35 Dec 102.69	1120.25	(4
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if TF if TF nnual educe ot more ot wate 4)m= nergy of 5)m= instant 6)m= /ater	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 taneous with a storage in 102.69	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - calc 137.44 ng at point 0	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water	ay Vd,av lwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage),	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0	+ 36 a water us Sep 91.49 0 kWh/more 106.76 0 to (61)	Oct 95.22 Total = Su 124.42 Total = Su 0	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69		(4
if TF if TF innual educe of more of wate 4)m= hergy of instant 6)m= /ater	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 102.69 content of 152.29 taneous with 125 taneous with 152.29 storage e volume	P, N = 1 P,	ter usaghot water berson per Mar day for ea 95.22 used - calcalcagar at point 0 includin	ge in litre usage by day (all w Apr ach month 91.49 culated me 119.82 of use (no	es per da 5% if the of vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0	ay Vd,av lwelling is hot and co Jun ctor from 7 84.02 190 x Vd,r 99.21 r storage), 0	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46) 0 within sa	+ 36 a water us Sep 91.49 0 kWh/more 106.76 0 to (61)	Oct 95.22 Total = Su 124.42 Total = Su 0	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69		(44
if TF if TF innual educe of more of wate 4)m= hergy of instant 6)m= /ater torag comr	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 taneous with annual enthat 125 taneous with annual enthat 125 content of 152.29 taneous with annual enthat 125 taneous enthat 125 taneous	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early 137.44 and at point 0 including and no tare.	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or W velling, e	ay Vd,av lwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46) 0 within sa	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44)112 = ables 1b, 1 135.81 m(45)112 =	.35 Dec 102.69		(44
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if TF if TF innual educe of more of wate 4)m= nergy of 5)m= instant torag comr otherw /ater a) If m	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 storage enumity he vise if no storage anufaction	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - calc 137.44 ag at point 0 includir nd no tal hot water	Apr Apr Ach month 91.49 culated mo 119.82 of use (no o and any so ank in dw er (this in	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o loar or W welling, e ancludes i	ay Vd,av lwelling is hot and co Jun ctor from 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	Dec 102.69 c, 1d) 147.48 0		(4)
if TF innual educe of more fot water (14)m= inergy (15)m= instant (15)m= vater vater otherw vater inergy (15)m= instant instan	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 storage e volume munity he vise if no storage lanufaction anufaction anu	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early sed - cally	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no o and any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or Water velling, encludes i or is known	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed ild) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69 c, 1d) 147.48 0		(4)
if TF if TF innual educe of more of wate 4)m= hergy of 5)m= instant forms forms forms instant forms forms forms instant forms	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 storage e volume munity h vise if no storage anufactor erature far	P, N = 1 P,	ter usage hot water person per day for early 137.44 137.44 137.44 109 at point of the person per day for early 137.44 137.44 137.44 137.44 137.44 137.44 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw er (this in coss facto 2b , kWh/ye cylinder l	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o loar or W welling, e ncludes i or is kno ear loss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	.35 Dec 102.69 c, 1d) 147.48 0 0 0		(4) (4) (4) (4) (5)
if TF innual educe of more of wate (4)m= instant (6)m= Vater of torag torag of mergy of torag	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we are t	P, N = 1 P,	ter usage hot water overson per Mar day for ear 95.22 used - calcate 137.44 ag at point 0 including at point water overson per day for ear day for	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no o ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or Water velling, encludes i or is known	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	Dec 102.69 = c, 1d) 147.48 = 0		(4: (4: (4: (4: (4: (5:
if TF innual educe of more fot water (14)m= instant (15)m= vater vater of torag commotherw vater empe inergy of torag of	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we are t	Poly N = 1 Poly N = 1	ter usage hot water person per day for early 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no o ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o loar or W welling, e ncludes i or is kno ear loss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	.35 Dec 102.69 c, 1d) 147.48 0 0 0		(4- (4- (4- (4- (4- (5- (5- (5- (5-

Energy lost from wa			(47) x (51) x (52) x (53) =				0		(54)			
Enter (50) or (54) in Water storage loss of	` '	for each	month			((56)m = (55) v (41)	m		0		(55)
	0	0	0	T 0	0	0	0	0	0	0	1	(56)
(56)m= 0 0 If cylinder contains dedic			_			_	_		_	_] lix H	(30)
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss	annual) fr	om Table	e 3							0		(58)
Primary circuit loss	alculated	for each	month ((59)m = ((58) ÷ 36	65 × (41)	m					
(modified by facto	1	ole H5 if t	here is	1	ter heati		cylinde	·			1	
(59)m = 0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calculate	d for each	n month	(61)m =	(60) ÷ 30	65 × (41)m	_		_		_	
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required t	or water h	eating ca	alculated	d for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 129.44 113.2	1 116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		(62)
Solar DHW input calculat								r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or\	WHRS	applies	, see Ap	pendix (G)	,			1	
(63)m = 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from water h	eater										,	
(64)m= 129.44 113.2	1 116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		_
						Outp	out from w	ater heate	r (annual)₁	12	1248.5	(64)
Heat gains from wat	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 >	k [(46)m	+ (57)m	+ (59)m]	
(65)m= 32.36 28.3	29.21	25.46	24.43	21.08	19.54	22.42	22.69	26.44	28.86	31.34		(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal gains (s	ee Table :	5 and 5a):									
Metabolic gains (Tal	ole 5), Wa	tts										
Jan Fe) Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 124.54 124.5	4 124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54		(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m= 19.84 17.6	14.33	10.85	8.11	6.85	7.4	9.62	12.91	16.39	19.13	20.39		(67)
Appliances gains (ca	lculated in	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m= 222.55 224.8	6 219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03	212.73		(68)
Cooking gains (calc	ılated in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5			_	
(69)m= 35.45 35.4	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45		(69)
Pumps and fans gai	ns (Table	5a)									-	
(70)m= 0 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapora	tion (nega	tive valu	es) (Tab	ole 5)							•	
(71)m= -99.63 -99.6	3 -99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63		(71)
Water heating gains	(Table 5)			•							•	
(72)m= 43.5 42.1	39.26	35.36	32.84	29.28	26.26	30.13	31.51	35.54	40.08	42.12		(72)
Total internal gains	· =	•	•	(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72)	m	•	
(73)m= 346.24 344.9		313.22	292.32	272.8	260.51	264.29	274.78	294.68	317.6	335.6		(73)
	•			•								

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.36	x	10.63	x	0.63	x	0.7	=	4.42	(74)
North	0.9x	0.77	x	1.36	x	20.32	х	0.63	X	0.7	=	8.45	(74)
North	0.9x	0.77	x	1.36	x	34.53	X	0.63	X	0.7	=	14.35	(74)
North	0.9x	0.77	x	1.36	x	55.46	х	0.63	x	0.7	=	23.05	(74)
North	0.9x	0.77	x	1.36	x	74.72	x	0.63	x	0.7	=	31.05	(74)
North	0.9x	0.77	x	1.36	x	79.99	x	0.63	x	0.7	=	33.24	(74)
North	0.9x	0.77	x	1.36	x	74.68	x	0.63	x	0.7	=	31.04	(74)
North	0.9x	0.77	x	1.36	x	59.25	x	0.63	x	0.7	=	24.62	(74)
North	0.9x	0.77	x	1.36	x	41.52	x	0.63	x	0.7	=	17.26	(74)
North	0.9x	0.77	x	1.36	x	24.19	x	0.63	x	0.7	=	10.05	(74)
North	0.9x	0.77	x	1.36	x	13.12	x	0.63	x	0.7	=	5.45	(74)
North	0.9x	0.77	x	1.36	x	8.86	x	0.63	x	0.7	=	3.68	(74)
East	0.9x	0.77	x	1.8	x	19.64	x	0.63	x	0.7	=	10.8	(76)
East	0.9x	0.77	x	1.8	x	38.42	x	0.63	X	0.7	=	21.14	(76)
East	0.9x	0.77	x	1.8	x	63.27	x	0.63	x	0.7	=	34.81	(76)
East	0.9x	0.77	x	1.8	x	92.28	x	0.63	x	0.7	=	50.76	(76)
East	0.9x	0.77	x	1.8	x	113.09	x	0.63	x	0.7	=	62.21	(76)
East	0.9x	0.77	x	1.8	x	115.77	x	0.63	x	0.7	=	63.69	(76)
East	0.9x	0.77	x	1.8	x	110.22	x	0.63	x	0.7	=	60.63	(76)
East	0.9x	0.77	x	1.8	x	94.68	x	0.63	x	0.7	=	52.08	(76)
East	0.9x	0.77	X	1.8	x	73.59	x	0.63	X	0.7	=	40.48	(76)
East	0.9x	0.77	X	1.8	x	45.59	x	0.63	X	0.7	=	25.08	(76)
East	0.9x	0.77	X	1.8	X	24.49	X	0.63	X	0.7	=	13.47	(76)
East	0.9x	0.77	X	1.8	x	16.15	x	0.63	X	0.7	=	8.88	(76)
South	0.9x	0.77	X	5.12	X	46.75	X	0.63	X	0.7	=	73.15	(78)
South	0.9x	0.77	X	5.12	x	76.57	X	0.63	X	0.7	=	119.81	(78)
South	0.9x	0.77	X	5.12	x	97.53	x	0.63	X	0.7	=	152.61	(78)
South	0.9x	0.77	X	5.12	x	110.23	x	0.63	X	0.7	=	172.49	(78)
South	0.9x	0.77	X	5.12	x	114.87	X	0.63	X	0.7	=	179.74	(78)
South	0.9x	0.77	X	5.12	X	110.55	X	0.63	x	0.7	=	172.98	(78)
South	0.9x	0.77	X	5.12	x	108.01	X	0.63	X	0.7	=	169.01	(78)
South	0.9x	0.77	X	5.12	x	104.89	X	0.63	X	0.7	=	164.13	(78)
South	0.9x	0.77	X	5.12	x	101.89	x	0.63	x	0.7	=	159.42	(78)
South	0.9x	0.77	X	5.12	x	82.59	x	0.63	x	0.7	=	129.22	(78)
South	0.9x	0.77	X	5.12	x	55.42	x	0.63	x	0.7	=	86.71	(78)
South	0.9x	0.77	X	5.12	X	40.4	X	0.63	X	0.7	=	63.21	(78)

Woot oo			1		1		1		1		1		7,000
West 0.9		0.77	X	1.36	X	19.64	X	0.63	X	0.7] = 1	24.49	(80)
West 0.9	_	0.77	X	1.36	X	38.42	X	0.63	X	0.7	=	47.91	(80)
West 0.9		0.77	X	1.36	X	63.27	X	0.63	X	0.7] =	78.9	(80)
West 0.9		0.77	X	1.36	X	92.28	X	0.63	X	0.7	=	115.06	(80)
West 0.9	_	0.77	X	1.36	X	113.09	X	0.63	X	0.7	=	141.02	(80)
West 0.9	_	0.77	X	1.36	X	115.77	X	0.63	X	0.7	=	144.35	(80)
West 0.9	` <u> </u>	0.77	X	1.36	X	110.22	X	0.63	X	0.7	=	137.43	(80)
West 0.9	(0.77	X	1.36	X	94.68	X	0.63	X	0.7	=	118.05	(80)
West 0.9	(0.77	X	1.36	X	73.59	X	0.63	X	0.7	=	91.76	(80)
West 0.9	(0.77	X	1.36	X	45.59	X	0.63	X	0.7	=	56.85	(80)
West 0.9	(0.77	X	1.36	X	24.49	X	0.63	X	0.7	=	30.54	(80)
West 0.9		0.77	X	1.36	X	16.15	X	0.63	X	0.7	=	20.14	(80)
Rooflights 0.9		1	X	1.12	X	25.93	Х	0.63	X	0.7	=	23.06	(82)
Rooflights 0.9		1	X	1.12	X	25.93	X	0.63	X	0.7	=	23.06	(82)
Rooflights 0.9	(1	X	0.93	X	25.93	X	0.63	x	0.7	=	9.53	(82)
Rooflights 0.9	(1	X	0.66	X	25.93	X	0.63	X	0.7	=	6.76	(82)
Rooflights 0.9	(1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights 0.9	(1	X	1.12	X	51.88	X	0.63	x	0.7	=	46.13	(82)
Rooflights 0.9	(1	x	0.93	X	51.88	x	0.63	x	0.7	=	19.08	(82)
Rooflights 0.9	•	1	X	0.66	X	51.88	x	0.63	x	0.7	=	13.53	(82)
Rooflights 0.9	(1	X	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights 0.9	<	1	x	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights 0.9	<	1	x	0.93	x	88.38	х	0.63	x	0.7	=	32.5	(82)
Rooflights 0.9	(1	X	0.66	x	88.38	x	0.63	X	0.7	=	23.04	(82)
Rooflights 0.9	(1	x	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights 0.9	(1	x	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights 0.9	(1	x	0.93	x	133.65	x	0.63	x	0.7	j =	49.15	(82)
Rooflights 0.9	(1	x	0.66	x	133.65	x	0.63	x	0.7	=	34.85	(82)
Rooflights 0.9	(1	x	1.12	x	168.1	х	0.63	x	0.7	=	149.47	(82)
Rooflights 0.9	(1	x	1.12	x	168.1	x	0.63	x	0.7	j =	149.47	(82)
Rooflights 0.9	(1	x	0.93	x	168.1	х	0.63	x	0.7	j =	61.81	(82)
Rooflights 0.9	(1	x	0.66	x	168.1	х	0.63	x	0.7	j =	43.83	(82)
Rooflights 0.9x	(1	x	1.12	x	174	x	0.63	X	0.7	j =	154.72	(82)
Rooflights 0.9	•	1	x	1.12	x	174	x	0.63	x	0.7	j =	154.72	(82)
Rooflights 0.9	•	1	x	0.93	x	174	х	0.63	x	0.7	j =	63.98	(82)
Rooflights 0.9	,	1	x	0.66	x	174	x	0.63	x	0.7	=	45.37	(82)
Rooflights 0.9	(1	×	1.12	×	164.87	x	0.63	x	0.7	i =	146.6	(82)
Rooflights 0.9		1	X	1.12	X	164.87	X	0.63	x	0.7	=	146.6	(82)
Rooflights 0.9	(1	X	0.93	X	164.87	X	0.63	X	0.7	=	60.62	(82)
Rooflights 0.9	(1	X	0.66	X	164.87	X	0.63	X	0.7	=	42.99	(82)
Rooflights 0.9		1	X	1.12	X	138.72	X	0.63	x	0.7	, 	123.35	(82)
									ı				_ ′

Pooflighto o o F					_		7						— (00)
Rooflights 0.9x	1	X	1.1			138.72] X	0.63	×	0.7	=	123.35	(82)
Rooflights 0.9x	1	X	0.9	93	—	138.72	X	0.63	X	0.7	_ =	51.01	(82)
Rooflights 0.9x	1	X	0.6	66	X	138.72	X	0.63	X	0.7	_ =	36.17	(82)
Rooflights 0.9x	1	X	1.1	12	X	104.33	X	0.63	X	0.7	=	92.77	(82)
Rooflights 0.9x	1	X	1.1	12	X	104.33	X	0.63	X	0.7	=	92.77	(82)
Rooflights 0.9x	1	X	0.9	93	X	104.33	X	0.63	Х	0.7	=	38.36	(82)
Rooflights 0.9x	1	X	0.6	66	X	104.33	X	0.63	X	0.7	=	27.2	(82)
Rooflights 0.9x	1	X	1.1	12	X	62.32	X	0.63	X	0.7	=	55.42	(82)
Rooflights 0.9x	1	X	1.1	12	x	62.32	X	0.63	X	0.7	=	55.42	(82)
Rooflights 0.9x	1	X	0.9	93	x	62.32	X	0.63	X	0.7	=	22.92	(82)
Rooflights 0.9x	1	X	0.6	66	x	62.32	X	0.63	X	0.7	=	16.25	(82)
Rooflights _{0.9x}	1	x	1.1	12	х	32.54	X	0.63	x	0.7	=	28.93	(82)
Rooflights 0.9x	1	X	1.1	12	x	32.54	X	0.63	X	0.7	=	28.93	(82)
Rooflights _{0.9x}	1	x	0.9	93	x	32.54	j×	0.63	x	0.7		11.96	(82)
Rooflights _{0.9x}	1	x	0.6	66	x	32.54	X	0.63	x	0.7	-	8.48	(82)
Rooflights _{0.9x}	1	x	1.1	12	x	21.19] x	0.63	x	0.7		18.84	(82)
Rooflights _{0.9x}	1	x	1.1	12	x	21.19	X	0.63	x	0.7		18.84	(82)
Rooflights 0.9x	1	x	0.9	_	x	21.19]]	0.63	x	0.7	= =	7.79	(82)
Rooflights 0.9x	<u>·</u> 1	x	0.6			21.19]]	0.63	×	0.7	= =	5.53	(82)
J 11 L	· · · · ·						1	0.00				0.00	(- /
Solar gains in	watts ca	lculated	for eac	h month	1		(83)m	n = Sum(74)n	n (82)m				
(83)m= 175.27	322.15	493.39	683.05	818.61	833.06	794.92	692		- ' ' '		146.93]	(83)
Total gains – ir	nternal a	nd solar	(84)m =	= (73)m	+ (83)m	, watts		·			ļ	1	
(84)m= 521.52	667.11	826.37	996.27	1110.93	1105.86	1055.43	957	.06 834.8	665.8	8 532.08	482.53]	(84)
7. Mean inter	nal temn	erature	(heating	season		1						<u>.</u>	
Temperature						from Tal	hle 9	Th1 (°C)				21	(85)
Utilisation fac	Ū	٠.			Ū		010 0	, , , , , , , , , , , , , , , , , , , ,				21	(00)
Jan	Feb	Mar	Apr	May	Jun	Jul	ΙΔ	ug Sep	Oc	t Nov	Dec	1	
(86)m= 1	0.99	0.97	0.91	0.78	0.59	0.44	0.		0.96		1	1	(86)
				<u> </u>	ļ	<u> </u>			0.00	1 0.00	<u> </u>		, ,
Mean interna	r	i		,	1	i 	1		T 00 4	- 1 400	1 40 40	1	(07)
(87)m= 19.52	19.76	20.12	20.54	20.84	20.96	20.99	20.	99 20.89	20.45	19.9	19.49		(87)
Temperature	during h				dwellin	g from Ta	able 9	9, Th2 (°C))			-	
(88)m= 19.79	19.8	19.8	19.81	19.82	19.83	19.83	19.	83 19.82	19.82	19.81	19.81		(88)
Utilisation fac	tor for ga	ains for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 1	0.99	0.96	0.88	0.71	0.49	0.33	0.3	0.68	0.94	0.99	1		(89)
Mean internal	l temper	ature in t	the rest	of dwell	ina T2 (follow ste	eps 3	to 7 in Ta	ble 9c)	-		-	
(90)m= 18.46	18.7	19.06	19.47	19.72	19.82	19.83	19.			18.85	18.44]	(90)
				<u> </u>	Į	1				ving area ÷ (4) =	0.22	(91)
Maan le trans	- سحمها	ahuna 11		ا- مام	۱۱:م ۱۱۰	41 A T 4	. /4	£1.^\ -	· O				
Mean internal	18.94	19.29	r the wh	19.97	20.07	1LA × 11 20.09	+ (1		1	1 19.09	10.67	1	(92)
	l l			l	l						18.67	J	(34)
Apply adjustn	ieni io ii	ie illegij	miema	remper	ature if	טווו ומטופ	, 4€,	where app	nopriate	7			

(93)m=	18.7	18.94	19.29	19.71	19.97	20.07	20.09	20.09	20.02	19.64	19.09	18.67		(93)
` '			uirement	L							1000			
					re ohtair	ned at st	en 11 of	Table 9	n so tha	t Ti m-(76)m an	d re-calc	rulate	
			or gains	•		ica at st	cp i i oi	Table 5	5, 50 tria	it 11,111—(r Ojiii aii	d ic calc	diato	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm):										
(94)m=	1	0.99	0.96	0.88	0.72	0.52	0.35	0.41	0.69	0.94	0.99	1		(94)
Usefu	l gains,	hmGm	, W = (94	4)m x (8	4)m									
(95)m=	518.97	657.85	792.33	874.48	800.81	570.14	371.55	390.01	579.41	622.9	526.31	480.83		(95)
Month	nly aver	age exte	rnal tem	perature	from T	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for me	an intern	al temp	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]	•			
(97)m=	1597.31	1552.34	1410.64	1175.48	896.69	586.24	373.77	394.2	637.07	979.96	1307.18	1586.67		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	802.29	601.1	460.02	216.72	71.33	0	0	0	0	265.65	562.23	822.74		
'			•			•		Tota	l per year	(kWh/yea	r) = Sum(9	8) _{15,912} =	3802.08	(98)
Space	e heatin	a require	ement in	kWh/m²	²/vear								46.65	(99)
•		•			7 y Oui								40.00	
			quiremer											
Calcu			July and				1	۸۰۰۰	Con	Oct	Nov	Doo		
Hoot	Jan	Feb	Mar	Apr	May 5°C into	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(100)m=	0	0 LIII (Ca	0	0	0	1006.88	792.65	and exte	0	o 0	0	0		(100)
` ′		tor for lo			<u> </u>	1000.00	792.03	012.2	0	U				(100)
(101)m=		0	0	0	0	0.91	0.95	0.93	0	0	0	0		(101)
							0.93	0.93	0	0				(101)
(102)m=	0	0	Vatts) = (0	0	915.36	753.23	755.14	0	0	0	0		(102)
								e Table		0				(102)
(103)m=		gairis ca 0	0	101 appli	0	1314.8		1154.83	0	0	0	0		(103)
				L	l			ous (kW		l			 v (41)m	(100)
			(104)m <			iwening,	COMMINA	ous (KVV	(11) — 0.0.	24 X [(1 (<i>)</i> 3)111 — (102)111] 2	x (4 1)111	
(104)m=		0	0	0	0	287.59	375.27	297.37	0	0	0	0		
l		<u> </u>							Total	= Sum(1.0.4)	=	960.24	(104)
Cooled	l fractio	า									area ÷ (4	4) =	1	(105)
Intermi	ttency f	actor (Ta	able 10b)		-	_				-			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
'									Total	l = Sum	(104)	=	0	(106)
		requirer	ment for	month =	(104)m	- ` 	`	1	•	·	1			
(107)m=	0	0	0	0	0	71.9	93.82	74.34	0	0	0	0		
									Total	= Sum((107)	=	240.06	(107)
Space	cooling	requirer	ment in k	رWh/m²/	year				(107)) ÷ (4) =			2.95	(108)
8f. Fab	ric En <u>e</u>	rgy Effi <u>c</u>	iency (ca	alcul <u>ate</u> c	l only un	der spe	cial cond	litions, s	ee s <u>ectic</u>	on 1 <u>1</u>) _				
		y Efficier								+ (108) :	=		49.6	(109)
			y Efficie	encv (TF	EE)				. ,	. ,			57.04	(109)
9			,	- , (- ,								1	 ` '

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V			n: 1.0.5.25	
	Pr	operty Address: HOU	SE C - IMPROV	ED		
Address :	Woodwell Cottage P2, Wood	lwell Road, BRISTOL	, BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(n	1)	Volume(m³)
Ground floor		40.75 (1a) x	2.6	(2a) =	105.95	(3a)
First floor		40.75 (1b) x	2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1n	81.5 (4)				
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	197.23	(5)
2. Ventilation rate:						
	main secondary heating heating	y other	total	_	m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Air ab	anges per ho	
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a	a)+(7h)+(7c) =				_
•	een carried out or is intended, proceed		30 e from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the		• /	, , , ,	[0	(9)
Additional infiltration			[4	(9)-1]x0.1 =	0	(10)
	.25 for steel or timber frame or	•			0	(11)
if both types of wall are pu deducting areas of openir	resent, use the value corresponding to	the greater wall area (after				
•	loor, enter 0.2 (unsealed) or 0.	1 (sealed), else enter	0	[0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) + (+ (12) + (13) + (15) =		0	(16)
	q50, expressed in cubic metres		metre of envelop	oe area	4	(17)
•	ity value, then $(18) = [(17) \div 20] + (8)$				0.35	(18)
	s if a pressurisation test has been done	e or a degree air permeabil	ity is being used	Г		–
Number of sides sheltere Shelter factor	9 0	(20) = 1 - [0.075]	< (19)] =	-	0	(19)
Infiltration rate incorporat	ing shelter factor	$(21) = (18) \times (20)$		l ſ	0.35	(21)
Infiltration rate modified for		(, (; ; ; ; (= 5)		L	0.33	(21)
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct No	v Dec		
Monthly average wind sp			- 1 30. 1 110			
working average willu Sp	TOTAL TABLE /					

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind F	actor (2	2a)m =	(22)m ÷	4										
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjuste	ed infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
	0.45	0.44	0.43	0.39	0.38	0.33	0.33	0.33	0.35	0.38	0.4	0.41		
		<i>tive air</i> o	change i	rate for t	he appli	cable ca	se	•		•				(23a)
_			using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23a)
			overy: effici		, ,	,	. ,	,, .	,	, , ,			0	(23c)
a) If b	palance	d mecha	anical ve	ntilation	with hea	at recov	erv (MVI	HR) (24a	a)m = (2)	2b)m + (23b) x [1 – (23c)		(200)
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If b	balance	d mecha	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24b	m = (22)	2b)m + (23b)		ı	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If v	whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	n from o	outside					
if	f (22b)m	า < 0.5 x	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	5 × (23k	o)		-	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,			on or wh		•					0.51				
Г	0.6	0.6	en (24d) _{0.59}	m = (221)	0.57	0.56		- `			0.50	0.50	1	(24d)
(24d)m=						<u> </u>	0.56	0.55	0.56	0.57	0.58	0.59		(24u)
(25)m=	0.6	cnange _{0.6}	rate - er	o.58) or (240 0.57	0.56 O.56	c) or (24 0.56	0.55	0.56	0.57	0.58	0.59	1	(25)
(23)111=	0.0	0.0	0.59	0.50	0.57	0.30	0.30	0.55	0.30	0.57	0.50	0.59		(20)
			eat loss p											
ELEM	IFNT	O												
		Gros area	_	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²·l		A X k kJ/K
Doors	LIVI		_				m²				K)			
Doors Windov		area	_			A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
	ws Type	area	_			A ,r	m ² x x 10	W/m2	eK = [0.04] = [(W/ 2.702	K)			kJ/K (26)
Windov	vs Type vs Type	area	_			A ,r	m ² x x1 x1 x1	W/m2 1.4 /[1/(1.4)+	eK = [0.04] = [0.04] = [2.702 2.15	K)			kJ/K (26) (27)
Window	vs Type vs Type vs Type	area	_			A ,r 1.93 1.62	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} & & & \\ & & & &$	2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
Window Window Window	vs Type vs Type vs Type vs Type	area	_			A ,r 1.93 1.62 1.62 6.08	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = 0.04 = 0.0	2.702 2.15 2.15 8.06	K)			kJ/K (26) (27) (27) (27) (27)
Window Window Window Window	vs Type vs Type vs Type vs Type hts Typ	area 1 2 2 3 4 4 e 1	_			A ,r 1.93 1.62 1.62 6.08 2.14	x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27) (27)
Window Window Window Roofligh	vs Type vs Type vs Type vs Type hts Typ hts Typ	area : 1 : 2 : 3 : 4 : e 1 : e 2	_			A ,r 1.93 1.62 1.62 6.08 2.14 1.33	x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) +	$ \begin{array}{ccc} & & & & \\ & & & \\ & & $	2.702 2.15 2.15 8.06 2.84 1.729	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Roofligh Roofligh	vs Type vs Type vs Type vs Type hts Typ hts Typ	area 11 22 33 44 e 1 e 2 e 3	_			A ,r 1.93 1.62 1.62 6.08 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) +	$ \begin{array}{ccc} $	2.702 2.15 2.15 8.06 2.84 1.729	K)			kJ/K (26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligl Roofligl	vs Type vs Type vs Type vs Type hts Typ hts Typ	area 11 22 33 44 e 1 e 2 e 3	_			A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} $	2.702 2.15 2.15 8.06 2.84 1.729 1.729	K)			kJ/K (26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ	area 11 22 33 44 e 1 e 2 e 3	(m²)		<u>,</u>	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.37	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	K	2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	area 41 42 43 44 61 62 63 64	(m²)	m	<u>,</u>	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	K	2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh Roofligh Floor Walls T	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	area 1 2 3 4 e 1 e 2 e 3 e 4 e 4 102.9	95	16.6	<u>,</u>	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	K	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b) (28)
Window Window Window Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Floor Walls T Roof	vs Type vs Type vs Type hts Typ hts Typ hts Typ ts Typ	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4	95 3	16.63 0	<u>,</u>	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.2	K	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
Window Window Window Roofligl Roofligl Roofligl Roofligl Roofligl Tloor Walls T Walls T Roof Total ar	vs Type vs Type vs Type hts Typ hts Typ hts Typ ts Typ Type1 Type2 rea of e	area 1 1 2 2 3 3 4 4 ee 1 ee 2 ee 3 ee 4 102.9 11 11 11 11 11 11 11 11 11 11 11 11 11	95 3 , m²	16.63 0	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	EK 0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Roofligl Tloor Walls T Walls T Roof Total an * for wind ** include	vs Type vs Type vs Type hts Typ hts Typ hts Typ Type1 Type2 rea of e dows and e the area	area area a 1 a 2 a 3 a 4 a e 1 a e 2 a 3 a 4 b e 1 a e 2 a 3 a e 4 b e 1 a con to the control of windows on both	95 3 , m² ows, use e sides of in	16.63 0 7.2 ffective will ternal wall	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207 alue calculations	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & &$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Roofligl Tloor Walls T Walls T Roof Total an ** for wind ** include Fabric I	vs Type vs Type vs Type hts Typ hts Typ hts Typ ts Typ cype1 cype2 rea of e dows and e the area heat los	area a1 a2 a3 a4 e1 e2 e3 e4 102.9 a1 a2 a1 a2 a1 a2 a3 a4 b4 b5 c6 a1 c7 c7 c7 c7 c7 c7 c7 c7 c7 c7 c7 c7 c7	95 3 , m ² ows, use e sides of in = S (A x	16.63 0 7.2 ffective will ternal wall	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207 alue calculations	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	K = 0.04 = 0.04 = 0.04 = 0.04 = 0.04 = 0.04 = 0.04 = 0.04 = 0.04 = 0.04 = = = = = = = =	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l		(26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Floor Walls T Walls T Roof Total an * for wind ** include Fabric I Heat ca	vs Type vs Type vs Type vs Type hts Typ hts Typ hts Typ Type1 Type2 rea of e dows and e the area heat los	area a 1 a 2 a 3 a 4 b 1 b 2 c 3 b 4 b 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 7 c 7 c 7 c 7 c 7 c 7 c 7	95 3 , m² ows, use e sides of in = S (A x	16.63 0 7.2 ffective winternal walk	3 ndow U-va	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1 207 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} & & & & & & & \\ & & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & \\$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	3.2	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)

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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

and have a disease	- 1 -6 - 1-	1-9-dl-	de Cere										
can be used instead Thermal bridge				ısina An	nendiy l	K						11.97	(36)
if details of therma	,	,			•							11.97	(30)
Total fabric hea	0 0		()	(0	.,			(33) +	(36) =			75.23	(37)
Ventilation hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × ((25)m x (5))		_
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 39.1	38.85	38.6	37.42	37.21	36.18	36.18	36	36.58	37.21	37.65	38.11		(38)
Heat transfer of	oefficier	nt, W/K			-	-		(39)m	= (37) + (37)	38)m	-		
(39)m= 114.33	114.08	113.83	112.65	112.43	111.41	111.41	111.22	111.81	112.43	112.88	113.34		
Heat loss para	meter (H	HLP), W/	m²K			-			Average = = (39)m ÷		12 /12=	112.65	(39)
(40)m= 1.4	1.4	1.4	1.38	1.38	1.37	1.37	1.36	1.37	1.38	1.38	1.39		
Number of day	s in moi	nth (Tab	le 1a)						Average =	Sum(40) ₁	12 /12=	1.38	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ing ener	rgy requi	rement:								kWh/ye	ear:	
Assumed occu	inancy I	N									40		(42)
if TFA > 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.49		(42)
Annual averag	e hot wa										3.35		(43)
Reduce the annua not more that 125	_				_	_	to achieve	a water us	se target o	f		•	
Jan	Feb	Mar			Jun	Jul	L	Sep	Oct	Nov	Dec		
Hot water usage in			Apr ach month	May Vd,m = fa			Aug (43)	Sep	Oct	I NOV	Dec		
(44)m= 102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49	95.22	98.96	102.69		
` ,						ļ			I Total = Su	<u>I</u> m(44) ₁₁₂ =	<u> </u>	1120.25	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48		_
If instantaneous w	ator hoatii	na at noint	of use (no	hot water	r storaga)	anter () in	hoves (16		Total = Su	m(45) ₁₁₂ =	=	1468.83	(45)
			•					. ,	Ι ,	Ι ,	Ι ,	1	(46)
(46)m= 0 Water storage	0 loss:	0	0	0	0	0	0	0	0	0	0		(40)
Storage volum		includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	eating a	nd no ta	nk in dw	elling, e	nter 110	litres in	(47)					•	
Otherwise if no		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage		odorod I	ooo foot	ar ia kna		2/d0x/):						Ī	(40)
a) If manufact				JI IS KIIO	WII (KVVI	i/uay).					0		(48)
Temperature fa				oor			(49) v (40)				0		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)	, =			0		(50)
Hot water stora	age loss	factor fr	om Tabl								0		(51)
If community h	_		on 4.3									Ī	
Volume factor Temperature fa			2h							_	0		(52) (53)
romporature it	20101 110	Table	_~								U	I	(53)

Energy lost from		•	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or	` , ` `	,									0		(55)
Water storage	loss cal	culated t	for each	month			((56)m = (55) × (41)ı	m -			•	
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H -	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circui	t loss (ar	nual) fro	om Table	3							0		(58)
Primary circui				`	•	,	, ,						
(modified by		i							 			1	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m					•	
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water h	eating ca	alculated	for eacl	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 129.44	113.21	116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		(62)
Solar DHW input	calculated	using App	endix G or	· Appendix	H (negati	ve quantity	v) (enter '0	' if no sola	r contribut	on to wate	er heating)		
(add additiona	al lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from w	ater hea	ter											
(64)m= 129.44	113.21	116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		_
							Outp	out from wa	ater heate	r (annual) ₁	12	1248.5	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	د [(46)m	+ (57)m	+ (59)m]	
(65)m= 32.36	28.3	29.21	25.46	24.43	21.08	19.54	22.42	22.69	26.44	28.86	31.34		(65)
include (57)	m in cal	culation	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal g	ains (see	Table 5	and 5a):									
Metabolic gair	ns (Table	. 5). Wat	ts										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54		(66)
Lighting gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	!			•	
(67)m= 19.84	17.62	14.33	10.85	8.11	6.85	7.4	9.62	12.91	16.39	19.13	20.39		(67)
Appliances ga	ins (calc	ulated ir										l	
(68)m= 222.55	`	uiaicu ii	ı Append	dix L. eq	uation L	13 or L1	3a), also	see Ta	ble 5				
(00)111= 222.33	224.86	219.04	206.65	dix L, eq	uation L ²	13 or L1 166.49	3a), also	see Ta	ble 5 182.39	198.03	212.73	1	(68)
` '	ļ	219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03	212.73		(68)
Cooking gains (69)m= 35.45	ļ	219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03 35.45	212.73] 	(68) (69)
Cooking gains (69)m= 35.45	s (calcula 35.45	219.04 Ited in A 35.45	206.65 ppendix 35.45	191.01 L, equat	176.31 tion L15	166.49 or L15a)	164.18 , also se	170 ee Table	182.39]	
Cooking gains	s (calcula 35.45	219.04 Ited in A 35.45	206.65 ppendix 35.45	191.01 L, equat	176.31 tion L15	166.49 or L15a)	164.18 , also se	170 ee Table	182.39				
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0	35.45 ns gains	219.04 Ited in A 35.45 (Table \$	206.65 ppendix 35.45 5a)	191.01 L, equat 35.45	176.31 tion L15 35.45	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45	182.39 5 35.45	35.45	35.45] 	(69)
Cooking gains (69)m= 35.45 Pumps and fa	35.45 ns gains	219.04 Ited in A 35.45 (Table \$	206.65 ppendix 35.45 5a)	191.01 L, equat 35.45	176.31 tion L15 35.45	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45	182.39 5 35.45	35.45	35.45]]]	(69)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -99.63	s (calcula 35.45 ns gains 0 vaporatio	219.04 Ited in A 35.45 (Table 5 0 on (nega	206.65 ppendix 35.45 5a) 0 tive valu	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5)	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45 0	182.39 5 35.45	35.45	35.45		(69) (70)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. e	s (calcula 35.45 ns gains 0 vaporatio	219.04 Ited in A 35.45 (Table 5 0 on (nega	206.65 ppendix 35.45 5a) 0 tive valu	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5)	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45 0	182.39 5 35.45	35.45	35.45] 	(69) (70)
Cooking gains $(69)m= 35.45$ Pumps and fa $(70)m= 0$ Losses e.g. et $(71)m= -99.63$ Water heating $(72)m= 43.5$	s (calcula 35.45 ns gains 0 vaporatio -99.63 gains (T	219.04 ated in A 35.45 (Table § 0 on (nega -99.63 Table 5) 39.26	206.65 ppendix 35.45 5a) 0 tive valu -99.63	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5) -99.63	166.49 or L15a) 35.45 0 -99.63	164.18 , also se 35.45 0 -99.63	170 ee Table 35.45 0 -99.63	182.39 5 35.45 0	35.45 0 -99.63 40.08	35.45 0 -99.63		(69) (70) (71)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -99.63 Water heating	s (calcula 35.45 ns gains 0 vaporatio -99.63 gains (T 42.12	219.04 ited in A 35.45 (Table § 0 on (nega -99.63 Table 5) 39.26	206.65 ppendix 35.45 5a) 0 tive valu -99.63	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5) -99.63	166.49 or L15a) 35.45 0 -99.63	164.18 , also se 35.45 0 -99.63	170 ee Table 35.45 0 -99.63	182.39 5 35.45 0 -99.63	35.45 0 -99.63 40.08	35.45 0 -99.63		(69) (70) (71)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	6.02	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.8	=	11.5	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	x	0.8	=	19.54	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	31.38	(74)
North	0.9x	0.77	X	1.62	x	74.72	x	0.63	x	0.8	=	42.28	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	45.26	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	42.25	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	33.52	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	23.49	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	13.69	(74)
North	0.9x	0.77	x	1.62	x	13.12	X	0.63	x	0.8	=	7.42	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	5.02	(74)
East	0.9x	0.77	x	2.14	x	19.64	x	0.63	x	0.8	=	14.68	(76)
East	0.9x	0.77	x	2.14	x	38.42	X	0.63	X	0.8	=	28.72	(76)
East	0.9x	0.77	x	2.14	x	63.27	X	0.63	X	0.8	=	47.29	(76)
East	0.9x	0.77	x	2.14	x	92.28	X	0.63	x	0.8	=	68.97	(76)
East	0.9x	0.77	X	2.14	x	113.09	X	0.63	X	0.8	=	84.53	(76)
East	0.9x	0.77	x	2.14	x	115.77	X	0.63	X	0.8	=	86.53	(76)
East	0.9x	0.77	x	2.14	x	110.22	X	0.63	x	0.8	=	82.38	(76)
East	0.9x	0.77	x	2.14	x	94.68	X	0.63	X	0.8	=	70.76	(76)
East	0.9x	0.77	x	2.14	x	73.59	X	0.63	x	0.8	=	55	(76)
East	0.9x	0.77	x	2.14	x	45.59	X	0.63	X	0.8	=	34.08	(76)
East	0.9x	0.77	X	2.14	X	24.49	X	0.63	X	0.8	=	18.3	(76)
East	0.9x	0.77	X	2.14	x	16.15	X	0.63	x	0.8	=	12.07	(76)
South	0.9x	0.77	X	6.08	X	46.75	X	0.63	X	0.8	=	99.28	(78)
South	0.9x	0.77	X	6.08	X	76.57	X	0.63	X	0.8	=	162.6	(78)
South	0.9x	0.77	x	6.08	x	97.53	x	0.63	x	0.8	=	207.12	(78)
South	0.9x	0.77	X	6.08	X	110.23	X	0.63	X	0.8	=	234.09	(78)
South	0.9x	0.77	x	6.08	X	114.87	x	0.63	x	0.8	=	243.94	(78)
South	0.9x	0.77	x	6.08	X	110.55	X	0.63	X	0.8	=	234.76	(78)
South	0.9x	0.77	X	6.08	X	108.01	X	0.63	X	0.8	=	229.37	(78)
South	0.9x	0.77	x	6.08	X	104.89	x	0.63	x	0.8	=	222.75	(78)
South	0.9x	0.77	x	6.08	x	101.89	x	0.63	x	0.8	=	216.36	(78)
South	0.9x	0.77	x	6.08	x	82.59	x	0.63	x	0.8	=	175.38	(78)
South	0.9x	0.77	x	6.08	x	55.42	x	0.63	x	0.8	=	117.68	(78)
South	0.9x	0.77	x	6.08	x	40.4	X	0.63	x	0.8	=	85.79	(78)

\Most	_		1		1		1		l		1		7,00
West 0.9	\vdash	0.77	X	1.62	X	19.64	X	0.63	X	0.8] = 1	33.34	(80)
West 0.9	\vdash	0.77	X	1.62	X	38.42	X	0.63	X	0.8	=	65.22	(80)
West 0.9		0.77	X	1.62	X	63.27	X	0.63	X	0.8	=	107.4	(80)
West 0.9	\vdash	0.77	X	1.62	X	92.28	X	0.63	X	0.8	=	156.64	(80)
West 0.9	×	0.77	X	1.62	X	113.09	X	0.63	X	0.8	=	191.97	(80)
West 0.9	×	0.77	X	1.62	X	115.77	X	0.63	X	0.8	=	196.52	(80)
West 0.9	×	0.77	X	1.62	X	110.22	Х	0.63	X	0.8	=	187.09	(80)
West 0.9	×	0.77	X	1.62	X	94.68	X	0.63	X	0.8	=	160.71	(80)
West 0.9	×	0.77	X	1.62	X	73.59	X	0.63	X	0.8	=	124.91	(80)
West 0.9	x	0.77	X	1.62	X	45.59	X	0.63	X	0.8	=	77.39	(80)
West 0.9	x 🗌	0.77	X	1.62	X	24.49	X	0.63	X	0.8	=	41.57	(80)
West 0.9	x 🗌	0.77	X	1.62	X	16.15	X	0.63	x	0.8	=	27.42	(80)
Rooflights 0.9	x 🗌	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x 🗌	1	X	1.1	X	25.93	x	0.63	X	0.8	=	12.94	(82)
Rooflights 0.9	x 🗌	1	X	0.78	x	25.93	x	0.63	x	0.8	=	9.17	(82)
Rooflights 0.9	x 🗌	1	X	1.33	x	51.88	x	0.63	X	0.8	=	62.59	(82)
Rooflights 0.9	×	1	X	1.33	x	51.88	X	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9	×	1	x	1.1	x	51.88	x	0.63	x	0.8	=	25.88	(82)
Rooflights 0.9	×	1	x	0.78	x	51.88	x	0.63	x	0.8	=	18.35	(82)
Rooflights 0.9	x 🗔	1	x	1.33	x	88.38	x	0.63	x	0.8] =	106.64	(82)
Rooflights 0.9	×	1	x	1.33	x	88.38	x	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9	×	1	x	1.1	x	88.38	x	0.63	x	0.8	=	44.1	(82)
Rooflights 0.9	×	1	x	0.78	x	88.38	x	0.63	x	0.8	j =	31.27	(82)
Rooflights 0.9	×	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	x 🔚	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	×	1	x	1.1	x	133.65	х	0.63	х	0.8	j =	66.69	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	0.78	x	133.65	x	0.63	х	0.8	j =	47.29	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	x	0.63	х	0.8	j =	202.82	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	х	0.63	х	0.8	j =	202.82	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	1.1	x	168.1	x	0.63	х	0.8	j =	83.87	(82)
Rooflights 0.9	×	1	x	0.78	x	168.1	x	0.63	x	0.8	=	59.47	(82)
Rooflights 0.9	×	1	x	1.33	x	174	x	0.63	х	0.8	j =	209.95	(82)
Rooflights 0.9	× $lacksquare$	1	x	1.33	x	174	x	0.63	x	0.8	=	209.95	(82)
Rooflights 0.9	×	1	x	1.1	x	174	x	0.63	x	0.8	=	86.82	(82)
Rooflights 0.9	×	1	X	0.78	X	174	X	0.63	x	0.8	=	61.56	(82)
Rooflights 0.9	×	1	X	1.33	X	164.87	X	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9	_	1	X	1.33	X	164.87	X	0.63	x	0.8	, 	198.92	(82)
Rooflights 0.9	_	1	X	1.1	X	164.87	x	0.63	x	0.8	, =	82.26	(82)
Rooflights 0.9		1	X	0.78	X	164.87	X	0.63	x	0.8	, =	58.33	(82)
Rooflights 0.9		1	X	1.33) x	138.72]] x	0.63	x	0.8] =	167.38	(82)
		<u> </u>	J		1		1		I		ı		_ ` ′

										_				_
Rooflights 0.9x	1	X	1.3	33	X	13	88.72	X	0.63	X	0.8	=	167.38	(82)
Rooflights 0.9x	1	X	1.	1	X	13	88.72	X	0.63	X	0.8	=	69.22	(82)
Rooflights 0.9x	1	X	0.7	' 8	X	13	88.72	X	0.63	X	0.8	=	49.08	(82)
Rooflights 0.9x	1	X	1.3	33	X	10	4.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.3	33	x	10	4.33	x	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.	1	x	10	4.33	X	0.63	x	0.8	=	52.05	(82)
Rooflights 0.9x	1	X	0.7	78	X	10	14.33	X	0.63	x	0.8	=	36.91	(82)
Rooflights 0.9x	1	X	1.3	33	x	62	2.32	X	0.63	x	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.3	33	x	62	2.32	X	0.63	x	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.	1	X	62	2.32	X	0.63	x	0.8	=	31.1	(82)
Rooflights 0.9x	1	X	0.7	78	x	62	2.32	x	0.63	x	0.8	=	22.05	(82)
Rooflights 0.9x	1	X	1.3	33	x	32	2.54	x	0.63	x	0.8	=	39.26	(82)
Rooflights 0.9x	1	X	1.3	33	x	32	2.54	x	0.63	x	0.8	=	39.26	(82)
Rooflights 0.9x	1	x	1.	1	x	32	2.54	x	0.63	x	0.8	_ =	16.23	(82)
Rooflights 0.9x	1	x	0.7	78	x	32	2.54	x	0.63	x	0.8	_ =	11.51	(82)
Rooflights 0.9x	1	x	1.3	33	x	2	1.19	x	0.63	×	0.8	=	25.57	(82)
Rooflights 0.9x	1	x	1.3	33	x	2	1.19	x	0.63	x	0.8	=	25.57	(82)
Rooflights 0.9x	1	x	1.	1	x	2	1.19	x	0.63	x	0.8	=	10.57	(82)
Rooflights 0.9x	1	X	0.7	' 8	X	2	1.19	x	0.63	×	0.8		7.5	(82)
Solar gains in (83)m= 238 Total gains – i (84)m= 584.24	437.45 nternal ar 782.41	670 nd solar 1002.99	927.58 (84)m = 1240.81	1111.71 = (73)m 1404.03	11 + (8 14	31.34 33)m ,	1079.54	940 1205		504.0 798.7	7 291.24	199.5 535.11]	(83)
7. Mean inter			`				- .		TI 4 (0.0)					—
Temperature	Ū	٠.			•			ые 9,	in1 (°C)				21	(85)
Utilisation fac					Ť					0.1	l NI-		7	
(86)m= 1	Feb 0.99	Mar 0.95	Apr 0.85	May 0.68	+	Jun 0.49	Jul 0.36	_	ug Sep 2 0.68	Oct 0.93	+	Dec	-	(86)
` ′	<u> </u>	!		<u> </u>				0.4	!	0.93	0.99	1		(00)
Mean interna	, <u> </u>	ī		,	1	- i							7	(07)
(87)m= 19.54	19.83	20.23	20.66	20.9	2	0.98	21	20.	99 20.92	20.53	19.93	19.49		(87)
Temperature	during he	eating p	eriods ir	rest of	dw	elling	from Ta	ble 9	9, Th2 (°C)			T	7	
(88)m= 19.76	19.76	19.77	19.78	19.78	1	9.79	19.79	19.	79 19.78	19.78	19.77	19.77		(88)
Utilisation fac	tor for ga	ins for r	est of d	welling,	h2,	m (se	e Table	9a)				_	_	
(89)m= 0.99	0.98	0.94	0.81	0.61	(0.41	0.26	0.3	0.58	0.9	0.99	1		(89)
Mean interna	l tempera	ture in t	the rest	of dwell	ing	T2 (fc	ollow ste	ps 3	to 7 in Tabl	e 9c)				
(90)m= 18.45	18.74	19.14	19.53	19.72	1	9.78	19.79	19.	79 19.75	19.43	18.86	18.41]	(90)
				•				-	f	LA = Li	ving area ÷ (4) =	0.22	(91)
Mean interna	l tempera	ture (fo	r the wh	ole dwe	ellina	a) = fl	A x T1	+ (1	– fLA) × T2					
(92)m= 18.7	18.98	19.38	19.78	19.98	_	0.05	20.06	20.		19.68	3 19.1	18.65	7	(92)
Apply adjustr		e mean	interna	l tempei	atu	re fror	m Table	4e,	where appro			I	_	
				•				-	• •	-				

(93)m=	18.7	18.98	19.38	19.78	19.98	20.05	20.06	20.06	20.01	19.68	19.1	18.65		(93)
` '			uirement		10.00	20.00	20.00	20.00	20.01	10.00	10.1	10.00		(00)
					ro obtair	and at et	on 11 of	Table Or	o so tha	t Ti m_/	76)m an	d re-calc	ulato	
				using Ta		ieu at st	ер 11 ог	Table 31	J, 30 IIIA	(11,111–(r O)III air	u re-caic	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac		ains, hm	<u> </u>			Į.		•					
(94)m=	0.99	0.98	0.93	0.81	0.62	0.43	0.29	0.34	0.6	0.9	0.98	0.99		(94)
Usefu	ıl gains,	hmGm .	W = (94	4)m x (8	4)m		!	!						
(95)m=	579.84	763.91	931.98	1002.79	<u> </u>	598.4	384.22	404.67	624.29	717.12	598.28	532.26		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8	ļ	ļ						
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Lm,W =	=[(39)m :	x [(93)m-	– (96)m	1				
(97)m=				1226.08		607.21	385.38	406.97	661.21	1020.83	1354.36	1638.04		(97)
Space	e heating	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97)	m – (95)m] x (4	1)m			
(98)m=	793.24	566.3	397.47	160.77	43.92	0	0	0	0	225.96	544.37	822.7		
				I	<u>Į</u>			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3554.73	(98)
Space	, hootin	a roquir	omont in	kWh/m²	2/voor				. ,	`	,	, , , , , , , , , , , , , , , , , , ,	40.00	(99)
	·	•			ува							L	43.62	(99)
8c. Sp	pace co	oling rec	uiremen	nt										
Calcu				August.	l .		1							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1		<u> </u>			i			and exte		_		Ó		(4.5.5)
(100)m=	0	0	0	0	0	1047.27	824.45	845.3	0	0	0	0		(100)
ĺ		tor for lo		i	i							- 1		(15.1)
(101)m=		0	0	0	0	0.94	0.97	0.96	0	0	0	0		(101)
				(100)m x	<u> </u>							1		
(102)m=	0	0	0	0	0	988.97	800.31	808.37	0	0	0	0		(102)
								e Table				1		
(103)m=		0	0	0	0	1638.2		1424.62	0	0	0	0		(103)
						dwelling,	continu	ous (kW	h') = 0.02	24 x [(10	03)m – (102)m] x	(41)m	
,	04)m to	2ero II (3 × (98	í –	467.45	569.97	458.49	0	0	0			
(104)m=	U	U	0	0	0	467.45	569.97	456.49	0 T -1-1	0	0	0		7(101)
Coolog	I fraction	,								= Sum(104) area ÷ (4	=	1495.91	(104) (105)
			able 10b	`					10=	coolea	aiea - (²	+) = [1	(103)
(106)m=		0	0	0	0	0.25	0.25	0.25	0	0	0	0		
(100)	Ů	ŭ	ŭ			0.20	0.20	0.20		' = Sum(=	0	(106)
Space	cooling	requirer	nent for	month =	: (104)m	× (105)	× (106)r	m	rotai	_ <i>Sum</i> (I MT)	_ [(100)
(107)m=	Ť	0	0	0	0	116.86	142.49	114.62	0	0	0	0		
(- /		-	-				<u> </u>	<u> </u>	Total	= Sum(=	373.98	(107)
Cnass	ممانمم	roguiron	nant in l	\\/\b/m2/	(00°					`	160081)	_ 		⊣
·		•		(Wh/m²/)					` '	÷ (4) =			4.59	(108)
				alculated	only un	der spec	cial cond	litions, se		· · · · ·		,		
Fabrio	Energy	/ Efficier	псу						(99) -	+ (108) =	=		48.2	(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nui	mbor	STDO	030065	
Software Name:	Stroma FSAP 2012	Software V			n: 1.0.5.25	
Continui o Italiio.		roperty Address: HOU				
Address :	Woodwell Cottage P2, Woo					
1. Overall dwelling dime	•					
		Area(m²)	Av. Height(m)	Volume(m³)	
Ground floor		40.75 (1a) x	2.6	(2a) =	105.95	(3a)
First floor		40.75 (1b) x	2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1ı	1) 81.5 (4)				
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	197.23	(5)
2. Ventilation rate:						
	main seconda heating heating	y other	total		m³ per hour	•
Number of chimneys	0 + 0	+ 0 =	0	40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	(20 =	0	(6b)
Number of intermittent far	าร		3 ,	10 =	30	(7a)
Number of passive vents			0 ,	10 =	0	(7b)
Number of flueless gas fin	es		0 ,	40 =	0	(7c)
				A : I-		-
Infiltration due to abine ou	to fly on and form (60) (6b) (7	70) (/7b) (/70) —		-	anges per ho	_
•	rs, flues and fans = (6a)+(6b)+(7 een carried out or is intended, procee		30 from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in th		,	() ()	Г	0	(9)
Additional infiltration	• · · ·		[(9	9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	struction	Ì	0	(11)
if both types of wall are pr deducting areas of openin	esent, use the value corresponding to	the greater wall area (after		_		
=	oor, enter 0.2 (unsealed) or 0	.1 (sealed), else enter (0	Г	0	(12)
If no draught lobby, ent	er 0.05, else enter 0			ļ	0	(13)
Percentage of windows	and doors draught stripped			Ţ	0	(14)
Window infiltration		0.25 - [0.2 x (14) -	- 100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	Ī	0	(16)
Air permeability value,	q50, expressed in cubic metre	es per hour per square	metre of envelop	e area	4	(17)
If based on air permeabili	ty value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16)		Ī	0.35	(18)
Air permeability value applies	s if a pressurisation test has been do	ne or a degree air permeabili	ty is being used	_		_
Number of sides sheltere	d				0	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =	Ĺ	1	(20)
Infiltration rate incorporati	ng shelter factor	$(21) = (18) \times (20) =$	=	[0.35	(21)
Infiltration rate modified for	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Ser	Oct Nov	Dec		
Monthly average wind spe	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for st	nelter an	d wind s	speed) =	(21a) x	(22a)m	•	•			
0.45	0.44	0.43	0.39	0.38	0.33	0.33	0.33	0.35	0.38	0.4	0.41	1	
Calculate effe		•	rate for t	he appli	cable ca	ise	!	<u>!</u>	!	ļ.	ļ.	J	
If mechanic			andiv N. 72	12h) - (22a) × Emy (nguation (N	VEVV otho	nvico (22h) = (23a)			0	(23a)
If balanced wi		0 11		, ,	,	. ,	,, .	,) = (23a)			0	(23b)
a) If balance		•	•	J		,		,	Oh)m ı ((22h) v [1 (22a)	0	(23c)
(24a)m= 0		o lical ve	0	0	0	0	0	0	0	(230) x [0] - 100j	(24a)
b) If balanc					L -					(23h)		J	()
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole I	nouse ex	tract ver	tilation o	r positiv	e input	ventilatio	on from (utside				J	
,	m < 0.5 ×			•	•				.5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m= 0.6	0.6	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59]	(24d)
Effective ai	r change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)	!	ļ.	ļ.	J	
(25)m= 0.6	0.6	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59]	(25)
3. Heat losse	es and he	eat loss r	paramete	er.		•						•	
0													
ELEMENT	Gros	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
		SS	Openin	gs	Net Ar A ,r	m²			A X U (W/	K)			
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [0.04] = [(W/ 2.702	K)			kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r	m ² x x1. x1.	W/m2 1.4 /[1/(1.4)+		2.702 2.15	K)			kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 1.93 1.62	m ² x x ¹ x ¹ x ¹ x ¹	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & \\ & & 0.04 & = \\ 0.04 & & & \\ 0.04 & & & \\ 0.04 & & & \\ \end{array} $	2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area e 1 e 2 e 3 e 4	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08	m ² x x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729	K)			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area e 1 e 2 e 3 e 4 be 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14	m² x x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	$ \begin{array}{ccc} 2K & & & & \\ & & & & \\ & & & & \\ & & & &$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} $	2.702 2.15 2.15 8.06 2.84 1.729 1.729	K)			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.37	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} $	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43	K) 			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4	ss (m²)	Openin	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	EK = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4	ss (m²)	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102.	95	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Type2 Roof	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61.	95 3	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of *for windows and	Gros area e 1 e 2 e 3 e 4 De 1 De 2 De 3 De 4 102. 2 elements	95 3 , m ² ows, use e	Openin m 16.6 0 7.2	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	m²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	EK = [0.04] =	(W/ 2.702 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of * for windows an ** include the area	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61. elements d roof winders on both	95 3 , m ² ows, use e sides of in	16.6. 0 7.2 effective winternal wal	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3] + /	$ \begin{array}{cccc} 2K & & & & & \\ & & & & & \\ & & & & & \\ & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of *for windows an **include the are Fabric heat lo	Gros area e 1 e 2 e 3 e 4 De 1 De 2 De 3 De 4 102. 2 elements d roof wind as on both	95 3 , m ² ows, use e sides of in = S (A x	16.6. 0 7.2 effective winternal wal	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	n 3.2	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of * for windows an ** include the area	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61. elements d roof wind as on both ss, W/K: Cm = S(95 95 3 , m ² ows, use e sides of in = S (A x (A x k)	16.6. 0 7.2 effective winternal wall	gs 1 ² 3 indow U-va Is and pan	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1 207 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3] + /	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)

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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

can he i	ısed instea	ad of a de	tailed calci	ulation										
					using Ap	pendix I	K						11.97	(36)
	_	•	•		= 0.05 x (3	•								(3.27
Total fa	abric hea	at loss							(33) +	(36) =			75.23	(37)
Ventila	tion hea	it loss ca	alculated	l monthly	y				(38)m	= 0.33 × ((25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	39.1	38.85	38.6	37.42	37.21	36.18	36.18	36	36.58	37.21	37.65	38.11		(38)
Heat tr	ansfer c	oefficier	nt, W/K		-	-	-		(39)m	= (37) + (38)m	-		
(39)m=	114.33	114.08	113.83	112.65	112.43	111.41	111.41	111.22	111.81	112.43	112.88	113.34		
Heat lo	ss para	meter (H	HLP), W/	′m²K			-			Average = = (39)m ÷	Sum(39)₁ · (4)	12 /12=	112.65	(39)
(40)m=	1.4	1.4	1.4	1.38	1.38	1.37	1.37	1.36	1.37	1.38	1.38	1.39		
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.38	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	1	(41)
					•	•	•	•		•	•	•	•	
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/y	ear:	
Λ													1	
if TF	ed occu A > 13.9 A £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.		49		(42)
Annua	l averag	e hot wa						(25 x N)				3.35]	(43)
		_			5% if the d ater use, l	_	_	to achieve	a water us	se target o	f		•	
notmore					<u> </u>		•	. .	0				1	
Hot wate	Jan er usage ir	Feb	Mar day for ea	Apr ach month	May Vd,m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49	95.22	98.96	102.69	1	
(44)111=	102.09	90.90	95.22	31.43	07.73	04.02	04.02	07.73			m(44) ₁₁₂ =		1120.25	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600					1120.20	` ′
(45)m=	152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48]	
							!			Total = Su	m(45) ₁₁₂ =	=	1468.83	(45)
If instant		ater heatir	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)				1	
(46)m=	22.84	19.98	20.62	17.97	17.25	14.88	13.79	15.82	16.01	18.66	20.37	22.12		(46)
	storage e volum		includin	na anv so	olar or W	/WHRS	storane	within sa	ame ves	ച		0	1	(47)
•		, ,			elling, e		_		arric voo	001		0		(47)
	-	_			_			mbi boil	ers) ente	er '0' in (47)			
Water	storage	loss:		`					,	·	,			
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0]	(48)
Tempe	erature fa	actor fro	m Table	2b								0]	(49)
•			storage	-				(48) x (49)) =			0]	(50)
•				-	oss fact								1	(E4)
		_	ee secti		e 2 (kW	i // ii (i C /U2	ay <i>)</i>					0	J	(51)
	e factor	-		-								0]	(52)
Tempe	rature fa	actor fro	m Table	2b								0]	(53)

- 3)	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0	(54)	
Enter	(50) or ((54) in (5	55)									0	(55)	
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)	
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)	
Primar	y circuit	loss (ar	nual) fro	om Table	3							0	(58)	
Primar	y circuit	loss cal	culated	for each	month ((59)m = ((58) ÷ 36	55 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)	
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64	(61)	
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12	(62)	
Solar DF	HW input of	calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add ad	dditiona	l lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)	
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63) (G2	2)
Output	from wa	ater hea	ter											
(64)m=	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
•			•			•		Outp	out from w	ater heate	(annual)	12	1617.66 (64)	
Heat g	ains froi	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	53.8	47.14	48.86	42.9	41.39	36.05	33.73	38.24	38.56	44.53	48.21	52.2	(65)	
inclu	de (57)ı	m in cal	culation	of (65)m	only if o	ا ممامدان	. ! 4					•		
5 Int			Jaiation	01 (00)111	Offig if C	giinderi	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
O. IIII	ernal ga		e Table 5			ylinaer i	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
		ains (see	e Table 5	and 5a		ylinder i	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
		ains (see		and 5a		Jun	Jul	dwelling	or hot w Sep	oater is fr	om com	munity h	eating	
	olic gain	ains (see	Table 5	and 5a):								leating (66)	
Metabo (66)m=	olic gain Jan 124.54	s (Table Feb 124.54	E Table 5 E 5), Wat Mar 124.54	ts Apr 124.54	May	Jun	Jul 124.54	Aug 124.54	Sep 124.54	Oct	Nov	Dec		
Metabo (66)m=	olic gain Jan 124.54	s (Table Feb 124.54	E Table 5 E 5), Wat Mar 124.54	ts Apr 124.54	May	Jun 124.54	Jul 124.54	Aug 124.54	Sep 124.54	Oct	Nov	Dec		
Metabo (66)m= Lightin (67)m=	Jan 124.54 g gains	rins (see s (Table Feb 124.54 (calcula	2 Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	ts Apr 124.54 opendix 10.85	May 124.54 L, equat 8.11	Jun 124.54 ion L9 o	Jul 124.54 r L9a), a 7.4	Aug 124.54 Iso see	Sep 124.54 Table 5 12.91	Oct 124.54	Nov 124.54	Dec 124.54	(66)	
Metabo (66)m= Lightin (67)m=	Jan 124.54 g gains 19.84	reb 124.54 (calcula 17.62	2 Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	ts Apr 124.54 opendix 10.85	May 124.54 L, equat 8.11	Jun 124.54 ion L9 o 6.85	Jul 124.54 r L9a), a 7.4	Aug 124.54 Iso see	Sep 124.54 Table 5 12.91	Oct 124.54	Nov 124.54	Dec 124.54	(66)	
Metabo (66)m= Lightin (67)m= Appliar (68)m=	Jan 124.54 g gains 19.84 nces gai	representations (see Feb 124.54 (calcula 17.62 ins (calcula 224.86	Mar 124.54 ted in Ap 14.33 sulated in 219.04	ts Apr 124.54 ppendix 10.85 Appendix 206.65	May 124.54 L, equat 8.11 dix L, eq 191.01	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	(66) (67)	
Metabo (66)m= Lightin (67)m= Appliar (68)m=	Jan 124.54 g gains 19.84 nces gai	representations (see Feb 124.54 (calcula 17.62 ins (calcula 224.86	Mar 124.54 ted in Ap 14.33 sulated in 219.04	ts Apr 124.54 ppendix 10.85 Appendix 206.65	May 124.54 L, equat 8.11 dix L, eq 191.01	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	(66) (67)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m=	Jan 124.54 g gains 19.84 nces ga 222.55 g gains 35.45	reb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45	Mar 124.54 ted in Ap 14.33 culated ir 219.04	ts Apr 124.54 ppendix 10.85 Append 206.65 ppendix 35.45	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat	Jun 124.54 ion L9 o 6.85 uation L 176.31	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a)	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39 212.73	(66) (67) (68)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m=	Jan 124.54 g gains 19.84 nces ga 222.55 g gains 35.45	reb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45	Mar 124.54 ted in Ap 14.33 culated ir 219.04 ated in A 35.45	ts Apr 124.54 ppendix 10.85 Append 206.65 ppendix 35.45	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat	Jun 124.54 ion L9 o 6.85 uation L 176.31	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a)	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39 212.73	(66) (67) (68)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m=	Jan 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far	reb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45 ns gains 3	Mar 124.54 ted in Ap 14.33 sulated in 219.04 ated in A 35.45 (Table §	and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65 oppendix 35.45	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66) (67) (68) (69)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m=	Jan 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far	reb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45 ns gains 3	Mar 124.54 ted in Ap 14.33 culated ir 219.04 ated in A 35.45 (Table \$	and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65 oppendix 35.45	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66) (67) (68) (69)	
Metabo (66)m= Lightine (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	Jan 124.54 g gains 19.84 nces gai 222.55 g gains 35.45 and far 3 s e.g. ev -99.63	raporatic	Mar 124.54 ted in Ap 14.33 culated ir 219.04 ated in A 35.45 (Table 9 3 on (nega	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45 3 es) (Tab	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03 35.45	Dec 124.54 20.39 212.73 35.45	(66) (67) (68) (69) (70)	
Metabo (66)m= Lightine (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	Jan 124.54 g gains 19.84 nces gai 222.55 g gains 35.45 and far 3 s e.g. ev -99.63	raporatic	Mar 124.54 ted in Ap 14.33 culated ir 219.04 ated in A 35.45 (Table 9 3 on (nega	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45 3 es) (Tab	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03 35.45	Dec 124.54 20.39 212.73 35.45	(66) (67) (68) (69) (70)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	polic gains Jan 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far 3 e.g. ev -99.63 heating 72.31	raporatice sgains (See	E Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 culated in 219.04 ated in A 35.45 (Table 5 3 on (nega -99.63 Table 5) 65.67	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3 tive valu -99.63	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45 3 es) (Tab	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3	Oct 124.54 16.39 ble 5 182.39 5 35.45 3 -99.63	Nov 124.54 19.13 198.03 35.45 3 -99.63	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66) (67) (68) (69) (70) (71)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	polic gains Jan 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far 3 e.g. ev -99.63 heating 72.31	raporatic ro.15	E Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 culated in 219.04 ated in A 35.45 (Table 5 3 on (nega -99.63 Table 5) 65.67	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3 tive valu -99.63	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45 3 es) (Tab	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3	Oct 124.54 16.39 ble 5 182.39 5 35.45 3 -99.63	Nov 124.54 19.13 198.03 35.45 3 -99.63	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66) (67) (68) (69) (70) (71)	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.8	=	6.02	(74)
North	0.9x	0.77	x	1.62	x	20.32	X	0.63	x	0.8	=	11.5	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	X	0.8	=	19.54	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	31.38	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	42.28	(74)
North	0.9x	0.77	x	1.62	x	79.99	X	0.63	X	0.8	=	45.26	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	42.25	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	X	0.8	=	33.52	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	23.49	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	X	0.8	=	13.69	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	7.42	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	5.02	(74)
East	0.9x	0.77	x	2.14	x	19.64	x	0.63	x	0.8	=	14.68	(76)
East	0.9x	0.77	x	2.14	x	38.42	x	0.63	x	0.8	=	28.72	(76)
East	0.9x	0.77	x	2.14	x	63.27	x	0.63	x	0.8	=	47.29	(76)
East	0.9x	0.77	x	2.14	x	92.28	x	0.63	x	0.8	=	68.97	(76)
East	0.9x	0.77	x	2.14	x	113.09	x	0.63	x	0.8	=	84.53	(76)
East	0.9x	0.77	x	2.14	x	115.77	x	0.63	x	0.8	=	86.53	(76)
East	0.9x	0.77	x	2.14	x	110.22	x	0.63	x	0.8	=	82.38	(76)
East	0.9x	0.77	x	2.14	x	94.68	X	0.63	x	0.8	=	70.76	(76)
East	0.9x	0.77	x	2.14	x	73.59	x	0.63	x	0.8	=	55	(76)
East	0.9x	0.77	x	2.14	x	45.59	x	0.63	x	0.8	=	34.08	(76)
East	0.9x	0.77	X	2.14	x	24.49	X	0.63	x	0.8	=	18.3	(76)
East	0.9x	0.77	X	2.14	x	16.15	X	0.63	X	0.8	=	12.07	(76)
South	0.9x	0.77	X	6.08	X	46.75	X	0.63	X	0.8	=	99.28	(78)
South	0.9x	0.77	X	6.08	x	76.57	X	0.63	X	0.8	=	162.6	(78)
South	0.9x	0.77	X	6.08	x	97.53	X	0.63	X	0.8	=	207.12	(78)
South	0.9x	0.77	X	6.08	X	110.23	X	0.63	X	0.8	=	234.09	(78)
South	0.9x	0.77	X	6.08	x	114.87	X	0.63	X	0.8	=	243.94	(78)
South	0.9x	0.77	X	6.08	x	110.55	X	0.63	X	0.8	=	234.76	(78)
South	0.9x	0.77	X	6.08	X	108.01	X	0.63	X	0.8	=	229.37	(78)
South	0.9x	0.77	X	6.08	x	104.89	X	0.63	X	0.8	=	222.75	(78)
South	0.9x	0.77	X	6.08	x	101.89	x	0.63	x	0.8	=	216.36	(78)
South	0.9x	0.77	X	6.08	x	82.59	X	0.63	x	0.8	=	175.38	(78)
South	0.9x	0.77	X	6.08	x	55.42	x	0.63	x	0.8	=	117.68	(78)
South	0.9x	0.77	X	6.08	x	40.4	x	0.63	x	0.8	=	85.79	(78)

\Most	_		1		1		1		l		1		7,00
West 0.9	\vdash	0.77	X	1.62	X	19.64	X	0.63	X	0.8] = 1	33.34	(80)
West 0.9	\vdash	0.77	X	1.62	X	38.42	X	0.63	X	0.8	=	65.22	(80)
West 0.9		0.77	X	1.62	X	63.27	X	0.63	X	0.8	=	107.4	(80)
West 0.9	\vdash	0.77	X	1.62	X	92.28	X	0.63	X	0.8	=	156.64	(80)
West 0.9	×	0.77	X	1.62	X	113.09	X	0.63	X	0.8	=	191.97	(80)
West 0.9	×	0.77	X	1.62	X	115.77	X	0.63	X	0.8	=	196.52	(80)
West 0.9	×	0.77	X	1.62	X	110.22	Х	0.63	X	0.8	=	187.09	(80)
West 0.9	×	0.77	X	1.62	X	94.68	X	0.63	X	0.8	=	160.71	(80)
West 0.9	×	0.77	X	1.62	X	73.59	X	0.63	X	0.8	=	124.91	(80)
West 0.9	x	0.77	X	1.62	X	45.59	X	0.63	X	0.8	=	77.39	(80)
West 0.9	x 🗌	0.77	X	1.62	X	24.49	X	0.63	X	0.8	=	41.57	(80)
West 0.9	x 🗌	0.77	X	1.62	X	16.15	X	0.63	x	0.8	=	27.42	(80)
Rooflights 0.9	x 🗌	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x 🗌	1	X	1.1	X	25.93	x	0.63	X	0.8	=	12.94	(82)
Rooflights 0.9	x 🗌	1	X	0.78	x	25.93	x	0.63	x	0.8	=	9.17	(82)
Rooflights 0.9	x 🗌	1	X	1.33	x	51.88	x	0.63	X	0.8	=	62.59	(82)
Rooflights 0.9	×	1	X	1.33	x	51.88	X	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9	×	1	x	1.1	x	51.88	x	0.63	x	0.8	=	25.88	(82)
Rooflights 0.9	×	1	x	0.78	x	51.88	x	0.63	x	0.8	=	18.35	(82)
Rooflights 0.9	x 🗔	1	x	1.33	x	88.38	x	0.63	x	0.8] =	106.64	(82)
Rooflights 0.9	×	1	x	1.33	x	88.38	x	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9	×	1	x	1.1	x	88.38	x	0.63	x	0.8	=	44.1	(82)
Rooflights 0.9	×	1	x	0.78	x	88.38	x	0.63	x	0.8	j =	31.27	(82)
Rooflights 0.9	×	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	x 🔚	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	×	1	x	1.1	x	133.65	х	0.63	х	0.8	j =	66.69	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	0.78	x	133.65	x	0.63	х	0.8	j =	47.29	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	x	0.63	х	0.8	j =	202.82	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	х	0.63	х	0.8	j =	202.82	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	1.1	x	168.1	x	0.63	х	0.8	j =	83.87	(82)
Rooflights 0.9	×	1	x	0.78	x	168.1	x	0.63	x	0.8	=	59.47	(82)
Rooflights 0.9	×	1	x	1.33	x	174	x	0.63	х	0.8	j =	209.95	(82)
Rooflights 0.9	× \sqsubset	1	x	1.33	x	174	x	0.63	x	0.8	=	209.95	(82)
Rooflights 0.9	×	1	x	1.1	x	174	x	0.63	x	0.8	=	86.82	(82)
Rooflights 0.9	×	1	X	0.78	X	174	X	0.63	x	0.8	=	61.56	(82)
Rooflights 0.9	×	1	X	1.33	X	164.87	X	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9	_	1	X	1.33	X	164.87	X	0.63	x	0.8	, 	198.92	(82)
Rooflights 0.9	_	1	X	1.1	X	164.87	x	0.63	x	0.8	, =	82.26	(82)
Rooflights 0.9		1	X	0.78	X	164.87	X	0.63	x	0.8	, =	58.33	(82)
Rooflights 0.9		1	X	1.33) x	138.72]] x	0.63	x	0.8] =	167.38	(82)
		<u> </u>	J		1		1		I		ı		_ ` ′

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Rooflights 0.9x	1	X	1.3			38.72	X	0.63	×	0.8	=	167.38	(82)
Rooflights 0.9x	1	Х	1.	1	X	38.72	X	0.63	×	0.8	=	69.22	(82)
Rooflights _{0.9x}	1	X	0.7	8	X	38.72	X	0.63	X	0.8	=	49.08	(82)
Rooflights 0.9x	1	X	1.3	3	X ·	04.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	04.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights _{0.9x}	1	X	1.	1	X ·	04.33	X	0.63	X	0.8	=	52.05	(82)
Rooflights 0.9x	1	X	0.7	'8	X	04.33	X	0.63	X	0.8	=	36.91	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	x	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.	1	x	62.32	X	0.63	X	0.8	=	31.1	(82)
Rooflights 0.9x	1	X	0.7	'8	x	62.32	x	0.63	X	0.8	=	22.05	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	32.54	x	0.63	x	0.8		39.26	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	32.54	х	0.63	x	0.8	=	39.26	(82)
Rooflights _{0.9x}	1	x	1.	1	х	32.54	x	0.63	x	0.8		16.23	(82)
Rooflights _{0.9x}	1	x	0.7	8	x	32.54	x	0.63	×	0.8	╡ =	11.51	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	21.19	X	0.63	X	0.8	=	25.57	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	21.19	X	0.63	×	0.8		25.57	(82)
Rooflights 0.9x	1	x	1.			21.19) x	0.63	= x	0.8	╡ -	10.57	(82)
Rooflights 0.9x	1	x	0.7			21.19]]	0.63	×	0.8	╡ -	7.5	(82)
, L	· ·		<u> </u>				J	0.00		0.0		7.10	
Solar gains in	watte ca	lculated	for eac	n month			(83)m	n = Sum(74)m	(82)m				
(83)m= 238	437.45	670	927.58			1079.54			504.0		199.5]	(83)
Total gains – ir	nternal a	nd solar	(84)m =	: (73)m ·	+ (83)m	, watts	ļ	Į.		-!		J	
(84)m= 616.05	813.44	1032.4	1268.03	1429.82	1427.93	1362.12	1229	9.35 1060.31	826.0	6 638.72	566.14]	(84)
7. Mean inter	nal temn	erature	(heating	season)			·		<u>'</u>			
Temperature						from Tal	nle 9	Th1 (°C)				21	(85)
Utilisation fac	_				•		010 0,	, 1111 (0)				21	(00)
Jan	Feb	Mar	Apr	May	Jun	Jul	Δ	ug Sep	Oct	Nov	Dec]	
(86)m= 0.99	0.98	0.95	0.84	0.67	0.49	0.36	0.4		0.92		1	1	(86)
` ′					<u> </u>	<u> </u>		<u> </u>	0.02	1 0.00			, ,
Mean interna		i		· •	ì	i	1		T 00.55	1000	10.50	1	(97)
(87)m= 19.57	19.86	20.26	20.67	20.9	20.98	21	20.	99 20.93	20.55	19.96	19.52		(87)
Temperature	during h	~ ~ `			·	from Ta	able 9	9, Th2 (°C)			1	1	
(88)m= 19.76	19.76	19.77	19.78	19.78	19.79	19.79	19.	79 19.78	19.78	19.77	19.77		(88)
Utilisation fac	tor for ga	ains for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 0.99	0.98	0.93	0.8	0.6	0.4	0.26	0.3	0.57	0.89	0.98	1		(89)
Mean interna	tempera	ature in t	the rest	of dwelli	na T2 (follow ste	eps 3	to 7 in Tab	le 9c)		-	-	
(90)m= 17.9	18.31	18.88	19.43	19.7	19.78	19.79	19.	1	19.3	18.48	17.83]	(90)
			<u> </u>	<u> </u>	I	1			fLA = Liv	L ∕ing area ÷ (4) =	0.22	(91)
Moon intorna	tompor	oturo /fo	r tha wh	مام طیب	llina\	: Λ Τ 4	. /4	fl A\ T O					
Mean interna (92)m= 18.27	18.66	19.19	19.71	19.97	20.05	20.06	+ (1		19.58	18.81	18.21	1	(92)
Apply adjustn					l	<u> </u>	<u> </u>		I		10.21	J	(02)
Apply aujustii	ioni io ii	ie ilieali	micilia	remper	ature III	יוו ומטול	, +c ,	where appr	opnate				

(00)	T	40.54	40.04	10.50	40.00	40.0	40.04	1 40 04	40.00	40.40	10.00	40.00	l	(93)
,		18.51	19.04	19.56	19.82	19.9	19.91	19.91	19.86	19.43	18.66	18.06		(93)
8. Space		· ·		nn o rotuu	o obtoin	ad at at	on 11 of	Table 0	h aa tha	tTim (76\m an	d ro colo	vuloto	
Set Ti to the utilisation				•		eu ai sii	ep 11 01	Table 9	u, su ina	t 11,111=(70)III aII	u re-caic	ulate	
	lan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisatio		Ť	i					,			,		ı	
` '	.99	0.97	0.92	0.79	0.6	0.41	0.27	0.32	0.58	0.88	0.98	0.99		(94)
Useful ga		i						T	I		T	I		(05)
` '		788.71	946.36	1002.19	861.37	583.03	367.78	388.52	612.95	726.66	623.73	561.75		(95)
Monthly (96)m=	averaç	ge exte	rnal tem 6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
											7.1	4.2		(90)
Heat loss (97)m= 15		552.27	1426.98			590.27	368.65	390.24	643.49	992.87	1304.82	1570.68		(97)
Space he							l i	l .	l		l	1370.00		(01)
· —	Ť	513.11	357.58	143.17	38.21	0	0.02	0	0	198.06	490.38	750.64		
(00)									l per year	(kWh/vear			3213.46	(98)
Cooss b				L(\ \ / / / 2	14.00				po. you.	(, Jan. (5	C)10,512		╡``
Space h													39.43	(99)
9a. Energ	i i		its – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space h	_				/I-									٦,,,,,,
Fraction	•			-		mentary	•		(554)				0	(201)
Fraction	of spa	ce hea	t from m	ain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction	of tota	I heatir	ng from i	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficienc	y of m	ain spa	ice heati	ng syste	em 1								89.9	(206)
Efficienc	y of se	conda	ry/supple	ementar	y heating	g system	ո, %						0	(208)
_ ,	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space he	eating	require	ement (c	alculated	d above))		,	1		,	1	İ	
72	22.3	513.11	357.58	143.17	38.21	0	0	0	0	198.06	490.38	750.64		
(211)m =	{[(98)n	n x (20	4)] } x 1	00 ÷ (20	6)			_			_		•	(211)
80	3.45	570.76	397.75	159.26	42.5	0	0	0	0	220.31	545.48	834.97		_
								Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3574.49	(211)
Space h	•	`	•	, ,	month									
= {[(98)m								1			T	1	I	
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		7
								Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	<u></u>	0	(215)
Water he	_													
Output fro		er heat 144.61	ter (calci 150.08	<u>132.06</u>	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
Efficiency				132.00	127.01	111.40	104.50	110.14	110.55	137.00	140.04	100.12	87.3	(216)
	9.41	89.32	89.12	88.63	87.89	87.3	87.3	87.3	87.3	88.82	89.28	89.43	07.5	(217)
` '					01.09	01.3	01.3	07.3	01.3	00.02	09.20	09.43		(211)
Fuel for w (219)m =		•												
(219)m= 18		161.91	168.41	148.99	145.2	127.66	119.79	135.32	136.3	154.31	165.81	179.04		
								Tota	I = Sum(2	19a) ₁₁₂ =	•	•	1827.23	(219)
Annual to	otals									k'	Wh/year	•	kWh/year	
Space he	ating f	uel use	d, main	system	1								3574.49	
												'		

Water heating fuel used				1827.23	
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30]	(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (23	80a)(230g) =		75	(231)
Electricity for lighting				350.38	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b) =			5914.4	(338)
12a. CO2 emissions – Individual heating system	s including micro-CHP				
	Energy kWh/year	Emission fac kg CO2/kWh	ctor	Emissions kg CO2/yea	
Space heating (main system 1)			etor =		
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh		kg CO2/yea	ar ¬
	kWh/year (211) x	kg CO2/kWh	=	kg CO2/yea	ar](261)
Space heating (secondary)	kWh/year (211) x (215) x	0.216 0.519 0.216	=	kg CO2/yea	(261) (263)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	0.216 0.519 0.216	=	kg CO2/yea 772.09 0 394.68	(261) (263) (264)
Space heating (secondary) Water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	kg CO2/kWh 0.216 0.519 0.216	= =	kg CO2/yea 772.09 0 394.68 1166.77	(261) (263) (264) (265)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x (232) x	kg CO2/kWh 0.216 0.519 0.216	= = =	kg CO2/yea 772.09 0 394.68 1166.77 38.93	(261) (263) (264) (265) (267)

El rating (section 14)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU	ISE C - IMPRO\	/ED		
Address:	Woodwell Cottage P2, V	Voodwell Road, BRISTOL	, BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(ı	n)	Volume(m³)_
Ground floor		40.75 (1a) x	2.6	(2a) =	105.95	(3a)
First floor		40.75 (1b) x	2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 81.5 (4)				
Dwelling volume		(3a)+((3b)+(3c)+(3d)+(3e)	+(3n) =	197.23	(5)
2. Ventilation rate:						
	main secor heating heati		total		m³ per hou	r
Number of chimneys	0 + (0	x 40 =	0	(6a)
Number of open flues	0 + () + 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents	•		0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Δir ch	anges per ho	ur
Infiltration due to chimne	ys, flues and fans = $(6a)+(6a)$	(b)+(7a)+(7b)+(7c) =	30	÷ (5) =	0.15	\(\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\
·	peen carried out or is intended, pr			. (0) –	0.13	
Number of storeys in the	he dwelling (ns)			[0	(9)
Additional infiltration				[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber fram	e or 0.35 for masonry con	struction	Ī	0	(11)
if both types of wall are pa deducting areas of openia	resent, use the value correspond	ling to the greater wall area (after		•		
	floor, enter 0.2 (unsealed)	or 0.1 (sealed), else enter	0	[0	(12)
If no draught lobby, en	ter 0.05, else enter 0			İ	0	(13)
Percentage of windows	s and doors draught stripp	ed		İ	0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =	İ	0	(15)
Infiltration rate		(8) + (10) + (11) +	+ (12) + (13) + (15) =	: j	0	(16)
Air permeability value,	q50, expressed in cubic m	netres per hour per square	metre of envelo	pe area	5	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 2]$	20]+(8), otherwise (18) = (16)			0.4	(18)
Air permeability value applie	es if a pressurisation test has bee	n done or a degree air permeabil	lity is being used	L		_
7 iii pormodomity valdo applio				ſ		(19)
Number of sides sheltere	ed				0	(13)
	ed	(20) = 1 - [0.075 :	x (19)] =	ŀ	1	(20)
Number of sides sheltered		(20) = 1 - [0.075 x (21) = (18) x (20)		[⊣ ``
Number of sides sheltere Shelter factor	ting shelter factor				1	(20)
Number of sides sheltered Shelter factor Infiltration rate incorporate	ting shelter factor for monthly wind speed		=	ov Dec	1	(20)

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor (2	2a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infiltra	ation rat	e (allowi	na for st	nelter an	d wind s	speed) =	(21a) x	(22a)m		-		-	
0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47	1	
Calculate effect		_	rate for t	he appli	cable ca	se							(co.).
If mechanica			endix N. (2	3b) = (23a	a) × Fmv (e	eguation (1	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced with		0		, ,	,	. ,	,, .	,	,, = (20a)			0	(23b) (23c)
a) If balance		•	•	· ·		`		,	2b)m + (23b) x [1 – (23c)		(230)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	d mecha	anical ve	ntilation	without	heat red	covery (N	иV) (24b	m = (22)	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	on from o	outside	•	•	•	•	
if (22b)n	า < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	.5 × (23b)			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)m									0.51				
(24d)m= 0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61]	(24d)
Effective air	change	rate - en	nter (24a	or (24b	o) or (24	c) or (24	·d) in bo	к (25)	!	!	ļ.	J	
(25)m= 0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	1	(25)
3. Heat losse	s and he	eat loss r	paramete	er:		•		•	•			4	
ELEMENT	Gros area	-	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/l	K)	k-value		A X k kJ/K
Doors		-	Openin	gs		m²				K)			
	area	-	Openin	gs	A ,r	m ² x	W/m2	2K =	(W/I	K)			kJ/K
Doors	area	-	Openin	gs	A ,r	m² x x1	W/m2	eK = 0.04] =	(W/l	K)			kJ/K (26)
Doors Windows Type	area	-	Openin	gs	A ,r 1.93	m² x x1 x1	W/m2 1 /[1/(1.4)+	= 0.04] = 0.04] =	1.93 1.8	K)			kJ/K (26) (27)
Doors Windows Type Windows Type	area	-	Openin	gs	A ,r 1.93 1.36	m ² x x ¹ x ¹ x ¹	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] =	1.93 1.8 1.8	K)			kJ/K (26) (27) (27)
Doors Windows Type Windows Type Windows Type	area	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] =	1.93 1.8 1.8 6.79				kJ/K (26) (27) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type	area 1 2 2 3 4 4 e 1	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	(W/l 1.93 1.8 1.8 6.79 2.39	9			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ	area : 1 : 2 : 3 : 4 : 4 : e 1 : e 2	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201	x1 x1 x1 x1 76 x1 x1	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	0.04] = 0.04]	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429	9			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) +	K	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429	9 9 4			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646	x1 x1 x1 x1 76 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	(m²)	Openin	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1 x1 x1 x1 76 x1 x1 452 x1 x1	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/I 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680	9 9 4 7			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ	area 41 42 43 44 61 62 63 64	(m²)	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1 x1 x1 x1 76 x1 x1 452 x1 x1	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1	area 1 2 3 4 e 1 e 2 e 3 e 4 e 4	95	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b) (28)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1 Walls Type2	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4 102.9	95 3	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1.7) + /[1.7] +	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36	9 9 4 7			(26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1 Walls Type2 Roof	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4 102.5 102.5 102.5 102.5 103.5 104.5 107.5 108.5 109.	95 3 , m ² ows, use e	Openin m 14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and	area area area area area area area area	95 3 , m² ows, use e sides of in	14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²-	K	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and ** include the area	area a1 a2 a3 a4 e1 e2 e3 e4 e1 e2 e3 e4 lements roof winders on both as on both	95 3 , m² ows, use e sides of in = S (A x	14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²•	K	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and ** include the area Fabric heat los	area a 1 a 2 a 3 a 4 b 1 b 2 c 3 b 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 7 c 61.5 c 7 c of windows as on both	95 3 , m ² ows, use e sides of in = S (A x (A x k)	14.29 0 6.06 effective winternal walk	gs 2 9 Indow U-vals and pan	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculatitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [] as given in	kJ/m²•	1 3.2 56.77	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29) (30) (31)

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oon he used insta	ad of a do	tailed color	ulation										
can be used instead Thermal bridge				usina Ar	nendix l	<						13.06	(36)
if details of therma					-	`						13.00	(30)
Total fabric hea	0 0		()	(-	• /			(33) +	(36) =			69.82	(37)
Ventilation hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5))		_
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 41.1	40.76	40.44	38.91	38.62	37.29	37.29	37.05	37.8	38.62	39.2	39.81		(38)
Heat transfer of	oefficier	nt, W/K	-	-	-	-	-	(39)m	= (37) + (37)	38)m	-		
(39)m= 110.92	110.59	110.26	108.73	108.45	107.11	107.11	106.87	107.63	108.45	109.03	109.63		
Heat loss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ · (4)	12 /12=	108.73	(39)
(40)m= 1.36	1.36	1.35	1.33	1.33	1.31	1.31	1.31	1.32	1.33	1.34	1.35		
Nivershau of day		ath /Tab	la 4a\					,	Average =	Sum(40) ₁	12 /12=	1.33	(40)
Number of day Jan	Feb	Mar		May	Jun	Jul	Δυα	Sep	Oct	Nov	Dec	1	
(41)m= 31	28	31	Apr 30	31	30	31	Aug 31	30 30	31	30	31		(41)
(11)=	20	<u> </u>		<u> </u>		<u> </u>		00	<u> </u>			J	()
4. Water heat	ing once	rav roqui	iromont:								kWh/y	oor:	
4. Water fleat	ing ener	igy requi	nement.								KVVII/y	- -	
Assumed occu	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.49		(42)
if TFA £ 13.9 Annual averag	•	ater usad	ge in litre	es per da	av Vd.av	erage =	(25 x N)	+ 36		93	3.35	1	(43)
Reduce the annua	ıl average	hot water	usage by	5% if the a	lwelling is	designed			se target o			J	(12)
not more that 125				ater use, i	not ana co I		ı				ı	1	
Jan Hot water usage ir	Feb	Mar day for ea	Apr	May	Jun	Jul Table 10 x	Aug	Sep	Oct	Nov	Dec		
	-						· ·	04.40	95.22	00.06	100.60	1	
(44)m= 102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49		98.96 m(44) ₁₁₂ =	102.69	1120.25	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600			(,		1120.23	(``)
(45)m= 152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48]	
					l .	l .			Γotal = Su	m(45) ₁₁₂ =	=	1468.83	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)				1	
(46)m= 22.84 Water storage	19.98	20.62	17.97	17.25	14.88	13.79	15.82	16.01	18.66	20.37	22.12		(46)
Storage volum		includin	ng anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	1	(47)
If community h	` ,		•			•						J	(,
Otherwise if no	•			•			` '	ers) ente	er '0' in (47)			
Water storage												•	
a) If manufact				or is kno	wn (kWł	n/day):					0]	(48)
Temperature fa											0		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)) =			0		(50)
Hot water stora			-								0]	(51)
If community h	eating s	ee secti		•									• •
Volume factor			Ol-							-	0		(52)
Temperature fa	acior tro	ın rabie	ZD								0	J	(53)

Lucigy	lost fro	m water	· storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54	1)
Enter	(50) or ((54) in (5	55)									0	(55	5)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56	5)
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57	7)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58	3)
Primar	y circuit	loss cal	culated	for each	month ((59)m = $($	(58) ÷ 36	5 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59	9)
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 36	65 × (41)	m						
(61)m=	50.96	45.55	48.52	45.12	44.72	41.43	42.82	44.72	45.12	48.52	48.8	50.96	(61	1)
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44	(62	2)
Solar DH	HW input of	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	') (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)				_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63	3)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63	3) (G2)
Output	from wa	ater hea	ter											
(64)m=	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44		
·		-	-	-	-	-	-	Outp	out from w	ater heate	r (annual)	12	2026.06 (64	1)
Heat g	ains froi	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	63.37	55.67	57.00	54.40	40.44	40.0-	44.07					1	1	
		00.07	57.83	51.12	49.41	43.35	41.27	46.26	46.78	53.5	57.36	61.78	(65	5)
inclu		<u> </u>	<u> </u>	<u> </u>		ļ	<u> </u>			53.5 rater is fr)	5)
	ıde (57)ı	m in cal	culation	<u> </u>	only if c	ļ	<u> </u>)	5)
5. Int	ide (57)i ernal ga	m in cal	culation of Table 5	of (65)m and 5a	only if c	ļ	<u> </u>)	5)
5. Int	ide (57)i ernal ga	m in cald ains (see	culation of Table 5	of (65)m and 5a	only if c	ļ	<u> </u>)	5)
5. Int	de (57) ernal ga olic gain	m in calo ains (see as (Table	culation Table 5 5), Wat	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	rater is fr	om com	munity h)	
5. Int Metabo (66)m=	ernal ga olic gain Jan 124.54	m in cald ains (see s (Table Feb 124.54	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 124.54	only if c): May 124.54	ylinder i	Jul 124.54	Aug 124.54	or hot w Sep 124.54	rater is fr	om com	munity h	neating	
5. Int Metabo (66)m=	ernal ga olic gain Jan 124.54	m in caldains (see	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 124.54	only if c): May 124.54	Jun	Jul 124.54	Aug 124.54	or hot w Sep 124.54	rater is fr	om com	munity h	neating	5)
5. Int Metabo (66)m= Lightin (67)m=	ernal ga olic gain Jan 124.54 g gains	m in calo	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	of (65)m 6 and 5a ts Apr 124.54 opendix 10.85	only if c): May 124.54 L, equat 8.11	Jun 124.54	Jul 124.54 r L9a), a	Aug 124.54 Iso see	Sep 124.54 Table 5	Oct 124.54	Nov	Dec	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m=	ernal ga olic gain Jan 124.54 g gains 19.84	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	of (65)m 6 and 5a ts Apr 124.54 opendix 10.85	only if c): May 124.54 L, equat 8.11	Jun 124.54 ion L9 o	Jul 124.54 r L9a), a	Aug 124.54 Iso see	Sep 124.54 Table 5	Oct 124.54	Nov	Dec	neating (66	55)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal ga olic gain Jan 124.54 g gains 19.84 nces ga 222.55	m in calconing (See See See See See See See See See Se	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04	of (65)m 5 and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta 170	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54	neating (66	55)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal ga olic gain Jan 124.54 g gains 19.84 nces ga 222.55	m in calconing (See See See See See See See See See Se	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04	of (65)m 5 and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta 170	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45	m in calconing in calconing (see Feb 124.54 (calcula 17.62 ins (calconing calconing (calcula c	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45	of (65)m s and 5a ts Apr 124.54 opendix 10.85 n Append 206.65 ppendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45	m in calconains (see Feb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45	of (65)m s and 5a ts Apr 124.54 opendix 10.85 n Append 206.65 ppendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	neating (66	(5) (7) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	plic gain Jan 124.54 g gains 19.84 nces gain 222.55 ng gains 35.45 and far	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc 224.86 (calcula 35.45 ns gains	Table 5 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45 (Table 5	of (65)m 5 and 5a ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66 (67 (68	(5) (7) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	plic gain Jan 124.54 g gains 19.84 nces gain 222.55 ng gains 35.45 and far	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc 224.86 (calcula 35.45 ns gains	Table 5 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45 (Table 5	of (65)m 5 and 5a ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66 (67 (68	55) 7) 3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga plic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 s e.g. ev	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ns gains 3	Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ted in A 35.45 (Table 9 3 on (nega	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 n Append 206.65 opendix 35.45 opendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73 35.45	(66 (68 (69	55) 7) 3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga plic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 s e.g. ev	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ins gains 3 raporatio -99.63	Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ted in A 35.45 (Table 9 3 on (nega	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 n Append 206.65 opendix 35.45 opendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73 35.45	(66 (68 (69	(5) (7) (3) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 e.g. ev -99.63 heating 85.18	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calcula 35.45 ns gains 3 raporatic -99.63 gains (T	ted in April 124.54 ted in	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 Appendix 206.65 opendix 35.45 oa) 3 tive valu -99.63	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3 -99.63	Oct 124.54 16.39 ble 5 182.39 2 5 35.45	Nov 124.54 19.13 198.03 35.45 3	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66 (67 (68 (70	(5) (7) (3) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 e.g. ev -99.63 heating 85.18	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ins gains 3 raporatio -99.63 gains (Table 82.85	ted in April 124.54 ted in	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 Appendix 206.65 opendix 35.45 oa) 3 tive valu -99.63	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3 -99.63	Oct 124.54 16.39 ble 5 182.39 5 35.45 3 -99.63	Nov 124.54 19.13 198.03 35.45 3	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66 (67 (68 (70	(5) (7) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.36	x	10.63	x	0.63	x	0.7	=	4.42	(74)
North	0.9x	0.77	x	1.36	x	20.32	х	0.63	X	0.7	=	8.45	(74)
North	0.9x	0.77	x	1.36	x	34.53	X	0.63	X	0.7	=	14.35	(74)
North	0.9x	0.77	x	1.36	x	55.46	х	0.63	x	0.7	=	23.05	(74)
North	0.9x	0.77	x	1.36	x	74.72	x	0.63	x	0.7	=	31.05	(74)
North	0.9x	0.77	x	1.36	x	79.99	x	0.63	x	0.7	=	33.24	(74)
North	0.9x	0.77	x	1.36	x	74.68	x	0.63	x	0.7	=	31.04	(74)
North	0.9x	0.77	x	1.36	x	59.25	x	0.63	x	0.7	=	24.62	(74)
North	0.9x	0.77	x	1.36	x	41.52	x	0.63	x	0.7	=	17.26	(74)
North	0.9x	0.77	x	1.36	x	24.19	x	0.63	x	0.7	=	10.05	(74)
North	0.9x	0.77	x	1.36	x	13.12	x	0.63	x	0.7	=	5.45	(74)
North	0.9x	0.77	x	1.36	x	8.86	x	0.63	x	0.7	=	3.68	(74)
East	0.9x	0.77	x	1.8	x	19.64	x	0.63	x	0.7	=	10.8	(76)
East	0.9x	0.77	x	1.8	x	38.42	x	0.63	X	0.7	=	21.14	(76)
East	0.9x	0.77	x	1.8	x	63.27	x	0.63	x	0.7	=	34.81	(76)
East	0.9x	0.77	x	1.8	x	92.28	x	0.63	x	0.7	=	50.76	(76)
East	0.9x	0.77	x	1.8	x	113.09	x	0.63	x	0.7	=	62.21	(76)
East	0.9x	0.77	x	1.8	x	115.77	x	0.63	x	0.7	=	63.69	(76)
East	0.9x	0.77	x	1.8	x	110.22	x	0.63	x	0.7	=	60.63	(76)
East	0.9x	0.77	x	1.8	x	94.68	x	0.63	x	0.7	=	52.08	(76)
East	0.9x	0.77	X	1.8	x	73.59	x	0.63	X	0.7	=	40.48	(76)
East	0.9x	0.77	X	1.8	x	45.59	x	0.63	X	0.7	=	25.08	(76)
East	0.9x	0.77	X	1.8	X	24.49	X	0.63	X	0.7	=	13.47	(76)
East	0.9x	0.77	X	1.8	x	16.15	x	0.63	X	0.7	=	8.88	(76)
South	0.9x	0.77	X	5.12	X	46.75	X	0.63	X	0.7	=	73.15	(78)
South	0.9x	0.77	X	5.12	x	76.57	X	0.63	X	0.7	=	119.81	(78)
South	0.9x	0.77	X	5.12	x	97.53	x	0.63	X	0.7	=	152.61	(78)
South	0.9x	0.77	X	5.12	x	110.23	x	0.63	X	0.7	=	172.49	(78)
South	0.9x	0.77	X	5.12	x	114.87	X	0.63	X	0.7	=	179.74	(78)
South	0.9x	0.77	X	5.12	X	110.55	X	0.63	x	0.7	=	172.98	(78)
South	0.9x	0.77	X	5.12	x	108.01	X	0.63	X	0.7	=	169.01	(78)
South	0.9x	0.77	X	5.12	x	104.89	X	0.63	X	0.7	=	164.13	(78)
South	0.9x	0.77	X	5.12	x	101.89	x	0.63	x	0.7	=	159.42	(78)
South	0.9x	0.77	X	5.12	x	82.59	x	0.63	x	0.7	=	129.22	(78)
South	0.9x	0.77	X	5.12	x	55.42	x	0.63	x	0.7	=	86.71	(78)
South	0.9x	0.77	X	5.12	X	40.4	X	0.63	X	0.7	=	63.21	(78)

West	ر م می ا		1		1		1		١		1		7(00)
	0.9x	0.77	X	1.36	X	19.64	X 1	0.63	X	0.7	= 1	24.49	(80)
	0.9x	0.77	X	1.36	X	38.42	X	0.63	X	0.7	=	47.91	(80)
	0.9x	0.77	X	1.36	X	63.27	X I	0.63	X	0.7] = 1	78.9	(80)
	0.9x	0.77	X	1.36	X	92.28	X	0.63	X	0.7	=	115.06	(80)
	0.9x	0.77	X	1.36	X	113.09	X	0.63	X	0.7] = 1	141.02	(80)
	0.9x	0.77	X	1.36	X	115.77	X	0.63	X	0.7] = 1	144.35	(80)
	0.9x	0.77	X	1.36	X	110.22	X	0.63	X	0.7] = 1	137.43	(80)
	0.9x	0.77	X	1.36	X	94.68	X	0.63	X	0.7	=	118.05	(80)
	0.9x	0.77	X	1.36	X	73.59	X	0.63	X	0.7	=	91.76	(80)
	0.9x	0.77	X	1.36	X	45.59	X	0.63	X	0.7	=	56.85	(80)
	0.9x	0.77	X	1.36	X	24.49	X	0.63	X	0.7	=	30.54	(80)
	0.9x	0.77	X	1.36	X	16.15	X	0.63	X	0.7	=	20.14	(80)
Rooflights		1	X	1.12	X	25.93	Х	0.63	X	0.7	=	23.06	(82)
Rooflights	<u> </u>	1	X	1.12	X	25.93	X	0.63	X	0.7	=	23.06	(82)
Rooflights	느	1	X	0.93	X	25.93	X	0.63	X	0.7	=	9.53	(82)
Rooflights	<u> </u>	1	X	0.66	X	25.93	X	0.63	X	0.7	=	6.76	(82)
Rooflights		1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights		1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights		1	X	0.93	X	51.88	x	0.63	X	0.7	=	19.08	(82)
Rooflights	0.9x	1	X	0.66	X	51.88	X	0.63	X	0.7	=	13.53	(82)
Rooflights	0.9x	1	X	1.12	X	88.38	x	0.63	X	0.7	=	78.59	(82)
Rooflights	0.9x	1	X	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights	0.9x	1	X	0.93	x	88.38	x	0.63	x	0.7	=	32.5	(82)
Rooflights	0.9x	1	X	0.66	x	88.38	x	0.63	x	0.7	=	23.04	(82)
Rooflights	0.9x	1	X	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights	0.9x	1	X	1.12	X	133.65	X	0.63	X	0.7	=	118.84	(82)
Rooflights	0.9x	1	X	0.93	x	133.65	x	0.63	X	0.7	=	49.15	(82)
Rooflights	0.9x	1	X	0.66	x	133.65	x	0.63	x	0.7	=	34.85	(82)
Rooflights	0.9x	1	X	1.12	x	168.1	x	0.63	x	0.7	=	149.47	(82)
Rooflights	0.9x	1	X	1.12	x	168.1	x	0.63	x	0.7	=	149.47	(82)
Rooflights	0.9x	1	X	0.93	x	168.1	x	0.63	x	0.7	=	61.81	(82)
Rooflights	0.9x	1	X	0.66	x	168.1	x	0.63	x	0.7	=	43.83	(82)
Rooflights	0.9x	1	X	1.12	x	174	x	0.63	x	0.7	=	154.72	(82)
Rooflights	0.9x	1	x	1.12	x	174	x	0.63	x	0.7	=	154.72	(82)
Rooflights	0.9x	1	X	0.93	x	174	x	0.63	x	0.7	=	63.98	(82)
Rooflights	0.9x	1	x	0.66	x	174	x	0.63	x	0.7	=	45.37	(82)
Rooflights	0.9x	1	x	1.12	x	164.87	x	0.63	x	0.7	=	146.6	(82)
Rooflights	0.9x	1	x	1.12	x	164.87	x	0.63	x	0.7	j =	146.6	(82)
Rooflights	0.9x	1	x	0.93	x	164.87	x	0.63	x	0.7	j =	60.62	(82)
Rooflights	0.9x	1	x	0.66	x	164.87	x	0.63	x	0.7	j =	42.99	(82)
Rooflights	0.9x	1	X	1.12	x	138.72	x	0.63	x	0.7	=	123.35	(82)

																_
Rooflights 0.9x	1	X	1.1	2	x	13	38.72	X	0.63	,	x	0.7		=	123.35	(82)
Rooflights 0.9x	1	X	0.9)3	X	13	38.72	X	0.63	,	x	0.7		=	51.01	(82)
Rooflights 0.9x	1	X	0.6	66	x	13	38.72	X	0.63	,	x	0.7		=	36.17	(82)
Rooflights 0.9x	1	X	1.1	2	x	10	04.33	X	0.63	,	x	0.7		=	92.77	(82)
Rooflights 0.9x	1	X	1.1	2	x	10)4.33	x	0.63	,	x	0.7		=	92.77	(82)
Rooflights 0.9x	1	Х	0.9)3	x	10	04.33	X	0.63	,	x	0.7		=	38.36	(82)
Rooflights 0.9x	1	X	0.6	66	x	10	04.33	x	0.63	,	x [0.7		=	27.2	(82)
Rooflights 0.9x	1	X	1.1	2	x	6	2.32	X	0.63	,	x	0.7		=	55.42	(82)
Rooflights 0.9x	1	X	1.1	2	x	6	2.32	x	0.63	,	x	0.7		=	55.42	(82)
Rooflights 0.9x	1	X	0.9)3	x	6	2.32	x	0.63	,	x [0.7		=	22.92	(82)
Rooflights 0.9x	1	х	0.6	66	x	6	2.32	x	0.63	,	x	0.7		=	16.25	(82)
Rooflights 0.9x	1	Х	1.1	2	x	3	2.54	x	0.63	,	x	0.7		=	28.93	(82)
Rooflights 0.9x	1	х	1.1	2	x	3	2.54	x	0.63	,	x [0.7		=	28.93	(82)
Rooflights 0.9x	1	x	0.9)3	x	3	2.54	x	0.63	 ,	x į	0.7		=	11.96	(82)
Rooflights 0.9x	1	X	0.6	66	x	3	2.54	x	0.63		x i	0.7		=	8.48	(82)
Rooflights 0.9x	1	x	1.1	2	x	2	1.19	x	0.63	,	x İ	0.7	\equiv	=	18.84	(82)
Rooflights 0.9x	1	x	1.1	2	x	2	1.19	x	0.63	,	x İ	0.7	司	=	18.84	(82)
Rooflights 0.9x	1	х	0.9)3	x	2	1.19	x	0.63	,	x İ	0.7		=	7.79	(82)
Rooflights 0.9x	1	X	0.6	66	x	2	1.19	x	0.63		x İ	0.7	司	=	5.53	(82)
Solar gains in (83)m= 175.27 Total gains – in (84)m= 566.2	322.15 nternal a 710.84	493.39 Ind solar 867.85	683.05 (84)m = 1034.91	818.61 = (73)m 1147.5	83 + (8	33.06 33)m ,	794.92	692		2 371	.21	-	146 526			(83)
7. Mean inter			`													_
Temperature	Ū	٠.			•			ole 9	, Th1 (°C)						21	(85)
Utilisation fac					ì							1	_		I	
Jan	Feb	Mar	Apr	May	-	Jun	Jul	_	ug Ser	_	ct oc	+	-	ec		(06)
(86)m= 1	0.99	0.97	0.9	0.76	<u> </u>).58	0.43	0.4		0.0	95	0.99	1			(86)
Mean interna					_							_			Ī	
(87)m= 19.57	19.8	20.16	20.57	20.85	20	0.97	20.99	20.	99 20.9	20.	.49	19.95	19.	53		(87)
Temperature	during h	eating p	eriods ir	rest of	dw	elling	from Ta	ble 9	9, Th2 (°C	;)						
(88)m= 19.79	19.8	19.8	19.81	19.82	19	9.83	19.83	19.	83 19.82	2 19.	.82	19.81	19.	81		(88)
Utilisation fac	tor for g	ains for	rest of d	welling,	h2,ı	m (se	e Table	9a)								
(89)m= 0.99	0.99	0.96	0.87	0.7	0).48	0.32	0.3	0.66	0.0	93	0.99	1			(89)
Mean interna	l temper	ature in	the rest	of dwell	ing	T2 (fc	ollow ste	eps 3	to 7 in Ta	able 9c	;)					
(90)m= 17.92	18.26	18.77	19.34	19.68	Ť	9.81	19.83	19.		1	_	18.48	17.	87		(90)
					_	!				fLA =	Liv	ring area ÷ (4	4) =		0.22	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwe	llinc	n) = fl	A x T1	+ (1	– fLA) ⊻ T	- 2						_
(92)m= 18.29	18.6	19.08	19.62	19.95	_	0.07	20.09	20.			.53	18.81	18.	25		(92)
Apply adjustn					<u> </u>										1	
,				•				•		•						

(93)m=	18.29	18.6	19.08	19.62	19.95	20.07	20.09	20.09	20.01	19.53	18.81	18.25		(93)
8. Spa	ace heat	ting requ	uirement								•			
				•		ed at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	:ulate	
the uti	T		or gains						I -			I _ 1	l	
<u>[</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
г			ains, hm										l	(0.4)
(94)m=	0.99	0.98	0.95	0.86	0.7	0.5	0.34	0.39	0.67	0.92	0.98	0.99		(94)
			, W = (94	ŕ		574.50	074.70	000.50	505.40	0.40.07	T 505 50	500.40	l	(OE)
(95)m=	561.93	697.24	823.49	892.3	807.5	571.53	371.78	390.52	585.48	649.07	565.56	523.49		(95)
	-		r	. 	from Ta		40.0	404	444	40.0	7.4	4.0		(06)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	I	(96)
					erature, l		- ` 	X [(93)m	<u> </u>	968.46	4070 00	4500.0		(07)
L	1551.47			L	894.17	585.94	373.75	l	636	l	1276.32	1539.8	I	(97)
	i	•	ı	i	nonth, k\		l e		i i	ŕ	·	75044	l	
(98)m=	736.22	549.89	419.13	196.75	64.49	0	0	0	0	237.63	511.75	756.14		٦
								Tota	l per year	(kWh/yea	r) = Sum(9	8) _{15,912} =	3471.98	(98)
Space	e heating	g require	ement in	kWh/m²	/year								42.6	(99)
9a. Ene	ergy req	uiremer	nts – Indi	ividual h	eating sy	/stems i	ncluding	micro-C	CHP)					_
	e heatin													
-		•	at from s	econdar	y/supple	mentary	system						0	(201)
Fraction	on of sp	ace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
			ng from	-	, ,			(204) = (2	02) x [1 –	(203)] =			1	(204)
			•	-					, -	. /-				(206)
	-	•	ace heat				0.1						93.4	╡
Efficie	ency of s	econda	ry/suppl	ementar	y heating	g system	า, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
			<u> </u>		d above)		•			1			•	
L	736.22	549.89	419.13	196.75	64.49	0	0	0	0	237.63	511.75	756.14		
(211)m	= {[(98)	m x (20	(4)] } x 1	00 ÷ (20	06)									(211)
	788.24	588.74	448.75	210.65	69.05	0	0	0	0	254.42	547.91	809.57		
_	-		-	-	-		-	Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}		3717.33	(211)
Space	e heating	g fuel (s	econdar	y), kWh/	month							'		_
-		-	00 ÷ (20											
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
_	•						•	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water I	heating											1		_
	_		ter (calc	ulated al	bove)						-			
	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44		
Efficien	cy of wa	ater hea	iter		-		-			-	-		80.3	(216)
(217)m=	88.01	87.69	87.04	85.5	82.97	80.3	80.3	80.3	80.3	85.85	87.48	88.1		(217)
Fuel for	r water l	neating,	kWh/mo	onth										
		•	÷ (217)										•	
(219)m=	230.95	203.82	213.66	192.92	192.48	175.15	167.81	187.07	189.13	201.44	211.02	225.25		_
								Tota	I = Sum(2	19a) ₁₁₂ =			2390.71	(219)
Annual										k'	Wh/year	•	kWh/year	-
Space I	heating	fuel use	ed, main	system	1								3717.33	_
												•		

					7
Water heating fuel used				2390.71	╛
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (230a)(230g) =		75	(231)
Electricity for lighting				350.38	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b) =			6613.72	(338)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	Energy kWh/year	Emission fa		Emissions kg CO2/yea	
Space heating (main system 1)	(211) x	0.216	=	802.94	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	516.39	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1319.34	(265)
-					
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
·	(231) x (232) x	0.519	=	38.93 181.85	(267) (268)
Electricity for pumps, fans and electric keep-hot	(232) x				

TER =

(273)

18.9

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Property Details: HOUSE C - IMPROVED

Dwelling type: Located in:Detached House
England

Region: South East England

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:West

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters:

Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 520.69 (P1)

Transmission heat loss coefficient: 75.2

Summer heat loss coefficient: 595.92 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
West (W1-3 FRONT)	0	1
North (W4 - SIDE N)	0	1
South (W5 - SIDE S)	0	1
East (W6 - REAR E)	0	1
West (RW1-2 FRONT V	V) 0	1
East (RW3-4 REAR E)	0	1
East (RW5 REAR E)	0	1
East (RW6 REAR E)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
West (W1-3 FRONT)	0.98	1	1	0.98	(P8)
North (W4 - SIDE N)	0.98	1	1	0.98	(P8)
South (W5 - SIDE S)	0.98	1	1	0.98	(P8)
East (W6 - REAR E)	0.98	1	1	0.98	(P8)
West (RW1-2 FRONT W	/) 0.98	1	1	0.98	(P8)
East (RW3-4 REAR E)	0.98	1	1	0.98	(P8)
East (RW5 REAR E)	0.98	1	1	0.98	(P8)
East (RW6 REAR E)	0.98	1	1	0.98	(P8)

Solar gains:

Orientation		Area	Flux	\mathbf{g}_{-}	FF	Shading	Gains
West (W1-3 FRONT)	1 x	4.86	124.8	0.63	0.8	0.98	270.99
North (W4 - SIDE N)	1 x	1.62	86.66	0.63	8.0	0.98	62.72
South (W5 - SIDE S)	1 x	6.08	118.4	0.63	8.0	0.98	321.63
East (W6 - REAR E)	1 x	2.14	124.8	0.63	0.8	0.98	119.32
	1 x	2.66	187.8	0.63	0.8	0.98	223.2
	1 x	2.66	187.8	0.63	0.8	0.98	223.2
	1 x	1.1	187.8	0.63	8.0	0.98	92.3
	1 x	0.78	187.8	0.63	0.8	0.98	65.45

SAP 2012 Overheating Assessment

		Total	1378.81 (P3/P4)
Internal gains:			
	June	July	August
Internal gains	432.58	414.57	422.73
Total summer gains	1893.39	1793.39	1640.4 (P5)
Summer gain/loss ratio	3.18	3.01	2.75 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5
Thermal mass temperature increment	0.25	0.25	0.25
Threshold temperature	18.83	20.66	20.5 (P7)
Likelihood of high internal temperature	Not significant	Slight	Slight
Assessment of likelihood of high internal temperature:	Slight		

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 Printed on 25 February 2021 at 14:04:54

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Semi-detached House

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 78.4m²

Site Reference: WOODWELL Plot Reference: HOUSE D - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.72 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.36 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.0 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	ОК
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	OK
Openings	1.38 (max. 2.00)	1.40 (max. 3.30)	ОК

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 4.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	TTZC by plumbing and electrical	l services	OK
Hot water controls:	No cylinder thermostat		
	No cylinder		
Boiler interlock:	Yes		OK
7 Low energy lights			
Percentage of fixed lights with lo	ow-energy fittings	100.0%	
Minimum		75.0%	OK
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East Er	ngland):	Not significant	OK
Based on:			
Overshading:		Average or unknown	
Windows facing: North		3.24m²	
Windows facing: West		2.59m²	
Windows facing: West		0.86m²	
Windows facing: South		2.14m²	
Roof windows facing: South		2.66m²	
Ventilation rate:		8.00	
Blinds/curtains:		Dark-coloured curtain or roller blind	
		Closed 10% of daylight hours	
10 Key features			
Party Walls U-value		0 W/m²K	

Thermal Bridge Report

Property Details: HOUSE D - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges

Thermal bridges: User-defined = UD

 $\begin{array}{l} \mathsf{Default} &= \mathsf{D} \\ \mathsf{Approved} &= \mathsf{A} \end{array}$

User-defined (individual PSI-values) Y-Value = 0.0583

External Junctions Details

Junction Type	PSI-Value	Length	Reference	Туре
Other lintels (including other steel lintels)	0.05	6.44	E2	[UD]
Sill	0.04	2.7	E3	[A]
Jamb	0.05	20.7	E4	[A]
Ground floor (normal)	0.08	18.11	E5	[UD]
Intermediate floor within a dwelling	0.07	18.11	E6	[A]
Eaves (insulation at rafter level)	0.04	12.43	E11	[A]
Gable (insulation at rafter level)	0.04	18.49	E13	[A]
Corner (normal)	0.09	12.6	E16	[A]
Staggered party wall between dwellings	0.12	6.4	E25	[D]
Party Junctions Details:				
Ground floor	0.16	6.15	P1	[D]
Roof (insulation at rafter level)	0.08	8.98	P5	[D]
Noor (insulation at ratter levely	0.00	0.70	13	[6]
Roof Junctions Details:				
Head	0.08	2.95	R1	[D]
Sill	0.06	2.95	R2	[D]
Jamb	0.08	5.4	R3	[D]
Ridge (vaulted ceiling)	0.08	7.6	R4	[D]

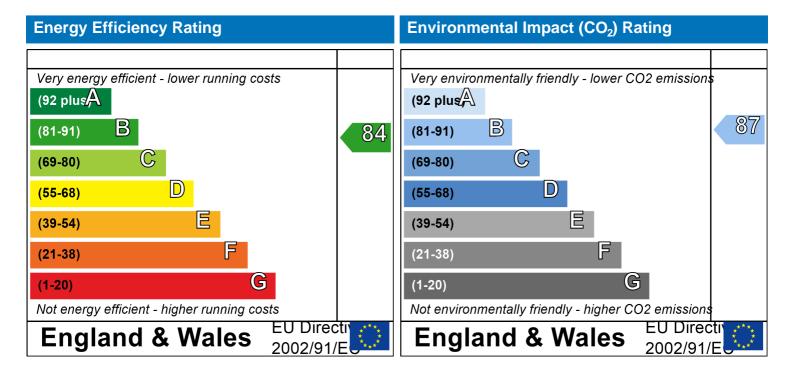
Predicted Energy Assessment



Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type: Date of assessment: Produced by: Total floor area: Semi-detached House 24 February 2021 Jemma Mclaughlan 78.4 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

SAP Input

Property Details: HOUSE D - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House

Detachment: Semi-detached

Year Completed: 2021

Floor Location: Floor area:

Floor 0 39.2 m² 2.6 m Floor 1 39.2 m² 2.56 m

Living area: 18.35 m² (fraction 0.234)

Front of dwelling faces: North

Opening types:

Name: FRONT DOOR	Source: Manufacturer	Type: Solid	Glazing:	Argon:	Frame: Wood
W1-2 FRONT N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W3 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - REAR S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 REAR S	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Storey height:

Name:	Gap:	Frame Fac	ctor: g-value:	U-value:	Area:	No. of Openings:
FRONT DOOR	mm	0.8	0	1.4	2.07	1
W1-2 FRONT N	16mm or more	0.8	0.63	1.4	1.62	2
W3 - SIDE E	16mm or more	0.8	0.63	1.4	2.59	1
W4 - SIDE E	16mm or more	0.8	0.63	1.4	0.86	1
W5 - REAR S	16mm or more	0.8	0.63	1.4	2.14	1
RW1-2 REAR S	16mm or more	0.8	0.63	1.3	1.33	2

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	North	0	0
W1-2 FRONT N		EXTERNAL WALLS	North	0	0
W3 - SIDE E		EXTERNAL WALLS	West	0	0
W4 - SIDE E		EXTERNAL WALLS	West	0	0
W5 - REAR S		EXTERNAL WALLS	South	0	0
RW1-2 REAR S		ROOF	South	0.001	0

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Element	<u>S</u>						
EXTERNAL WALLS	80.83	10.9	69.93	0.2	0	False	N/A
DORMER CHEEKS	2.12	0	2.12	0.2	0	False	N/A

SAP Input

 ROOF
 57.4
 2.66
 54.74
 0.14
 0
 N/A

 GROUND FLOOR
 39.2
 0.17
 N/A

 Internal Elements
 0.17
 N/A

Internal Elements
Party Elements

PARTY WALL 29.73

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0583

	Length	Psi-value		
	6.44	0.05	E2	Other lintels (including other steel lintels)
[Approved]	2.7	0.04	E3	Sill
[Approved]	20.7	0.05	E4	Jamb
	18.11	0.08	E5	Ground floor (normal)
[Approved]	18.11	0.07	E6	Intermediate floor within a dwelling
[Approved]	12.43	0.04	E11	Eaves (insulation at rafter level)
[Approved]	18.49	0.04	E13	Gable (insulation at rafter level)
[Approved]	12.6	0.09	E16	Corner (normal)
	6.4	0.12	E25	Staggered party wall between dwellings
	6.15	0.16	P1	Ground floor
	8.98	0.08	P5	Roof (insulation at rafter level)
	2.95	0.08	R1	Head
	2.95	0.06	R2	Sill
	5.4	0.08	R3	Jamb
	7.6	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys: 0
Number of open flues: 0
Number of fans: 3
Number of passive stacks: 0
Number of sides sheltered: 1
Pressure test: 4

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

Boiler interlock: Yes Delayed start

Main heating Control

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

SAP Input

Water heating

Water heating: From main heating system

Water code: 901 Fuel :mains gas No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 100%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No Photovoltaics: None Assess Zero Carbon Home: No

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOL		/ED		
Address :	Woodwell Cottage P2, Woo	odwell Road, BRISTOL	, BS11 9XU			
1. Overall dwelling dime	ensions:					
Ground floor		Area(m²)	Av. Height(r	<u> </u>	Volume(m³)	(3a)
		39.2 (1a) >		(2a) =	101.92	Ⅎ
First floor		39.2 (1b) >	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	78.4 (4)				
Dwelling volume		(3a)+i	(3b)+(3c)+(3d)+(3e)-	+(3n) =	202.27	(5)
2. Ventilation rate:						
	main seconda heating heating		total		m³ per houi	ſ
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				L		
				Air ch	anges per ho	ur
•	ys, flues and fans = $(6a)+(6b)+$		30	÷ (5) =	0.15	(8)
·	een carried out or is intended, proce	ed to (17), otherwise continu	e from (9) to (16)	Г		٦,0)
Number of storeys in the Additional infiltration	ie dweiling (ris)			[(9)-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame of	or 0.35 for masonry con		(5)-1]X0.1 =	0	(11)
	resent, use the value corresponding	•		L		
	floor, enter 0.2 (unsealed) or (0.1 (sealed), else enter	0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) -	+ (12) + (13) + (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metr	es per hour per square	metre of envelo	pe area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] +$	-(8), otherwise $(18) = (16)$			0.35	(18)
Air permeability value applie	s if a pressurisation test has been do	one or a degree air permeabi	lity is being used			_
Number of sides sheltere	ed	(00) 4 [0.075]	·· (40)]		1	(19)
Shelter factor		(20) = 1 - [0.075]		ļ	0.92	(20)
Infiltration rate incorporat	_	$(21) = (18) \times (20)$	=		0.32	(21)
Infiltration rate modified f		1 1	<u> </u>			
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct No	v Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18	
Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m	
0.41 0.4 0.39 0.35 0.35 0.31 0.31 0.3 0.32 0.35 0.36 0.38	7
Calculate effective air change rate for the applicable case If mechanical ventilation:	
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)	0 (23a) 0 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0 (23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) \times [1 – (23c)	
(24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0	(24a)
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)	
(24b)m= 0 0 0 0 0 0 0 0 0 0 0 0	(24b)
c) If whole house extract ventilation or positive input ventilation from outside if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b)m + 0.5 \times (23b)$	
(24c)m =	(24c)
d) If natural ventilation or whole house positive input ventilation from loft	_
if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$	_
(24d)m= 0.58 0.58 0.58 0.56 0.56 0.55 0.55 0.54 0.55 0.56 0.57 0.57	(24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)	_
(25)m= 0.58 0.58 0.58 0.56 0.56 0.55 0.55 0.54 0.55 0.56 0.57 0.57	(25)
3. Heat losses and heat loss parameter:	
ELEMENT GrossOpeningsNet AreaU-valueA X Uk-valuearea (m²)m²A ,m²W/m2K(W/K)kJ/m²	
Doors 2.07 x 1.4 = 2.898	
	(26)
Windows Type 1 1.62 $x^{1/[1/(1.4) + 0.04]} = 2.15$	(26) (27)
Windows Type 1	,
	(27)
Windows Type 2 2.59 $x^{1/[1/(1.4)+0.04]} = 3.43$	(27) (27)
Windows Type 2 $ 2.59 $	(27) (27) (27)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$	(27) (27) (27) (27)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$	(27) (27) (27) (27) (27b)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$ Floor 39.2 x 0.17 0.664	(27) (27) (27) (27) (27b) (28)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$ Floor 39.2 x 0.17 $=$ 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 $=$ 13.99	(27) (27) (27) (27) (27b) (28) (29)
Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4)+0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3)+0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type2 2.12 0 2.12 x 0.2 = 0.42	(27) (27) (27) (27) (27b) (28) (29) (29)
Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4)+0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3)+0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66	(27) (27) (27) (27) (27b) (28) (29) (29) (30)
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Windows Type 2 Windows Type 3 Windows Type 4 Rooflights 1.33 X1/[1/(1.4)+0.04] = 1.14 Walls Type 1 80.83 10.9 69.93 Walls Type 2 2.12 0 2.12 0 2.12 0 2.12 0 2.12 0 2.12 0 1.729 Walls Type 2 1.729 Floor Walls Type 3 Walls Type 4 Roof 57.4 2.66 54.74 70.14 70.66 Total area of elements, m² Party wall *for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragra, include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) 2.59 X1/[1/(1.4)+0.04] = 3.43 X1/[1/(1.4)+0.04] = 1.14 X1/[1/(1.4)+0.04] = 1.12 X1/[1/(1.4)+0.04] =	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32) oh 3.2
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	Ū	,	,		using Ap	•							10.48	(50
	of therma Ibric hea		are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			F7.4	(37
			alculated	l monthly	A.					, ,	25)m x (5)		57.1	(37
Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m=	39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38
Ĺ	enefer o	coefficier	nt M/K				!	!	(39)m	= (37) + (37)	1	<u> </u>	l	
39)m= [96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Ĺ							!	!	,	Average =	Sum(39) ₁ .	₁₂ /12=	94.67	(39
leat lo	ss para	meter (F	ILP), W/	m²K					(40)m	= (39)m ÷	(4)			
10)m=	1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		— .
lumbe	r of day	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.21	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
11)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
I. Wat	ter heat	ing ener	gy requi	rement:								kWh/y	ear:	
ssume	ed occu	nancy I	NI.										1	(4
if TF	۹ > 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43	I	(4
if TF/ if TF/ nnual	A > 13.9 A £ 13.9 averag	9, N = 1 9, N = 1 e hot wa	+ 1.76 x ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.96		•
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if TFA if TFA nnual educe t	A > 13.9 A £ 13.9 averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)			•
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if TFA if TFA nnual educe to ot more ot water 4)m= [nergy co	A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir 101.15	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Fotal = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(4
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if TFA if TFA if TFA nnual educe to the more of water 4)m= [nergy color to the more to the recommendate of the more a) If may emperimently of the more to the more to the more to the more a) If may emperimently of the more to the mo	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufaction rature fa lost fro anufaction ter storage	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31 including and no talce hot water eclared left marge eclared of the storage eclare	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Color or W velling, e acludes in por is knowear	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4 (4 (4 (4 (4 (5
if TFA if TFA innual leduce to ot more lot water laym= [linergy column lisym= [lotwater s lotwa	A > 13.9 A £ 13.9 average the annual that 125 Jan rusage ir 101.15 ontent of 150 aneous w 22.5 storage e volum hunity he ise if no storage anufaction anufa	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 and at point 20.31 including and no talc hot water eclared less storage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4

Energy	y lost fro	m watei	· storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0]	(54)
Enter	(50) or	(54) in (5	55)									0]	(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0]	(58)
Primar	y circuit	loss cal	culated	for each	month ((59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add a	dditiona	I lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output	t from w	ater hea	ter											
(64)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
								Outp	out from w	ater heate	r (annual)	l12	1595.65	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
inclu	ide (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	e Table 5	and 5a):									
Metab	olic gair	ıs (Table	e 5), Wat	ts										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	1	(66)
Lightin	g gains	(calcula	ted in A	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	•	•	•	•	
(67)m=	48.45	43.03	35	26.5	19.81	16.72	18.07	23.48	31.52	40.02	46.71	49.8]	(67)
Applia	nces ga	ins (calc	ulated ir	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5		•	•	
(68)m=	322.48	325.83	317.4	299.44	276.78	255.48	241.26	237.91	246.34	264.29	286.96	308.25]	(68)
Cookir	ng gains	(calcula	ted in A	ppendix	L, equa	tion L15	or L15a), also se	e Table	5			•	
(69)m=	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02]	(69)
Pumps	and fa	ns gains	(Table :	 5а)		•					<u>I</u>			
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3]	(70)
Losses	s e.g. ev	aporatio	n (nega	tive valu	es) (Tab	ole 5)	!	!		!	<u>I</u>	!	1	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
	heating	gains (1	Table 5)	<u> </u>	<u> </u>	1	<u> </u>	<u> </u>		<u> </u>	ı	1	ı	
(72)m=	71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17]	(72)
		gains =		I	I	ļ	<u> </u>	n + (68)m -		<u> </u>	ļ	ļ	J	
(73)m=	545.88	541.68	520.8	488.35	455.11	425.24	407.7	415.74	434.33	466.99	503.35	530.88]	(73)
• •	<u> </u>	L	L	L	L	L	L	L	L	L	L	<u> </u>	J	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientati	on:	Access Factor Table 6d	7	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	15.63	(74)
North	0.9x	1	X	1.62	x	20.32	х	0.63	X	0.8	=	29.86	(74)
North	0.9x	1	X	1.62	x	34.53	x	0.63	X	0.8	=	50.75	(74)
North	0.9x	1	X	1.62	x	55.46	х	0.63	x	0.8	=	81.51	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	109.81	(74)
North	0.9x	1	x	1.62	x	79.99	x	0.63	x	0.8	=	117.55	(74)
North	0.9x	1	X	1.62	x	74.68	x	0.63	x	0.8	=	109.75	(74)
North	0.9x	1	X	1.62	x	59.25	x	0.63	x	0.8	=	87.07	(74)
North	0.9x	1	x	1.62	x	41.52	x	0.63	x	0.8	=	61.02	(74)
North	0.9x	1	x	1.62	x	24.19	x	0.63	x	0.8	=	35.55	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	19.28	(74)
North	0.9x	1	x	1.62	x	8.86	x	0.63	x	0.8	=	13.03	(74)
South	0.9x	1	x	2.14	x	46.75	x	0.63	x	0.8	=	45.38	(78)
South	0.9x	1	x	2.14	x	76.57	x	0.63	X	0.8	=	74.32	(78)
South	0.9x	1	x	2.14	x	97.53	x	0.63	x	0.8	=	94.68	(78)
South	0.9x	1	x	2.14	x	110.23	x	0.63	x	0.8	=	107.01	(78)
South	0.9x	1	X	2.14	x	114.87	x	0.63	X	0.8	=	111.51	(78)
South	0.9x	1	X	2.14	x	110.55	x	0.63	X	0.8	=	107.31	(78)
South	0.9x	1	x	2.14	x	108.01	x	0.63	x	0.8	=	104.85	(78)
South	0.9x	1	X	2.14	x	104.89	x	0.63	X	0.8	=	101.82	(78)
South	0.9x	1	X	2.14	x	101.89	x	0.63	X	0.8	=	98.9	(78)
South	0.9x	1	X	2.14	x	82.59	x	0.63	X	0.8	=	80.17	(78)
South	0.9x	1	X	2.14	X	55.42	X	0.63	X	0.8	=	53.79	(78)
South	0.9x	1	X	2.14	x	40.4	x	0.63	X	0.8	=	39.21	(78)
West	0.9x	1	X	2.59	x	19.64	X	0.63	X	0.8	=	23.07	(80)
West	0.9x	1	X	0.86	x	19.64	X	0.63	X	0.8	=	7.66	(80)
West	0.9x	1	X	2.59	x	38.42	X	0.63	X	0.8	=	45.14	(80)
West	0.9x	1	X	0.86	x	38.42	x	0.63	X	0.8	=	14.99	(80)
West	0.9x	1	X	2.59	x	63.27	X	0.63	X	0.8	=	74.33	(80)
West	0.9x	1	X	0.86	X	63.27	X	0.63	x	0.8	=	24.68	(80)
West	0.9x	1	X	2.59	x	92.28	X	0.63	X	0.8	=	108.41	(80)
West	0.9x	1	X	0.86	x	92.28	X	0.63	X	0.8	=	36	(80)
West	0.9x	1	X	2.59	x	113.09	x	0.63	X	0.8	=	132.86	(80)
West	0.9x	1	X	0.86	x	113.09	x	0.63	x	0.8	=	44.12	(80)
West	0.9x	1	X	2.59	x	115.77	x	0.63	x	0.8	=	136.01	(80)
West	0.9x	1	X	0.86	X	115.77	X	0.63	X	0.8	=	45.16	(80)

\Most	. —		7						1			1 1		_	ı		7,00
West 0.9		1	X	2.5		X	_	10.22	X	0.6		X	0.8	_	= [129.49	(80)
West 0.9	-	1	X	0.8	6	X	1	10.22	X	0.6	3	X	0.8	_	=	43	(80)
West 0.9	9x	1	X	2.5	9	X	9	4.68	X	0.6	3	X	0.8		=	111.23	(80)
West 0.9	9x	1	X	0.8	6	X	9	4.68	X	0.6	3	X	0.8		=	36.93	(80)
West 0.9	Эх	1	X	2.5	9	X	7	3.59	X	0.6	3	X	0.8		=	86.45	(80)
West 0.9	9x	1	X	8.0	6	X	7	3.59	X	0.6	3	X	0.8		= [28.71	(80)
West 0.9	Эх	1	X	2.5	9	x	4	5.59	X	0.6	3	X	0.8		= [53.56	(80)
West 0.9	Эх	1	X	0.8	6	X	4	5.59	X	0.6	3	x	0.8		= [17.78	(80)
West 0.9	Эх	1	X	2.5	i9	x	2	4.49	X	0.6	3	X	0.8		= [28.77	(80)
West 0.9	Эх	1	X	8.0	6	X	2	4.49	X	0.6	3	X	0.8		= [9.55	(80)
West 0.9	9x	1	X	2.5	i9	x	1	6.15	x	0.6	3	X	0.8		= [18.97	(80)
West 0.9	Эх	1	x	0.8	6	x	1	6.15	x	0.6	3	X	0.8		= [6.3	(80)
Rooflights 0.9	Эх	1	X	1.3	3	x	4	7.01	x	0.6	3	x	0.8		= [56.72	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	8	33.9	x	0.6	3	x	0.8		= [101.23	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	12	22.73	X	0.6	3	X	0.8		= [148.08	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	16	61.74	х	0.6	3	x	0.8		= [195.15	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	18	87.38	x	0.6	3	X	0.8		= [226.09	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	18	88.06	x	0.6	3	X	0.8		= [226.91	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	18	80.51	x	0.6	3	x	0.8		= [217.8	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	16	61.54	x	0.6	3	x	0.8	\equiv	= [194.91	(82)
Rooflights 0.	Эх	1	X	1.3	3	x	1	36.5	x	0.6	3	x	0.8		= [164.7	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	9	5.08	x	0.6	3	x	0.8	T	=	114.72	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	5	7.06	x	0.6	3	x	0.8	ī	= [68.85	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	3	9.72	x	0.6	3	x	0.8		= [47.92	(82)
															_		
Solar gains										n = Sum(7							
(83)m= 148.									531	.96 439	.78	301.78	180.24	125.4	14		(83)
Total gains		al and		<u> </u>	<u> </u>	`											
(84)m= 694.	35 807.	23 913	3.32	1016.43	1079.4	9 10)58.18	1012.58	947	7.7 874	.11	768.77	683.59	656.3	32		(84)
7. Mean ir	ternal te	empera	ture (heating	seaso	n)											
Temperati	ıre durir	ıg heati	ing pe	eriods ir	the liv	/ing	area f	from Tab	ole 9	, Th1 (°0	C)					21	(85)
Utilisation	factor fo	r gains	for li	ving are	ea, h1,	m (s	ее Та	ble 9a)									
Ja	n Fe	b N	/lar	Apr	May	/	Jun	Jul	Α	ug S	ер	Oct	Nov	De	c		
(86)m= 0.9	9 0.9	8 0.	95	0.87	0.73		0.55	0.4	0.4	15 0.6	69	0.91	0.98	0.99)		(86)
Mean inte	nal tem	peratur	e in li	iving are	ea T1 (follo	w ste	ps 3 to 7	7 in T	able 9c)		-				
(87)m= 19.9	_		.38	20.7	20.9	\neg	20.98	21	20.			20.67	20.23	19.8	8		(87)
Temperati	ıre durin	ng heati	ina na	eriode ir	rest	of dv	/elling	from Ta	hle (Th2/9	.C)						
(88)m= 19.			9.9	19.91	19.92	\neg	9.92	19.92	19.	<u>`</u>	$\overline{}$	19.92	19.91	19.9	1		(88)
		-											1				•
Utilisation (89)m= 0.9			93	0.84	welling 0.67	\neg	,m (se _{0.46}	e Table 0.31	9a) 0.3	35 0.	<u>в</u> Т	0.88	0.97	0.99			(89)
` ′		-								!			0.91	0.98			(55)
Mean inte	mal tem	peratur	e in t	he rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in	Table	9c)					

									ı —	i		1	
(90)m= 18.49	18.77	19.16	19.58	19.83	19.91	19.92	19.92	19.88	19.56	18.96	18.44		(90)
								f	LA = Livin	g area ÷ (4	4) =	0.23	(91)
Mean_interna	al temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.82	19.08	19.45	19.84	20.08	20.16	20.17	20.17	20.13	19.82	19.25	18.78		(92)
Apply adjust	ment to t	ne mean	interna	temper	ature fro	m Table	4e, whe	re appro	opriate			1	
(93)m= 18.67	18.93	19.3	19.69	19.93	20.01	20.02	20.02	19.98	19.67	19.1	18.63		(93)
8. Space he	ating requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa				iviay	Odii	Oui	l //ug	СОР		1101	200		
(94)m= 0.98	0.96	0.92	0.83	0.67	0.47	0.32	0.36	0.61	0.87	0.96	0.98		(94)
Useful gains	, hmGm	W = (94)	1)m x (84	L 4)m			l	<u> </u>					
(95)m= 681.18	1	843.63	844.46	725.3	499.3	319.77	337.28	529.06	669.23	659.06	646.38		(95)
Monthly ave	rage exte	rnal tem	perature	from Ta	able 8				<u>I</u>	<u>I</u>			
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for mea	an intern	al tempe	erature, l	Lm , W =	=[(39)m	x [(93)m	– (96)m]			l	
(97)m= 1381.46	1345.57	1224.39	1021.91	777.3	506.67	320.58	338.71	552.48	857	1138.76	1374.21		(97)
Space heati	ng require	ement fo	r each n	nonth, k\	Wh/mon	h = 0.02	24 x [(97)m – (95)m] x (4	1)m		l.	
(98)m= 521.01	381.62	283.28	127.76	38.69	0	0	0	0	139.7	345.38	541.5		
												0070.04	┓
		-					Tota	l per year	(kWh/yeai) = Sum(9)	8) _{15,912} =	2378.94	(98)
Space heati	ng require	ement in	kWh/m²	²/year			Tota	l per year	(kWh/yeaı	') = Sum(9	8) _{15,912} =	30.34	(98)
Space heati	<u> </u>			•	vstems i	ncluding			(kWh/yeaı) = Sum(9	8)15,912 =		╡``
9a. Energy re	quiremer			•	ystems i	ncluding			(kWh/yeaı) = Sum(9	8) _{15,912} =		╡``
·	quiremer	nts – Indi	vidual h	eating sy			micro-C		(kWh/yeaı	') = Sum(9	8) _{15,912} =		(99)
9a. Energy re Space heat Fraction of s	quiremer ng: pace hea	nts – Indi	vidual h	eating sy		system	micro-C	CHP)	(kWh/yeai) = Sum(9	8)15,912 =	30.34	(99)
9a. Energy re Space heat Fraction of s Fraction of s	quiremer ng: pace hea pace hea	nts – Indi at from se at from m	vidual h econdary	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15,912 =	30.34	(201)
9a. Energy re Space heat Fraction of s Fraction of to	quiremer ng: pace hea pace hea otal heati	nts - Indi	ividual h econdary nain syst main sys	eating sy y/supple em(s) stem 1		system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	30.34 0 1	(99) (201) (202) (204)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of	quirement ng: pace heat pace heat total heat in main spa	nts – Indi at from se at from m ag from a ace heati	vidual hecondary nain systemain syst	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	30.34 0 1 1 89.9	(99) (201) (202) (204) (206)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of	quirement ng: pace heat pace heat total heat in main space seconda	nts – Indi	econdary nain systemain systemain systemain systematory	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan	quirement ng: pace heat pace heat otal heat main space seconda	nts – Indi at from so at from m ng from a ace heati ry/supplo	vidual hecondary nain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1	CHP) - (201) =		Nov	Dec	30.34 0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require	nts - Indi	econdary nain systemain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system n, % Jul	(202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =	Nov	Dec	0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from set from many from mace heating ry/supplement (co. 283.28	econdary nain systemain systematar Apr nalculatee	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system	(202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from so at from m ace heati ry/supple Mar ement (c 283.28	econdary nain systemain systemater Apr alculater 127.76 00 ÷ (20	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 -	(203)] = Oct	Nov 345.38	Dec 541.5	0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from set from many from mace heating ry/supplement (co. 283.28	econdary nain systemain systematar Apr nalculatee	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system n, % Jul	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from so at from m ace heati ry/supple Mar ement (c 283.28	econdary nain systemain systemater Apr alculater 127.76 00 ÷ (20	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54]	quirement ng: pace heat pa	at from set from mace heating ry/supplement (c 283.28 4)] } x 1 315.1	econdary nain systemain systematrar Apr alculated 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01 (211)m = {[(9) 579.54} Space heati = {[(98)m x (2)	quiremer ng: pace hea pace hea patal heatil main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1	nts - Indicate from some set from many from the set of	econdary nain systemain systematar Apr nalculater 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0	(203)] = Oct 139.7 155.4 ar) =Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54]	quirement ng: pace heat pa	at from set from mace heating ry/supplement (c 283.28 4)] } x 1 315.1	econdary nain systemain systematrar Apr alculated 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54} Space heati = {[(98)m x (2) (215)m= 0	quiremer ng: pace hea pace hea patal heatil main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1	nts - Indicate from some set from many from the set of	econdary nain systemain systematar Apr nalculater 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54 Space heati = {[(98)m x (2) (215)m=0	quirement ng: pace heat pa	t from set from many from	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/8) 0	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of s Fraction of te Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54 Space heati = {[(98)m x (2) (215)m= 0 Water heating	quiremer ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1 0 g vater hea	trom so that from many from the many from th	econdary nain systemain systemater Apr alculatee 127.76 00 ÷ (20 142.12 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 emonth 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) =Sum(2	Nov 345.38 384.18 211) _{15,1012} 0	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy respectively space heating fraction of some services of the energy of the e	quiremer ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1 0 g vater hea 142.61	ter (calce	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/8) 0	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear

(217)m= 89.27 89.18 88.99	88.57 87.9	87.3	87.3	87.3	87.3	88.6	89.11	89.3		(217)
Fuel for water heating, kWh/mon										
(219) m = (64) m x $100 \div (217)$ m (219)m = 182.2 159.92 166.33	1 147.07 143.22	125.96	118.21	133.51	134.47	152.58	163.85	176.83]	
	!			Tota	I = Sum(2	19a) ₁₁₂ =			1804.16	(219)
Annual totals kWh/year						kWh/year	- -			
Space heating fuel used, main s	ystem 1								2646.21	╛
Water heating fuel used									1804.16	
Electricity for pumps, fans and el	lectric keep-hot	•							_	
central heating pump:								30		(230c)
boiler with a fan-assisted flue								45]	(230e)
Total electricity for the above, kWh/year sum of (230a)(230g) =						75	(231)			
Electricity for lighting						342.26	(232)			
Total delivered energy for all use	es (211)(221)	+ (231)	+ (232).	(237b)	=				4954.94	(338)
10a. Fuel costs - individual hea	ting systems:									
		Fu	ام			Fuel P	rica		Fuel Cost	
			h/year			(Table			£/year	
Space heating - main system 1		(211) x			3.4	.8	x 0.01 =	92.09	(240)
Space heating - main system 2		(213	3) x			0		x 0.01 =	0	(241)
Space heating - secondary		(215	5) x			13.	19	x 0.01 =	0	(242)
Water heating cost (other fuel)		(219	9)			3.4	.8	x 0.01 =	62.78	(247)
Pumps, fans and electric keep-h	ot	(231	1)			13.	19	x 0.01 =	9.89	コ フ (249)
(if off-peak tariff, list each of (230	Da) to (230g) se	parately	as app	licable a	nd apply	fuel pri	ce accoi	rding to	Table 12a	_
Energy for lighting	, , ,	(232				13.		x 0.01 =	45.14	(250)
Additional standing charges (Tab	ole 12)								120	(251)
Appendix Q items: repeat lines (253) and (254)	as need	led							
Total energy cost	, , ,	247) + (25		=					329.91	(255)
11a. SAP rating - individual hea	ating systems									
Energy cost deflator (Table 12)									0.42	(256)
Energy cost factor (ECF)	[(255) x	(256)] ÷ [(4) + 45.0]	=					1.12	(257)
SAP rating (Section 12)									84.34	(258)
12a. CO2 emissions – Individua	al heating syste	ms inclu	ıding mi	cro-CHP)					
		En	ergy			Fmiss	ion fac	tor	Emissions	
			h/year			kg CO			kg CO2/yea	
Space heating (main system 1)		(211	l) x			0.2	16	=	571.58	(261)
Space heating (secondary)		(215	5) x			0.5	19	=	0	(263)
Water heating		(219	9) x			0.2	16	=	389.7	」 [264]
·										」 ` ′

Space and water heating	(261) + (262) + (263) + (264) =	961.28 (265)	
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	177.63 (268)
Total CO2, kg/year	sun	1177.84 (272)	
CO2 emissions per m ²	(27	15.02 (273)	
El rating (section 14)			87 (274)

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	3228.38 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2201.08 (264)
Space and water heating	(261) + (262) + (263) + (264) =		5429.46 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	1050.75 (268)
'Total Primary Energy	sum	of (265)(271) =	6710.46 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	85.59 (273)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mher:	STRO030065		
Software Name:	Stroma FSAP 2012	Software V		Version: 1.0.5.25		
		Property Address: HOL	JSE D - IMPROVI	ED		
Address :	Woodwell Cottage P2, \	Woodwell Road, BRISTOL	, BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(m	<u> </u>	Volume(m³))
Ground floor		39.2 (1a)	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b)	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 78.4 (4)				
Dwelling volume		(3a)+	(3b)+(3c)+(3d)+(3e)+.	(3n) =	202.27	(5)
2. Ventilation rate:						
	main secon heating heat	ndary other ing	total		m³ per hou	r
Number of chimneys		0 =	0	x 40 =	0	(6a)
Number of open flues	0 +	0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
						_
				Air ch	anges per ho	ur —
•	ys, flues and fans = (6a)+(6		30	÷ (5) =	0.15	(8)
Number of storeys in the		roceed to (17), otherwise continu	e from (9) to (16)	ı	0	(9)
Additional infiltration	ic awaiiiig (110)		[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction					0	(11)
		ling to the greater wall area (after	r	ı		_
deducting areas of openir		or 0.1 (sealed), else enter	0	i		(12)
If no draught lobby, en	· · · · · · · · · · · · · · · · · · ·	or o.r (scaled), clac criter	0	<u> </u>	0	(13)
•	s and doors draught stripp	ed		 	0	(14)
Window infiltration	0 11	0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15) =	İ	0	(16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area					5	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div (18)]$	20]+(8), otherwise $(18) = (16)$			0.4	(18)
		n done or a degree air permeabi	lity is being used	,		_
Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$				1	(19)	
Infiltration rate incorporating shelter factor $ (20) = 1 - [0.073 \times (19)] = $			[0.92	(20)	
Infiltration rate incorporation rate modified for	-	(21) - (10) \ (20)	· 	l	0.37	(21)
awarate (IIOOIIIEO I	or monunity wind Speed					
		בי בי בי בי בי בי בי בי	n Oct Nov	/ Dec		
Jan Feb Monthly average wind sp	Mar Apr May J	un Jul Aug Se	p Oct Nov	/ Dec		

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infil	tration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43]	
Calculate eff If mechani		-	rate for t	he appli	cable ca	ise	-	-	-	-	-		(23a)
If exhaust air			endix N. (2	(23a) = (23a	a) × Fmv (e	eguation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced w									, (===,			0	(23c)
a) If baland	ced mech	, anical ve	ntilation	with he	at recovi	erv (MVI	HR) (24:	′ a)m = (2)	2b)m + (23h) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balan	ced mech	anical ve	entilation	without	heat red	covery (N	лV) (24k	o)m = (22	2b)m + (23b)	<u> </u>	J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from (outside					
if (22b)m < 0.5 >	< (23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
,	m = 1, th	` ′	<u> </u>		<u>`</u>			- 		0.50	T 0.50	1	(24d)
(24d)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(24u)
Effective a (25)m= 0.61	o.61	rate - er	nter (24a 0.58	0.58	0) or (24)	c) or (24 0.56	0.56	X (25) 0.57	0.58	0.59	0.59	1	(25)
(23)111= 0.01	0.01	0.0	0.30	0.30	0.30	0.30	0.50	0.57	0.30	0.59	0.59		(20)
3. Heat loss	بط لمصم مما												
		•											
ELEMENT		SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [- 0.04] = [(W/				kJ/K (26)
ELEMENT Doors Windows Tyl	Gros area pe 1 pe 2	SS	Openin	gs	A ,r 2.07	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.07 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.07 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.07 2.15 3.43 1.14				kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43 1.14 2.84	K) 			kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights	Gros area oe 1 oe 2 oe 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43 1.14 2.84 2.261	K) 			kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor	Gros area pe 1 pe 2 pe 3 pe 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096	K) 			(26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1	Gros area De 1 De 2 De 3 De 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= = [2.07 2.15 3.43 1.14 2.84 2.261 5.096	K) 			(26) (27) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1/2 x1/2 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.18	2K = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [= [= = [= = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38	K) 			(26) (27) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.18	2K = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [= [= = [= = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38	K) 			(26) (27) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57. Telements	33 2 4 5, m ²	Openin m 10.9 0 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/4 x1/5 x1/5 x1/6 x1/6 x1/6 x1/6 x1/6 x1/6 x1/6 x1/6	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [= [= [= [= [= [= [= [= [= [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	K)	kJ/m²-	K	(26) (27) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows all ** include the all	Gros area De 1 De 2 De 3 De 4	33 2 4 5, m ² lows, use e	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/4 x1/4 x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57. Telements and roof wind reas on both poss, W/K =	33 2 4 5, m ² sows, use e sides of in = S (A x	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/4 x1/4 x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12 0	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows all ** include the all Fabric heat le	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57. Telements and roof wind reas on both oss, W/K Ty Cm = Si	33 2 4 5, m ² ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1/2 x1/2 x1/4 x1/5 x x1/4 x x1/5 x x1/6 x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12 0	K)	kJ/m²•	1 3.2 43.19	(26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

				ulation.										
	ŭ	`	,		using Ap	•	K						10.55	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			52.74	(37
			alculated	l monthly	V					•	25)m x (5)		53.74	(0,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(3
eat tr	ansfer c	coefficier	nt W/K	<u> </u>	<u> </u>	<u> </u>	!	!	(39)m	= (37) + (37)		ļ	l	
9)m=	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		
oot lo	oo poro	motor (b	JI D) \\\	/m²l/	I	I	l			Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	92.59	(3
)m=	1.21	1.2	HLP), W/	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		
5)111-	1.21	1.2	1.2	1.10	1.10	1.10	1.10	1.10			Sum(40) ₁ .		1.18	(4
umbe	er of day	s in mor	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
eum	ad occu	ipancy, I	NI									40	1	(4
				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43		(
f TF	A £ 13.9	9, N = 1											-	
nnual	OVOROR													
								(25 x N) to achieve		se taraet o		.96		(-
duce	the annua	al average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target o		.96		(4
duce	the annua	al average	hot water	usage by a day (all w	5% if the a	lwelling is	designed	to achieve	a water us	se target o		.96 Dec]	(-
duce t more	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d ater use, l	lwelling is hot and co Jun	designed and and and and and and and and and an	Aug		_	,	1		(
duce t more t t wate	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed and and and and and and and and and an	Aug	a water us	_	,	1		(
duce t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in 101.15	Feb 197.47	Mar day for ea	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$	Jun ctor from 3	designed and desig	Aug (43)	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(«
educe It more It wate It wate It may come to the sergy come to the	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - calc 135.38	Apr ach month 90.12	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1	Dec 101.15 = c, 1d) 145.27	1103.46	(«
t water ergy comparisons instant	the annual that 125 Jan ar usage in 101.15 content of 150 taneous w	Feb 11 Per per per per per per per per per per p	Mar day for ea 93.79 used - cale 135.38	Apr ach month 90.12 culated mo 118.03	May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water	Jun ctor from 82.76 190 x Vd,r 97.73	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/more 105.16	Oct 93.79 Total = Su 122.55 Total = Su	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		(
duce t more t wate l)m= ergy c s)m= mstant	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - calc 135.38	Apr ach month 90.12	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 c, 1d) 145.27		
duce the more t	Jan 101.15 content of 150 aneous w 0 storage	Feb 11 per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage),	designed and desig	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		
duce t more t water t water t water t water t water t water t water t water t water t water t water	the annual that 125 Jan ar usage in 101.15 content of 150 faneous w 0 storage e volum	Feb 1/2 Feb 1/	Mar day for ea 93.79 used - call 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03 of use (no	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t water dust i)m= dust in material corage common herw	the annual that 125 Jan ar usage in 101.15 content of 150 storage e volum munity herise if no	Feb 1 litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0 includinated no talcated and no talcated and a calcated and a calcated and a calcated and and and a calcated and and a calcated and and a calcated and a ca	Apr ach month 90.12 culated mo 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 97.73 storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
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duce t more	Jan 101.15 101.1	Feb 11 printer per per per per per per per per per p	Mar day for ea 93.79 used - call 135.38 ng at point o includinate hot water	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		
duce t more literative water ergy of mostant mostant orage commister: in the mostant in the most	Jan 101.15 101.1	Feb 1 litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de	Mar 93.79 used - calc 135.38 ng at point and no tal hot water eclared le m Table	Apr ach month 90.12 culated me 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 lar or Water 20 ling, each or is known	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4)
duce to more that water that wate	the annual that 125 Jan 101.15 content of 150 storage e volum munity helise if no storage example anufact example that 125	Feb n litres per p 97.47 hot water 131.19 loss: e (litres) eating a o stored loss: urer's de actor fro m water	Mar day for ea 93.79 used - cale 135.38 ng at point nd no tale hot water eclared le m Table storage	Apr ach month 90.12 culated me 118.03 of use (no	5% if the orater use, I May $Vd,m = fa$ 86.44 0 0 0 0 0 0 0	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		(4)
duce t more	the annual that 125 Jan 101.15 content of 150 storage e volum munity h vise if no storage anufact rature fa	Feb plitres per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point nd no tal hot water m Table storage eclared to	Apr ach month 90.12 culated mo 118.03 of use (no ank in dw er (this ir oss facto 2b cylinder l	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 lar or Water 20 ling, each or is known	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at wate 4)m= anergy of anstant b)m= atternation att	the annual that 125 Jan 101.15 content of 150 anneous w o storage e volum munity h vise if no storage anufact rature fa to lost fro anufact ter stora	Feb n litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de	Mar day for ea 93.79 used - call 135.38 ng at point nd no tal hot water m Table storage eclared to	Apr ach month 90.12 culated mo 118.03 of use (no ng any so ank in dw er (this ir oss facto 2b cylinder l com Table	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at more at more at more at more at more at more at wate at more	the annual the annual that 125 Jan 101.15 content of 150 storage e volum munity h vise if no storage anufact trature fa v lost fro anufact ter stora munity h e factor	Feb 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	Mar day for ea 93.79 used - cale 135.38 ng at point nd no ta hot water eclared le m Table storage eclared of factor fr ee section	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this ir oss facto 2b cylinder I com Tabl on 4.3	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4) (4) (4) (4) (5) (5) (5) (5)

Energy	Energy lost from water storage, kWh/year								x (52) x ((53) =		0] ((54)
Enter	(50) or	(54) in (5	55)									0	((55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	J lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0] ((58)
Primar	y circuit	loss cal	culated	for each	month (59)m =	(58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wa	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	((59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48	((62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	-	
(add a	dditiona	I lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)	_			_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	((63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	((63) (G2)
Output	from w	ater hea	ter										_	
(64)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		
								Outp	out from w	ater heate	r (annual)	12	1229.79	(64)
Heat g	ains fro	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8	x [(46)m	+ (57)m	+ (59)m]	
(65)m=	31.88	27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87	((65)
inclu	ıde (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	Table 5	and 5a):									
Metab	olic gair	s (Table	5), Wat	ts									_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	((66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m=	20.26	18	14.64	11.08	8.28	6.99	7.56	9.82	13.18	16.74	19.54	20.83	((67)
Applia	nces ga	ins (calc	ulated ir	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m=	216.06	218.31	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	((68)
Cookir	ng gains	(calcula	ited in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5				
(69)m=	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	((69)
Pumps	and fa	ns gains	(Table	5a)	-	-	-	-			-	-		
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	((70)
Losses	e.g. ev	aporatic	n (nega	tive valu	es) (Tab	ole 5)							-	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water	heating	gains (T	able 5)										-	
(72)m=	42.84	41.49	38.67	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49	((72)
Total i	nternal	gains =	;			(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72))m	-	
(73)m=	338.65	337.27	325.44	306.02	285.55	266.49	254.54	258.38	268.75	288.3	310.76	328.33] ((73)
		•	•	•	•	•	•	•	-	•		•	•	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	x	20.32	х	0.63	X	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	x	55.46	х	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.7	=	30.58	(78)
South	0.9x	0.77	x	2.14	x	76.57	x	0.63	x	0.7	=	50.08	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	x	0.7	=	63.79	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.7	=	72.09	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	x	0.7	=	75.13	(78)
South	0.9x	0.77	x	2.14	x	110.55	x	0.63	x	0.7	=	72.3	(78)
South	0.9x	0.77	x	2.14	x	108.01	x	0.63	x	0.7	=	70.64	(78)
South	0.9x	0.77	X	2.14	x	104.89	x	0.63	X	0.7	=	68.6	(78)
South	0.9x	0.77	x	2.14	x	101.89	x	0.63	X	0.7	=	66.63	(78)
South	0.9x	0.77	X	2.14	x	82.59	x	0.63	X	0.7	=	54.01	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.7	=	36.24	(78)
South	0.9x	0.77	X	2.14	x	40.4	x	0.63	X	0.7	=	26.42	(78)
West	0.9x	0.77	X	2.59	X	19.64	X	0.63	X	0.7	=	15.55	(80)
West	0.9x	0.77	X	0.86	x	19.64	X	0.63	X	0.7	=	5.16	(80)
West	0.9x	0.77	X	2.59	x	38.42	x	0.63	X	0.7	=	30.41	(80)
West	0.9x	0.77	X	0.86	X	38.42	X	0.63	X	0.7	=	10.1	(80)
West	0.9x	0.77	X	2.59	x	63.27	X	0.63	X	0.7	=	50.08	(80)
West	0.9x	0.77	X	0.86	x	63.27	X	0.63	X	0.7	=	16.63	(80)
West	0.9x	0.77	X	2.59	x	92.28	x	0.63	X	0.7	=	73.04	(80)
West	0.9x	0.77	X	0.86	X	92.28	X	0.63	X	0.7	=	24.25	(80)
West	0.9x	0.77	X	2.59	x	113.09	x	0.63	x	0.7	=	89.52	(80)
West	0.9x	0.77	X	0.86	x	113.09	x	0.63	X	0.7	=	29.72	(80)
West	0.9x	0.77	X	2.59	x	115.77	X	0.63	x	0.7	=	91.64	(80)
West	0.9x	0.77	X	0.86	X	115.77	x	0.63	x	0.7	=	30.43	(80)

West 0.9x	0.77	×	2.59	x	110.22	X	0.63	×	0.7	=	87.24	(80)
West 0.9x	0.77	→ ×	0.86] x	110.22	X	0.63	≓ ×	0.7	= =	28.97	(80)
West 0.9x	0.77	×	2.59	X	94.68	i x	0.63	= x	0.7	-	74.94	(80)
West 0.9x	0.77	×	0.86	X	94.68	X	0.63	×	0.7	-	24.88	(80)
West 0.9x	0.77	×	2.59	i x	73.59	×	0.63	×	0.7		58.25	(80)
West 0.9x	0.77	×	0.86	X	73.59	X	0.63	x	0.7	= =	19.34	(80)
West 0.9x	0.77	×	2.59	X	45.59	×	0.63	×	0.7	= =	36.09	(80)
West 0.9x	0.77	×	0.86	X	45.59	×	0.63	×	0.7	=	11.98	(80)
West 0.9x	0.77	x	2.59	x	24.49	X	0.63	x	0.7	=	19.38	(80)
West 0.9x	0.77	x	0.86	x	24.49	X	0.63	x	0.7	=	6.44	(80)
West 0.9x	0.77	x	2.59	x	16.15	X	0.63	×	0.7	=	12.78	(80)
West 0.9x	0.77	x	0.86	x	16.15	X	0.63	x	0.7	=	4.24	(80)
Rooflights 0.9x	1	x	1.33	x	47.01	X	0.63	x	0.7	=	49.63	(82)
Rooflights 0.9x	1	x	1.33	X	83.9	X	0.63	x	0.7	=	88.58	(82)
Rooflights _{0.9x}	1	X	1.33	X	122.73	X	0.63	×	0.7	=	129.57	(82)
Rooflights 0.9x	1	x	1.33	X	161.74	X	0.63	x	0.7	=	170.76	(82)
Rooflights 0.9x	1	x	1.33	X	187.38	X	0.63	x	0.7	=	197.83	(82)
Rooflights 0.9x	1	x	1.33	X	188.06	X	0.63	×	0.7	=	198.54	(82)
Rooflights _{0.9x}	1	X	1.33	X	180.51	X	0.63	X	0.7	=	190.58	(82)
Rooflights 0.9x	1	x	1.33	X	161.54	X	0.63	×	0.7	=	170.54	(82)
Rooflights _{0.9x}	1	X	1.33	X	136.5	X	0.63	×	0.7	=	144.11	(82)
Rooflights _{0.9x}	1	X	1.33	X	95.08	x	0.63	X	0.7	=	100.38	(82)
Rooflights _{0.9x}	1	x	1.33	X	57.06	X	0.63	x	0.7	=	60.24	(82)
Rooflights 0.9x	1	X	1.33	X	39.72	X	0.63	X	0.7	=	41.93	(82)
Solar gains in	1	T	ı		70.44 454.07	1	n = Sum(74)m.			04.40	1	(93)
(83)m= 111.45 Total gains – i		94.26 solar	$\begin{array}{c c} 395.07 & 466.7 \\ \hline (84)m - (73) \end{array}$		72.11 451.37 83\m watts	397	7.63 329.45	226.4	1 135.29	94.16		(83)
(84)m= 450.1		19.7	701.09 751.7	`	738.6 705.91	656	5.01 598.19	514.7	1 446.05	422.49	1	(84)
` '	LL_				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 000		3 1 1 1 1	. 1			
7. Mean inter	·				araa fram Ta	shlo O	Th1 (°C)				24	7(05)
Utilisation fac	ŭ	٠.		•			, IIII (C)				21	(85)
Jan	 -	Mar	Apr Ma	Ť	Jun Jul		ug Sep	Oct	Nov	Dec]	
(86)m= 1	 	0.99	0.96 0.88		0.72 0.55	0.6	<u> </u>	0.98	1	1		(86)
Mean interna	l tomporatu	ıro in li	ving area T1	(follo	w stops 2 to	7 in 7			<u> </u>		I	
(87)m= 19.66	 	20.11	20.47 20.7		20.94 20.99	20.		20.46	19.99	19.64]	(87)
` ′	<u> </u>		!	!	!		l		1		J	, ,
Temperature (88)m= 19.92	 	9.92	19.94 19.9		19.95 19.95	19.		19.94	19.93	19.93	1	(88)
` ′	<u> </u>			!	!		10.34	10.04	10.90	10.00	J	(55)
Utilisation fac	 			Ť	<u>`</u>		10 0 70	0.07	0.00	1	1	(89)
(89)m= 1	<u> </u>	0.98	0.94 0.84		0.63 0.43	0.4		0.97	0.99	1	I	(03)
Mean interna	ıl temperatu	ıre in t	he rest of dw	elling	T2 (follow st	teps 3	to 7 in Tabl	e 9c)				

(90)m=														
	18.7	18.87	19.15	19.51	19.78	19.92	19.95	19.95	19.86	19.5	19.04	18.68		(90) —
									f	LA = Livin	g area ÷ (4	ł) =	0.23	(91)
Mean	internal	temper	ature (fo	r the wh	ole dwel	ling) = fl	_A × T1	+ (1 – fL	.A) × T2					
(92)m=	18.92	19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(92)
Apply	adjustm	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.92	19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(93)
8. Spa	ace heat	ting requ	uirement											
Set Ti	i to the r	nean int	ernal ter	nperatu	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m and	d re-calc	ulate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	ation fac		ains, hm											
(94)m=	1	0.99	0.98	0.94	0.84	0.65	0.46	0.52	8.0	0.96	0.99	1		(94)
Usefu	ıl gains,		W = (94)	4)m x (8	4)m						· · · · · · · · · · · · · · · · · · ·			
(95)m=		532.72	607.76	659.91	631.38	479.8	323.54	337.91	475.61	496.09	443.22	421.57		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
						Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m=	1381.67	1337.36	1209.01	1002.99	767.52	507.12	327.41	344.65	549.56	842.77	1129.49	1373.09		(97)
Space	e heating	g require	ement fo	r each n	nonth, k\	Wh/mont	h = 0.02	4 x [(97)m – (95)m] x (4	1)m			
(98)m=	694.08	540.72	447.32	247.02	101.29	0	0	0	0	257.93	494.11	707.93		_
								Tota	l per year	(kWh/year) = Sum(98	8) _{15,912} =	3490.42	(98)
Space	e heating	g require	ement in	kWh/m²	² /year								44.52	(99)
8c Sr	nace cod	olina rea	uiremen	nt								L		
		Ĭ	July and		See Tak	ole 10h								
Oulou	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug						
Heat				•					l Sepl	Oct	l Nov l	Dec		
(100)m=		0		using Z	o°C inter	nal temp	erature		Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		
Utilisa	ation fac	tor for lo	0	0	o o inter	nal temp 857.31	674.9				Nov e from T			(100)
(101)m=	0							and exte	ernal ten	nperatur	e from T	able 10)		(100)
Usefu	ıl loss. h	0						and exte	ernal ten	nperatur	e from T	able 10)		(100) (101)
1			oss hm	0	0	857.31 0.86	674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0		, ,
(102)m =			ss hm	0	0	857.31 0.86	674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0		, ,
	0	mLm (W	oss hm 0 /atts) = (0 0 (100)m x	0 0 (101)m 0	0.86 738.17	0.92	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0		(101)
	0 (solar g	mLm (W	oss hm 0 /atts) = (0 0 (100)m x	0 0 (101)m 0	0.86 738.17	0.92	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0		(101)
Gains (103)m=	0 s (solar g	mLm (W 0 gains cal	oss hm 0 /atts) = (0 culated 0	0 (100)m x 0 for appli	0 (101)m 0 cable we	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0	c (41)m	(101)
Gains (103)m=	0 (solar g	mLm (W 0 gains ca 0 g require	oss hm 0 /atts) = (0 culated 0	0 100)m x 0 for appli	0 0 (101)m 0 cable we 0 whole c	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0	c (41)m	(101)
Gains (103)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains ca 0 g require	oss hm 0 /atts) = (0 culated 0 ement fo	0 100)m x 0 for appli	0 0 (101)m 0 cable we 0 whole c	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0	c (41)m	(101)
Gains (103)m= Space set (1	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W gains cal grequire zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 0/h) = 0.00	0 0 0 0 24 x [(10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 102)m] x	c (41)m 478.84	(101)
Gains (103)m= <i>Space</i> set (1 (104)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains ca 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >		(101) (102) (103)
Gains (103)m= Space set (1 (104)m=	s (solar coling 04)m to 0 d fraction	mLm (W 0 gains cal 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month, 3 x (98	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement for 104)m <	0 (100)m x 0 for appli 0 r month, 3 x (98	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m= Coolec Intermi	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0	oss hm o /atts) = (o culated o ement fo 104)m < o	0 (100)m x 0 for appli 0 r month, 3 x (98	0 (101)m 0 cable we 0 whole c)m 0	0.86 738.17 eather re 920.76 //welling,	0.92 622.55 egion, se 882.07 continuo	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta	oss hm o /atts) = (o culated o ement fo 104)m < o	0 100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	0.86 738.17 eather re 920.76 //welling, 131.47	674.9 0.92 622.55 egion, se 882.07 continue 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta	oss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 able 10b	0 100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	0.86 738.17 eather re 920.76 //welling, 131.47	674.9 0.92 622.55 egion, se 882.07 continue 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta 0	oss hm o /atts) = (o lculated o ement for able 10b o ment for	0 (100)m x 0 for appli 0 r month, (3 x (98) 0	0 0 (101)m 0 cable we 0 whole come 0 0	0.86 738.17 eather re 920.76 //welling, 131.47 0.25 × (105)	674.9 0.92 622.55 egion, se 882.07 continue 193.09 0.25 × (106)r	and exte 691.53 0.9 621.41 e Table 828.78 Dus (kW 154.28	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m= Space (107)m=	o (solar coling o) cooling o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta 0 requirer 0	oss hm o /atts) = (o lculated o ement for able 10b o ment for	0 (100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole o)m 0	0.86 738.17 eather re 920.76 //welling, 131.47 0.25 × (105)	674.9 0.92 622.55 egion, se 882.07 continue 193.09 0.25 × (106)r	and exte 691.53 0.9 621.41 e Table 828.78 Dus (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under sp	pecial conditions, see section 11)		
Fabric Energy Efficiency	(99) + (108) =	46.05	(109)
Target Fabric Energy Efficiency (TFEE)		52.95	(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mher·	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V			n: 1.0.5.25	
		Property Address: HOU	SE D - IMPROVE	ΞD		
Address :	Woodwell Cottage P2, W	oodwell Road, BRISTOL	, BS11 9XU			
1. Overall dwelling dime	nsions:					
		Area(m²)	Av. Height(m	<u>^</u>	Volume(m³))
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 78.4 (4)				
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+.	(3n) =	202.27	(5)
2. Ventilation rate:						
	main second heating heatin		total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0)	x 10 =	0	(7b)
Number of flueless gas fi	res		0 ,	x 40 =	0	(7c)
				Air ch	anges per ho	our —
•	ys, flues and fans = $(6a)+(6b)$		30	÷ (5) =	0.15	(8)
Number of storeys in the	een carried out or is intended, prod ne dwelling (ns)	ceea to (17), otnerwise continue	e trom (9) to (16)		0	(9)
Additional infiltration	ic dwelling (113)		[(9	9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame	or 0.35 for masonry con		., .	0	(11)
	resent, use the value corresponding	g to the greater wall area (after				
deducting areas of openir	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) o	r 0.1 (sealed), else enter	0		0	(12)
If no draught lobby, en	,	0.1 (ddaidd), didd diffel			0	(13)
	s and doors draught stripped	d			0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) +	+ (12) + (13) + (15) =		0	(16)
Air permeability value,	q50, expressed in cubic me	tres per hour per square	metre of envelop	e area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20]$]+(8), otherwise (18) = (16)			0.35	(18)
	s if a pressurisation test has been	done or a degree air permeabil	ity is being used	ı		_
Number of sides sheltere Shelter factor	ed	(20) = 1 - [0.075 :	((19)] =		1	(19)
Infiltration rate incorporat	ing shelter factor	$(20) = 1 \cdot [0.073]$ $(21) = (18) \times (20)$			0.92	$\frac{(20)}{(21)}$
Infiltration rate modified for	_	(21) - (10) X (20)			0.32	(21)
Jan Feb	Mar Apr May Jui	n Jul Aug Se	p Oct Nov	Dec		
July 1 CD	wa j rpi j way j du	. I dai I Adg I de	P 001 140V	1 200		
Monthly average wind sp	and from Table 7					

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor ((22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.41	0.4	0.39	0.35	0.35	0.31	0.31	0.3	0.32	0.35	0.36	0.38]	
Calculate effe		-	rate for t	he appli	cable ca	se	!	!	!	!	!	,	(00.)
If mechanic			andiv N (2	3h) - (23s	a) v Emy (4	aguation (N	V5)) othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balanc		,	,			`		,	2h\m + (23h) v [1 – (23c)	0 - 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balanc	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from	outside	l			J	
if (22b)	m < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
	m = 1, th 0.58	en (24d) _{0.58}	m = (221)	0.56	0.55	(4d)m = 0.55	$0.5 + [(2)]_{0.54}$	(2b)m² x 0.55		0.57	0.57	1	(24d)
` ′	<u>.</u> !	<u> </u>		<u> </u>	l				0.56	0.57	0.57	J	(240)
Effective ai (25)m= 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.57	0.57	1	(25)
(),	1	1						1]	. ,
3. Heat loss		•							A 37.11				A 3/ I
3. Heat loss	es and he Gros area	SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [- 0.04] = [(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r 2.07	m ² x x10 x10	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area ne 1 ne 2 ne 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.729				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements	33 2 4 , m ²	Openin m 10.9 0 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof winder eas on both	33 2 4 , m ² ows, use e	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [= [= [= [= [= [= [= [= [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K:	33 2 4 , m ² ows, use e sides of in = S (A x	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66 0	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the are Fabric heat lo	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oess, W/K: y Cm = S(33 2 4 , m ² ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66 0	K)	kJ/m²•	n 3.2	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

can he u	sed inste	ad of a de	tailed calcı	ulation										
					using Ap	pendix I	K						10.48	(36)
	•	,	•		= 0.05 x (3	•								(==)
Total fa	bric hea	at loss							(33) +	(36) =			57.1	(37)
Ventilat	tion hea	it loss ca	alculated	monthl	y				(38)m	= 0.33 × (25)m x (5)			
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Heat lo	ss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	94.67	(39)
(40)m=	1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		
Numbe	r of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.21	(40)
ſ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
_	-			-	-	-		-		-	-	-	•	
4. Wat	ter heat	ing ener	gy requi	irement:								kWh/ye	ear:	
Accum	od occu	nanov I	NI.									10	Ī	(40)
if TF				[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.43		(42)
Annual	averag	e hot wa						(25 x N)				.96		(43)
		_			5% if the d ater use, l	_	_	to achieve	a water us	se target o	f			
Г	-				<u> </u>		•	Ι	0		N			
Hot wate	Jan	Feb	Mar day for ea	Apr ach month	May Vd,m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	101.15	97.47	93.79	90.12	86.44	82.76	82.76	86.44	90.12	93.79	97.47	101.15		
(44)111-	101.10	37.47	33.73	30.12	00.44	02.70	02.70	00.44		Total = Su			1103.46	(44)
Energy c	ontent of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			(,		1.000	` ′
(45)m=	150	131.19	135.38	118.03	113.25	97.73	90.56	103.92	105.16	122.55	133.77	145.27		
_							!			Total = Su	m(45) ₁₁₂ =	=	1446.81	(45)
If instanta	aneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)	,	,		•	
(46)m=	0 storage	0	0	0	0	0	0	0	0	0	0	0		(46)
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	me ves	sel		0		(47)
_		,		•	velling, e		_			00.		0		()
	-	_			_			ombi boil	ers) ente	er '0' in (47)			
Water s	storage	loss:												
a) If ma	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature fa	actor fro	m Table	2b								0		(49)
•			storage	-		:4		(48) x (49)	=			0		(50)
•				-	loss fact le 2 (kW							0		(51)
		•	ee secti		(1.00)	, 5, 00	-1/					<u> </u>	1	(01)
	-	from Ta										0		(52)
Tempe	rature fa	actor fro	m Table	2b								0		(53)

Energy lost from wa	•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54) in	, ,									0		(55)
Water storage loss of	alculated	for each	month			((56)m = (55) × (41)	m -			_	
(56)m= 0 0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains dedicate	ted solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss (annual) fr	om Table	e 3							0		(58)
Primary circuit loss of					` '	` '						
(modified by facto	1	1		1	1			1	'	i	1	4
(59)m= 0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calculate	d for eacl	n month ((61)m =	(60) ÷ 30	65 × (41))m						
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required f	or water h	eating ca	alculated	d for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		(62)
Solar DHW input calculat	ed using App	pendix G o	r Appendix	κ Η (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or \	//WHRS	applies	, see Ap	pendix (3)				•	
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from water h	eater										_	
(64)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		_
						Outp	out from w	ater heate	r (annual) ₁	12	1229.79	(64)
Heat gains from wat	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	x [(46)m	+ (57)m	+ (59)m	1	
(65)m= 31.88 27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87		(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains (s	ee Table	5 and 5a):									
Metabolic gains (Tal	ole 5), Wa	tts									_	
Jan Fel		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 121.59 121.5	9 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59		(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	-	-	-		
(67)m= 19.76 17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31		(67)
Appliances gains (ca	lculated i	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5	•		•	
(68)m= 216.06 218.3	1 212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53		(68)
Cooking gains (calc	ılated in A	ppendix	L, equa	tion L15	or L15a	, also se	ee Table	5	•		-	
(69)m= 35.16 35.10	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16		(69)
Pumps and fans gai	ns (Table	5a)			l					ı	ı	
(70)m= 0 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapora	tion (nega	ative valu	es) (Tab	ole 5)							1	
(71)m= -97.27 -97.2		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water heating gains	(Table 5)	<u> </u>						•			ı	
(72)m= 42.84 41.49	<u>` </u>	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49		(72)
Total internal gains	=		I	(66)	ım + (67)m	ı + (68)m -	L + (69)m + ∈	(70)m + (7	1)m + (72)	m	I	
(73)m= 338.14 336.8		305.74	285.34	266.31	254.35	258.13	268.42	287.88	310.27	327.81		(73)
		1		1	· · · · · ·						I	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	х	34.53	X	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	X	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	X	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	10.03	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.8	=	34.94	(78)
South	0.9x	0.77	x	2.14	x	76.57	x	0.63	x	0.8	=	57.23	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	x	0.8	=	72.9	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.8	=	82.39	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	x	0.8	=	85.86	(78)
South	0.9x	0.77	x	2.14	x	110.55	X	0.63	x	0.8	=	82.63	(78)
South	0.9x	0.77	x	2.14	x	108.01	x	0.63	x	0.8	=	80.73	(78)
South	0.9x	0.77	x	2.14	x	104.89	X	0.63	x	0.8	=	78.4	(78)
South	0.9x	0.77	x	2.14	x	101.89	X	0.63	x	0.8	=	76.15	(78)
South	0.9x	0.77	x	2.14	x	82.59	X	0.63	X	0.8	=	61.73	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.8	=	41.42	(78)
South	0.9x	0.77	X	2.14	x	40.4	X	0.63	x	0.8	=	30.2	(78)
West	0.9x	0.77	X	2.59	x	19.64	X	0.63	X	0.8	=	17.77	(80)
West	0.9x	0.77	X	0.86	X	19.64	X	0.63	X	0.8	=	5.9	(80)
West	0.9x	0.77	x	2.59	X	38.42	x	0.63	x	0.8	=	34.76	(80)
West	0.9x	0.77	X	0.86	X	38.42	X	0.63	X	0.8	=	11.54	(80)
West	0.9x	0.77	X	2.59	X	63.27	X	0.63	X	0.8	=	57.24	(80)
West	0.9x	0.77	x	0.86	X	63.27	x	0.63	x	0.8	=	19.01	(80)
West	0.9x	0.77	X	2.59	X	92.28	X	0.63	X	0.8	=	83.48	(80)
West	0.9x	0.77	X	0.86	X	92.28	X	0.63	X	0.8	=	27.72	(80)
West	0.9x	0.77	X	2.59	x	113.09	X	0.63	X	0.8	=	102.31	(80)
West	0.9x	0.77	x	0.86	x	113.09	x	0.63	x	0.8	=	33.97	(80)
West	0.9x	0.77	x	2.59	x	115.77	x	0.63	x	0.8	=	104.73	(80)
West	0.9x	0.77	x	0.86	x	115.77	X	0.63	x	0.8	=	34.77	(80)

West 0.9x	0.77	x	2.5	9	X	1	10.22	x	0.63		x	0.8		_ [99.71	(80)
West 0.9x	0.77	×	0.8		x	_	10.22) x	0.63		X	0.8		_	33.11	(80)
West 0.9x	0.77	×	2.5		x	_	4.68]]	0.63		X	0.8	_	_	85.65	(80)
West 0.9x	0.77	x	0.8		x		4.68) x	0.63		x	0.8		<u> </u>	28.44	(80)
West 0.9x	0.77	x	2.5	9	x	7	3.59	X	0.63		X	0.8		_ [66.57	(80)
West 0.9x	0.77	x	0.8	6	x	7	3.59	X	0.63		x	0.8		<u> </u>	22.1	(80)
West 0.9x	0.77	x	2.5	9	x	4	5.59	X	0.63		X	0.8		<u> </u>	41.24	(80)
West 0.9x	0.77	×	0.8	6	x	4	5.59	j×	0.63		x	0.8	_	<u> </u>	13.69	(80)
West 0.9x	0.77	x	2.5	9	x	2	4.49	x	0.63		x	0.8		= [22.15	(80)
West 0.9x	0.77	x	0.8	6	x	2	4.49	x	0.63		x	0.8		= [7.36	(80)
West 0.9x	0.77	x	2.5	9	x	1	6.15	x	0.63		x	0.8	<u> </u>	<u> </u>	14.61	(80)
West 0.9x	0.77	x	8.0	6	x	1	6.15	X	0.63		x	0.8		= [4.85	(80)
Rooflights 0.9x	1	x	1.3	3	x	4	7.01	x	0.63		x	0.8		= [56.72	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	8	33.9	X	0.63		x	0.8		= [101.23	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	1:	22.73	X	0.63		x	0.8		= [148.08	(82)
Rooflights 0.9x	1	X	1.3	3	x	10	61.74	X	0.63		x	0.8		= [195.15	(82)
Rooflights 0.9x	1	X	1.3	3	X	18	87.38	X	0.63		x	0.8		= [226.09	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	18	88.06	X	0.63		x	0.8	:	= [226.91	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	18	80.51	X	0.63		x	0.8	:	= [217.8	(82)
Rooflights _{0.9x}	1	x	1.3	3	X	10	61.54	X	0.63		X	0.8		= [194.91	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	1	36.5	X	0.63		X	0.8		= [164.7	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	9	5.08	X	0.63		x	0.8	:	= [114.72	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	5	7.06	X	0.63		x	0.8	:	= [68.85	(82)
Rooflights 0.9x	1	X	1.3	3	X	3	9.72	X	0.63		X	0.8		= [47.92	(82)
Solar gains in		I				20.55	F4F 0C	T T	n = Sum(74)ı			154.00	407.0			(92)
(83)m= 127.37 Total gains – i		336.3 d solar	451.51 (84)m =	532.77 (73)m		39.55 83\m	515.86 watts	454	.44 376.5	1 25	8.76	5 154.62	107.6)1		(83)
(84)m= 465.51		661.37	757.25	818.12	<u> </u>	05.87	770.21	712	.57 644.9	3 54	6.63	3 464.89	435.4	2		(84)
` ′	<u> </u>	!														
7. Mean inter						area f	from Tak	hla 0	Th1 (°C)					ſ	21	(85)
Utilisation fac	_	• .			_			oic o	, 1111 (0)					L	21	
Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	ΙΑ	ug Se	0 (Oct	Nov	De	С		
(86)m= 1	0.99	0.98	0.95	0.86	-	0.69	0.52	0.5	 	_	.97	1	1			(86)
Mean interna	l temnerat	ture in I	iving ar	22 T1 (follo	w ste	ns 3 to 7	7 in T		·						
(87)m= 19.65		20.13	20.49	20.79	$\overline{}$	20.95	20.99	20.		7 20	0.47	19.99	19.62	2		(87)
Temperature	during he	ating n	oriode ir	rosto	of du	/olling	from To	hla (D_Th2 (°C	.)		Į .				
(88)m= 19.9	19.9	19.9	19.91	19.92	$\overline{}$	9.92	19.92	19.	<u>`</u>		9.92	19.91	19.9 ²	1		(88)
												1				
Utilisation fac	0.99	0.98	0.93	veiling 0.81	\neg	,m (se 0.59	0.4	9a) 0.4	16 0.75	1 0	.96	0.99	1	\neg		(89)
									<u>l</u>			0.59	'			(00)
Mean interna	ıı temperat	ture in t	ne rest	ot dwe	ıııng	12 (fo	DIIOW Ste	eps 3	to / in Ta	able 9	C)					

()														
(90)m=	18.68	18.86	19.15	19.51	19.78	19.9	19.92	19.92	19.85	19.49	19.02	18.65		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.23	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llina) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	18.9	19.09	19.38	19.74	20.01	20.15	20.17	20.17	20.09	19.72	19.25	18.88		(92)
Apply	adjustn	nent to t	he mean	internal	l tempera	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.9	19.09	19.38	19.74	20.01	20.15	20.17	20.17	20.09	19.72	19.25	18.88		(93)
8. Sp	ace hea	tina reau	uirement											
					re obtain	ed at ste	ep 11 of	Table 9l	o. so tha	t Ti.m=(76)m an	d re-calc	ulate	
			or gains	•			- F		o, ooa	(. 0,	u . o oao		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	1	0.99	0.98	0.93	0.81	0.62	0.43	0.49	0.77	0.96	0.99	1		(94)
Usefu	ıl gains,	hmGm ,	W = (94	4)m x (84	4)m		•	•						
(95)m=	463.91	559.64	645.43	702.3	663.96	495.8	331.09	346.46	495.49	522.92	461.4	434.32		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	1				
(97)m=	1403.7	1360.91		1026.55		519.2	334.35	352.26	562.54	861.83	1152.19	1398.25		(97)
Space	e heating	g require	ement fo	r each n	nonth, k\	Nh/mont	th = 0.02	24 x [(97)m – (95)m] x (4 ²	1)m			
(98)m=	699.2	538.46	436.77	233.46	90.48	0	0	0	0	252.16	497.37	717.16		
							l	Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3465.06	(98)
Space	o bootin	a roquir	omont in	k\A/b/m²	2/voor				. ,	` •	,	, , [44.0	
•	· ·	•	ement in		7уваі								44.2	(99)
8c. S	pace cod	olina rec												
		oning rec	luiremen	nt										
Calcu	lated fo	r June, J	luly and	August.										
	lated fo	r June, c Feb	luly and Mar	August. Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	Jan Jan loss rate	r June, c Feb e Lm (ca	luly and Mar Iculated	August. Apr using 2	May 5°C inter	Jun nal temp	perature	and ext	ernal ten	nperatur	e from T	able 10)		(400)
Heat (100)m=	Jan Jan loss rate	r June, c Feb Lm (ca	luly and Mar Iculated	August. Apr	May	Jun	<u> </u>							(100)
Heat (100)m=	Jan Jan loss rate 0 ation fac	r June, c Feb e Lm (ca o tor for lo	Mar Mar Iculated 0	August. Apr using 25	May 5°C inter	Jun nal temp 879.9	692.69	and exte	ernal ten	nperatur 0	e from T	able 10)		, ,
Heat (100)m= Utilisa (101)m=	Jan Jan loss rate 0 ation fac	r June, c Feb E Lm (ca 0 tor for lo	Mar Iculated 0 oss hm	August. Apr using 25	May 5°C inter 0	Jun nal temp 879.9	perature	and ext	ernal ten	nperatur	e from T	able 10)		(100)
Heat (100)m= Utilisa (101)m= Usefu	Jan loss rate 0 ation fac	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W	luly and Mar lculated 0 ess hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun nal temp 879.9	692.69 0.93	and external and e	ernal ten 0	o 0	e from T 0	able 10) 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m=	Jan Jan Joss rate 0 ation fac 0 I loss, h	r June, c Feb e Lm (ca 0 tor for lo 0 mLm (W	July and Mar Iculated 0 oss hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9 0.88 771.09	0.93 645.44	and exter 710.17 0.91	ernal ten 0 0	nperatur 0	e from T	able 10)		` ,
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains	Jan loss rate 0 ation fac 0 Il loss, h 0 (solar o	r June, c Feb e Lm (ca 0 tor for lo 0 mLm (W	luly and Mar lculated 0 ess hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9 0.88 771.09 eather re	0.93 0.93 645.44 egion, se	and external and e	ernal ten 0 0	o 0	e from T 0 0	able 10) 0 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	Jan Jan Joss rate 0 ation fac I loss, h 0 s (solar o	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca	July and Mar Journal of the second of the se	August. Apr using 25 0 100)m x 0 for appli	May 5°C inter 0 (101)m 0 cable we	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 0 10)	0 0 0	0 0 0	able 10) 0 0 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space	lated for Jan loss rate 0 ation facult loss, he cooling e cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole c	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 0 10)	0 0 0	0 0 0	able 10) 0 0	c (41)m	(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1	Jan loss rate 0 ation fac 0 ul loss, h 0 s (solar c 0 e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 grequire zero if (luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	August. Apr using 25 0 100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 (h) = 0.0	0 0 0 0 24 x [(10	0 0 0 0 0 0	able 10) 0 0 0 102)m]	c (41)m	(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	Jan loss rate 0 ation fac 0 ul loss, h 0 s (solar c 0 e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole c	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 10) 0 0/h) = 0.00	0 0 0 0 24 x [(10	0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>		(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar of 0 c) e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	August. Apr using 25 0 100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar g 0 e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>		(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar o 0 0 0 0 0 0 0 0 0 0 0 0 d fraction fattency factors	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement for 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 0.93 645.44 egion, se 952.37 continuo	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar o 0 0 0 0 0 0 0 0 0 0 0 0 d fraction fattency factors	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	571.39 1	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermit (106)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar c 0 04)m to 0 d fractior ittency fac 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Iculated 0 Pss hm 0 Jatts) = (0 Iculated 0 Pement fo 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 645.44 egion, se 952.37 continue 228.36	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated for Jan loss rate 0 ation face 0 loss, he cooling cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0 month =	May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>	571.39 1	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated for Jan loss rate 0 ation face 0 loss, he cooling cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Iculated 0 Pss hm 0 Jatts) = (0 Iculated 0 Pement fo 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 645.44 egion, se 952.37 continue 228.36	and external and e	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermi (106)m= Space (107)m=	lated for Jan loss rate 0 ation fac 0 loss, h 0 s (solar g 0 4)m to 0 d fractior ittency fac 0 cooling 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require correquirer 0	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	May 5°C inter 0 (101)m 0 cable we 0 whole co m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>	571.39 1 0	(101) (102) (103) (104) (105) (106)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m= Space (107)m=	lated for Jan loss rate 0 ation fac 0 loss, h 0 s (solar g 0 4)m to 0 d fractior ittency fac 0 cooling 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require correquirer 0	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	May 5°C inter 0 (101)m 0 cable we 0 whole co m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11)

Fabric Energy Efficiency

(99) + (108) =

46.02

(109)

		User Details:			
Assessor Name:	Jemma Mclaughlan	Stroma Nur	nber: STRC	030065	
Software Name:	Stroma FSAP 2012	Software Ve	ersion: Version	on: 1.0.5.25	
	Pro	operty Address: HOUS	SE D - IMPROVED		
Address :	Woodwell Cottage P2, Woody	well Road, BRISTOL,	BS11 9XU		
1. Overall dwelling dime	ensions:				
		Area(m²)	Av. Height(m)	Volume(m³)	_
Ground floor		39.2 (1a) x	2.6 (2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56 (2b) =	100.35	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	78.4 (4)			
Dwelling volume		(3a)+(3	(3c)+(3c)+(3d)+(3e)+(3n) =	202.27	(5)
2. Ventilation rate:					
	main secondary heating heating	other	total	m³ per hour	
Number of chimneys	0 + 0	+ 0 =	0 x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0 x 20 =	0	(6b)
Number of intermittent fa	ns		3 x 10 =	30	(7a)
Number of passive vents			0 x 10 =	0	(7b)
Number of flueless gas fi	res		0 x 40 =	0	(7c)
			Air al	nanges per hou	_
Infiltration due to chimno	ys, flues and fans = $(6a)+(6b)+(7a)$)+(7h)+(7c) -			_
	peen carried out or is intended, proceed		\div (5) = from (9) to (16)	0.15	(8)
Number of storeys in the		(),	(-) (-)	0	(9)
Additional infiltration	· ,		[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame or 0	0.35 for masonry cons	truction	0	(11)
if both types of wall are p deducting areas of openi	resent, use the value corresponding to to	he greater wall area (after			_
	floor, enter 0.2 (unsealed) or 0.1	(sealed), else enter ()	0	(12)
If no draught lobby, en	ter 0.05, else enter 0			0	(13)
Percentage of window	s and doors draught stripped			0	(14)
Window infiltration		0.25 - [0.2 x (14) ÷	100] =	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	0	(16)
Air permeability value,	q50, expressed in cubic metres	per hour per square r	metre of envelope area	4	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$		0.35	(18)
Air permeability value applie	es if a pressurisation test has been done	or a degree air permeabilit	y is being used		
Number of sides sheltered	ed		4.50	1	(19)
Shelter factor		(20) = 1 - [0.075 x]		0.92	(20)
Infiltration rate incorporate	_	$(21) = (18) \times (20) =$:	0.32	(21)
Infiltration rate modified f	or monthly wind speed	, ,	, , ,	7	
Jan Feb	Mar Apr May Jun	Jul Aug Sep	Oct Nov Dec]	
Monthly average wind sp	eed from Table 7			_	

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor ((22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.41	0.4	0.39	0.35	0.35	0.31	0.31	0.3	0.32	0.35	0.36	0.38]	
Calculate effe		-	rate for t	he appli	cable ca	se	!	!	!	!	!	,	(00.)
If mechanic			andiv N (2	3h) - (23s	a) v Emy (4	aguation (N	V5)) othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balanc		,	,			`		,	2h\m + (23h) v [1 – (23c)	0 - 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balanc	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from	outside	l			J	
if (22b)	m < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
	m = 1, th 0.58	en (24d) _{0.58}	m = (221)	0.56	0.55	(4d)m = 0.55	$0.5 + [(2)]_{0.54}$	(2b)m² x 0.55		0.57	0.57	1	(24d)
` ′	<u>.</u> !	<u> </u>		<u> </u>	l				0.56	0.57	0.57	J	(240)
Effective ai (25)m= 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.57	0.57	1	(25)
(),	1	1						1]	. ,
3. Heat loss		•							A 37.11				A 3/ I
3. Heat loss	es and he Gros area	SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [- 0.04] = [(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r 2.07	m ² x x10 x10	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area ne 1 ne 2 ne 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.729				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements	33 2 4 , m ²	Openin m 10.9 0 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof winder eas on both	33 2 4 , m ² ows, use e	10.9 10.9 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [= [= [= [= [= [= [= [= [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K:	33 2 4 , m ² ows, use e sides of in = S (A x	10.9 10.9 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66 0	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the are Fabric heat lo	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oess, W/K: y Cm = S(33 2 4 , m ² ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66 0	K)	kJ/m²•	n 3.2	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

		laneu calci	ulation.										
Thermal bridg	jes : S (L	x Y) cal	culated (using Ap	pendix I	K						10.48	(36)
f details of therm	0 0	are not kn	own (36) =	= 0.05 x (3	1)			(00)	(0.0)				<u> </u>
Total fabric h								` '	(36) =			57.1	(37
entilation he			·	<u> </u>					= 0.33 × (· · · · · ·	<u> </u>	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m= 39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38
Heat transfer	coefficie	nt, W/K	•		•			(39)m	= (37) + (3	38)m		1	
39)m= 96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Heat loss par	ameter (H	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	94.67	(39
40)m= 1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		_
Number of da	ys in mo	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.21	(40
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41
												-	
4. Water hea	atina ene	rav reaui	irement:								kWh/y	ear:	
	<u> </u>									1			
ssumed occ. if TFA > 13 if TFA £ 13	.9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		43		(4
	,	ater usac	ge in litre	es per da	av Vd,av	erage =	(25 x N)	+ 36		91	.96	1	(43
Annual avera Reduce the annu	ge hot wa lal average	hot water	usage by	5% if the a	lwelling is	designed			se target o		.96]	(43
Annual avera Reduce the annu	ge hot wa lal average	hot water	usage by	5% if the a	lwelling is	designed		a water us	se target o]	(43
Annual avera Reduce the annual not more that 12	ge hot wa gal average 5 litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d vater use, I May	lwelling is not and co Jun	designed ld) Jul	to achieve Aug		se target o		.96]	(43
Annual avera Reduce the annu not more that 12	ge hot wa lal average 5 litres per l Feb in litres per	hot water person per Mar day for ea	usage by aday (all was Aprach month	5% if the divater use, I May Vd,m = fa	welling is not and co Jun ctor from	designed Id) Jul Table 1c x	Aug (43)	a water us Sep	Oct	Nov	Dec]	(43
Annual avera Reduce the annual not more that 12	ge hot wa lal average 5 litres per l Feb in litres per	hot water person per Mar	usage by day (all w	5% if the d vater use, I May	lwelling is not and co Jun	designed ld) Jul	to achieve Aug	Sep	Oct 93.79	Nov 97.47	Dec 101.15]	
Annual avera Reduce the annual not more that 12: Jan Hot water usage	ge hot wa nal average 5 litres per p Feb in litres per 97.47	hot water person per Mar day for ea	usage by a day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 86.44	Jun ctor from 7	designed ld) Jul Table 1c x	Aug (43) 86.44	Sep	93.79 Total = Su	Nov 97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	`
Annual avera Reduce the annual not more that 12. Jan Hot water usage 44)m= 101.15	ge hot wa nal average 5 litres per p Feb in litres per 97.47	hot water person per Mar day for ea	usage by a day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 86.44	Jun ctor from 7	designed ld) Jul Table 1c x	Aug (43) 86.44	Sep	93.79 Total = Su	Nov 97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	`
Annual avera Reduce the annual of more that 12. Jan Hot water usage 144)m= 101.15	ge hot wa nal average litres per litres per gen gen gen gen gen gen gen gen gen gen	Mar day for ea 93.79 used - cale	usage by a day (all was Apr ach month 90.12	5% if the orater use, I May Vd,m = fa 86.44 conthly = 4.	Jun ctor from 3 82.76	designed ld) Jul Table 1c x 82.76	Aug (43) 86.44 PTm / 3600	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27	1103.46	(44
Annual avera Reduce the annual reduce the annual reduce the annual reduced the annual red	ge hot wa yel average 5 litres per yel yel yel yel yel yel yel yel yel yel	Mar day for ea 93.79 used - calc 135.38	Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44 onthly = 4.	Jun Jun ctor from 1 82.76 190 x Vd,r 97.73	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12	93.79 Total = Su th (see Ta 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(44
Jan dot water usage 44)m= 101.15 Energy content of 15)m= 150 instantaneous 46)m= 22.5	ge hot wa yal average 5 litres per yer yer yer yer yer yer yer yer yer y	Mar day for ea 93.79 used - calc 135.38	Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44 onthly = 4.	Jun Jun ctor from 1 82.76 190 x Vd,r 97.73	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12	93.79 Total = Su th (see Ta 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(44
Annual avera Reduce the annual	ge hot water heatile 19.68	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31	Apr ach month 90.12 culated mo 118.03	5% if the director use, I May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage),	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tall 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
Annual avera Reduce the annual reduce the annual	ge hot wa yal average 5 litres per yer yer yer yer yer yer yer yer yer y	Mar day for ea 93.79 used - calc 135.38 ng at point 20.31	Apr ach month 90.12 culated mo 118.03 for use (no	5% if the orater use, I May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W	Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tall 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27		(4:
Annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 f instantaneous 46)m= 22.5 Vater storage Storage volur f community	ge hot water leading and average for litres per leading and litres per leading and litres per leading and litres per leading and litres per leading and litres leadin	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31 includin	Apr ach month 90.12 culated mo 118.03 r of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 Diar or Water Velling, e	Jun storage), 14.66 /WHRS Not and co	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage Ulitres in	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame ves	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
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Annual avera Reduce the annual reduce the annual	ge hot way and average to litres per per per per per per per per per per	Mar Gay for ea 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame ves	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(44 (45 (47
Annual avera Reduce the annual reduce the annual	ge hot water sper special services and services sper special services sper special services special services services services services services special services ser	Mar Mar 93.79 used - calc 135.38 ng at point 20.31 includin and no tal hot water	Apr ach month 90.12 culated mo 118.03 r of use (no 17.7 ang any so ank in dw er (this in	May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame ves	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(45) (45) (46) (47)
Annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera I Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 If instantaneous A6)m= 22.5 Vater storage Storage volur If community Otherwise if r Vater storage a) If manuface Temperature	ge hot water sper per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared lem Table	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in oss facto 2b	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 20 lar or Water 20 yelling, each or is known is	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0		(45) (46) (47) (48) (49)
Annual avera Reduce the annual reduce the annual	ge hot wa value average to litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared left market storage	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 ag any so ank in dw er (this in oss facto 2b	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or Water $velling, e$	Jun ctor from 7 82.76 82.76 97.73 14.66 WHRS nter 110 nstantar wn (kWł	designed des	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(444 (45) (46) (47) (48) (49)
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Annual avera Reduce the annual reduce the annual	ge hot water sper per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared left actor fractor fractor fractor fractor fractor see sections.	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in coss facto 2b cylinder l com Table	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(44 (45 (46 (47 (48 (49 (50 (51
Annual avera Reduce the annual reduce the annual	ge hot way and average to litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 135.38 including and no talchot water eclared left m Table storage eclared of factor from the section of the	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 ang any so ank in dw er (this in coss facto 2b cylinder I com Tabl con 4.3	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 c, 1d) 145.27 21.79 0 0 0		(43 (44 (46 (47 (48 (49 (50 (51 (52 (53

Energy lost fr	om wateı	r storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0]	(54)
Enter (50) or	(54) in (5	55)									0]	(55)
Water storage	e loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primary circu	it loss (ar	nnual) fro	om Table	e 3							0]	(58)
Primary circu	•	,			(59)m = ((58) ÷ 36	65 × (41)	m				-	
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		_	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m= 12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total heat red	quired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar DHW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	4	
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
FHRS 0	0	0	0	0	0	0	0	0	0	0	0	-	(63) (G2)
Output from v	vater hea	iter											
(64)m= 162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
	•					!	Outp	out from w	ater heate	r (annual)	12	1595.65	(64)
Heat gains fro	om water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	ı + (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m	·]	_
(65)m= 53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
include (57)m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal of	ains (see	e Table 5	and 5a):									
Metabolic gai				,									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m= 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	1	(66)
Lighting gains	s (calcula	ted in A	ppendix	L. equat	ion L9 o	r L9a). a	lso see	Lable 5	!	<u>I</u>	!	J	
(67)m= 19.76	17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31	1	(67)
Appliances ga	ains (calc	ulated ir	. Append	dix L. ea	uation L	13 or L1	3a), also	see Ta	ble 5		<u>!</u>	J	
(68)m= 216.06	- ` 	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	1	(68)
Cooking gain	s (calcula	ted in A	nnendix	I equat	tion I 15	or I 15a) also se	ee Table	1			J	
(69)m= 35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16]	(69)
Pumps and fa			<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>		<u> </u>	J	
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3]	(70)
Losses e.g. e	vaporatio	n (nega	tive valu	es) (Tab	ole 5)					<u> </u>	<u> </u>	J	
(71)m= -97.27		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
Water heating			I	I	1					l	1	J	
(72)m= 71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17]	(72)
Total interna				L	ļ	<u> </u>	<u> </u>		(70)m + (7	ļ	ļ	J	-
(73)m= 369.58	-	354.15	332.66	310.86	289.85	276.2	282.14	293.19	314.89	339.81	358.48]	(73)
, 2,	1	1	1	1	1 ======	I =: •:=	I ===···		1	1	1	J	•

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	x	1.62	x	20.32	х	0.63	X	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	X	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	х	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	х	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	X	0.63	X	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	X	0.8	=	10.03	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.8	=	34.94	(78)
South	0.9x	0.77	x	2.14	x	76.57	х	0.63	X	0.8	=	57.23	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	x	0.8	=	72.9	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.8	=	82.39	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	X	0.8	=	85.86	(78)
South	0.9x	0.77	x	2.14	x	110.55	x	0.63	x	0.8	=	82.63	(78)
South	0.9x	0.77	x	2.14	x	108.01	х	0.63	X	0.8	=	80.73	(78)
South	0.9x	0.77	x	2.14	x	104.89	x	0.63	X	0.8	=	78.4	(78)
South	0.9x	0.77	x	2.14	x	101.89	x	0.63	x	0.8	=	76.15	(78)
South	0.9x	0.77	x	2.14	x	82.59	x	0.63	x	0.8	=	61.73	(78)
South	0.9x	0.77	x	2.14	x	55.42	x	0.63	x	0.8	=	41.42	(78)
South	0.9x	0.77	X	2.14	x	40.4	x	0.63	X	0.8	=	30.2	(78)
West	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.8	=	17.77	(80)
West	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.8	=	5.9	(80)
West	0.9x	0.77	X	2.59	x	38.42	x	0.63	X	0.8	=	34.76	(80)
West	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.8	=	11.54	(80)
West	0.9x	0.77	X	2.59	x	63.27	X	0.63	X	0.8	=	57.24	(80)
West	0.9x	0.77	X	0.86	x	63.27	x	0.63	X	0.8	=	19.01	(80)
West	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.8	=	83.48	(80)
West	0.9x	0.77	X	0.86	x	92.28	X	0.63	X	0.8	=	27.72	(80)
West	0.9x	0.77	X	2.59	x	113.09	x	0.63	x	0.8	=	102.31	(80)
West	0.9x	0.77	X	0.86	x	113.09	x	0.63	x	0.8	=	33.97	(80)
West	0.9x	0.77	X	2.59	x	115.77	X	0.63	x	0.8	=	104.73	(80)
West	0.9x	0.77	x	0.86	x	115.77	X	0.63	х	0.8	=	34.77	(80)

West 0.9	× 0.77		x	2.5	0	x	1.	10.22] _x	0.63		x	0.8	- 1 .		99.71	(80)
West 0.9			x	0.8		x	_	10.22	」^]	0.63	=	^ [x	0.8	=		33.11	(80)
West 0.9			x			x	_] ^] x			^ x		=	<u> </u>		(80)
West 0.9				2.5		l I	_	14.68	」^] x	0.63		ı I	0.8	=		85.65	(80)
West 0.9			X	0.8		X	_	94.68 70.50	1	0.63		X	0.8	=	\vdash	28.44	= ' '
West 0.9		=	X	2.5		X	_	'3.59] X] ,,	0.63		X	0.8	=	<u> </u>	66.57	(80)
West 0.9		==	X	0.8		X		3.59] X] ,	0.63		X	0.8	=	<u> </u>	22.1	(80)
		==	X	2.5		X	_	5.59] X]	0.63		X	0.8	=	<u> </u>	41.24	(80)
			X	0.8		X	_	5.59] X]	0.63		X	0.8	=	<u> </u>	13.69	(80)
			X	2.5		X		4.49	X	0.63		X	0.8	=	·	22.15	(80)
West 0.9	-	=	X	0.8		X		24.49] X]	0.63		X	0.8	=	<u> </u>	7.36	(80)
West 0.9			X	2.5		X		6.15] X	0.63		X	0.8	╡	·	14.61	(80)
West 0.9			X	0.8	6	Х	1	6.15	X	0.63		X	0.8	:	<u> </u>	4.85	(80)
Rooflights 0.9			X	1.3	3	X	4	7.01	X	0.63		X	0.8	•	•	56.72	(82)
Rooflights 0.9			X	1.3	3	X	8	33.9	X	0.63		X	0.8	:	• <u>L</u>	101.23	(82)
Rooflights 0.9			X	1.3	3	X	12	22.73	X	0.63		X	0.8	:	• <u> </u>	148.08	(82)
Rooflights 0.9			X	1.3	3	X	16	61.74	X	0.63		X	0.8		• <u> </u>	195.15	(82)
Rooflights 0.9			X	1.3	3	X	18	87.38	X	0.63		X	0.8	:	• <u> </u>	226.09	(82)
Rooflights 0.9	x 1		X	1.3	3	x	18	88.06	X	0.63		X	0.8			226.91	(82)
Rooflights 0.9	x 1		X	1.3	3	X	18	80.51	X	0.63		X	0.8		=	217.8	(82)
Rooflights 0.9	x 1		x	1.3	3	X	16	61.54	X	0.63		X	0.8		-	194.91	(82)
Rooflights 0.9	x 1		X	1.3	3	x	1	36.5	X	0.63		X	0.8	-		164.7	(82)
Rooflights 0.9	x 1		x	1.3	3	x	9	5.08	x	0.63		x	0.8			114.72	(82)
Rooflights 0.9	x 1		x	1.3	3	x	5	7.06	x	0.63		x	0.8	╗.	- 🗀	68.85	(82)
Rooflights 0.9	x 1		x	1.3	3	x	3	9.72	X	0.63		x	0.8	一:	• 🗔	47.92	(82)
						•											
Solar gains									_	n = Sum(74					_		
(83)m= 127.3	227.75	336	.3	451.51	532.7	7 5	39.55	515.86	454	.44 376.	51 2	258.76	154.62	107.6	1		(83)
Total gains -	- internal a	and so	olar	(84)m =	: (73)n	า + (83)m	, watts							_		
(84)m= 496.9	595.24	690.	45	784.17	843.63	3 8	329.4	792.06	736	.58 669	.7 5	73.65	494.43	466.1			(84)
7. Mean int	ernal tem	peratu	ıre (heating	seaso	n)											
Temperatu	re during l	heatin	g pe	eriods ir	the li	ving	area f	from Tal	ble 9	, Th1 (°C	;)					21	(85)
Utilisation f	actor for g	jains f	or li	ving are	a, h1,	m (s	ee Ta	ble 9a)									
Jar	n Feb	Ма	ar	Apr	Ma	/	Jun	Jul	Α	ug Se	эр	Oct	Nov	Dec	;		
(86)m= 1	0.99	0.9	8	0.94	0.85		0.67	0.51	0.5	0.8	2	0.97	0.99	1			(86)
Mean inter	nal tempe	rature	in li	ving are	ea T1	(follo	w ste	ns 3 to 7	7 in T	able 9c)	•						
(87)m= 19.69		20.1	$\overline{}$	20.52	20.8	`	20.95	20.99	20.		38 2	20.49	20.02	19.66			(87)
	ro durina l	nootin	- L		root	of du	, alling	from To	hla (!_		!				
Temperatu (88)m= 19.9		19.9		19.91	19.92	\neg	9.92	19.92	19.			19.92	19.91	19.91	\neg		(88)
								Į		10.0	<u>- L</u>	. 0.02	1 . 5.5 1	10.01			(/
Utilisation f		1	$\overline{}$			$\overline{}$	<u> </u>		T –	u	<u>, I</u>	0.05	0.00	4	\neg		(90)
(89)m= 1	0.99	0.98		0.92	0.79		0.58	0.39	0.4			0.95	0.99	1			(89)
Mean inter	nal tempe	rature	in tl	he rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in T	able	9c)					

	1				1	l							(00)
(90)m= 18.16	18.43	18.85	19.36	19.73	19.89	19.92	19.92	19.83	19.34	18.65	18.12		(90)
								ı	LA = LIVIN	g area ÷ (4	+) =	0.23	(91)
Mean interna	ıl temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m= 18.52	18.77	19.16	19.63	19.98	20.14	20.17	20.17	20.07	19.61	18.97	18.48		(92)
Apply adjustr	ment to t	he mean	interna	temper	ature fro	m Table	4e, whe	re appro	priate				
(93)m= 18.37	18.62	19.01	19.48	19.83	19.99	20.02	20.02	19.92	19.46	18.82	18.33		(93)
8. Space hea	iting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	L		•			J 311	1 119						
(94)m= 0.99	0.99	0.97	0.91	0.79	0.59	0.4	0.45	0.74	0.94	0.99	1		(94)
Useful gains,	hmGm	, W = (9 ⁴	4)m x (84	4)m	ı								
(95)m= 494.31	587.84	668.62	715.59	664.63	486.21	317.96	334.07	493.16	541.06	488.89	464.24		(95)
Monthly aver	age exte	ernal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	e for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(<mark>97)</mark> m= 1352.22	1315.64	1196.57	1001.74	768.2	504.73	320.28	338.19	547.11	836.81	1112.17	1345.98		(97)
Space heating	g require	ement fo	r each n	nonth, k\	Nh/mon	th = 0.02	24 x [(97)	m – (95)m] x (4	1)m			
(98)m= 638.29	489.08	392.79	206.03	77.05	0	0	0	0	220.04	448.76	656.02		
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3128.06	(98)
Space heating	ig require	ement in	kWh/m²	²/year								39.9	(99)
·	• •				vstems i	ncludina	micro-C	HP)				39.9	(99)
9a. Energy re	quiremer				ystems i	ncluding	micro-C	HP)				39.9	(99)
·	quiremer	nts – Indi	vidual h	eating s		_	micro-C	CHP)				39.9	
9a. Energy red Space heati	quiremer ng: pace hea	nts – Indi	vidual h	eating s		system	micro-C (202) = 1 -						(20
Space heating Fraction of space heating Fraction of space heating Fraction of space heating fraction of space heating fraction of space heating fraction fraction of space heating fraction frac	quiremerng: pace head	nts – Indi at from se at from m	vidual h econdary	eating sy y/supple em(s)		system		- (201) =	(203)] =			0	(20)
9a. Energy reconstruction of space heating fraction of space fraction of to	quirements ng: pace head pace head pace head patal heati	nts — Indi at from se at from m ng from i	ividual h econdary nain syst main sys	eating sy/supple em(s) stem 1		system	(202) = 1 -	- (201) =	(203)] =			0 1 1	(202
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of	quirement ng: pace hea pace hea patal heati main spa	nts – Indi at from se at from m ng from l ace heati	vidual hecondary nain systemain syst	eating sy/supple em(s) stem 1	mentary	system	(202) = 1 -	- (201) =	(203)] =			0 1 1 89.9	(20 ²) (20 ²) (20 ⁴) (20 ⁶)
9a. Energy red Space heati Fraction of space fraction of to Efficiency of	quirement ng: pace hea pace hea patal heati main spa seconda	nts – Indi	econdary nain systemain systemain systemain systematory	eating syysupple em(s) stem 1 em 1	mentary	system	(202) = 1 - (204) = (2	- (201) = 02) × [1 –				0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of Efficiency of Jan	quirement ng: pace hea pace hea patal heati main spa seconda	nts – Indi at from se at from m ng from a ace heati ary/supple Mar	vidual hecondary nain systemain systementar Apr	eating sy/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 -	- (201) =	(203)] =	Nov	Dec	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recomplete Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating	quirement ng: pace heat to tal heat it main sparseconda Feb	nts – Indi at from se at from m ng from n ace heati ary/supple Mar ement (c	econdary nain systemain systemain systementar Apr	eating syysupple em(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 -	Oct			0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of Efficiency of Jan	quirement ng: pace hea pace hea patal heati main spa seconda	nts – Indi at from se at from m ng from a ace heati ary/supple Mar	vidual hecondary nain systemain systementar Apr	eating sy/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 - (204) = (2	- (201) = 02) × [1 –		Nov 448.76	Dec 656.02	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Efficiency of Space heating 638.29	quirement of the property of t	at from seat from mace heating/supplement (constant)	econdary nain systemain systementar Apr alculatee	eating syy/supplem(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 -	Oct		656.02	0 1 1 89.9	(20 ²) (20 ²) (20 ⁶) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Efficiency of Space heating 638.29	quirement ng: pace heat pace heat pace heat patal heat it main spates secondar rebuire require 489.08	at from seat from mace heating/supplement (constant)	econdary nain systemain systementar Apr alculatee	eating syy/supplem(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76 499.18	656.02 729.72	0 1 1 89.9	(20 ²) (20 ²) (20 ⁸) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211) m = {[(98)]	quirement of the property of t	at from so at from m at from m ace heati ary/supple Mar ement (c 392.79	econdary nain systemain systementar Apr alculated 206.03 00 ÷ (20	eating sy/supple em(s) stem 1 em 1 May dabove 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76	656.02 729.72	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(986) 710]	quirement of the property of t	at from seat from mace heating/supplement (compared as 192.79) 1436.92	econdary nain systemain systematrar Apr alculated 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 y heating May d above 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76 499.18	656.02 729.72	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) m x (20) modes]	quirement ng: pace heat pa	at from so at from m ng from m ace heati ary/supple Mar ement (c 392.79 04)] } x 1 436.92	econdary nain systemain systematar Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	729.72 =	0 1 1 89.9 0 kWh/ye	(20 ²) (20 ²) (20 ⁸) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) m x (20) modes]	quirement of the property of t	at from seat from mace heating/supplement (compared as 192.79) 1436.92	econdary nain systemain systematrar Apr alculated 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 y heating May d above 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 0 (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Ef	quirement ng: pace heat pa	at from so at from m ng from m ace heati ary/supple Mar ement (c 392.79 04)] } x 1 436.92	econdary nain systemain systematar Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 0 (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98)	quirement pace head pace head pace head patent heating main spansecondar February (20 544.03 for five left) 1	at from seat from mace heating/supplement (compared) 392.79 04)] } x 1 436.92 econdary 00 ÷ (20 0	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating syy/supple em(s) stem 1 em 1 y heating dabove 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 0 (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Efficiency of Space heating (211)m = {[(98) m x (215)m= 0]} Water heating Output from we	quirement ng: pace heat pa	at from so at from mace heating mar lement (c 392.79 lecondary 00 ÷ (20 lecondary on the first conditions)	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/ 8) 0	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71 fmonth 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 = 0	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ar
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) 710} Space heating {[(98) m x (20) 215)m=0} Water heating	quirement ng: pace heat pa	at from so at from mace heating/supplement (c 392.79) 436.92 econdary 00 ÷ (20 0)	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating syy/supple em(s) stem 1 em 1 y heating dabove 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 0 (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(99) (201 (202 (204 (208 (208 ar (211)

							_	
(217)m= 89.36 89.3 89.17 88.87 88.27	87.3 87.3	87.3	87.3	88.89	89.25	89.38		(217)
Fuel for water heating, kWh/month								
(219) m = (64) m x $100 \div (217)$ m (219)m = 182.01 159.7 165.99 146.57 142.62 1	125.96 118.21	133.51	134.47	152.09	163.6	176.67		
		Total	= Sum(2	19a) ₁₁₂ =		ļ	1801.39	(219)
Annual totals				k۱	Nh/yeaı	•	kWh/year	1
Space heating fuel used, main system 1							3479.49	
Water heating fuel used							1801.39	Ī
Electricity for pumps, fans and electric keep-hot						'		-
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum (of (230a).	(230g) =			75	(231)
Electricity for lighting							348.92	(232)
								_
Total delivered energy for all uses (211)(221) +	- (231) + (232).	(237b) :	=				5792.1	(338)
Total delivered energy for all uses (211)(221) + 12a. CO2 emissions – Individual heating system			=				5792.1	(338)
	ns including mi		=	Emiss	ion fac	tor		(338)
			=	Emiss kg CO2		tor	5792.1 Emissions kg CO2/yea]
	ns including mi		=		2/kWh	tor =	Emissions]
12a. CO2 emissions – Individual heating system	Energy kWh/year		=	kg CO2	2/kWh		Emissions kg CO2/yea	ır
12a. CO2 emissions – Individual heating system Space heating (main system 1)	Energy kWh/year		=	kg CO2	2/kWh	=	Emissions kg CO2/yea	nr (261)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary)	Energy kWh/year (211) x (215) x	cro-CHP		0.21 0.51	2/kWh	=	Emissions kg CO2/yea 751.57	(261)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Energy kWh/year (211) x (215) x (219) x	cro-CHP		0.21 0.51	2/kWh	=	Emissions kg CO2/yea 751.57 0	(261) (263) (264)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energy kWh/year (211) x (215) x (219) x (261) + (262)	cro-CHP		0.21 0.21	2/kWh 16 19 16	= = =	Emissions kg CO2/yea 751.57 0 389.1 1140.67	(261) (263) (264) (265)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	Energy kWh/year (211) x (215) x (219) x (261) + (262) (231) x	cro-CHP	264) =	0.21 0.51 0.51	2/kWh 16 19 16	= = =	Emissions kg CO2/yea 751.57 0 389.1 1140.67 38.93	(261) (263) (264) (265) (267)

El rating (section 14)

(274)

		User Details:				
A a a a a a a a a Nama a a	la marga a Malayyarkila m		l	CTDO	000005	
Assessor Name: Software Name:	Jemma Mclaughlan Stroma FSAP 2012	Stroma Nur Software V			030065 n: 1.0.5.25	
Software Name.		roperty Address: HOU			11. 1.0.3.23	
Address :	Woodwell Cottage P2, Wood	· · ·		۔		
Overall dwelling dime	•	awen read, Briterez,	DOTT 5X6			
<u> </u>		Area(m²)	Av. Height(m)	Volume(m³)	
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r	78.4 (4)				
Dwelling volume		(3a)+(3	3b)+(3c)+(3d)+(3e)+.	(3n) =	202.27	(5)
2. Ventilation rate:						
	main secondar heating heating	y other	total		m³ per hour	•
Number of chimneys	0 + 0	+ 0 =	0	(40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	(20 =	0	(6b)
Number of intermittent far	ns		3	(10 =	30	(7a)
Number of passive vents			0	(10 =	0	(7b)
Number of flueless gas fire	res		0	(40 =	0	(7c)
				Δir ch	anges per ho	ıır
Infiltration due to chimne	/s, flues and fans = (6a)+(6b)+(7	(a)+(7b)+(7c) =	30	÷ (5) =	0.15	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
•	een carried out or is intended, proceed			+ (3) =	0.15	(0)
Number of storeys in the	ne dwelling (ns)				0	(9)
Additional infiltration			[(9	9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	struction		0	(11)
if both types of wall are pr deducting areas of openin	resent, use the value corresponding to nas): if equal user 0.35	the greater wall area (after				
= -	loor, enter 0.2 (unsealed) or 0.	1 (sealed), else enter ()		0	(12)
If no draught lobby, ent	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14) -	- 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	<u> </u>	0	(16)
Air permeability value,	q50, expressed in cubic metre	s per hour per square	metre of envelop	e area	5	(17)
If based on air permeabili	ity value, then $(18) = [(17) \div 20] + (8)$	3), otherwise (18) = (16)		Ī	0.4	(18)
Air permeability value applies	s if a pressurisation test has been don	e or a degree air permeabili	ty is being used			_
Number of sides sheltere	d				1	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =		0.92	(20)
Infiltration rate incorporat	ing shelter factor	(21) = (18) x (20) :	=		0.37	(21)
Infiltration rate modified for	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Sep	Oct Nov	Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		-	rate for t	he appli	cable ca	se	-	-	-	-	-		(23a)
If exhaust air h			endix N. (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced wit									, (,			0	(23c)
a) If balance	ed mecha	anical ve	ntilation	with he	at recov	· erv (MVI	HR) (24a	a)m = (22	2b)m + (23b) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	иV) (24t	m = (22)	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from o	outside		•	•	•	
if (22b)	m < 0.5 ×	(23b), t	hen (24)	c) = (23b); other	wise (24	c) = (22k	o) m + 0.	5 × (23b) 		1	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m = 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.51	0.59	0.59	1	(24d)
Effective air					l	l			0.00	1 0.00	0.00	J	,
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(25)
3. Heat losse	oc and he	nat loce r	paramete	or:									
ELEMENT	Gros		Openin		Net Ar	ea	U-val	ue	AXU		k-value	<u>.</u>	ΑΧk
	area	_	m	-	A ,r		W/m2		(W/I	K)	kJ/m²-l		kJ/K
Doors					2.07	Х	1	=	2.07				(26)
Windows Typ	e 1				1.62	x1,	/[1/(1.4)+	0.04] =	2.15				(27)
Windows Typ	e 2				2.59	x1,	/[1/(1.4)+	0.04] =	3.43				(27)
Windows Typ	e 3				0.86	x1,	/[1/(1.4)+	0.04] =	1.14				(27)
Windows Typ	e 4				2.14	x1,	/[1/(1.4)+	0.04] =	2.84				(27)
Rooflights					1.33	x1,	/[1/(1.7) +	0.04] =	2.261				(27b)
Floor					39.2	X	0.13	= [5.096				(28)
Walls Type1	80.8	33	10.9		69.93	3 X	0.18	= [12.59				(29)
Walls Type2	2.12	2	0		2.12	х	0.18	= [0.38				(29)
Daaf		4	2.66	;	54.74	, x	0.13	= [7.12				(30)
Roof	57.4	·											
Total area of					179.5	5							(31)
					179.5 29.73	=	0	= [0				(31)
Total area of o	elements	, m² ows, use e	ffective wi		29.73	x	L			as given in	paragraph	3.2	``
Total area of o	elements d roof winder eas on both	, m² ows, use e sides of ir	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu		as given in	paragraph		(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	L	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)
Total area of o	elements d roof winder eas on both ess, W/K: Cm = S(ows, use e sides of ir = S (A x (A x k)	iffective wi ternal wali U)	ls and par	29.73 alue calcul titions	X ated using	formula 1	/[(1/U-valu) + (32) = ((28)	ie)+0.04] a	2) + (32a).			(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)

an be use	ea instea						,							(26)
Thermal	bridge	s : S (L	x Y) cal	culated i	using Ap	pendix I	1						10.55	(36)
		0 0	are not kn	own (36) =	= 0.05 x (3	1)			(0.0)	(2.5)				_
Total fab									` '	(36) =			53.74	(37
entilatio/			alculated				<u> </u>				25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(38
Heat tran	nsfer c	oefficier	nt, W/K			T		1	(39)m	= (37) + (3	38)m	ı	1	
39)m= 9	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		— ,
leat loss	s parar	meter (H	ILP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	92.59	(39
40)m=	1.21	1.2	1.2	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		_
Number	of day:	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.18	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
													-	
4. Wate	er heati	ing ener	gy requi	rement:								kWh/y	ear:	
			k I											
if TFA if TFA	> 13.9 £ 13.9), N = 1), N = 1	+ 1.76 x)2)] + 0.(ΓFA -13.	.9)	43	1	
if TFA if TFA annual a Reduce the	> 13.9 £ 13.9 average e annual), N = 1), N = 1 e hot wa l average	+ 1.76 x ater usag	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed)2)] + 0.0 (25 x N) to achieve	+ 36		91	.96]	•
if TFA if TFA innual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		91]	·
if TFA if TFA Annual a Reduce the of more th	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96]	·
if TFA if TFA Annual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		•
if TFA if TFA Annual a Reduce the not more the dot water to	> 13.9 £ 13.9 average e annual hat 125 lusage in 101.15	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43)	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the not more th dot water the 44)m= 1	> 13.9 £ 13.9 average e annual hat 125 lusage in 101.15	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the lot more the Hot water the 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15 c, 1d) 145.27	1103.46	(4:
if TFA if TFA Annual a Reduce the not more the Hot water to 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
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if TFA if TFA if TFA annual a Reduce the ot more th lot water th the standard stan	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa	P, N = 1 P, N = 1 P hot was a verage litres per p Peb litres per p 97.47 Phot water 131.19 Pater heatin 19.68	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA Annual a Reduce the bot more the dot water the 44)m= 1 Energy cor 45)m= finstantan 46)m= Vater sto	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 150 150 meous wa 22.5 orage volume	Post N = 1 Post N = 1	ter usaghot water berson per Mar day for ea 93.79 used - calcate 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av Iwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27		(44)
if TFA if TFA if TFA Annual a Reduce the lot more th dot water the start and the start and the finstantan 46)m= Vater start Storage of the start and the finstantan 46)m= Vater start f community	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa 22.5 Iorage volume unity he	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA if TFA Annual a Reduce the ot more if dot water i 44)m= 1 Energy cor 45)m= Vater sto Storage value Communication	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the control	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= Vater sto Storage of Communication Otherwis Vater sto	> 13.9 £	P, N = 1 P, N = 1 P hot was I average litres per p P hot water 131.19 P hot water 131.19 P hot water 19.68 P litres P cating a P stored P stored P stored P stored P stored P stored P stored P stored P stored P stored	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw er (this in	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45)
if TFA if TFA if TFA Annual a Reduce the not more if that water if 44)m= Tenergy cor 45)m= Vater sta Storage if from the community Com	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the state	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	Apr Apr Ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in	es per da 5% if the d vater use, f May Vd,m = fac 86.44 2011 13.25 20 hot water 16.99 Color or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45) (45) (46) (47)
if TFA Annual a Reduce the not more the state of the stat	> 13.9 £	Power of the company	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared le m Table storage	Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the d rater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e acludes in or is known	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed and ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(48)
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 150 150 meous we 22.5 orage volume unity hase if no orage in ufacture fatu	Polynomials of the second of t	ter usage hot water overson per Mar day for ear 93.79 used - calce 135.38 including at point 20.31 including and no talce the water eclared lear to factor fr	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Color or W velling, e acludes in por is knowear	ay Vd,av welling is not and co	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(44 (45 (46 (47 (48 (49 (50
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second of t	ter usage hot water person per Mar day for ear 93.79 used - calconditions and no tale hot water storage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

	/ lost fro	m water	storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54))
•		(54) in (5	_	,								0	(55)	
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56))
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57))
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58))
Primar	y circuit	loss cal	culated	for each	month (59)m = 0	(58) ÷ 36	55 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59))
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41))m						
(61)m=	50.96	44.86	47.8	44.44	44.05	40.81	42.17	44.05	44.44	47.8	48.07	50.96	(61))
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23	(62))
Solar DH	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63))
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63)	(G2)
Output	from w	ater hea	ter											
(64)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23		
'		•	•	•	•	•	•	Outp	out from w	ater heate	r (annual) ₁	12	1997.22 (64))
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	62.62	54.84	56.96	50.35	48.67	42.7	40.65	45.56	46.08	52.7	56.5	61.04	(65)	١
inclu							ı			_			(00)	'
	ıde (57)ı	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling		ater is fr	om com		·	
				of (65)m and 5a	•	ylinder i	s in the	dwelling			om com		·	
5. Int	ernal ga		e Table 5	and 5a	•	eylinder i	s in the o	dwelling			om com		·	
5. Int	ernal ga	ains (see	e Table 5	and 5a	•	ylinder i	s in the o	dwelling Aug			om com		·	
5. Int	ernal ga	ains (see	Table 5	and 5a):				or hot w	rater is fr		munity h	·	
5. Int Metabo (66)m=	ernal gain Jan 121.59	rins (see	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m=	ernal gain Jan 121.59	rins (see	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun 121.59	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m= Lightin (67)m=	ernal gan Dlic gain Jan 121.59 g gains	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m=	ernal gain Jan 121.59 g gains 20.26	rains (see as (Table Feb 121.59 (calcula	2 Table 5 2 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reins (see Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 16 calcula 17 calcula 18	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	Apr 121.59 pendix 11.08 Appendix 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	and 5a tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatic	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 35.16	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatice gains (see less (Table Feb 121.59) (calcula 18 ins (calcula 35.16) as gains 3 appropriate 97.27 gains (Table Feb 121.59) gains (Table Feb 121.59) (calcula 35.16) as gains (Table Feb 121.59)	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 3 -97.27	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	X	1.62	x	74.72	x	0.63	x	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	X	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	X	0.63	X	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	X	0.63	X	0.7	=	8.78	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.7	=	30.58	(78)
South	0.9x	0.77	X	2.14	x	76.57	X	0.63	X	0.7	=	50.08	(78)
South	0.9x	0.77	x	2.14	x	97.53	X	0.63	X	0.7	=	63.79	(78)
South	0.9x	0.77	x	2.14	x	110.23	X	0.63	x	0.7	=	72.09	(78)
South	0.9x	0.77	X	2.14	x	114.87	X	0.63	X	0.7	=	75.13	(78)
South	0.9x	0.77	x	2.14	x	110.55	X	0.63	x	0.7	=	72.3	(78)
South	0.9x	0.77	x	2.14	x	108.01	X	0.63	x	0.7	=	70.64	(78)
South	0.9x	0.77	x	2.14	x	104.89	X	0.63	X	0.7	=	68.6	(78)
South	0.9x	0.77	x	2.14	x	101.89	X	0.63	x	0.7	=	66.63	(78)
South	0.9x	0.77	x	2.14	x	82.59	X	0.63	X	0.7	=	54.01	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.7	=	36.24	(78)
South	0.9x	0.77	x	2.14	x	40.4	x	0.63	x	0.7	=	26.42	(78)
West	0.9x	0.77	X	2.59	X	19.64	X	0.63	X	0.7	=	15.55	(80)
West	0.9x	0.77	x	0.86	X	19.64	x	0.63	x	0.7	=	5.16	(80)
West	0.9x	0.77	x	2.59	X	38.42	X	0.63	x	0.7	=	30.41	(80)
West	0.9x	0.77	x	0.86	X	38.42	x	0.63	X	0.7	=	10.1	(80)
West	0.9x	0.77	x	2.59	X	63.27	X	0.63	x	0.7	=	50.08	(80)
West	0.9x	0.77	x	0.86	X	63.27	X	0.63	X	0.7	=	16.63	(80)
West	0.9x	0.77	X	2.59	X	92.28	X	0.63	X	0.7	=	73.04	(80)
West	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(80)
West	0.9x	0.77	x	2.59	x	113.09	x	0.63	x	0.7	=	89.52	(80)
West	0.9x	0.77	x	0.86	x	113.09	x	0.63	x	0.7	=	29.72	(80)
West	0.9x	0.77	x	2.59	x	115.77	x	0.63	x	0.7	=	91.64	(80)
West	0.9x	0.77	x	0.86	x	115.77	X	0.63	X	0.7	=	30.43	(80)

West 0.9	0.7	7	x	2.5	0	x		10.22] x	0.63		x [0.7	_	_	87.24	(80)
West 0.9] ^] x	0.8		, ^ x	_	10.22	」^] _×	0.63	=	^ [x [0.7	\dashv	_	28.97	(80)
West 0.9] ^] x			_^ х	_		」^] _×		_	^ [x [ᅥ	_		(80)
West 0.9]]	2.5		^ x	_	4.68	」^] _×	0.63	_	_ L	0.7	ᅥ	_	74.94	(80)
West 0.9			X	0.8			_	4.68	1	0.63	_	х [., [0.7	=		24.88	=
West 0.9			X	2.5		X	_	3.59	」 × 1 ↓	0.63	_	x , [0.7	븜	=	58.25	(80)
West 0.9			X	0.8		X		3.59] X] ,,	0.63	_	x , [0.7	믬	=	19.34	(80)
			X	2.5		X	_	5.59] X]	0.63	=	х [0.7	\dashv	=	36.09	(80)
			X	0.8		X	_	5.59] X]	0.63	=	х [0.7	ᆗ	=	11.98	(80)
			X	2.5		X		4.49	X	0.63	_	X [0.7	픰	=	19.38	(80)
West 0.9			X	0.8		X		4.49	」 X ∃	0.63	_	X]	0.7	_	=	6.44	(80)
West 0.9			X	2.5		Х		6.15	」 X ¬	0.63	_	X [0.7	4	=	12.78	(80)
West 0.9		7	X	0.8		X		6.15	X	0.63		X [0.7	4	=	4.24	(80)
Rooflights 0.9			X	1.3	3	X	4	7.01	X	0.63		x [0.7	_	=	49.63	(82)
Rooflights 0.9			X	1.3	3	X		33.9	X	0.63		x	0.7	_	=	88.58	(82)
Rooflights 0.9			X	1.3	3	X	12	22.73	X	0.63		× [0.7		=	129.57	(82)
Rooflights 0.9			X	1.3	3	X	16	61.74	X	0.63		x [0.7		=	170.76	(82)
Rooflights 0.9			X	1.3	3	X	18	87.38	X	0.63		x [0.7		=	197.83	(82)
Rooflights 0.9			X	1.3	3	X	18	88.06	X	0.63		x	0.7		=	198.54	(82)
Rooflights 0.9			X	1.3	3	X	18	80.51	X	0.63		x [0.7		=	190.58	(82)
Rooflights 0.9)x 1		X	1.3	3	X	16	61.54	X	0.63		x [0.7		=	170.54	(82)
Rooflights 0.9)x 1		X	1.3	3	x	1	36.5	X	0.63		x [0.7		=	144.11	(82)
Rooflights 0.9)x 1		x	1.3	3	x	9	5.08	X	0.63		x [0.7		=	100.38	(82)
Rooflights 0.9)x 1		x	1.3	3	x	5	7.06	X	0.63		x	0.7		=	60.24	(82)
Rooflights 0.9)x 1		x	1.3	3	х	3	9.72	X	0.63		x [0.7		=	41.93	(82)
									_								
Solar gains									_	n = Sum(74)r						•	
(83)m= 111.4									397	.63 329.4	5 226	5.41	135.29	94.1	6		(83)
Total gains		and s	olar	(84)m =	: (73)n	า + (83)m	, watts									
(84)m= 494.4	41 579.67	660	.59	739.19	787.8	7	72.06	737.69	690	.57 634.1	5 553	3.53	488.04	466.	04		(84)
7. Mean in	ternal ten	nperat	ure (heating	seaso	n)											
Temperatu	ire during	heatir	ng pe	eriods ir	the li	ving	area f	from Tal	ble 9	, Th1 (°C)						21	(85)
Utilisation	factor for	gains	for li	ving are	ea, h1,	m (s	ee Ta	ble 9a)									_
Ja	n Feb	М	lar	Apr	Ma	/	Jun	Jul	А	ug Sep		Oct	Nov	De	ЭС		
(86)m= 1	0.99	0.9	98	0.95	0.87		0.7	0.53	0.5	0.83	0.	97	0.99	1			(86)
Mean inter	nal tempe	erature	e in li	iving are	ea T1	(follo	w ste	ps 3 to 7	7 in T	able 9c)						•	
(87)m= 19.7		20.	$\overline{}$	20.5	20.79	`	20.95	20.99	20.		20).5	20.04	19.6	69		(87)
Temperatu	ıro durina	hootii	20.00	oriode in	roct	of dva	(alling	from To	abla (Th2 (°C	<u> </u>						
(88)m= 19.9		19.		19.94	19.94	\neg	9.95	19.95	19.			.94	19.93	19.9	93		(88)
. ,	ļ					_!_				10.04	1 13		1 . 5.55				(= =)
Utilisation		-				$\overline{}$	<u> </u>		T	10 0 70			1 0 00			1	(90)
(89)m= 1	0.99	0.9		0.93	0.82		0.61	0.41	0.4			96	0.99	1			(89)
Mean inter	nal tempe	erature	e in t	he rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in Ta	ble 9d)					

(90)m= 18.21	18.46	18.85	19.36	19.73	19.92	19.95	19.94	19.85	19.36	18.7	18.18		(90)
10.21	10.10	10.00	10.00	10.70	10.02	10.00	10.01			g area ÷ (4		0.23	(91)
										g aroa . (., –	0.23	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(92)
Apply adjustr	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(93)
8. Space hea	ıting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:				•				•		
(94)m= 1	0.99	0.97	0.93	0.82	0.63	0.44	0.49	0.77	0.95	0.99	1		(94)
Useful gains,	hmGm ,	W = (94	l)m x (84	4)m									
(95)m= 491.97	573.41	643.2	685.66	644.99	483.53	324.19	339.18	486.26	526.41	483.09	464.29		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8		•						
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1347.38	1308.62	1188.81	993.13	764.64	506.81	327.4	344.65	548.62	833.3	1106.17	1338.22		(97)
Space heating	g require	ement fo	r each n	nonth, k\	/Vh/mont	h = 0.02	24 x [(97)m – (95)m] x (4 ⁻	1)m			
98)m= 636.43	494.06	405.93	221.38	89.01	0	0	0	0	228.33	448.62	650.21		
											L		_
							Tota	l per year	(kWh/year) = Sum(9)	8) _{15,912} =	3173.97	(98)
Snace heatin	a require	ement in	k\\/h/m²	!/vear			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Space heatin	• ,			•					(kWh/year) = Sum(9	8)15,912 =	3173.97 40.48	(98)
9a. Energy red	quiremer			•	ystems i	ncluding			(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Pa. Energy red Space heating	quiremer ng:	nts – Indi	vidual h	eating sy					(kWh/year) = Sum(9	8) _{15,912} =	40.48	(99)
Space heating Fraction of sp	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system	micro-C	CHP)	(kWh/year) = Sum(9	8)15.912 =		(99)
Pa. Energy red Space heating	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system		CHP)	(kWh/year) = Sum(9	8)15,912 =	40.48	(99)
Space heating Fraction of sp	quiremenng: Dace head	nts – Indi nt from se nt from m	vidual h econdar ain syst	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15.912 =	40.48	(201
Space heating Fraction of space Fraction Fraction Of space Fraction Fractio	quiremen ng: pace hea pace hea pace heatin	nts - Indi at from se at from m	vidual h econdary ain syst	eating sy y/supple em(s) stem 1		system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912	0	(99) (201 (202 (204
Space heating Fraction of space Fraction of space Fraction of to	quirement ng: pace hea pace hea patal heatin main spa	nts – Indi at from se at from m ag from i	vidual hecondary ain systemain system	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1	CHP) - (201) =) = Sum(9	8)15.912 =	0 1	(99) (201 (202 (204 (206
Space heating Fraction of space Fraction of to Efficiency of	quirement ng: pace hea pace hea patal heatii main spa seconda	nts – Indi	vidual hecondary ain systemain systemain system	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	micro-C (202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 93.4	(201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of Jan	quirement ng: pace heat pace heat tal heatin main spa seconda	nts – Indi at from se at from m ng from i ace heati ry/supple Mar	vidual h econdary ain syst main sys ng syste ementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1	CHP) - (201) =) = Sum(9	8) _{15,912} =	0 1 1 93.4	(99) (201 (202 (204 (206 (208
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Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43	quirements pace heat pace	nts – Indi	econdary ain systemain systemain systementar Apralculated	eating sylv/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system 1, % Jul	micro-C (202) = 1 · (204) = (2 Aug	Sep 0	(203)] = Oct 228.33	Nov 448.62 480.32	Dec 650.21	0 1 1 93.4 0 kWh/ye	(201 (202 (204 (206 (208 ear
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Space heating Fraction of space heating Fraction of to Efficiency of Efficiency of Space heating 636.43 (211)m = {[(986) 681.4]	quirement of the property of t	at from set from many from the condary. At from many from the	vidual hecondary ain systemain systemantar Apr alculated 221.38 00 ÷ (20 237.02	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 89.01	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating 636.43 [211] m = {[(98)	quirement of the property of t	nts - Indicate from set from many from the from	vidual hecondary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sylv/supple em(s) stem 1 em 1 y heating May d above) 89.01 e6) 95.3 emonth	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	Sep 0 (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(201) (202) (204) (206) (208) ear
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43 (211)m = {[(98)	quirement of the property of t	nts - Indicate from set from many from the from	vidual hecondary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sylv/supple em(s) stem 1 em 1 y heating May d above) 89.01 e6) 95.3 emonth	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
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Space heating Fraction of space fraction of space fraction of to Efficiency of Efficie	puirement of the property of t	nts – Indi	econdary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 89.01 95.3 month	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208)

				1	i		1	(a.a.)
` '	80.3 80.3	80.3	80.3	85.79	87.24	87.84		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m								
` '	72.53 165.29	184.27	186.3	198.57	208.45	223.4		
	•	Tota	I = Sum(2	19a) ₁₁₂ =			2356.83	(219)
Annual totals				k'	Wh/year	•	kWh/year	_
Space heating fuel used, main system 1							3398.26	
Water heating fuel used							2356.83	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a)	(230g) =	:		75	(231)
Electricity for lighting							357.88	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b)	=				6268.27	(338)
12a. CO2 emissions – Individual heating systems	s including mi	icro-CHP)					_
	Energy			Emiss	ion fac	tor	Emissions	
	kWh/year			kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1)	(211) x			0.2	16	=	734.02	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	509.08	(264)
Space and water heating	(261) + (262)	+ (263) + (264) =				1243.1	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	185.74	(268)
				((005)				_
Total CO2, kg/year			sum c	of (265)(271) =		1467.76	(272)

TER =

(273)

18.72

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Property Details: HOUSE D - IMPROVED

Dwelling type: Semi-detached House

Located in: England

Region: South East England

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters:

Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 534 (P1)

Transmission heat loss coefficient: 57.1

Summer heat loss coefficient: 591.1 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
North (W1-2 FRONT N)	0	1
West (W3 - SIDE E)	0	1
West (W4 - SIDE E)	0	1
South (W5 - REAR S)	0	1
South (RW1-2 REAR S)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North (W1-2 FRONT N)	0.98	1	1	0.98	(P8)
West (W3 - SIDE E)	0.98	1	1	0.98	(P8)
West (W4 - SIDE E)	0.98	1	1	0.98	(P8)
South (W5 - REAR S)	0.98	1	1	0.98	(P8)
South (RW1-2 REAR S)	0.98	1	1	0.98	(P8)

Solar gains:

Orientation		Area	Flux	g _	FF	Shading	Gains
North (W1-2 FRONT N)	1 x	3.24	86.66	0.63	0.8	0.98	125.45
West (W3 - SIDE E)	1 x	2.59	124.8	0.63	0.8	0.98	144.42
West (W4 - SIDE E)	1 x	0.86	124.8	0.63	0.8	0.98	47.95
South (W5 - REAR S)	1 x	2.14	118.4	0.63	0.8	0.98	113.21
	1 x	2.66	202.31	0.63	0.8	0.98	240.45
						Total	671.47 (P3/P4)

Internal gains:

	June	July	August
Internal gains	422.24	404.7	412.74
Total summer gains	1133.38	1076.17	1007.8 (P5)
Summer gain/loss ratio	1.92	1.82	1.7 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5

SAP 2012 Overheating Assessment

Thermal mass temperature increment 0.25 0.25

Threshold temperature 17.57 19.47 19.45 (P7)

Likelihood of high internal temperature Not significant Not significant

Assessment of likelihood of high internal temperature: Not significant

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 *Printed on 25 February 2021 at 14:04:51*

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Semi-detached House

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 78.4m²

Site Reference: WOODWELL Plot Reference: HOUSE E - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.72 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 17.36 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.0 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	OK
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	ОК
Openings	1.38 (max. 2.00)	1.40 (max. 3.30)	ОК

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 4.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls	TTZC by plumbing and elec	trical services	ок
Hot water controls:	No cylinder thermostat		
	No cylinder		
Boiler interlock:	Yes		ок
7 Low energy lights			
Percentage of fixed lights with	h low-energy fittings	100.0%	
Minimum	-	75.0%	oĸ
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East	England):	Not significant	ок
Based on:		-	
Overshading:		Average or unknown	
Windows facing: North		3.24m²	
Windows facing: East		2.59m²	
Windows facing: East		0.86m²	
Windows facing: South		2.14m²	
Roof windows facing: South		2.66m²	
Ventilation rate:		8.00	
Blinds/curtains:		Dark-coloured curtain or roller blind	d
		Closed 10% of daylight hours	
10 Key features			
		0 W/m²K	

Thermal Bridge Report

Property Details: HOUSE E - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges

Thermal bridges: User-defined = UD

Default = D Approved = A

User-defined (individual PSI-values) Y-Value = 0.0583

External Junctions Details:

Junction Type	PSI-Value	Length	Reference	Туре
Other lintels (including other steel lintels)	0.05	6.44	E2	[UD]
Sill	0.04	2.7	E3	[A]
Jamb	0.05	20.7	E4	[A]
Ground floor (normal)	0.08	18.11	E5	[UD]
Intermediate floor within a dwelling	0.07	18.11	E6	[A]
Eaves (insulation at rafter level)	0.04	12.43	E11	[A]
Gable (insulation at rafter level)	0.04	18.49	E13	[A]
Corner (normal)	0.09	12.6	E16	[A]
Staggered party wall between dwellings	0.12	6.4	E25	[D]
Party Junctions Details:				
Ground floor	0.16	6.15	P1	[D]
Roof (insulation at rafter level)	0.08	8.98	P5	[D]
Roof Junctions Details:				
Head	0.08	2.95	R1	[D]
Sill	0.06	2.95	R2	[D]
Jamb	0.08	5.4	R3	[D]
Ridge (vaulted ceiling)	0.08	7.6	R4	[D]

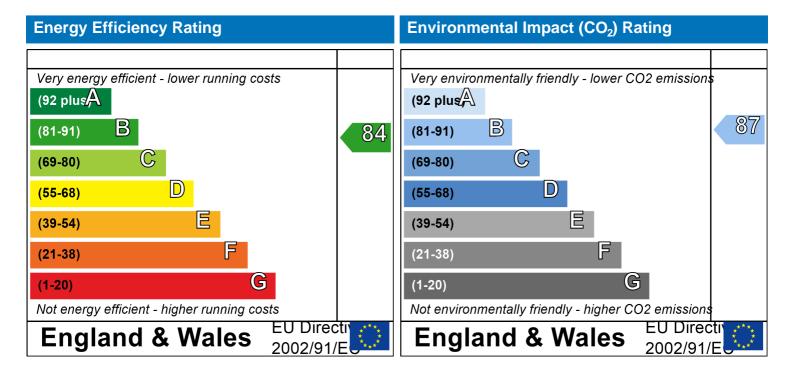
Predicted Energy Assessment



Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type: Date of assessment: Produced by: Total floor area: Semi-detached House 24 February 2021 Jemma Mclaughlan 78.4 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

SAP Input

Property Details: HOUSE E - IMPROVED

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House

Detachment: Semi-detached

Year Completed: 2021

Floor Location: Floor area:

Storey height:

Floor 0 39.2 m^2 2.6 m Floor 1 39.2 m^2 2.56 m

Living area: 18.35 m² (fraction 0.234)

Front of dwelling faces: North

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
FRONT DOOR	Manufacturer	Solid			Wood
W1-2 FRONT N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W3 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - REAR S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 REAR S	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Name:	Gap:	Frame Fac	ctor: g-value:	U-value:	Area:	No. of Openings:
FRONT DOOR	mm	0.8	0	1.4	2.07	1
W1-2 FRONT N	16mm or more	0.8	0.63	1.4	1.62	2
W3 - SIDE E	16mm or more	0.8	0.63	1.4	2.59	1
W4 - SIDE E	16mm or more	0.8	0.63	1.4	0.86	1
W5 - REAR S	16mm or more	0.8	0.63	1.4	2.14	1
RW1-2 REAR S	16mm or more	0.8	0.63	1.3	1.33	2

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	North	0	0
W1-2 FRONT N		EXTERNAL WALLS	North	0	0
W3 - SIDE E		EXTERNAL WALLS	East	0	0
W4 - SIDE E		EXTERNAL WALLS	East	0	0
W5 - REAR S		EXTERNAL WALLS	South	0	0
RW1-2 REAR S		ROOF	South	0.001	0

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Element	<u>S</u>						
EXTERNAL WALLS	80.83	10.9	69.93	0.2	0	False	N/A
DORMER CHEEKS	2.12	0	2.12	0.2	0	False	N/A

SAP Input

 ROOF
 57.4
 2.66
 54.74
 0.14
 0
 N/A

 GROUND FLOOR
 39.2
 0.17
 N/A

 Internal Elements
 0.17
 N/A

Internal Elements
Party Elements

PARTY WALL 29.73

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0583

	Length	Psi-value		
	6.44	0.05	E2	Other lintels (including other steel lintels)
[Approved]	2.7	0.04	E3	Sill
[Approved]	20.7	0.05	E4	Jamb
	18.11	0.08	E5	Ground floor (normal)
[Approved]	18.11	0.07	E6	Intermediate floor within a dwelling
[Approved]	12.43	0.04	E11	Eaves (insulation at rafter level)
[Approved]	18.49	0.04	E13	Gable (insulation at rafter level)
[Approved]	12.6	0.09	E16	Corner (normal)
	6.4	0.12	E25	Staggered party wall between dwellings
	6.15	0.16	P1	Ground floor
	8.98	0.08	P5	Roof (insulation at rafter level)
	2.95	0.08	R1	Head
	2.95	0.06	R2	Sill
	5.4	0.08	R3	Jamb
	7.6	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys: 0
Number of open flues: 0
Number of fans: 3
Number of passive stacks: 0
Number of sides sheltered: 1
Pressure test: 4

Main heating system

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

Boiler interlock: Yes Delayed start

Main heating Control

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

SAP Input

Water heating

Water heating: From main heating system

Water code: 901 Fuel :mains gas No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 100%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No Photovoltaics: None Assess Zero Carbon Home: No

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU		/ED		
Address :	Woodwell Cottage P2, Woo	odwell Road, BRISTOL	, BS11 9XU			
Overall dwelling dime	nsions:	A (m. 2)	A. Hainbal	\	\/ a a / 2\	
Ground floor		Area(m²) 39.2 (1a) >	Av. Height(r	(2a) =	Volume(m³)	(3a)
First floor		39.2 (1b) >		(2b) =	100.35](3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1					」 ` ′
Dwelling volume		,,	(3b)+(3c)+(3d)+(3e)	+(3n) =	202.27	(5)
2. Ventilation rate:				<u> </u>	202.21	
2. Ventilation rate.	main seconda		total		m³ per houi	
Number of chimneys	heating heating	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				4		_
l me et e e	(0.) (01)	(=) (=)			anges per ho	_
•	ys, flues and fans = (6a)+(6b)+ een carried out or is intended, proce		30 e from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the		ou to (117), out of 11100 out 11110		ſ	0	(9)
Additional infiltration	3 \			[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 for masonry con	struction		0	(11)
if both types of wall are po deducting areas of openir	resent, use the value corresponding	to the greater wall area (after				_
	loor, enter 0.2 (unsealed) or	0.1 (sealed), else enter	0	[0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11) -	+ (12) + (13) + (15) =	=	0	(16)
Air permeability value,	q50, expressed in cubic metr	es per hour per square	metre of envelo	pe area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] +$	-(8), otherwise (18) = (16)		Ī	0.35	(18)
Air permeability value applie	s if a pressurisation test has been do	one or a degree air permeabii	lity is being used	-		_
Number of sides sheltere	d				1	(19)
Shelter factor		(20) = 1 - [0.075]	x (19)] =		0.92	(20)
Infiltration rate incorporat	ing shelter factor	$(21) = (18) \times (20)$	=		0.32	(21)
Infiltration rate modified f	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct No	ov Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18	
Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m	
0.41 0.4 0.39 0.35 0.35 0.31 0.31 0.3 0.32 0.35 0.36 0.38	7
Calculate effective air change rate for the applicable case If mechanical ventilation:	
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)	0 (23a) 0 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0 (23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) \times [1 – (23c)	
(24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0	(24a)
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)	
(24b)m= 0 0 0 0 0 0 0 0 0 0 0 0	(24b)
c) If whole house extract ventilation or positive input ventilation from outside if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b)m + 0.5 \times (23b)$	
(24c)m =	(24c)
d) If natural ventilation or whole house positive input ventilation from loft	_
if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$	_
(24d)m= 0.58 0.58 0.58 0.56 0.56 0.55 0.55 0.54 0.55 0.56 0.57 0.57	(24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)	_
(25)m= 0.58 0.58 0.58 0.56 0.56 0.55 0.55 0.54 0.55 0.56 0.57 0.57	(25)
3. Heat losses and heat loss parameter:	
ELEMENT GrossOpeningsNet AreaU-valueA X Uk-valuearea (m²)m²A ,m²W/m2K(W/K)kJ/m²	
Doors 2.07 x 1.4 = 2.898	
	(26)
Windows Type 1 1.62 $x^{1/[1/(1.4) + 0.04]} = 2.15$	(26) (27)
Windows Type 1	,
	(27)
Windows Type 2 2.59 $x^{1/[1/(1.4)+0.04]} = 3.43$	(27) (27)
Windows Type 2 $ 2.59 $	(27) (27) (27)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$	(27) (27) (27) (27)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$	(27) (27) (27) (27) (27b)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$ Floor 39.2 x 0.17 0.664	(27) (27) (27) (27) (27b) (28)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$ Floor 39.2 x 0.17 $=$ 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 $=$ 13.99	(27) (27) (27) (27) (27b) (28) (29)
Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4)+0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3)+0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type2 2.12 0 2.12 x 0.2 = 0.42	(27) (27) (27) (27) (27b) (28) (29) (29)
Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4)+0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3)+0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66	(27) (27) (27) (27) (27b) (28) (29) (29) (30)
Windows Type 2 2.59 x1/[1/(1.4) + 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4) + 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4) + 0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3) + 0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66 Total area of elements, m² 179.55 Party wall 29.73 x 0 = 0 0 * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31)
Windows Type 2 2.59 x1/[1/(1.4) + 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4) + 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4) + 0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3) + 0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type 1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type 2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66 Total area of elements, m² 179.55 Party wall 29.73 x 0 = 0 * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragra, include the areas on both sides of internal walls and partitions	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32)
Windows Type 2 Windows Type 3 Windows Type 4 Rooflights 1.33 X1/[1/(1.4)+0.04] = 1.14 Walls Type 1 80.83 10.9 69.93 Walls Type 2 2.12 0 2.12 0 2.12 0 2.12 0 2.12 0 2.12 0 1.729 Walls Type 2 1.729 Party wall *for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragragus in clude the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) *1/[1/(1.4)+0.04] = 3.43 *X1/[1/(1.4)+0.04] = 1.14 *X1/[1/(1.4)+0.04] = 2.84 *X1/[1/(1.4)+0.04] = 1.729 *1.729 **Include the areas on the sides of internal walls and partitions **Construction* *2.59 *X1/[1/(1.4)+0.04] = 1.14 **Include the areas on both sides of internal walls and partitions **Construction* **Co	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32) oh 3.2
Windows Type 2 2.59 x1/[1/(1.4) + 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4) + 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4) + 0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3) + 0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type 1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type 2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66 Total area of elements, m² 179.55 Party wall 29.73 x 0 = 0 * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragra, include the areas on both sides of internal walls and partitions	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32) (32) (33)

an be us							<i>Z</i>							(36
	Ū	,	,		using Ap	•							10.48	(50
	of therma Ibric hea		are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			F7.4	(37
			alculated	l monthly	A.					, ,	25)m x (5)		57.1	(37
Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m=	39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38
Ĺ	enefer o	coefficier	nt M/K				!	!	(39)m	= (37) + (37)	1	<u> </u>	l	
39)m= [96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Ĺ							!	!	,	Average =	Sum(39) ₁ .	₁₂ /12=	94.67	(39
leat lo	ss para	meter (F	ILP), W/	m²K					(40)m	= (39)m ÷	(4)			
10)m=	1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		— .
lumbe	r of day	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.21	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
11)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
I. Wat	ter heat	ing ener	gy requi	rement:								kWh/y	ear:	
ssume	ed occu	nancy I	NI.										1	(4
if TF	۹ > 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43	I	(4
if TF/ if TF/ nnual	A > 13.9 A £ 13.9 averag	9, N = 1 9, N = 1 e hot wa	+ 1.76 x ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.96		•
if TFA if TFA nnual educe t	A > 13.9 A £ 13.9 averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed		+ 36		9)			(4:
if TFA if TFA nnual educe t	A > 13.9 A £ 13.9 averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)			•
if TFA if TFA nnual educe to ot more	A > 13.9 A £ 13.9 averag the annual that 125	P, N = 1 P, N = 1 P hot was Al average Stress per p Feb	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		,
if TFA if TFA nnual educe to tot more fot water	A > 13.9 A £ 13.9 averag the annual that 125	P, N = 1 P, N = 1 P hot was Al average Stress per p Feb	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		,
if TFA if TFA nnual educe to ot more ot water 4)m=	A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 82.76	(25 x N) to achieve Aug	+ 36 a water us Sep 90.12	Oct 93.79 Fotal = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(4
if TFA if TFA nnual educe to ot more ot water 4)m= [nergy co	A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir 101.15	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Fotal = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(4
if TFA if TFA innual Reduce to ot more [dot water 44)m= [A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - cale	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76	erage = designed ld) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mon 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15	1103.46	(4-
if TFA if TFA innual Reduce to ot more flot water inergy co	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the dater use, has 5% May 5% 5% 5% 5% 5% 5% 5% 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r	erage = designed ld) Jul Table 1c x 82.76 m x nm x L 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15		•
if TFA if TFA nnual educe to the more of water 4)m= [nergy colors 5)m= [instanta 6)m= [A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the dater use, has 5% May 5% 5% 5% 5% 5% 5% 5% 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r	erage = designed ld) Jul Table 1c x 82.76 m x nm x L 90.56	(25 x N) to achieve Aug (43) 86.44 27m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15		(4
if TFA if TFA nnual educe to ot more of water (4)m= [nergy co instanta (6)m= [Vater s	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage),	erage = designed ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
if TFA if TFA nnual educe to ot more ot water 4)m= [nergy co instanta 6)m= [Jater s torage	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av welling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
if TFA if TFA nnual educe to the more of water 4)m= finergy co instanta 6)m= /ater s torage comm	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calce 135.38 ng at point 20.31 including and no talce 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw	es per da 5% if the d vater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 IWHRS	erage = designed ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) Nov 97.47 m(44) ₁₁₂ = 20.07	.96 Dec 101.15		(4
if TFA if TFA nnual educe to ot more ot water 4)m= [hergy or 5)m= [Jater s torage comm therwite	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calce 135.38 ng at point 20.31 including and no talce 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw	es per da 5% if the d vater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 IWHRS	erage = designed ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) Nov 97.47 m(44) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
if TFA if TFA innual reduce to the otherwice the interest of t	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calcal 135.38 and at point 20.31 including and no tal hot water water series are series at the calcal c	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw er (this in	es per da 5% if the d vater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15		(4 (4 (4
if TFA if TFA nnual educe to ot more (4)m= (5)m= (instanta) (ater s torage comm otherwi /ater s a) If ma	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufacti	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calcal 135.38 and at point 20.31 including and no tal hot water water series are series at the calcal c	Apr Apr Ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in	es per da 5% if the d vater use, f May Vd,m = fac 86.44 2011 13.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4 (4 (4 (4
if TFA if TFA if TFA nnual educe to ot more (4)m= (5)m= (5)m= (7ater s) torage commontherwither	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufaction rature fallost fro	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early so and so	Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Collar or W velling, e acludes in por is knowear	ay Vd,av fwelling is foot and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed ild) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4)
if TFA if TFA if TFA nnual educe to the more (a) the mergy of the mergy of the mergy of the mergy	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufact rature fa lost fro anufact	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31 including and no talce the hot water eclared lear to storage eclared of the stora	ge in litre usage by day (all w Apr ach month 90.12 culated mo 17.7 ag any so ank in dw er (this in coss facto 2b , kWh/ye cylinder l	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4) (4) (4) (4) (5)
if TFA if TFA if TFA nnual educe to the more of water 4)m= [nergy color to the more to the recommendate of the more a) If may emperimently of the more to the m	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufaction rature fa lost fro anufaction ter storage	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31 including and no talce the hot water eclared lear to storage eclared of the stora	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Collar or W velling, e acludes in por is knowear	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4 (4 (4 (4 (4 (5
if TFA if TFA innual leduce to ot more lot water lahm= linergy co linergy c	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum hunity h ise if no storage anufaction rature fa lost fro anufaction anufaction ter stora hunity h	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 and at point 20.31 including and no talc hot water eclared less storage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4

Energy	y lost fro	m watei	· storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0]	(54)
Enter	(50) or	(54) in (5	55)									0]	(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0]	(58)
Primar	y circuit	loss cal	culated	for each	month ((59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add a	dditiona	I lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output	t from w	ater hea	ter											
(64)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
								Outp	out from w	ater heate	r (annual)	l12	1595.65	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
inclu	ide (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	e Table 5	and 5a):									
Metab	olic gair	ıs (Table	e 5), Wat	ts										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	1	(66)
Lightin	g gains	(calcula	ted in A	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	•	•	•	•	
(67)m=	48.45	43.03	35	26.5	19.81	16.72	18.07	23.48	31.52	40.02	46.71	49.8]	(67)
Applia	nces ga	ins (calc	ulated ir	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5		•	•	
(68)m=	322.48	325.83	317.4	299.44	276.78	255.48	241.26	237.91	246.34	264.29	286.96	308.25]	(68)
Cookir	ng gains	(calcula	ted in A	ppendix	L, equa	tion L15	or L15a), also se	e Table	5			•	
(69)m=	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02]	(69)
Pumps	and fa	ns gains	(Table :	 5а)		•					<u>I</u>			
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3]	(70)
Losses	s e.g. ev	aporatio	n (nega	tive valu	es) (Tab	ole 5)	!	!		!	<u> </u>	!	1	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
	heating	gains (1	Table 5)	<u> </u>	<u> </u>	1	<u> </u>	<u> </u>		<u> </u>	ı	1	ı	
(72)m=	71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17]	(72)
		gains =		I	I	ļ	<u> </u>	n + (68)m -		<u> </u>	ļ	ļ	J	
(73)m=	545.88	541.68	520.8	488.35	455.11	425.24	407.7	415.74	434.33	466.99	503.35	530.88]	(73)
• •	<u> </u>	L	L	L	L	L	L	L	L	L	L	<u> </u>	J	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientati	on:	Access Factor Table 6d	7	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	15.63	(74)
North	0.9x	1	X	1.62	x	20.32	x	0.63	X	0.8	=	29.86	(74)
North	0.9x	1	X	1.62	x	34.53	X	0.63	X	0.8	=	50.75	(74)
North	0.9x	1	X	1.62	x	55.46	x	0.63	x	0.8	=	81.51	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	109.81	(74)
North	0.9x	1	x	1.62	x	79.99	x	0.63	x	0.8	=	117.55	(74)
North	0.9x	1	X	1.62	x	74.68	x	0.63	x	0.8	=	109.75	(74)
North	0.9x	1	X	1.62	x	59.25	x	0.63	x	0.8	=	87.07	(74)
North	0.9x	1	x	1.62	x	41.52	x	0.63	x	0.8	=	61.02	(74)
North	0.9x	1	x	1.62	x	24.19	x	0.63	x	0.8	=	35.55	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	19.28	(74)
North	0.9x	1	x	1.62	x	8.86	x	0.63	x	0.8	=	13.03	(74)
East	0.9x	1	x	2.59	x	19.64	x	0.63	x	0.8	=	23.07	(76)
East	0.9x	1	x	0.86	x	19.64	x	0.63	X	0.8	=	7.66	(76)
East	0.9x	1	x	2.59	x	38.42	x	0.63	x	0.8	=	45.14	(76)
East	0.9x	1	x	0.86	x	38.42	x	0.63	x	0.8	=	14.99	(76)
East	0.9x	1	X	2.59	x	63.27	x	0.63	X	0.8	=	74.33	(76)
East	0.9x	1	X	0.86	x	63.27	x	0.63	X	0.8	=	24.68	(76)
East	0.9x	1	x	2.59	x	92.28	x	0.63	x	0.8	=	108.41	(76)
East	0.9x	1	X	0.86	x	92.28	x	0.63	X	0.8	=	36	(76)
East	0.9x	1	X	2.59	x	113.09	x	0.63	X	0.8	=	132.86	(76)
East	0.9x	1	X	0.86	x	113.09	x	0.63	X	0.8	=	44.12	(76)
East	0.9x	1	X	2.59	X	115.77	X	0.63	X	0.8	=	136.01	(76)
East	0.9x	1	X	0.86	x	115.77	x	0.63	X	0.8	=	45.16	(76)
East	0.9x	1	X	2.59	x	110.22	X	0.63	X	0.8	=	129.49	(76)
East	0.9x	1	X	0.86	x	110.22	X	0.63	X	0.8	=	43	(76)
East	0.9x	1	X	2.59	x	94.68	X	0.63	X	0.8	=	111.23	(76)
East	0.9x	1	X	0.86	x	94.68	x	0.63	X	0.8	=	36.93	(76)
East	0.9x	1	X	2.59	x	73.59	X	0.63	X	0.8	=	86.45	(76)
East	0.9x	1	X	0.86	x	73.59	x	0.63	X	0.8	=	28.71	(76)
East	0.9x	1	X	2.59	x	45.59	X	0.63	X	0.8	=	53.56	(76)
East	0.9x	1	X	0.86	x	45.59	X	0.63	X	0.8	=	17.78	(76)
East	0.9x	1	X	2.59	x	24.49	x	0.63	x	0.8	=	28.77	(76)
East	0.9x	1	X	0.86	x	24.49	x	0.63	x	0.8	=	9.55	(76)
East	0.9x	1	X	2.59	x	16.15	x	0.63	x	0.8	=	18.97	(76)
East	0.9x	1	X	0.86	X	16.15	X	0.63	X	0.8	=	6.3	(76)

South 0.9x	1		x	2.14		X	4	6.75] _x	0.63		x	0.8	一.	. Г	45.38	(78)
South 0.9x		\equiv	X	2.14	_	x		6.57] ^] _X	0.63	\dashv	X	0.8	=	┇┝	74.32	(78)
South 0.9x			X	2.14		x		7.53] ^] _x	0.63	\exists	x	0.8	=	.	94.68	(78)
South 0.9x		\equiv	X	2.14	〓	x		0.23] ^] _X	0.63	\dashv	X	0.8	=	┇┝	107.01	(78)
South 0.9x		=	X	2.14	一	x		4.87] ^] _X	0.63	퓜	x	0.8	=	┇┝	111.51	(78)
South 0.9x			X	2.14	_	x		0.55] ^] _x	0.63	\dashv	x	0.8	=	.	107.31	(78)
South 0.9x			X	2.14	\dashv	x		0.00] ^] _X	0.63	\dashv	X	0.8	=	┇┝	104.85	(78)
South 0.9x			X	2.14	_	x)4.89] x	0.63	=	X	0.8	=	┇┝	101.82	(78)
South 0.9x			x	2.14		X)1.89]]	0.63	=	X	0.8	=	┇┝	98.9	(78)
South 0.9x		一	x	2.14	一	X		2.59]]	0.63	〓	х	0.8	=	┇	80.17	」、 / 「(78)
South 0.9x	1		x	2.14		X		5.42	X	0.63	=	X	0.8	╡.	┇	53.79	(78)
South 0.9x			x	2.14		X		0.4	X	0.63	=	Х	0.8	= =	. ř	39.21	(78)
Rooflights 0.9x	1		x	1.33		X	4	7.01) x	0.63		х	0.8	╡.	<u> </u>	56.72	(82)
Rooflights 0.9x	1		x	1.33		X		33.9	X	0.63	一	X	0.8		. F	101.23	(82)
Rooflights 0.9x	1		x	1.33	一	X	12	22.73	X	0.63	一	х	0.8	=	. T	148.08	(82)
Rooflights 0.9x	1		x	1.33		X	16	61.74	X	0.63		X	0.8	一 .	. T	195.15	(82)
Rooflights 0.9x	1		x	1.33		X	18	37.38	x	0.63		X	0.8	〓.	- Ē	226.09	(82)
Rooflights 0.9x	1		x	1.33		X	18	38.06	x	0.63		x	0.8		- [226.91	(82)
Rooflights 0.9x	1		x	1.33	一	X	18	30.51	x	0.63	一	x	0.8		- Ī	217.8	(82)
Rooflights 0.9x	1		x	1.33		X	16	61.54	x	0.63		X	0.8	<u> </u>	- Ī	194.91	(82)
Rooflights 0.9x	1		x	1.33		X	1:	36.5	x	0.63		x	0.8	-	• Ī	164.7	(82)
Rooflights 0.9x	1		x	1.33		X	9:	5.08	x	0.63		x	0.8	=	- Ī	114.72	(82)
Rooflights 0.9x	1		x	1.33		X	5	7.06	x	0.63		x	0.8		• [68.85	(82)
Rooflights 0.9x	1		x	1.33		X	3	9.72	x	0.63		X	0.8		- [47.92	(82)
Solar gains in		ı				1			r i	n = Sum(74)m	T		_		_		(00)
(83)m= 148.47 Total gains –					24.38		32.94	604.88	531	.96 439.78	3 30)1.78	180.24	125.4	4		(83)
(84)m= 694.35	-	913.		1016.43		<u> </u>			947	7.7 874.11	1 76	88.77	683.59	656.3	2		(84)
,							,50.10	1012.30	J 347	074.11	' '		000.00	000.0			(0.)
7. Mean inte			· ·	Ť			oroo f	rom Tok	olo O	Th4 (9C)					г	04	7(05)
Utilisation fa	ŭ		٠.			·			JIE 9	, IIII (C)					L	21	(85)
Jan	Feb	Ma	$\overline{}$	Apr	May	Ť	Jun	Jul	Α	ug Sep	<u>, </u>	Oct	Nov	Dec			
(86)m= 0.99	0.98	0.9	$\overline{}$		0.73	+	0.55	0.4	0.4		+).91	0.98	0.99	\dashv		(86)
	al tompor	oturo.	in li	ving area	T1 /f	مالہ	w stor	oc 2 to 7	L 7 in T	able (le)					_		
Mean internation (87)m= 19.92	20.11	20.3	$\overline{}$		20.9	$\overline{}$	0.98	21	20.		20	0.67	20.23	19.88			(87)
		<u> </u>		ļ											_		` ,
Temperature (88)m= 19.9	19.9	19.9			19.92	_	9.92	19.92	19.		$\overline{}$	9.92	19.91	19.91	\neg		(88)
		<u> </u>		ļ						10.02		J.UL	1 .0.01	70.01			()
Utilisation fa	ctor for g	ains f 0.93	-		elling, 0.67	$\overline{}$	m (se	e Table 0.31	9a) 0.3	35 0.6	T ^	0.88	0.97	0.99	\neg		(89)
, ,				!									0.97	0.55			(00)
Mean interna	al temper	ature	in th	ne rest of	dwell	ing	T2 (fc	ollow ste	eps 3	to 7 in Tal	ble 9	C)					

									ı —	i		1	
(90)m= 18.49	18.77	19.16	19.58	19.83	19.91	19.92	19.92	19.88	19.56	18.96	18.44		(90)
								f	LA = Livin	g area ÷ (4	4) =	0.23	(91)
Mean_interna	al temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.82	19.08	19.45	19.84	20.08	20.16	20.17	20.17	20.13	19.82	19.25	18.78		(92)
Apply adjust	ment to t	ne mean	interna	temper	ature fro	m Table	4e, whe	re appro	opriate			1	
(93)m= 18.67	18.93	19.3	19.69	19.93	20.01	20.02	20.02	19.98	19.67	19.1	18.63		(93)
8. Space he	ating requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa				iviay	Odii	Oui	l //ug	СОР		1101	200		
(94)m= 0.98	0.96	0.92	0.83	0.67	0.47	0.32	0.36	0.61	0.87	0.96	0.98		(94)
Useful gains	, hmGm	W = (94)	1)m x (84	L 4)m			l	<u> </u>					
(95)m= 681.18	1	843.63	844.46	725.3	499.3	319.77	337.28	529.06	669.23	659.06	646.38		(95)
Monthly ave	rage exte	rnal tem	perature	from Ta	able 8				<u>I</u>	<u>I</u>			
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for mea	an intern	al tempe	erature, l	Lm , W =	=[(39)m	x [(93)m	– (96)m]			l	
(97)m= 1381.46	1345.57	1224.39	1021.91	777.3	506.67	320.58	338.71	552.48	857	1138.76	1374.21		(97)
Space heati	ng require	ement fo	r each n	nonth, k\	Wh/mon	h = 0.02	24 x [(97)m – (95)m] x (4	1)m		l.	
(98)m= 521.01	381.62	283.28	127.76	38.69	0	0	0	0	139.7	345.38	541.5		
												0070.04	┓
		-					Tota	l per year	(kWh/yeai) = Sum(9)	8) _{15,912} =	2378.94	(98)
Space heati	ng require	ement in	kWh/m²	²/year			Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	30.34	(98)
Space heati	<u> </u>			•	vstems i	ncluding			(kWh/yeaı) = Sum(9	8)15,912 =		╡``
9a. Energy re	quiremer			•	ystems i	ncluding			(kWh/yeaı) = Sum(9	8) _{15,912} =		╡``
·	quiremer	nts – Indi	vidual h	eating sy			micro-C		(kWh/yeaı	') = Sum(9	8) _{15,912} =		(99)
9a. Energy re Space heat Fraction of s	quiremer ng: pace hea	nts – Indi	vidual h	eating sy		system	micro-C	CHP)	(kWh/yeai) = Sum(9	8)15,912 =	30.34	(99)
9a. Energy re Space heat Fraction of s Fraction of s	quiremer ng: pace hea pace hea	nts – Indi at from se at from m	vidual h econdary	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15,912 =	30.34	(201)
9a. Energy re Space heat Fraction of s Fraction of to	quiremer ng: pace hea pace hea otal heati	nts - Indi	ividual h econdary nain syst main sys	eating sy y/supple em(s) stem 1		system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	30.34 0 1	(99) (201) (202) (204)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of	quirement ng: pace heat pace heat total heat in main spa	nts – Indi at from se at from m ag from a ace heati	vidual hecondary nain systemain syst	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	30.34 0 1 1 89.9	(99) (201) (202) (204) (206)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of	quirement ng: pace heat pace heat total heat in main space seconda	nts – Indi	econdary nain systemain systemain systemain systematory	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan	quirement ng: pace heat pace heat otal heat main space seconda	nts – Indi at from so at from m ng from a ace heati ry/supplo	vidual hecondary nain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1	CHP) - (201) =		Nov	Dec	30.34 0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require	nts - Indi	econdary nain systemain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system n, % Jul	(202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =	Nov	Dec	0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from set from many from mace heating ry/supplement (co. 283.28	econdary nain systemain systematar Apr alculatee	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	mentary g system Jun	system	(202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from so at from m ace heati ry/supple Mar ement (c 283.28	econdary nain systemain systemater Apr alculater 127.76 00 ÷ (20	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 -	(203)] = Oct	Nov 345.38	Dec 541.5	0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from set from many from mace heating ry/supplement (co. 283.28	econdary nain systemain systematar Apr alculatee	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	mentary g system Jun	system n, % Jul	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from so at from m ace heati ry/supple Mar ement (c 283.28	econdary nain systemain systemater Apr alculater 127.76 00 ÷ (20	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54]	quirement ng: pace heat pa	at from set from mace heating ry/supplement (c 283.28 4)] } x 1 315.1	econdary nain systemain systematrar Apr alculated 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01 (211)m = {[(9) 579.54} Space heati = {[(98)m x (2)	quiremer ng: pace hea pace hea patal heatil main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1	nts - Indicate from some set from many from the set of	econdary nain systemain systematar Apr nalculater 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0	(203)] = Oct 139.7 155.4 ar) =Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54]	quirement ng: pace heat pa	at from set from mace heating ry/supplement (c 283.28 4)] } x 1 315.1	econdary nain systemain systematrar Apr alculated 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54} Space heati = {[(98)m x (2) (215)m=0	quiremer ng: pace hea pace hea patal heatil main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1	nts - Indicate from some set from many from the set of	econdary nain systemain systematar Apr nalculater 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54 Space heati = {[(98)m x (2) (215)m=0	quirement ng: pace heat pa	t from set from many from	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/8) 0	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of s Fraction of te Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54 Space heati = {[(98)m x (2) (215)m= 0 Water heating	quiremer ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1 0 g vater hea	trom so that from many from the many from th	econdary nain systemain systemater Apr alculatee 127.76 00 ÷ (20 142.12 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 emonth 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012} 0	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy respectively space heating fraction of some services of the energy of the e	quiremer ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1 0 g vater hea 142.61	ter (calce	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/8) 0	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear

(217)m= 89.27 89.18 88.99	88.57 87.9	87.3	87.3	87.3	87.3	88.6	89.11	89.3		(217)
Fuel for water heating, kWh/mo										
(219) m = (64) m x $100 \div (217)$ r (219)m = 182.2 159.92 166.33	n 147.07 143.22	125.96	118.21	133.51	134.47	152.58	163.85	176.83	1	
				Tota	I = Sum(2	19a) ₁₁₂ =		<u> </u>	1804.16	(219)
Annual totals						k'	Wh/yea	r	kWh/year	-
Space heating fuel used, main s	system 1								2646.21	
Water heating fuel used									1804.16	
Electricity for pumps, fans and e	electric keep-ho	t								
central heating pump:								30]	(230c)
boiler with a fan-assisted flue								45]	(230e)
Total electricity for the above, k	Wh/year			sum	of (230a)	(230g) =			75	(231)
Electricity for lighting									342.26	(232)
Total delivered energy for all us	es (211)(221)	+ (231)	+ (232).	(237b)	=				4954.94	(338)
10a. Fuel costs - individual hea	ating systems:									
		Fu	el			Fuel P	rice		Fuel Cost	
		kW	/h/year			(Table	12)		£/year	
Space heating - main system 1		(211	I) x			3.4	.8	x 0.01 =	92.09	(240)
Space heating - main system 2		(213	3) x			0		x 0.01 =	0	(241)
Space heating - secondary		(215	5) x			13.	19	x 0.01 =	0	(242)
Water heating cost (other fuel)		(219	9)			3.4	8	x 0.01 =	62.78	(247)
Pumps, fans and electric keep-h	not	(231	I)			13.	19	x 0.01 =	9.89	(249)
(if off-peak tariff, list each of (23	0a) to (230g) se			licable a	nd apply	fuel pri		_	Table 12a	_
Energy for lighting		(232	<u>2)</u>			13.	19	x 0.01 =	45.14	(250)
Additional standing charges (Ta	ıble 12)								120	(251)
Appendix Q items: repeat lines	(253) and (254)	as need	ded							_
Total energy cost	(245)(247) + (25	0)(254)	=					329.91	(255)
11a. SAP rating - individual he	ating systems									
Energy cost deflator (Table 12)									0.42	(256)
Energy cost factor (ECF)	[(255) x	(256)] ÷ [(4) + 45.0]	=					1.12	(257)
SAP rating (Section 12)									84.34	(258)
12a. CO2 emissions – Individu	al heating syste	ems inclu	uding mi	cro-CHP						
		En	ergy			Emiss	ion fac	tor	Emissions	
		kW	/h/year			kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1)		(211	I) x			0.2	16	=	571.58	(261)
Space heating (secondary)		(215	5) x			0.5	19	=	0	(263)
Water heating		(219	9) x			0.2	16	=	389.7	(264)

Space and water heating	(261) + (262) + (263) + (264) =		961.28 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	177.63 (268)
Total CO2, kg/year	sun	m of (265)(271) =	1177.84 (272)
CO2 emissions per m ²	(27	72) ÷ (4) =	15.02 (273)
El rating (section 14)			87 (274)

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22 =	3228.38 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22 =	2201.08 (264)
Space and water heating	(261) + (262) + (263) + (264) =		5429.46 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	1050.75 (268)
'Total Primary Energy	sum	of (265)(271) =	6710.46 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	85.59 (273)

		User Details:			
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mher: S	TRO030065	
Software Name:	Stroma FSAP 2012	Software V		ersion: 1.0.5.25	
		Property Address: HOU	SE E - IMPROVED		
Address :	Woodwell Cottage P2, Wo	oodwell Road, BRISTOL,	BS11 9XU		
1. Overall dwelling dime	nsions:				
		Area(m²)	Av. Height(m)	Volume(m ²	3)
Ground floor		39.2 (1a) x	2.6 (2a	101.92	(3a)
First floor		39.2 (1b) x	2.56 (2b	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 78.4 (4)			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+(3n)	202.27	(5)
2. Ventilation rate:					
	main second heating heatin		total	m³ per hou	ır
Number of chimneys	0 + 0	+ 0 =	0 x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0 x 20 =	0	(6b)
Number of intermittent fa	ns		3 x 10 =	30	(7a)
Number of passive vents			0 x 10 =	0	(7b)
Number of flueless gas fi	res		0 x 40 =	0	(7c)
				Air changes per ho	our
•	ys, flues and fans = $(6a)+(6b)$		30 ÷ (5)	0.15	(8)
Number of storeys in the	een carried out or is intended, prod oe dwelling (ns)	ceed to (17), otherwise continue	e from (9) to (16)		(9)
Additional infiltration	ie dweiling (113)		[(9)-1]x(0.1 = 0	(10)
	.25 for steel or timber frame	or 0.35 for masonry cons		0	(11)
if both types of wall are pr	resent, use the value corresponding	•			`
deducting areas of openir	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or	: 0.1 (soaled) also enter	n		7(10)
If no draught lobby, en	,	o. i (Scaled), else cittel	O	0	(12)
•	s and doors draught stripped	d		0	(14)
Window infiltration	3 []	0.25 - [0.2 x (14) ·	÷ 100] =	0	
					=
Infiltration rate		(8) + (10) + (11) +	· (12) + (13) + (15) =	0	(15)
	q50, expressed in cubic me				(15)
Air permeability value,	q50, expressed in cubic me ity value, then (18) = [(17) ÷ 20	tres per hour per square			(15)
Air permeability value, If based on air permeabil Air permeability value applie	ity value, then $(18) = [(17) \div 20]$ s if a pressurisation test has been	tres per hour per square]+(8), otherwise (18) = (16)	metre of envelope are	ea 5	(15) (16) (17) (18)
Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere	ity value, then $(18) = [(17) \div 20]$ s if a pressurisation test has been	tres per hour per square]+(8), otherwise (18) = (16) done or a degree air permeabili	metre of envelope are	0.4 1	(15) (16) (17) (18) (19)
Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere Shelter factor	ity value, then (18) = [(17) ÷ 20 s if a pressurisation test has been ed	tres per hour per square]+(8), otherwise (18) = (16) done or a degree air permeabili (20) = 1 - [0.075 >	metre of envelope are ity is being used	1 0.92	(15) (16) (17) (18) (19) (20)
Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere Shelter factor Infiltration rate incorporat	ity value, then (18) = [(17) ÷ 20 is if a pressurisation test has been and the distribution of the state of the distribution of the state of the sta	tres per hour per square]+(8), otherwise (18) = (16) done or a degree air permeabili	metre of envelope are ity is being used	0.4 1	(15) (16) (17) (18) (19)
Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere Shelter factor Infiltration rate incorporat Infiltration rate modified for	ity value, then (18) = [(17) ÷ 20 s if a pressurisation test has been and the distribution of the state of the distribution of the state of the stat	tres per hour per square $]+(8)$, otherwise $(18) = (16)$ done or a degree air permeability $(20) = 1 - [0.075 \times (21) = (18) \times (20)$	metre of envelope are ity is being used (19)] =	1 0.92 0.37	(15) (16) (17) (18) (19) (20)
Air permeability value, If based on air permeabil Air permeability value applie Number of sides sheltere Shelter factor Infiltration rate incorporat	ity value, then (18) = [(17) ÷ 20 s if a pressurisation test has been and the distribution of the state of the distribution of the state of the stat	tres per hour per square $]+(8)$, otherwise $(18) = (16)$ done or a degree air permeability $(20) = 1 - [0.075 \times (21) = (18) \times (20)$	metre of envelope are ity is being used (19)] =	1 0.92	(15) (16) (17) (18) (19) (20)

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infilt	tration rat	e (allowi	ng for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		•	rate for t	he appli	cable ca	se	•					· 	(00-)
If exhaust air			andiv N (2	23h) - (23a	a) v Emy (6	aguation (N	V5)) othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balance		-	-	_					2h\m + (23h) v [1 _ (23c)	0 ± 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)		l	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	/e input v	ventilatio	n from (outside	l			ı	
if (22b)	m < 0.5 >	< (23b), t	hen (24	c) = (23k	o); other	wise (24	c) = (22l	b) m + 0.	5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura				•	•				0.51				
(24d)m= 0.61	m = 1, th 0.61	en (24d) 0.6	m = (22)	0.58	0.56	4a)m = 0.56	0.5 + [(2)]	0.57	0.5]	0.59	0.59	Ī	(24d)
Effective ai		ļ			ļ.	<u> </u>			0.36	0.59	0.59		(244)
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(25)
` ′					l	l							
0 1141													
3. Heat loss		·			Not Ar	00	Hyal		A V I I		le volue		A V I ₂
3. Heat loss ELEMENT	es and he Gros area	SS	oaramet Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
	Gros	SS	Openin	ıgs									
ELEMENT	Gros area	SS	Openin	ıgs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area oe 1	SS	Openin	ıgs	A ,r	m ² x x x 1.	W/m2	2K = [- 0.04] = [(W/ 2.07				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area oe 1 oe 2	SS	Openin	ıgs	A ,r 2.07	m² x x1. x1.	W/m2 1 /[1/(1.4)+		2.07 2.15				kJ/K (26) (27)
Doors Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43				kJ/K (26) (27) (27)
Doors Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{c} 2K \\ \hline \\ -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $ $ \begin{array}{c} -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $	2.07 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{c} 2K \\ \hline \\ -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $ $ \begin{array}{c} -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $	2.07 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area oe 1 oe 2 oe 3	ss (m²)	Openin	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{ccc} 2K & & & & \\ & & & & & \\ & & & & & \\ & & & &$	2.07 2.15 3.43 1.14 2.84 2.261				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area oe 1 oe 2 oe 3 oe 4	ss (m²)	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096				kJ/K (26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and	Gros area one 1 one 2 one 3 one 4 and 57. elements	33 2 4 5, m ²	10.9 0 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	EK = [- 0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1 57. elements	33 2 4 5, m ² lows, use e	10.9 10.9 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K = [- 0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1 57. elements od roof wind eas on both oss, W/K	33 2 4 5, m ² dows, use e sides of in = S (A x	10.9 10.9 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	$ \begin{array}{cccc} 2K & = & \\ & -0.04 $	(W/ 2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	(26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and ** include the are Fabric heat lo	Gros area De 1 De 2 De 3 De 4	33 2 4 5, m² lows, use end sides of interest and interest	10.9 0 2.66	indow U-valls and par	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	$ \begin{array}{cccc} 2K & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & = & \\$	(W/ 2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	K)	kJ/m²-l	3.2	(26) (27) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

				ulation.										
	ŭ	`	,		using Ap	•	K						10.55	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			52.74	(37
			alculated	l monthly	V						25)m x (5)		53.74	(0,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(3
eat tr	ansfer c	coefficier	nt W/K	<u> </u>	<u> </u>	<u> </u>	!	!	(39)m	= (37) + (37)		<u> </u>	l	
9)m=	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		
oot lo	oo poro	motor (b	JI D) \\\	/m²l/	I	I	l			Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	92.59	(3
)m=	1.21	1.2	HLP), W/	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		
5)111-	1.21	1.2	1.2	1.10	1.10	1.10	1.10	1.10			Sum(40) ₁ .		1.18	(4
umbe	er of day	s in mor	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
eum	ad occu	ipancy, I	NI									40	1	(4
				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43		(
f TF	A £ 13.9	9, N = 1											-	
nnual	OVOROR													
								(25 x N) to achieve		se taraet o		.96		(-
duce	the annua	al average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target o		.96		(4
duce	the annua	al average	hot water	usage by a day (all w	5% if the a	lwelling is	designed	to achieve	a water us	se target o		.96 Dec]	(-
duce t more	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d ater use, l	lwelling is hot and co Jun	designed (Aug		_	,	1		(
duce t more t t wate	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed (Aug	a water us	_	,	1		(
duce t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in 101.15	Feb 197.47	Mar day for ea	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$	Jun ctor from 3	designed and desig	Aug (43)	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all when Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(«
educe It more It wate It wate It may come to the company come to the company come to the company compa	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1	Dec 101.15 = c, 1d) 145.27	1103.46	(«
t water ergy comparisons instant	the annual that 125 Jan ar usage in 101.15 content of 150 taneous w	Feb 11tres per properties per proper	Mar day for ea 93.79 used - cale 135.38	Apr ach month 90.12 culated mo 118.03	May Vd,m = fa 86.44 201113.25 20 hot water	Jun ctor from 82.76 190 x Vd,r 97.73	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/more 105.16	Oct 93.79 Total = Su 122.55 Total = Su	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		(
duce t more t wate l)m= ergy c s)m= mstant	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		
duce the more t	Jan 101.15 content of 150 aneous w 0 storage	Feb 11 per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage),	designed and desig	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		
duce t more t water t water t water t water t water t water t water t water t water t water t water	the annual that 125 Jan ar usage in 101.15 content of 150 staneous w 0 storage e volum	Feb 1/2 Feb 1/	Mar day for ea 93.79 used - call 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03 of use (no	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t water i)m= corag common herw	the annual that 125 Jan ar usage in 101.15 content of 150 storage e volum munity herise if no	Feb 1 litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0 includinated no talcated and no talcated and a calcated and a calcated and a calcated and and and and and and and and a calcated and and and and and and and and and an	Apr ach month 90.12 culated mo 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 97.73 storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t si)m= mstant oragg commherw ater:	the annual that 125 Jan ar usage in 101.15 content of 150 staneous w 0 storage e volum munity herise if no storage	Feb 11tres per properties per proper	Mar 93.79 used - call 135.38 ng at point 0 includinate the the the the the the the the the t	Apr ach month 90.12 culated mo 118.03 of use (no unk in dw er (this in	May Vd,m = fa 86.44 201113.25 20 hot water 0 colar or Welling, encludes i	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(((
duce t more	the annual that 125 Jan 101.15 content of 150 storage e volum munity h vise if no storage anufact	Feb 11 prints per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point o includinate hot water	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		
duce t more literative water ergy of mostant mostant orage commister: in the mostant in the most	Jan 101.15 101.1	Feb 1 litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de	Mar 93.79 used - calc 135.38 ng at point and no tal hot water eclared le m Table	Apr ach month 90.12 culated me 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 colar or Water 20 colar or Water 21 colar or Water 22 colar or Water 23 colar or Water 24 colar or Water 35 colar or Water 36 colar or Water 47 colar or Water 48 colar or Water 59 colar or Water 60 colar or Water 60 colar or Water 61 colar or Water 62 colar or Water 63 colar or Water 64 colar or Water 65 colar or Water 66 colar or Water 67 colar or Water 67 colar or Water 68 colar or Water 69 colar or Water 69 colar or Water 60 colar or Water	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4)
duce to more that water that wate	the annual that 125 Jan 101.15 content of 150 storage e volum munity helise if no storage example anufact	Feb n litres per p 97.47 hot water 131.19 loss: e (litres) eating a o stored loss: urer's de actor fro m water	Mar day for ea 93.79 used - cale 135.38 ng at point nd no tale hot water eclared le m Table storage	Apr ach month 90.12 culated mo 118.03 of use (no ng any so nk in dw er (this in oss facto 2b	5% if the orater use, I May $Vd,m = fa$ 86.44 0 0 0 0 0 0 0	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		(4)
duce t more	the annual that 125 Jan 101.15 content of 150 storage e volum munity he vise if no storage anufact trature far anufact trature far anufact	Feb plitres per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point of including and no tall hot water eclared left m Table storage eclared colored	Apr ach month 90.12 culated mo 118.03 of use (no ank in dw er (this ir oss facto 2b cylinder l	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 colar or Water 20 colar or Water 21 colar or Water 22 colar or Water 23 colar or Water 24 colar or Water 35 colar or Water 36 colar or Water 47 colar or Water 48 colar or Water 59 colar or Water 60 colar or Water 60 colar or Water 61 colar or Water 62 colar or Water 63 colar or Water 64 colar or Water 65 colar or Water 66 colar or Water 67 colar or Water 67 colar or Water 68 colar or Water 69 colar or Water 69 colar or Water 60 colar or Water	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at wate 4)m= anergy of anstant b)m= atternation att	the annual that 125 Jan 101.15 content of 150 anneous w o storage e volum munity h vise if no storage anufact rature fa to lost fro anufact ter storage	Feb n litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de	Mar day for ea 93.79 used - call 135.38 ng at point of including and no tall hot water eclared left m Table storage eclared colored	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this in oss facto 2b cylinder l com Table	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at more at more at more at more at more at more at wate at more	the annual the annual that 125 Jan 101.15 content of 150 storage e volum munity h vise if no storage anufact trature fa v lost fro anufact ter stora munity h e factor	Feb 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	Mar day for ea 93.79 used - calc 135.38 ng at point on includir and no talc hot water eclared left m Table storage eclared of factor free sections	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this ir oss facto 2b cylinder I com Tabl on 4.3	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4) (4) (4) (4) (5) (5) (5) (5)

Energy	/ lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)	x (52) x ((53) =		0] ((54)
Enter	(50) or	(54) in (5	55)									0	((55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	J lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0] ((58)
Primar	y circuit	loss cal	culated	for each	month (59)m =	(58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wa	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	((59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48	((62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	-	
(add a	dditiona	I lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)				_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	((63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	((63) (G2)
Output	from w	ater hea	ter										_	
(64)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		
								Outp	out from w	ater heate	r (annual)	12	1229.79	(64)
Heat g	ains fro	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8	x [(46)m	+ (57)m	+ (59)m]	
(65)m=	31.88	27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87	((65)
inclu	ıde (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	Table 5	and 5a):									
Metab	olic gair	s (Table	5), Wat	ts									_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	((66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m=	20.26	18	14.64	11.08	8.28	6.99	7.56	9.82	13.18	16.74	19.54	20.83	((67)
Applia	nces ga	ins (calc	ulated ir	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m=	216.06	218.31	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	((68)
Cookir	ng gains	(calcula	ited in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5				
(69)m=	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	((69)
Pumps	and fa	ns gains	(Table	5a)	-	-	-	-			-	-		
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	((70)
Losses	e.g. ev	aporatic	n (nega	tive valu	es) (Tab	ole 5)							-	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water	heating	gains (T	able 5)										-	
(72)m=	42.84	41.49	38.67	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49	((72)
Total i	nternal	gains =	;			(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72))m	-	
(73)m=	338.65	337.27	325.44	306.02	285.55	266.49	254.54	258.38	268.75	288.3	310.76	328.33	((73)
		•	•	•	•	•	•	•		•		•	•	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	ion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	х	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	X	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.7	=	15.55	(76)
East	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.7	=	5.16	(76)
East	0.9x	0.77	x	2.59	x	38.42	x	0.63	x	0.7	=	30.41	(76)
East	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.7	=	10.1	(76)
East	0.9x	0.77	x	2.59	x	63.27	x	0.63	x	0.7	=	50.08	(76)
East	0.9x	0.77	x	0.86	x	63.27	x	0.63	x	0.7	=	16.63	(76)
East	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.7	=	73.04	(76)
East	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(76)
East	0.9x	0.77	x	2.59	X	113.09	x	0.63	x	0.7	=	89.52	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	x	0.7	=	29.72	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.7	=	91.64	(76)
East	0.9x	0.77	X	0.86	x	115.77	x	0.63	X	0.7	=	30.43	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.7	=	87.24	(76)
East	0.9x	0.77	X	0.86	X	110.22	x	0.63	X	0.7	=	28.97	(76)
East	0.9x	0.77	X	2.59	x	94.68	x	0.63	X	0.7	=	74.94	(76)
East	0.9x	0.77	X	0.86	X	94.68	X	0.63	X	0.7	=	24.88	(76)
East	0.9x	0.77	X	2.59	X	73.59	x	0.63	X	0.7	=	58.25	(76)
East	0.9x	0.77	X	0.86	x	73.59	X	0.63	x	0.7	=	19.34	(76)
East	0.9x	0.77	X	2.59	X	45.59	x	0.63	X	0.7	=	36.09	(76)
East	0.9x	0.77	X	0.86	x	45.59	x	0.63	x	0.7	=	11.98	(76)
East	0.9x	0.77	X	2.59	x	24.49	x	0.63	x	0.7	=	19.38	(76)
East	0.9x	0.77	X	0.86	x	24.49	x	0.63	x	0.7	=	6.44	(76)
East	0.9x	0.77	X	2.59	x	16.15	x	0.63	x	0.7	=	12.78	(76)
East	0.9x	0.77	X	0.86	X	16.15	X	0.63	X	0.7	=	4.24	(76)

	_									_						_		_
South 0).9x	0.77		X	2.1	4	X	4	6.75	X	0.	63	x	0.7		= [30.58	(78)
South 0).9x	0.77		X	2.1	4	X	7	6.57	X	0.	63	X	0.7		= [50.08	(78)
South 0).9x	0.77		X	2.1	4	X	9	7.53	X	0.	63	x	0.7		= [63.79	(78)
South 0).9x	0.77		X	2.1	4	X	1	10.23	X	0.	63	x	0.7		= [72.09	(78)
South 0).9x	0.77		X	2.1	4	x	1	14.87	X	0.	63	x	0.7		= [75.13	(78)
South 0).9x	0.77		X	2.1	4	x	1	10.55	X	0.	63	x	0.7		= [72.3	(78)
South 0).9x	0.77		X	2.1	4	x	10	08.01	X	0.	63	x	0.7		= [70.64	(78)
South 0).9x	0.77		X	2.1	4	x	10	04.89	X	0.	63	x	0.7		= [68.6	(78)
South 0).9x	0.77		X	2.1	4	x	10	01.89	X	0.	63	x	0.7		= [66.63	(78)
South 0).9x	0.77		X	2.1	4	x	8	2.59	X	0.	63	x	0.7		= [54.01	(78)
South 0).9x	0.77		X	2.1	4	x	5	5.42	X	0.	63	x	0.7		= [36.24	(78)
South 0).9x	0.77		X	2.1	4	x	4	40.4	X	0.	63	x	0.7		= [26.42	(78)
Rooflights 0).9x	1		X	1.3	3	x	4	7.01	X	0.	63	x	0.7		= [49.63	(82)
Rooflights o).9x	1		X	1.3	3	X	8	33.9	X	0.	63	x	0.7		= [88.58	(82)
Rooflights o).9x	1		X	1.3	3	x	1:	22.73	X	0.	63	x	0.7		= [129.57	(82)
Rooflights 0).9x	1		X	1.3	3	x	10	61.74	X	0.	63	x[0.7		= [170.76	(82)
Rooflights o).9x	1		X	1.3	3	x	18	87.38	X	0.	63	x	0.7		= [197.83	(82)
Rooflights o).9x	1		X	1.3	3	x	18	88.06	X	0.	63	x	0.7		= [198.54	(82)
Rooflights 0).9x	1		X	1.3	3	x	18	80.51	X	0.	63	x	0.7		= [190.58	(82)
Rooflights 0).9x	1		X	1.3	3	X	10	61.54	X	0.	63	x	0.7		= [170.54	(82)
Rooflights o).9x	1		X	1.3	3	x	1	36.5	X	0.	63	x	0.7		= [144.11	(82)
Rooflights 0).9x	1		X	1.3	3	x	9	5.08	X	0.	63	x	0.7		= [100.38	(82)
Rooflights o).9x	1		X	1.3	3	X	5	7.06	X	0.	63	x	0.7		= [60.24	(82)
Rooflights o).9x	1		X	1.3	3	x	3	9.72	X	0.	63	x	0.7		= [41.93	(82)
Solar gain											n = Sum							
					395.07			72.11		397	7.63 32	29.45	226.41	135.29	94.1	6		(83)
Total gains				_	` 	` '				1 050		20.40		140.05	400			(0.4)
(84)m= 45	0.1	536.55	619	./	701.09	751.7	3 1	738.6	705.91	656	5.01 5	98.19	514.71	446.05	422.4	49		(84)
7. Mean i		•		,	Ŭ											_		_
Tempera		•		• .			•			ble 9	, Th1 (°C)					21	(85)
Utilisation	n fact	 _	ains f	or li	ving are	a, h1,	m (s	ee Ta	ble 9a)			-						
	an	Feb	Ma	\rightarrow	Apr	Ma	$\overline{}$	Jun	Jul	_	_	Sep	Oct	Nov	De	C		
(86)m=	1	1	0.9	9	0.96	0.88		0.72	0.55	0.6	61 (0.85	0.98	1	1			(86)
Mean inte	ernal	tempera	ature	in li	ving are	a T1	(follo	w ste	ps 3 to 7	7 in T	able 9	c)						
(87)m= 19	.66	19.83	20.1	1	20.47	20.77	2	20.94	20.99	20.	98 2	0.86	20.46	19.99	19.6	4		(87)
Tempera	ture o	during h	eatin	g pe	eriods in	rest o	of dw	elling/	from Ta	able 9	9, Th2	(°C)						
(88)m= 19	.92	19.92	19.9	2	19.94	19.94	. 1	19.95	19.95	19.	95 1	9.94	19.94	19.93	19.9	3		(88)
Utilisation	n fact	or for ga	ains f	or re	est of dv	velling	, h2	,m (se	e Table	9a)								
	1	0.99	0.9	-	0.94	0.84		0.63	0.43	0.4	49 (0.78	0.97	0.99	1			(89)
Mean inte	ernal	tempera	ature	in t	he rest o	of dwe	ellina	T2 (fc	ollow ste	eps 3	to 7 ir	Table	9c)	-				
		1		-			. 9	ν		,			- /					

(90)m=	18.7	18.87	19.15	19.51	19.78	19.92	19.95	19.95	19.86	19.5	19.04	18.68		(90)
(30)111=	10.7	10.07	19.10	19.51	19.70	19.92	19.90	19.90			g area ÷ (4		0.23	(91)
						\ 4					9 (, l	0.20	(01)
	interna 18.92	- _	ature (fo	r	1	· · ·				10.72	10.26	10.01		(02)
(92)m=		19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(92)
(93)m=	18.92	19.1	he mean 19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(93)
			uirement		20.01	20.10	20.10	20.10	20.1	10.70	10.20	10.01		()
•			ernal ter		re obtain	ned at ste	ep 11 of	Table 9	o, so tha	t Ti.m=(76)m an	d re-calc	ulate	
			or gains	•				1 4510 01	, 00 ii a		, o,,,,, a,,,	u 10 0010	diato	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:										
(94)m=	1	0.99	0.98	0.94	0.84	0.65	0.46	0.52	0.8	0.96	0.99	1		(94)
	<u> </u>		W = (94)	ŕ	·									
(95)m=		532.72	607.76	659.91	631.38	479.8	323.54	337.91	475.61	496.09	443.22	421.57		(95)
	<u> </u>		rnal tem	i 										(0.0)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			an intern		1		<u> </u>		<u> </u>		1100.10	4070.00		(07)
		1337.36		1002.99	767.52	507.12	327.41	344.65	549.56	842.77	1129.49	1373.09		(97)
Space (98)m=	694.08	g require 540.72	ement fo 447.32	247.02	101.29	/vn/mon	$\ln = 0.02$	24 X [(97))m – (95 0)mj x (4° 257.93	494.11	707.93		
(90)111=	094.00	340.72	447.32	247.02	101.29	U	U						3490.42	(98)
_					- /			TUla	l per year	(KVVII/yeai) = Sum(9	O)15,912 =	3490.42	╡``
Space	e heatin	g require	ement in	kWh/m²	²/vear								44.52	(99)
					, , ca.								44.52	(33)
8c. S	pace co	oling rec	quiremen		,,,								44.02	(33)
	lated fo	r June, c	July and	t August.	See Tal					_			44.JZ	(00)
Calcu	lated fo Jan	r June, c Feb	July and Mar	August. Apr	See Tal	Jun	Jul	Aug	Sep	Oct	Nov	Dec	77.02	(00)
Calcu Heat	lated fo Jan loss rate	r June, c Feb e Lm (ca	July and Mar Iculated	August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)	77.02	
Calcu Heat (100)m=	Jan Jan loss rate	r June, c Feb e Lm (ca	July and Mar Iculated	August. Apr	See Tal	Jun							77.02	(100)
Heat (100)m=	Jan Jan loss rate 0 ation fac	r June, C Feb E Lm (ca 0	July and Mar Iculated 0 oss hm	August. Apr using 25	See Tal May 5°C inter	Jun nal temp 857.31	oerature 674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0	77.02	(100)
Calcu Heat (100)m= Utilisa (101)m=	Jan Jan loss rate 0 ation fac	r June, C Feb E Lm (ca 0 tor for lo	July and Mar Ilculated 0 oss hm 0	August. Apr using 25	See Tal May 5°C inter 0	Jun rnal temp 857.31	perature	and exte	ernal ten	nperatur	e from T	able 10)	77.02	
Heat (100)m= Utilisa (101)m= Usefu	Jan loss rate 0 ation fac	r June, C Feb Lm (ca 0 tor for lc 0	July and Mar Ilculated 0 pss hm 0 Vatts) = (August. Apr using 29 0 100)m x	See Tal May 5°C inter 0	Jun rnal temp 857.31	0.92	and exte 691.53	ernal ten 0	o 0	e from T 0	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m=	Jan Jan Joss rate 0 ation fac 0 I loss, h	r June, C Feb E Lm (ca 0 stor for lo mLm (W	July and Mar Ilculated 0 oss hm 0 Vatts) = (August. Apr using 25 0 0 (100)m x	See Tal May 5°C inter 0 0 (101)m	Jun nal temp 857.31 0.86	0.92 622.55	and exte 691.53 0.9	ernal ten 0 0	nperatur 0	e from T	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g	r June, C Feb E Lm (ca 0 stor for lo mLm (W	July and Mar Ilculated 0 pss hm 0 Vatts) = (August. Apr using 25 0 0 (100)m x	See Tal May 5°C inter 0 0 (101)m	Jun nal temp 857.31 0.86	0.92 622.55	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar q	r June, c Feb e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca	July and Mar Ilculated 0 oss hm 0 Vatts) = (0 Iculated 0	August. Apr using 25 0 (100)m x for appli	See Tal May 5°C inter 0 (101)m 0 cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation fact I loss, h 0 s (solar g	r June, c Feb Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0	July and Mar Iculated 0 pss hm 0 Vatts) = (0	August. Apr using 29 0 (100)m x o for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar q 0 e cooling 04)m to	r June, c Feb Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0	July and Mar Journal of the second of the se	August. Apr using 29 0 (100)m x o for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar o e cooling 04)m to	r June, c Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fact outliness, he cooling 04)m to d fraction	r June, c Feb Lm (ca 0 stor for lo 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>	c (41)m	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 cooling 04)m to d fraction	r June, C Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Ilculated 0 pss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m < 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun nal temp 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07 continuo	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	c (41)m 478.84	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 cooling 04)m to d fraction	r June, c Feb Lm (ca 0 stor for lo 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<i>((41)m</i> 478.84 1	(100) (101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of 0 e cooling 04)m to 0 d fraction ittency fi	r June, C Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar July	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47	0.92 622.55 egion, se 882.07 continuo 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	c (41)m 478.84	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermi (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of the cooling of the coolin	r June, c Feb Lm (ca 0 tor for lo mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 ment for	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<i>((41)m</i> 478.84 1	(100) (101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of the cooling of the coolin	r June, C Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar July	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47	0.92 622.55 egion, se 882.07 continuo 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(100) (101) (102) (103) (104) (105)
Calcul Heat (100)m= Utilisa (101)m= Useful (102)m= Gains (103)m= Space set (1) (104)m= Cooled Intermit (106)m= Space (107)m=	lated fo Jan loss rate 0 ation factor (solar (cooling) 0 cooling 0 cooling	r June, c Feb E Lm (ca 0 Intor for lo 0 Intor for l	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0 (104)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	((41)m 478.84 1	(100) (101) (102) (103) (104) (105) (106)
Calcul Heat (100)m= Utilisa (101)m= Useful (102)m= Gains (103)m= Space set (1) (104)m= Cooled Intermit (106)m= Space (107)m=	lated fo Jan loss rate 0 ation factor (solar (cooling) 0 cooling 0 cooling	r June, c Feb E Lm (ca 0 Intor for lo 0 Intor for l	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 ment for	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0 (104)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(100) (101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under sp	pecial conditions, see section 11)		
Fabric Energy Efficiency	(99) + (108) =	46.05	(109)
Target Fabric Energy Efficiency (TFEE)		52.95	(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU		/ED		
Address :	Woodwell Cottage P2, Woo	odwell Road, BRISTOL	, BS11 9XU			
Overall dwelling dime	nsions:	A (m. 2)	A. Hainbal	\	\/ a a / 2\	
Ground floor		Area(m²) 39.2 (1a) >	Av. Height(r	(2a) =	Volume(m³)	(3a)
First floor		39.2 (1b) >		(2b) =	100.35](3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1					」 ` ′
Dwelling volume		,,	(3b)+(3c)+(3d)+(3e)	+(3n) =	202.27	(5)
2. Ventilation rate:				<u> </u>	202.21	
2. Ventilation rate.	main seconda		total		m³ per houi	
Number of chimneys	heating heating	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				4		_
l me et e e	(0.) (01)	(=) (=)			anges per ho	_
•	ys, flues and fans = (6a)+(6b)+ een carried out or is intended, proce		30 e from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the		ou to (117), out of 11100 out 11110		ſ	0	(9)
Additional infiltration	3 \			[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 for masonry con	struction		0	(11)
if both types of wall are po deducting areas of openir	resent, use the value corresponding	to the greater wall area (after				_
	loor, enter 0.2 (unsealed) or	0.1 (sealed), else enter	0	[0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11) -	+ (12) + (13) + (15) =	=	0	(16)
Air permeability value,	q50, expressed in cubic metr	es per hour per square	metre of envelo	pe area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] +$	-(8), otherwise (18) = (16)		Ī	0.35	(18)
Air permeability value applie	s if a pressurisation test has been do	one or a degree air permeabii	lity is being used	-		_
Number of sides sheltere	d				1	(19)
Shelter factor		(20) = 1 - [0.075]	x (19)] =		0.92	(20)
Infiltration rate incorporat	ing shelter factor	$(21) = (18) \times (20)$	=		0.32	(21)
Infiltration rate modified f	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct No	ov Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor (22a)m = (22)m ÷ 4	
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18]
A divisted infiltration rate (allowing for abolton and wind an add). (O4a) v (O0a) v	•
Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m 0.41	1
Calculate effective air change rate for the applicable case	J
If mechanical ventilation:	0 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)	0 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0 (23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c)	- 1
(24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0	(24a)
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)	1 (245)
(24b)m= 0 0 0 0 0 0 0 0 0 0 0 0	(24b)
c) If whole house extract ventilation or positive input ventilation from outside if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b)m + 0.5 \times (23b)$	
(24c)m= 0 0 0 0 0 0 0 0 0 0 0 0	(24c)
d) If natural ventilation or whole house positive input ventilation from loft	4
if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$	-
(24d)m= 0.58	(24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)	7
(25)m= 0.58 0.58 0.58 0.56 0.56 0.55 0.55 0.54 0.55 0.56 0.57 0.57	(25)
3. Heat losses and heat loss parameter:	
ELEMENT Gross Openings Net Area U-value A X U k-value	
Doors $\frac{\text{ELEMENT}}{\text{area (m}^2)}$ $\frac{\text{Gloss}}{\text{m}^2}$ $\frac{\text{Openings}}{\text{A ,m}^2}$ $\frac{\text{Net Area}}{\text{W/m2K}}$ $\frac{\text{O-Value}}{\text{W/m2K}}$ $\frac{\text{K-Value}}{\text{W/M2K}}$ $\frac{\text{W/K}}{\text{W/K}}$	
Doors m^2 A , m^2 W/m2K (W/K) kJ/m ² · m^2 Doors m^2 A , m^2 W/m2K m^2 m	K kJ/K (26)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m²- Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 $x1/[1/(1.4)+0.04]$ = 2.15	K kJ/K (26) (27)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m²- Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4)+0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43	K kJ/K (26) (27) (27)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m². Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4)+ 0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4)+ 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+ 0.04] = 1.14	K kJ/K (26) (27) (27)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m². Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4)+ 0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4)+ 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+ 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4)+ 0.04] = 2.84	K kJ/K (26) (27) (27) (27)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m². Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4) + 0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4) + 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4) + 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4) + 0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3) + 0.04] = 1.729	K kJ/K (26) (27) (27) (27) (27) (27b)
	K kJ/K (26) (27) (27) (27) (27) (27b)
Doors 2.07 \times 1.4 $=$ 2.898 Windows Type 1 1.62 $\times 1/[1/(1.4) + 0.04] =$ 2.15 Windows Type 2 2.59 $\times 1/[1/(1.4) + 0.04] =$ 3.43 Windows Type 3 0.86 $\times 1/[1/(1.4) + 0.04] =$ 1.14 Windows Type 4 2.14 $\times 1/[1/(1.4) + 0.04] =$ 2.84 Rooflights 1.33 $\times 1/[1/(1.3) + 0.04] =$ 1.729 Floor $3.9.2$ \times 0.17 $=$ 6.664	K kJ/K (26) (27) (27) (27) (27) (27b)
	K kJ/K (26) (27) (27) (27) (27b) (28) (29)
area (m²) m² A ,m² W/m2K (W/K) kJ/m²- Doors	K kJ/K (26) (27) (27) (27) (27b) (28) (29)
area (m²) m² A ,m² W/m2K (W/K) kJ/m². Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4)+0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43 Windows Type 3 Windows Type 4 Rooflights 1.33 x1/[1/(1.4)+0.04] = 1.729 Floor Walls Type 1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type 2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66 Total area of elements, m²	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31)
A , m² W/m2K (W/K) kJ/m²-Doors 2.07 x 1.4 = 2.898	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32)
A ,m² W/m2K (W/K) kJ/m²-	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32)
A ,m² W/m2K (W/K) kJ/m²-	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32) h 3.2
A ,m² W/m2K (W/K) kJ/m²-	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32)

can he u	sed inste	ad of a de	tailed calcı	ulation										
					using Ap	pendix I	K						10.48	(36)
	•	,	•		= 0.05 x (3	•								()
Total fa	bric hea	at loss							(33) +	(36) =			57.1	(37)
Ventilat	tion hea	it loss ca	alculated	monthl	y				(38)m	= 0.33 × (25)m x (5)			
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Heat lo	ss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	94.67	(39)
(40)m=	1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		
Numbe	r of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.21	(40)
ſ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
_	-			-	-	-		-		-	-	-	•	
4. Wat	ter heat	ing ener	gy requi	irement:								kWh/ye	ear:	
Accum	od occu	nanov I	NI.									10	Ī	(40)
if TF				[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.43		(42)
Annual	averag	e hot wa						(25 x N)				.96		(43)
		_			5% if the d ater use, l	_	_	to achieve	a water us	se target o	f			
Г	-				<u> </u>		•	Ι	0		N			
Hot wate	Jan r usage in	Feb	Mar day for ea	Apr ach month	May Vd,m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	101.15	97.47	93.79	90.12	86.44	82.76	82.76	86.44	90.12	93.79	97.47	101.15		
(44)111-	101.10	37.47	33.73	30.12	00.44	02.70	02.70	00.44		Total = Su			1103.46	(44)
Energy c	ontent of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			(,		1.000	` ′
(45)m=	150	131.19	135.38	118.03	113.25	97.73	90.56	103.92	105.16	122.55	133.77	145.27		
_							!			Total = Su	m(45) ₁₁₂ =	=	1446.81	(45)
If instanta	aneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)	,	,	,	•	
(46)m=	0 storage	0	0	0	0	0	0	0	0	0	0	0		(46)
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	me ves	sel		0		(47)
_		,		•	velling, e		_			00.		0		()
	-	_			_			ombi boil	ers) ente	er '0' in (47)			
Water s	storage	loss:												
a) If ma	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature fa	actor fro	m Table	2b								0		(49)
•			storage	-		:4		(48) x (49)	=			0		(50)
•				-	loss fact le 2 (kW							0		(51)
		•	ee secti		(1.00)	, 0, 00	-1/					<u> </u>	1	(01)
	-	from Ta										0		(52)
Tempe	rature fa	actor fro	m Table	2b								0		(53)

Energy lost from wa	•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54) in	, ,									0		(55)
Water storage loss of	alculated	for each	month			((56)m = (55) × (41)	m -			_	
(56)m= 0 0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains dedicate	ted solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss (annual) fr	om Table	e 3							0		(58)
Primary circuit loss of					` '	` '						
(modified by facto	1	1		1	1			1	'	i	1	4
(59)m= 0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calculate	d for eacl	n month ((61)m =	(60) ÷ 30	65 × (41))m						
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required f	or water h	eating ca	alculated	d for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		(62)
Solar DHW input calculat	ed using App	pendix G o	r Appendix	κ Η (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or \	//WHRS	applies	, see Ap	pendix (3)				•	
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from water h	eater										_	
(64)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		_
						Outp	out from w	ater heate	r (annual) ₁	12	1229.79	(64)
Heat gains from wat	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	x [(46)m	+ (57)m	+ (59)m	1	
(65)m= 31.88 27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87		(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains (s	ee Table	5 and 5a):									
Metabolic gains (Tal	ole 5), Wa	tts									_	
Jan Fel		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 121.59 121.5	9 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59		(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	-	-	-		
(67)m= 19.76 17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31		(67)
Appliances gains (ca	lculated i	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5	•		•	
(68)m= 216.06 218.3	1 212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53		(68)
Cooking gains (calc	ılated in A	ppendix	L, equa	tion L15	or L15a	, also se	ee Table	5	•			
(69)m= 35.16 35.10	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16		(69)
Pumps and fans gai	ns (Table	5a)			l					ı	ı	
(70)m = 0 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapora	tion (nega	ative valu	es) (Tab	ole 5)							1	
(71)m= -97.27 -97.2		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water heating gains	(Table 5)	<u> </u>						•			ı	
(72)m= 42.84 41.49	<u>` </u>	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49		(72)
Total internal gains	=		I	(66)	ım + (67)m	ı + (68)m -	L + (69)m + ∈	(70)m + (7	1)m + (72)	m	I	
(73)m= 338.14 336.8		305.74	285.34	266.31	254.35	258.13	268.42	287.88	310.27	327.81		(73)
		1		1	· · · · · ·						I	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	X	1.62	X	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	X	41.52	X	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	X	13.12	X	0.63	X	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	X	8.86	X	0.63	X	0.8	=	10.03	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.8	=	17.77	(76)
East	0.9x	0.77	X	0.86	X	19.64	X	0.63	X	0.8	=	5.9	(76)
East	0.9x	0.77	x	2.59	X	38.42	X	0.63	X	0.8	=	34.76	(76)
East	0.9x	0.77	x	0.86	X	38.42	x	0.63	x	0.8	=	11.54	(76)
East	0.9x	0.77	X	2.59	X	63.27	X	0.63	X	0.8	=	57.24	(76)
East	0.9x	0.77	x	0.86	X	63.27	X	0.63	x	0.8	=	19.01	(76)
East	0.9x	0.77	x	2.59	X	92.28	x	0.63	x	0.8	=	83.48	(76)
East	0.9x	0.77	x	0.86	X	92.28	X	0.63	X	0.8	=	27.72	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.8	=	102.31	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	X	0.8	=	33.97	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.8	=	104.73	(76)
East	0.9x	0.77	x	0.86	x	115.77	x	0.63	x	0.8	=	34.77	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.8	=	99.71	(76)
East	0.9x	0.77	x	0.86	x	110.22	x	0.63	x	0.8	=	33.11	(76)
East	0.9x	0.77	x	2.59	X	94.68	x	0.63	x	0.8	=	85.65	(76)
East	0.9x	0.77	x	0.86	x	94.68	x	0.63	X	0.8	=	28.44	(76)
East	0.9x	0.77	x	2.59	X	73.59	x	0.63	x	0.8	=	66.57	(76)
East	0.9x	0.77	x	0.86	X	73.59	x	0.63	X	0.8	=	22.1	(76)
East	0.9x	0.77	x	2.59	x	45.59	x	0.63	X	0.8	=	41.24	(76)
East	0.9x	0.77	x	0.86	X	45.59	x	0.63	x	0.8	=	13.69	(76)
East	0.9x	0.77	x	2.59	x	24.49	x	0.63	x	0.8	=	22.15	(76)
East	0.9x	0.77	x	0.86	x	24.49	x	0.63	x	0.8	=	7.36	(76)
East	0.9x	0.77	x	2.59	x	16.15	x	0.63	x	0.8	=	14.61	(76)
East	0.9x	0.77	x	0.86	X	16.15	x	0.63	x	0.8	=	4.85	(76)

South 0.9x	0.77	x	2	14	l x		6.75] _x		0.63	X	0.8			34.94	(78)
South 0.9x	0.77			14	^ x		6.57]		0.63] ^ x	0.8			57.23	(78)
South 0.9x	0.77	^		14	x		7.53]	<u> </u>	0.63] ^ x	0.8	=		72.9	(78)
South 0.9x	0.77	×		14	l x	_	10.23]	_	0.63] ^ x	0.8	╡.		32.39	(78)
South 0.9x	0.77	×		14	X		14.87]		0.63] ^	0.8	╡.	_	85.86	(78)
South 0.9x	0.77	×		14	×	_	10.55] x	<u> </u>	0.63	X	0.8	= =		32.63	(78)
South 0.9x	0.77	x		14) x		08.01]]	_	0.63] x	0.8			80.73	(78)
South 0.9x	0.77	x		14	X	_	04.89]]		0.63] x	0.8	= =		78.4	(78)
South _{0.9x}	0.77	x		14	X		01.89] X	<u> </u>	0.63	X	0.8	= =		76.15	(78)
South 0.9x	0.77	x		14	X	_	2.59] x		0.63	d x	0.8	_ =		61.73	(78)
South _{0.9x}	0.77	×		14	x	\vdash	55.42] x		0.63	X	0.8			41.42	(78)
South _{0.9x}	0.77	×	2.	14	x	_	40.4	X		0.63	X	0.8	= =		30.2	(78)
Rooflights 0.9x	1	x	1.	33	x	4	7.01	j×		0.63	i x	0.8		: [56.72	(82)
Rooflights 0.9x	1	×	1.	33	x	7	33.9	X		0.63	X	0.8	=	1	01.23	(82)
Rooflights 0.9x	1	×	1.	33	x	1:	22.73	x	(0.63	x	0.8		1	48.08	(82)
Rooflights 0.9x	1	×	1.	33	x	1	61.74	X		0.63	X	0.8		1	95.15	(82)
Rooflights 0.9x	1	х	1.	33	x	1	87.38	X		0.63	X	0.8	=	2	26.09	(82)
Rooflights 0.9x	1	X	1.	33	x	1	88.06	X	(0.63	X	0.8	=	2	26.91	(82)
Rooflights _{0.9x}	1	X	1.	33	x	1	80.51	X		0.63	X	0.8	=	: 2	217.8	(82)
Rooflights 0.9x	1	X	1.	33	X	1	61.54	X		0.63	X	0.8	=	1	94.91	(82)
Rooflights _{0.9x}	1	X	1.	33	X	1	36.5	X	(0.63	X	0.8	=		164.7	(82)
Rooflights _{0.9x}	1	X	1.	33	x	9	5.08	X		0.63	X	0.8	=	1	14.72	(82)
Rooflights _{0.9x}	1	х	1.	33	X	5	7.06	X		0.63	X	0.8	=	. (68.85	(82)
Rooflights 0.9x	1	X	1.	33	X	3	9.72	X		0.63	X	0.8	-	: 4	47.92	(82)
Solar gains in	1 1		ı			00.55	545.00	Ť		n(74)m		2 454.00	407.04	_		(02)
(83)m= 127.37 Total gains – i		336.3	451.51 r (84)m	532.7 - (73)n		39.55 83\m	515.86	454	.44	376.51	258.7	6 154.62	107.61			(83)
(84)m= 465.51		661.37	757.25	818.1	`	05.87	770.21	712	57	644.93	546.6	3 464.89	435.42	5]		(84)
` ′			!	<u> </u>				1			0.0.0	1 10 1100	100111			
7. Mean inter			•			oroo	from Tol	blo O	Th1	(°C)						7,05)
Utilisation fac	•	٠.			·			DIE 9	, 1111	(C)					21	(85)
Jan	Feb	Mar	Apr	Ma ¹	Ť	Jun	Jul	ΙΔ	ug	Sep	Oct	Nov	Dec			
(86)m= 1	0.99	0.98	0.95	0.86	+	0.69	0.52	0.5	-	0.83	0.97	1	1	\exists		(86)
Mean interna	l tompora	turo in	living o	·02 T1	(follo	w cto	ne 2 to 7	 7 in T		00)						
(87)m= 19.65	19.84	20.13	20.49	20.79		20.95	20.99	20.	$\overline{}$	20.87	20.47	19.99	19.62	٦		(87)
` ′							Į						1010-			` ,
Temperature (88)m= 19.9	19.9	19.9	19.91	19.92	_	/eiiing 19.92	19.92	19.		19.92	19.92	19.91	19.91	┐		(88)
							Į			10.02	10.02	10.91	10.91			(55)
Utilisation fac	 -		1	 				–	16 T	0.75	0.00	1 0.00		\neg		(89)
(89)m= 1	0.99	0.98	0.93	0.81		0.59	0.4	0.4		0.75	0.96	0.99	1			(09)
Mean interna	al tempera	ture in	the rest	of dwe	elling	T2 (f	ollow ste	eps 3	3 to 7	in Table	9c)					

()														
(90)m=	18.68	18.86	19.15	19.51	19.78	19.9	19.92	19.92	19.85	19.49	19.02	18.65		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.23	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llina) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	18.9	19.09	19.38	19.74	20.01	20.15	20.17	20.17	20.09	19.72	19.25	18.88		(92)
Apply	adjustn	nent to t	he mean	internal	l tempera	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.9	19.09	19.38	19.74	20.01	20.15	20.17	20.17	20.09	19.72	19.25	18.88		(93)
8. Sp	ace hea	tina reau	uirement											
					re obtain	ed at ste	ep 11 of	Table 9l	o. so tha	t Ti.m=(76)m an	d re-calc	ulate	
			or gains	•			- F		o, ooa	(. 0,	u . o oao		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	1	0.99	0.98	0.93	0.81	0.62	0.43	0.49	0.77	0.96	0.99	1		(94)
Usefu	ıl gains,	hmGm ,	W = (94	4)m x (84	4)m		•	•						
(95)m=	463.91	559.64	645.43	702.3	663.96	495.8	331.09	346.46	495.49	522.92	461.4	434.32		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	1				
(97)m=	1403.7	1360.91		1026.55		519.2	334.35	352.26	562.54	861.83	1152.19	1398.25		(97)
Space	e heating	g require	ement fo	r each n	nonth, k\	Nh/mont	th = 0.02	24 x [(97)m – (95)m] x (4 ²	1)m			
(98)m=	699.2	538.46	436.77	233.46	90.48	0	0	0	0	252.16	497.37	717.16		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3465.06	(98)
Space	o hootin	a roquir	omant in	k\A/b/m²	2/voor				. ,	` •	,	, , [44.0	
•	· ·	•	ement in		7уваі								44.2	(99)
8c. S	pace co	olina rec												
		oning rec	luiremen	nt										
Calcu	lated fo	r June, J	luly and	August.										
	lated fo	r June, c Feb	luly and Mar	August. Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	Jan Jan loss rate	r June, c Feb e Lm (ca	luly and Mar Iculated	August. Apr using 2	May 5°C inter	Jun nal temp	perature	and ext	ernal ten	nperatur	e from T	able 10)		(400)
Heat (100)m=	Jan Jan loss rate	r June, c Feb Lm (ca	luly and Mar Iculated	August. Apr	May	Jun	<u> </u>							(100)
Heat (100)m=	Jan Jan loss rate 0 ation fac	r June, c Feb e Lm (ca o tor for lo	Mar Mar Iculated 0	August. Apr using 25	May 5°C inter	Jun nal temp 879.9	692.69	and exte	ernal ten	nperatur 0	e from T	able 10)		, ,
Heat (100)m= Utilisa (101)m=	Jan Jan loss rate 0 ation fac	r June, c Feb E Lm (ca 0 tor for lo	Mar Iculated 0 oss hm	August. Apr using 25	May 5°C inter 0	Jun nal temp 879.9	perature	and ext	ernal ten	nperatur	e from T	able 10)		(100)
Heat (100)m= Utilisa (101)m= Usefu	Jan loss rate 0 ation fac	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W	luly and Mar lculated 0 ess hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9	692.69 0.93	and external and e	ernal ten 0	o 0	e from T 0	able 10) 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m=	Jan Jan Joss rate 0 ation fac 0 I loss, h	r June, c Feb e Lm (ca 0 tor for lo 0 mLm (W	July and Mar Iculated 0 oss hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9 0.88 771.09	0.93 645.44	and exter 710.17 0.91	ernal ten 0 0	nperatur 0	e from T	able 10)		` ,
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains	Jan loss rate 0 ation fac 0 Il loss, h 0 (solar o	r June, c Feb e Lm (ca 0 tor for lo 0 mLm (W	luly and Mar lculated 0 ess hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9 0.88 771.09 eather re	0.93 0.93 645.44 egion, se	and external and e	ernal ten 0 0	o 0	e from T 0 0	able 10) 0 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	Jan Jan Joss rate 0 ation fac I loss, h 0 s (solar o	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca	July and Mar Journal of the second of the se	August. Apr using 25 0 100)m x 0 for appli	May 5°C inter 0 (101)m 0 cable we	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 0 10)	0 0 0	0 0 0	able 10) 0 0 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space	lated for Jan loss rate 0 ation facult loss, he cooling e cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole c	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 0 10)	0 0 0	0 0 0	able 10) 0 0	c (41)m	(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1	Jan loss rate 0 ation fac 0 ul loss, h 0 s (solar o e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 grequire zero if (luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	August. Apr using 25 0 100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 (h) = 0.0	0 0 0 0 24 x [(10	0 0 0 0 0 0	able 10) 0 0 0 102)m]	c (41)m	(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	Jan loss rate 0 ation fac 0 ul loss, h 0 s (solar o e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole c	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 10) 0 0/h) = 0.00	0 0 0 0 24 x [(10	0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>		(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar of 0 c) e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	August. Apr using 25 0 100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar g 0 d fraction d	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>		(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar o 0 0 0 0 0 0 0 0 0 0 0 0 d fraction fattency factors	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement for 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 0.93 645.44 egion, se 952.37 continuo	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar o 0 0 0 0 0 0 0 0 0 0 0 0 d fraction fattency factors	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	571.39 1	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermit (106)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar o 0 0 0 0 0 0 0 0 0 d fraction fittency fac 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Iculated 0 Pss hm 0 Jatts) = (0 Iculated 0 Pement fo 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 645.44 egion, se 952.37 continue 228.36	and exter 710.17 0.91 645.45 Table 890.45 Dus (kW) 182.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated for Jan loss rate 0 ation face 0 loss, he cooling cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0 month =	May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]> 0 = 4) =	571.39 1	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated for Jan loss rate 0 ation face 0 loss, he cooling cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Iculated 0 Pss hm 0 Jatts) = (0 Iculated 0 Pement fo 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 645.44 egion, se 952.37 continue 228.36	and exter 710.17 0.91 645.45 Table 890.45 Dus (kW) 182.28	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermi (106)m= Space (107)m=	lated for Jan loss rate 0 ation fac 0 loss, h 0 s (solar g 0 4)m to 0 d fractior ittency fac 0 cooling 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require correquirer 0	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	May 5°C inter 0 (101)m 0 cable we 0 whole co m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]> 0 = 4) =	571.39 1 0	(101) (102) (103) (104) (105) (106)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m= Space (107)m=	lated for Jan loss rate 0 ation fac 0 loss, h 0 s (solar g 0 4)m to 0 d fractior ittency fac 0 cooling 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require correquirer 0	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	May 5°C inter 0 (101)m 0 cable we 0 whole co m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11)

Fabric Energy Efficiency

(99) + (108) =

46.02

(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	ımber	STRO	030065	
Software Name:	Stroma FSAP 2012	Software \			n: 1.0.5.25	
	Pr	operty Address: HOL		VED		
Address :	Woodwell Cottage P2, Wood	lwell Road, BRISTOL	., BS11 9XU			
1. Overall dwelling dime	nsions:					
		Area(m²)	Av. Height(m)	Volume(m³)
Ground floor		39.2 (1a)	x 2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b)	x 2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1n)	78.4 (4)				_
Dwelling volume		(3a)+	(3b)+(3c)+(3d)+(3e))+(3n) =	202.27	(5)
2. Ventilation rate:						
	main secondary heating heating	y other	total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Air ch	angos nor ho	NIIP
Infiltration due to chimne	vo. fluor and fano - (63)±(6b)±(7;	a)+(7h)+(7c) =			anges per ho	_
•	ys, flues and fans = (6a)+(6b)+(7a een carried out or is intended, proceed		30 ne from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the		· //	() ()	Γ	0	(9)
Additional infiltration				[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame or	0.35 for masonry cor	struction		0	(11)
if both types of wall are po deducting areas of openir	resent, use the value corresponding to	the greater wall area (afte	r			
•	floor, enter 0.2 (unsealed) or 0.7	1 (sealed), else enter	0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0			Ì	0	(13)
Percentage of windows	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15)	=	0	(16)
Air permeability value,	q50, expressed in cubic metres	s per hour per square	metre of envelo	ope area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] + (8)$), otherwise (18) = (16)			0.35	(18)
	s if a pressurisation test has been done	e or a degree air permeab	ility is being used	-		_
Number of sides sheltere Shelter factor	ed	(20) = 1 - [0.075	v (19)1 –	-	1	(19)
	ing chalter factor	$(23) = 1 \cdot [6.073]$ $(21) = (18) \times (20)$		[[0.92	(20)
Infiltration rate incorporat		(21) = (10) x (20)	, -	L	0.32	(21)
Infiltration rate modified for	- , , , , , , , , , , , , , , , , , , ,	Jul Aug Se	p Oct N	ov Dec		
l l		Jui Aug Se	P OUL N	OV Dec		
Monthly average wind sp	eea from Table /					

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor ((22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.41	0.4	0.39	0.35	0.35	0.31	0.31	0.3	0.32	0.35	0.36	0.38]	
Calculate effe		-	rate for t	he appli	cable ca	se	!	!	!	!	!	,	(00.)
If mechanic			andiv N (2	3h) - (23s	a) v Emy (4	aguation (N	V5)) othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balanc		,	,			`		,	2h\m + (23h) v [1 – (23c)	0 - 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balanc	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from	outside				J	
if (22b)	m < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
	m = 1, th 0.58	en (24d) _{0.58}	m = (221)	0.56	0.55	(4d)m = 0.55	$0.5 + [(2)]_{0.54}$	(2b)m² x 0.55		0.57	0.57	1	(24d)
` ′	<u>.</u> !	<u> </u>		<u> </u>	l				0.56	0.57	0.57	J	(240)
Effective ai (25)m= 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.57	0.57	1	(25)
(),	1	1]	. ,
3. Heat loss		•							A 37.11				A 3/ I
3. Heat loss	es and he Gros area	SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [- 0.04] = [(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r 2.07	m ² x x10 x10	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area ne 1 ne 2 ne 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
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ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K:	33 2 4 , m ² ows, use e sides of in = S (A x	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the are Fabric heat lo	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K: y Cm = S(33 2 4 , m ² ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²•	n 3.2	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

		laneu calci	ulation.										
Thermal bridg	jes : S (L	x Y) cal	culated (using Ap	pendix I	K						10.48	(36)
f details of therm	0 0	are not kn	own (36) =	= 0.05 x (3	1)			(00)	(0.0)				<u> </u>
Total fabric h								` '	(36) =			57.1	(37
entilation he			·	<u> </u>					= 0.33 × (· · · · · ·	<u> </u>	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m= 39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38
Heat transfer	coefficie	nt, W/K	•		•			(39)m	= (37) + (3	38)m		1	
39)m= 96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Heat loss par	ameter (H	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	94.67	(39
40)m= 1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		_
Number of da	ys in mo	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.21	(40
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41
												-	
4. Water hea	atina ene	rav reaui	irement:								kWh/y	ear:	
	<u> </u>									1			
ssumed occ. if TFA > 13 if TFA £ 13	.9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		43		(4
	,	ater usac	ge in litre	es per da	av Vd,av	erage =	(25 x N)	+ 36		91	.96	1	(43
Annual avera Reduce the annu	ge hot wa lal average	hot water	usage by	5% if the a	lwelling is	designed			se target o		.96]	(43
Annual avera Reduce the annu	ge hot wa lal average	hot water	usage by	5% if the a	lwelling is	designed		a water us	se target o]	(43
Annual avera Reduce the annual not more that 12	ge hot wa gal average 5 litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d vater use, I May	lwelling is not and co Jun	designed ld) Jul	to achieve Aug		se target o		.96]	(43
Annual avera Reduce the annu not more that 12	ge hot wa lal average 5 litres per l Feb in litres per	hot water person per Mar day for ea	usage by aday (all was Aprach month	5% if the divater use, I May Vd,m = fa	welling is not and co Jun ctor from	designed Id) Jul Table 1c x	Aug (43)	a water us Sep	Oct	Nov	Dec]	(43
Annual avera Reduce the annual not more that 12	ge hot wa lal average 5 litres per l Feb in litres per	hot water person per Mar	usage by day (all w	5% if the d vater use, I May	lwelling is not and co Jun	designed ld) Jul	to achieve Aug	Sep	Oct 93.79	Nov 97.47	Dec 101.15]	
Annual avera Reduce the annual not more that 12: Jan Hot water usage	ge hot wa nal average 5 litres per p Feb in litres per 97.47	hot water person per Mar day for ea	usage by a day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 86.44	Jun ctor from 7	designed ld) Jul Table 1c x	Aug (43) 86.44	Sep	93.79 Total = Su	Nov 97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	`
Annual avera Reduce the annual not more that 12. Jan Hot water usage 44)m= 101.15	ge hot wa nal average 5 litres per p Feb in litres per 97.47	hot water person per Mar day for ea	usage by a day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 86.44	Jun ctor from 7	designed ld) Jul Table 1c x	Aug (43) 86.44	Sep	93.79 Total = Su	Nov 97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	`
Annual avera Reduce the annual rot more that 12. Jan Hot water usage 101.15 Energy content of	ge hot wa nal average litres per litres per gen gen gen gen gen gen gen gen gen gen	Mar day for ea	usage by a day (all was Apr ach month 90.12	5% if the orater use, I May Vd,m = fa 86.44 conthly = 4.	Jun ctor from 1 82.76	designed ld) Jul Table 1c x 82.76	Aug (43) 86.44 PTm / 3600	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27	1103.46	(44
Annual avera Reduce the annual reduce the annual reduce the annual reduced the annual red	ge hot wa yel average 5 litres per yel yel yel yel yel yel yel yel yel yel	Mar day for ea 93.79 used - calc	Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44 onthly = 4.	Jun Jun ctor from 1 82.76 190 x Vd,r 97.73	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su th (see Ta 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(44
Jan dot water usage 44)m= 101.15 Energy content of 15)m= 150 instantaneous 46)m= 22.5	ge hot wa yal average 5 litres per yer yer yer yer yer yer yer yer yer y	Mar day for ea 93.79 used - calc	Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44 onthly = 4.	Jun Jun ctor from 1 82.76 190 x Vd,r 97.73	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su th (see Ta 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(44
Annual avera Reduce the annual	ge hot water heatile 19.68	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31	Apr ach month 90.12 culated mo 118.03	5% if the director use, I May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage),	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tall 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
Annual avera Reduce the annual reduce the annual	ge hot wa yal average 5 litres per yer yer yer yer yer yer yer yer yer y	Mar day for ea 93.79 used - calc 135.38 ng at point 20.31	Apr ach month 90.12 culated mo 118.03 for use (no	5% if the orater use, I May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W	Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tall 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27		(4:
Annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 f instantaneous 46)m= 22.5 Vater storage Storage volur f community	ge hot water leading and average for litres per leading and litres per leading and litres per leading and litres per leading and litres per leading and litres leadin	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31 includin	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 Diar or Water Velling, e	Jun storage), 14.66 /WHRS Not and co	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage Ulitres in	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
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Annual avera Reduce the annual reduce the annual reduce the annual reduce the annual reduced that 12: Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 f instantaneous 46)m= 22.5 Vater storage Storage voluri	ge hot water sper sper sper sper sper sper sper sp	Mar Mar 93.79 used - calc 135.38 ng at point 20.31 includinated no talchot water	Apr ach month 90.12 culated mo 118.03 r of use (no 17.7 ang any so ank in dw er (this in	May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame ves	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(45) (45) (46) (47)
Annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera I Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 If instantaneous A6)m= 22.5 Vater storage Storage volur If community Otherwise if r Vater storage a) If manuface Temperature	ge hot water sper per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared lem Table	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in oss facto 2b	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 20 lar or Water 20 yelling, each or is known is	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0		(45) (46) (47) (48) (49)
Annual avera Reduce the annual reduce the annual	ge hot wa value average to litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared left marger.	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 ag any so ank in dw er (this in oss facto 2b	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or Water $velling, e$	Jun ctor from 7 82.76 82.76 97.73 14.66 WHRS nter 110 nstantar wn (kWł	designed des	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(444 (45) (46) (47) (48) (49)
Annual avera Reduce the annual reduce the annual	ge hot wa yal average 5 litres per l Feb in litres per 97.47 f hot water 131.19 water heatil 19.68 e loss: ne (litres) heating a no stored e loss: sturer's de factor fro om water sturer's de rage loss	Mar Mar 93.79 used - calc 135.38 ng at point 20.31 includin and no ta hot water eclared le storage eclared of	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in coss facto 2b cylinder l com Table	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0		(44 (45 (46 (47 (48 (49 (50
Annual avera Reduce the annual reduce the annual	ge hot water sper per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared left actor fractor fractor fractor fractor fractor security and no talchot water eclared contactor fr	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in coss facto 2b cylinder l com Table	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(44 (45 (46 (47 (48 (49 (50 (51
Annual avera Reduce the annual reduce the annual	ge hot way and average to litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 135.38 including and no talchot water eclared left m Table storage eclared of factor from the section of the	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 ang any so ank in dw er (this in coss facto 2b cylinder I com Tabl con 4.3	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 c, 1d) 145.27 21.79 0 0 0		(43 (44 (46 (47 (48 (49 (50 (51 (52 (53

Energy lost fr	om watei	r storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0]	(54)
Enter (50) or	(54) in (5	55)									0]	(55)
Water storage	e loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primary circu	it loss (ar	nnual) fro	om Table	e 3							0]	(58)
Primary circu	•	,			(59)m = ((58) ÷ 36	65 × (41)	m				-	
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		_	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m= 12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total heat red	quired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar DHW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	4	
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
FHRS 0	0	0	0	0	0	0	0	0	0	0	0	-	(63) (G2)
Output from v	vater hea	iter											
(64)m= 162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
	•					!	Outp	out from w	ater heate	r (annual)	12	1595.65	(64)
Heat gains fro	om water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	ı + (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m	·]	_
(65)m= 53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
include (57)m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal of	ains (see	e Table 5	and 5a):									
Metabolic gai				,									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m= 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	1	(66)
Lighting gains	s (calcula	ted in A	ppendix	L. equat	ion L9 o	r L9a). a	lso see	Lable 5	!	<u>I</u>	!	J	
(67)m= 19.76	17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31	1	(67)
Appliances ga	ains (calc	ulated ir	. Append	dix L. ea	uation L	13 or L1	3a), also	see Ta	ble 5		<u>!</u>	J	
(68)m= 216.06	- ` 	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	1	(68)
Cooking gain	s (calcula	ted in A	nnendix	I equat	tion I 15	or I 15a) also se	ee Table	1			J	
(69)m= 35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16]	(69)
Pumps and fa			<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>		<u> </u>	J	
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3	1	(70)
Losses e.g. e	vaporatio	n (nega	tive valu	es) (Tab	ole 5)					<u> </u>	<u> </u>	J	
(71)m= -97.27		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
Water heating				I						l	1	J	
(72)m= 71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17]	(72)
Total interna				L	ļ	<u> </u>	<u> </u>		(70)m + (7	ļ	ļ	J	-
(73)m= 369.58	-	354.15	332.66	310.86	289.85	276.2	282.14	293.19	314.89	339.81	358.48]	(73)
(2/	1	1	1	1	1 ======	I =: •:=	I ===···		1	1	1	J	•

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	X	1.62	X	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	X	41.52	X	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	X	13.12	X	0.63	X	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	X	8.86	X	0.63	X	0.8	=	10.03	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.8	=	17.77	(76)
East	0.9x	0.77	X	0.86	X	19.64	X	0.63	X	0.8	=	5.9	(76)
East	0.9x	0.77	x	2.59	X	38.42	X	0.63	X	0.8	=	34.76	(76)
East	0.9x	0.77	x	0.86	X	38.42	x	0.63	x	0.8	=	11.54	(76)
East	0.9x	0.77	X	2.59	X	63.27	X	0.63	X	0.8	=	57.24	(76)
East	0.9x	0.77	x	0.86	X	63.27	X	0.63	x	0.8	=	19.01	(76)
East	0.9x	0.77	x	2.59	X	92.28	x	0.63	x	0.8	=	83.48	(76)
East	0.9x	0.77	x	0.86	X	92.28	X	0.63	X	0.8	=	27.72	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.8	=	102.31	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	X	0.8	=	33.97	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.8	=	104.73	(76)
East	0.9x	0.77	x	0.86	x	115.77	x	0.63	x	0.8	=	34.77	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.8	=	99.71	(76)
East	0.9x	0.77	x	0.86	x	110.22	x	0.63	x	0.8	=	33.11	(76)
East	0.9x	0.77	x	2.59	X	94.68	x	0.63	x	0.8	=	85.65	(76)
East	0.9x	0.77	x	0.86	x	94.68	x	0.63	X	0.8	=	28.44	(76)
East	0.9x	0.77	x	2.59	X	73.59	x	0.63	x	0.8	=	66.57	(76)
East	0.9x	0.77	x	0.86	X	73.59	x	0.63	X	0.8	=	22.1	(76)
East	0.9x	0.77	x	2.59	x	45.59	x	0.63	X	0.8	=	41.24	(76)
East	0.9x	0.77	x	0.86	X	45.59	x	0.63	x	0.8	=	13.69	(76)
East	0.9x	0.77	x	2.59	x	24.49	x	0.63	x	0.8	=	22.15	(76)
East	0.9x	0.77	x	0.86	x	24.49	x	0.63	x	0.8	=	7.36	(76)
East	0.9x	0.77	x	2.59	x	16.15	x	0.63	x	0.8	=	14.61	(76)
East	0.9x	0.77	x	0.86	X	16.15	x	0.63	x	0.8	=	4.85	(76)

South 0.9x	0.77	x	2.14	1	x	46.75		x	0.63	×	0.8		34.94	(78)
South 0.9x	0.77	= x	2.14	=	x	76.57		X	0.63	$=$ $\frac{1}{x}$	0.8	= =	57.23	(78)
South 0.9x	0.77	- x	2.14		x	97.53		l x	0.63	^ x	0.8	_	72.9	(78)
South 0.9x	0.77	×	2.14		x	110.2		l x	0.63	X	0.8	= =	82.39	(78)
South 0.9x	0.77	= x	2.14	_	x	114.8		X	0.63	$=$ $\frac{1}{x}$	0.8	= =	85.86	(78)
South 0.9x	0.77	X	2.14		x	110.5		X	0.63	X	0.8	= =	82.63	(78)
South 0.9x	0.77	x	2.14	==	x	108.0		l X	0.63	= x	0.8	= =	80.73	(78)
South 0.9x	0.77	x	2.14		x	104.8		X	0.63	= x	0.8	= =	78.4	(78)
South _{0.9x}	0.77	×	2.14		X	101.8		X	0.63	×	0.8	= =	76.15	(78)
South 0.9x	0.77	x	2.14	==	X	82.59		X	0.63	×	0.8		61.73	(78)
South _{0.9x}	0.77	x	2.14	=	X	55.42		X	0.63	×	0.8		41.42	(78)
South 0.9x	0.77	x	2.14		x	40.4		X	0.63	×	0.8	=	30.2	(78)
Rooflights _{0.9x}	1	x	1.33	3	X	47.01	1	x	0.63	×	0.8	_ =	56.72	(82)
Rooflights 0.9x	1	x	1.33	3	x	83.9		x	0.63	×	0.8	=	101.23	(82)
Rooflights 0.9x	1	X	1.33	3	x	122.7	3	x	0.63	x	0.8	=	148.08	(82)
Rooflights 0.9x	1	X	1.33	3	x	161.7	4	x	0.63	×	0.8		195.15	(82)
Rooflights 0.9x	1	х	1.33	3	x	187.3	8	X	0.63	x	0.8	=	226.09	(82)
Rooflights 0.9x	1	X	1.33	3	x	188.0	6	X	0.63	X	0.8	=	226.91	(82)
Rooflights _{0.9x}	1	X	1.33	3	X	180.5	1	X	0.63	x	0.8	=	217.8	(82)
Rooflights 0.9x	1	X	1.33	3	X	161.5	4	X	0.63	X	0.8	=	194.91	(82)
Rooflights _{0.9x}	1	X	1.33	3	X	136.5	5	x	0.63	X	0.8	=	164.7	(82)
Rooflights _{0.9x}	1	X	1.33	3	X	95.08	3	X	0.63	x	0.8	=	114.72	(82)
Rooflights _{0.9x}	1	X	1.33	3	X	57.06	6	X	0.63	X	0.8	=	68.85	(82)
Rooflights 0.9x	1	X	1.33	3	X	39.72	2	X	0.63	X	0.8	=	47.92	(82)
Solar gains in					1	20.55 54		r i	1 = Sum(74)m	T		407.04	1	(92)
(83)m= 127.37 Total gains – i		336.3 d solar	451.51 (84)m =	532.77 (73)m			5.86	454	.44 376.51	258.7	76 154.62	107.61		(83)
(84)m= 496.95		690.45	784.17	843.63	·	' -	2.06	736	.58 669.7	573.6	65 494.43	466.1	1	(84)
` /	<u> </u>							1.00	1 200	0.0		10011		
7. Mean inter						araa fran	n Toh	olo O	Th1 (°C)				24	7(05)
Utilisation fac	ŭ	٠.			•			ле э,	, IIII (C)				21	(85)
Jan	Feb	Mar	Apr	May	Ť		Jul	Δ	ug Sep	Oc	t Nov	Dec]	
(86)m= 1	0.99	0.98	0.94	0.85	+		.51	0.5		0.97		1		(86)
Mean interna	l tomporat	turo in l	iving are	2 T1 /f	مالہ	w ctope '	2 to 7	L 7 in T	able 0e)				_	
(87)m= 19.69		20.16	20.52	20.8	_		0.99	20.		20.4	9 20.02	19.66		(87)
` ′		-						<u> </u>	ļ		-			, ,
Temperature (88)m= 19.9	19.9	19.9	19.91	19.92	_		m 1a 9.92	19.		19.9	2 19.91	19.91	1	(88)
` ′		-						<u> </u>	10.92	1 19.9	10.91	10.91	J	(55)
Utilisation fac					$\overline{}$	$\overline{}$		r –	0.74	0.00		4	7	(89)
(89)m= 1	0.99	0.98	0.92	0.79	1		.39	0.4		0.95	0.99	1		(09)
Mean interna	al temperat	ture in t	he rest o	f dwell	ing	T2 (follo	w ste	ps 3	to 7 in Tab	le 9c)				

$(00)_{m} = 1.4046$					1	1					1		(00)
(90)m= 18.16	18.43	18.85	19.36	19.73	19.89	19.92	19.92	19.83	19.34	18.65	18.12		(90)
								ı	LA = LIVIN	g area ÷ (4	+) =	0.23	(91)
Mean interna	ıl temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m= 18.52	18.77	19.16	19.63	19.98	20.14	20.17	20.17	20.07	19.61	18.97	18.48		(92)
Apply adjustr	ment to t	he mean	interna	temper	ature fro	m Table	4e, whe	re appro	priate			ı	
(93)m= 18.37	18.62	19.01	19.48	19.83	19.99	20.02	20.02	19.92	19.46	18.82	18.33		(93)
8. Space hea	iting req	uirement											
Set Ti to the the utilisation			•		ned at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	L						9						
(94)m= 0.99	0.99	0.97	0.91	0.79	0.59	0.4	0.45	0.74	0.94	0.99	1		(94)
Useful gains,	hmGm	, W = (9 ⁴	4)m x (8	4)m		ı							
(95)m= 494.31	587.84	668.62	715.59	664.63	486.21	317.96	334.07	493.16	541.06	488.89	464.24		(95)
Monthly aver	age exte	ernal tem	perature	from Ta	able 8	<u>.</u>						l	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	e for me	an intern	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(<mark>97)</mark> m= 1352.22	1315.64	1196.57	1001.74	768.2	504.73	320.28	338.19	547.11	836.81	1112.17	1345.98		(97)
Space heating	g requir	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97	m – (95)m] x (4	1)m		1	
(98)m= 638.29	489.08	392.79	206.03	77.05	0	0	0	0	220.04	448.76	656.02		_
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3128.06	(98)
Space bootin											_		_
Space nealli	ig require	ement in	kWh/m²	²/year								39.9	(99)
·	• •				vstems i	ncludina	micro-C	HP)				39.9	(99)
9a. Energy re	quiremer				ystems i	ncluding	micro-C	CHP)				39.9	(99)
·	quiremer	nts – Indi	vidual h	eating s		_	micro-C	CHP)				39.9	
9a. Energy red Space heati	quirement ng: pace hea	nts – Indi	vidual h	eating s		system	micro-C (202) = 1						(20
Space heating Fraction of space heating Fraction of space heating Fraction of space heating fraction of space heating fraction of space heating fraction fraction of space heating fraction frac	quirements ng: Dace head Dace head	nts – Indi at from se at from m	vidual h econdar nain syst	eating sy y/supple em(s)		system		- (201) =	(203)] =			0	(20)
9a. Energy reconstruction of space heating fraction of space fraction of to	quirements ng: Dace head Dace head Dace head Datal head	nts — Indi at from se at from m ng from i	vidual h econdar nain syst main sys	eating sy/supple em(s) stem 1		system	(202) = 1 ·	- (201) =	(203)] =			0 1 1	(202
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of	quirement ng: pace hea pace hea patal heati main spa	nts – Indi at from se at from m ng from l ace heati	vidual hecondar nain systemain syste	eating sy/supple em(s) stem 1	ementary	system	(202) = 1 ·	- (201) =	(203)] =			0 1 1 89.9	(20 ²) (20 ²) (20 ⁴) (20 ⁶)
9a. Energy red Space heati Fraction of space fraction of to Efficiency of	quirement ng: pace hea pace hea pace hea patal heati main spa seconda	nts – Indi	econdar nain syst main syst ing syste ementar	eating syysupple em(s) stem 1 em 1	mentary g system	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 –				0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of Efficiency of Jan	quirement ng: pace heat pace heat tal heat it main space seconda	nts – Indi at from se at from m ng from a ace heati ary/supple Mar	vidual hecondar nain systemain systemain systemain systematar ementar	eating sy/supple em(s) stem 1 em 1 y heating	ementary g system Jun	system	(202) = 1 ·	- (201) =	(203)] =	Nov	Dec	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recomplete Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating	quirement ng: pace heat to tal heat it main sparseconda Feb	nts – Indi at from se at from m ng from n ace heati ary/supple Mar ement (c	econdar nain syst main syst ing syste ementar Apr alculate	eating syysupple em(s) stem 1 em 1 y heating May d above	g system	system 1, % Jul	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	Oct			0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of Efficiency of Jan	quirement ng: pace heat pace heat tal heat it main space seconda	nts – Indi at from se at from m ng from a ace heati ary/supple Mar	vidual hecondar nain systemain systemain systemain systematar ementar	eating sy/supple em(s) stem 1 em 1 y heating	ementary g system Jun	system	(202) = 1 · (204) = (2	- (201) = 02) × [1 –		Nov 448.76	Dec 656.02	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Efficiency of Space heating 638.29	quirement ng: pace heat to tal heat it main space seconda Feb 19 requirement 1489.08 3)m x (20	at from seat from mace heating/supplement (compared)	econdary nain systemain systementar Apr alculater 206.03	eating syy/supplem(s) stem 1 em 1 y heating May d above	g system	system 1, % Jul	(202) = 1 · (204) = (2	- (201) = 02) × [1 -	Oct		656.02	0 1 1 89.9	(20 ²) (20 ²) (20 ⁶) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Efficiency of Space heating 638.29	quirement ng: pace heat pace heat pace heat patal heat it main space secondary in the page requirement with the page requi	at from seat from mace heating/supplement (compared)	econdary nain systemain systementar Apr alculater 206.03	eating syy/supplem(s) stem 1 em 1 y heating May d above	g system	system 1, % Jul	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76 499.18	656.02 729.72	0 1 1 89.9	(20 ²) (20 ²) (20 ⁸) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211) m = {[(98)]	quirement ng: pace heat to tal heat it main space seconda Feb 19 requirement 1489.08 3)m x (20	at from so at from m at from m ace heati ary/supple Mar ement (c 392.79	econdary nain systemain systementar Apr alculater 206.03	eating sy/supple em(s) stem 1 em 1 May dabove 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76	656.02 729.72	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(986) 710]	quirement of the property of t	at from seat from mace heating/supplement (compared as 192.79) 1436.92	econdary nain systemain systematrar Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 y heating May d above 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76 499.18	656.02 729.72	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) m x (20) model of the Efficiency of Space heating from Space heating	quirement of the property of t	at from so at from m ng from m ace heati ary/supplo Mar ement (c 392.79 04)] } x 1 436.92	econdary nain systemain systemater Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	729.72 =	0 1 1 89.9 0 kWh/ye	(20 ²) (20 ²) (20 ⁸) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) m x (20) model of the Efficiency of Space heating for the Efficiency of Spa	quirement of the property of t	at from seat from mace heating/supplement (compared as 192.79) 1436.92	econdary nain systemain systematrar Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 y heating May d above 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98)	quirement ng: pace heat pa	at from so at from m ng from m ace heati ary/supplo Mar ement (c 392.79 04)] } x 1 436.92	econdary nain systemain systemater Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98)	quirement of the property of t	at from seat from mace heating/supplement (compared) 392.79 04)] } x 1 436.92 econdary 00 ÷ (20 0	econdary nain systemain systemain systementar Apr alculater 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating syy/supple em(s) stem 1 em 1 y heating dabove 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Efficiency of Space heating (211)m = {[(98) m x (215)m= 0]} Water heating Output from we	quirement ng: pace heat pa	at from so at from mace heating mar lement (c 392.79 lecondary 00 ÷ (20 lecondary on the first conditions)	econdary nain systemain systemain systementar Apr alculatee 206.03 00 ÷ (20 229.17 y), kWh/ 8) 0	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71 fmonth 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota 0 Tota	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 = 0	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ar
9a. Energy recomplete Space heating Fraction of space heating Fraction of to Efficiency of Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) 710} Space heating = {[(98) m x (2015)m=0]} Water heating	quirement ng: pace heat pa	at from so at from mace heating/supplement (c 392.79) 436.92 econdary 00 ÷ (20 0)	econdary nain systemain systemain systementar Apr alculater 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating syy/supple em(s) stem 1 em 1 y heating dabove 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(99) (201 (202 (204 (208 (208 ar (211)

							_	
(217)m= 89.36 89.3 89.17 88.87 88.27	87.3 87.3	87.3	87.3	88.89	89.25	89.38		(217)
Fuel for water heating, kWh/month								
$(219)m = (64)m \times 100 \div (217)m$ (219)m = 182.01 159.7 165.99 146.57 142.62 1	125.96 118.21	133.51	134.47	152.09	163.6	176.67		
		Total	= Sum(2	19a) ₁₁₂ =		ļ	1801.39	(219)
Annual totals				k۱	Nh/yeaı	•	kWh/year	1
Space heating fuel used, main system 1							3479.49	
Water heating fuel used							1801.39	Ī
Electricity for pumps, fans and electric keep-hot						'		-
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum (of (230a).	(230g) =			75	(231)
Electricity for lighting							348.92	(232)
								_
Total delivered energy for all uses (211)(221) +	- (231) + (232).	(237b) :	=				5792.1	(338)
Total delivered energy for all uses (211)(221) + 12a. CO2 emissions – Individual heating system			=				5792.1	(338)
	ns including mi		=	Emiss	ion fac	tor		(338)
			=	Emiss kg CO2		tor	5792.1 Emissions kg CO2/yea]
	ns including mi		=		2/kWh	tor =	Emissions]
12a. CO2 emissions – Individual heating system	Energy kWh/year		=	kg CO2	2/kWh		Emissions kg CO2/yea	ır
12a. CO2 emissions – Individual heating system Space heating (main system 1)	Energy kWh/year		=	kg CO2	2/kWh	=	Emissions kg CO2/yea	nr (261)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary)	Energy kWh/year (211) x (215) x	cro-CHP		0.21 0.51	2/kWh	=	Emissions kg CO2/yea 751.57	(261)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Energy kWh/year (211) x (215) x (219) x	cro-CHP		0.21 0.51	2/kWh	=	Emissions kg CO2/yea 751.57 0	(261) (263) (264)
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energy kWh/year (211) x (215) x (219) x (261) + (262)	cro-CHP		0.21 0.21	2/kWh 16 19 16	= = =	Emissions kg CO2/yea 751.57 0 389.1 1140.67	(261) (263) (264) (265)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	Energy kWh/year (211) x (215) x (219) x (261) + (262) (231) x	cro-CHP	264) =	0.21 0.51 0.51	2/kWh 16 19 16	= = =	Emissions kg CO2/yea 751.57 0 389.1 1140.67 38.93	(261) (263) (264) (265) (267)

El rating (section 14)

(274)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma N	ımber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software '			n: 1.0.5.25	
	Pr	operty Address: HO	USE E - IMPRO	VED		
Address :	Woodwell Cottage P2, Wood	well Road, BRISTO	_, BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height	(m)	Volume(m ³	*)
Ground floor		39.2 (1a)	x 2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b)	x 2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1n)	78.4 (4)				_
Dwelling volume		(3a)-	+(3b)+(3c)+(3d)+(3e	e)+(3n) =	202.27	(5)
2. Ventilation rate:				-		
	main secondary heating heating	y other	total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Air ob	anges per ho	
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a	a)+(7h)+(7c) =				_
•	een carried out or is intended, proceed		30 ue from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in the			,,,,,		0	(9)
Additional infiltration				[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame or	0.35 for masonry co	nstruction		0	(11)
if both types of wall are po deducting areas of openir	resent, use the value corresponding to	the greater wall area (afte	er			
=	floor, enter 0.2 (unsealed) or 0.2	1 (sealed), else ente	r 0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0			Ī	0	(13)
Percentage of windows	s and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14) ÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15)) =	0	(16)
Air permeability value,	q50, expressed in cubic metres	s per hour per squar	e metre of envel	ope area	5	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] + (8)$), otherwise $(18) = (16)$			0.4	(18)
	s if a pressurisation test has been done	e or a degree air permeal	oility is being used	-		_
Number of sides sheltere Shelter factor	ed	(20) = 1 - [0.075	(v (19)] –	-	1	(19)
	ing shelter factor	$(20) = 1 - [0.073]$ $(21) = (18) \times (20)$		[r	0.92	(20)
Infiltration rate incorporat		(21) - (10) x (20	., -	L	0.37	(21)
Infiltration rate modified for	- , , , , , , , , , , , , , , , , , , ,	Jul Aug S	ep Oct N	lov Dec		
l l		Jui Aug Si	ah Oct IV	iov Dec		
Monthly average wind sp	eed from Table /					

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		-	rate for t	he appli	cable ca	se	-	-	-	-	-		(23a)
If exhaust air h			endix N. (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced wit									, (,			0	(23c)
a) If balance	ed mecha	anical ve	ntilation	with he	at recov	· erv (MVI	HR) (24a	a)m = (22	2b)m + (23b) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	иV) (24t	m = (22)	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from o	outside		•	•	•	
if (22b)	m < 0.5 ×	(23b), t	hen (240	c) = (23b); other	wise (24	c) = (22k	o) m + 0.	5 × (23b) 		1	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m = 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.51	0.59	0.59	1	(24d)
Effective air					l	l			0.00	1 0.00	0.00	J	,
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(25)
3. Heat losse	oc and he	nat loce r	paramete	or:									
ELEMENT	Gros		Openin		Net Ar	ea	U-val	ue	AXU		k-value	<u>.</u>	ΑΧk
	area	_	m	-	A ,r		W/m2		(W/I	K)	kJ/m²-l		kJ/K
Doors					2.07	Х	1	=	2.07				(26)
Windows Typ	e 1				1.62	x1,	/[1/(1.4)+	0.04] =	2.15				(27)
Windows Typ	e 2				2.59	x1,	/[1/(1.4)+	0.04] =	3.43				(27)
Windows Typ	e 3				0.86	x1,	/[1/(1.4)+	0.04] =	1.14				(27)
Windows Typ	e 4				2.14	x1,	/[1/(1.4)+	0.04] =	2.84				(27)
Rooflights					1.33	x1,	/[1/(1.7) +	0.04] =	2.261				(27b)
Floor					39.2	X	0.13	= [5.096				(28)
Walls Type1	80.8	33	10.9		69.93	3 X	0.18	= [12.59				(29)
Walls Type2	2.12	2	0		2.12	х	0.18	= [0.38				(29)
Daaf		4	2.66	;	54.74	, x	0.13	= [7.12				(30)
Roof	57.4	·											
Total area of					179.5	5							(31)
					179.5 29.73	=	0	= [0				(31)
Total area of o	elements	, m² ows, use e	ffective wi		29.73	x	L			as given in	paragraph	3.2	``
Total area of o	elements d roof winder eas on both	, m² ows, use e sides of ir	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu		as given in	paragraph		(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	L	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)
Total area of o	elements d roof winder eas on both ess, W/K: Cm = S(ows, use e sides of ir = S (A x (A x k)	iffective wi ternal wali U)	ls and par	29.73 alue calcul titions	X ated using	formula 1	/[(1/U-valu) + (32) = ((28)	ie)+0.04] a	2) + (32a).			(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)

an be use	ea instea						,							(26)
Thermal	bridge	s : S (L	x Y) cal	culated i	using Ap	pendix I	1						10.55	(36)
		0 0	are not kn	own (36) =	= 0.05 x (3	1)			(0.0)	(2.5)				_
Total fab									` '	(36) =			53.74	(37
entilatio/			alculated				<u> </u>				25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(38
Heat tran	nsfer c	oefficier	nt, W/K			T		1	(39)m	= (37) + (3	38)m	ı	1	
39)m= 9	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		— ,
leat loss	s parar	meter (H	ILP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	92.59	(39
40)m=	1.21	1.2	1.2	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		_
Number	of day:	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.18	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
													-	
4. Wate	er heati	ing ener	gy requi	rement:								kWh/y	ear:	
			k I											
if TFA if TFA	> 13.9 £ 13.9), N = 1), N = 1	+ 1.76 x)2)] + 0.(ΓFA -13.	.9)	43	1	
if TFA if TFA annual a Reduce the	> 13.9 £ 13.9 average e annual), N = 1), N = 1 e hot wa l average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed)2)] + 0.0 (25 x N) to achieve	+ 36		91	.96]	•
if TFA if TFA innual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		91]	·
if TFA if TFA Annual a Reduce the of more th	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96]	·
if TFA if TFA Annual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		•
if TFA if TFA Annual a Reduce the not more the dot water to	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43)	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the not more th dot water the 44)m= 1	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the lot more the Hot water the 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15 c, 1d) 145.27	1103.46	(4:
if TFA if TFA Annual a Reduce the not more the Hot water to 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in 5% is the da 5% in 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= instantan 46)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l 150 neous wa	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19 ater heatin 19.68	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in 5% is the da 5% in 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(44
if TFA if TFA if TFA annual a Reduce the ot more th lot water th the standard stan	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa	P, N = 1 P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per Pr Pr Pr Pr Pr Pr Pr Pr Pr Pr Pr Pr Pr	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA Annual a Reduce the bot more the dot water the 44)m= 1 Energy cor 45)m= finstantan 46)m= Vater sto	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 150 150 meous wa 22.5 orage volume	Post N = 1 Post N = 1	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av Iwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27		(44)
if TFA if TFA if TFA Annual a Reduce the lot more th dot water the start and the start and the finstantan 46)m= Vater start Storage of the start and the finstantan 46)m= Vater start f community	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa 22.5 Iorage volume unity he	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA if TFA Annual a Reduce the ot more if dot water i 44)m= 1 Energy cor 45)m= Vater sto Storage value Communication	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the control	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= Vater sto Storage of Communication Otherwis Vater sto	> 13.9 £	P, N = 1 P, N = 1 P hot was I average litres per p P hot water 131.19 P hot water 131.19 P hot water 19.68 P litres P cating a stored P stored P stored P stored P stored	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw er (this in	es per da 5% if the d rater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45)
if TFA if TFA if TFA Annual a Reduce the not more if that water if 44)m= Tenergy cor 45)m= Vater sta Storage if from the community Com	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the state	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	Apr Apr Ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in	es per da 5% if the d vater use, f May Vd,m = fac 86.44 2011 13.25 20 hot water 16.99 Color or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45) (45) (46) (47)
if TFA Annual a Reduce the not more the state of the stat	> 13.9 £	Power of the company	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared lem Table storage	Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the d rater use, t May Vd,m = fat 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e ancludes in or is known	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar wn (kWh	erage = designed and ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(48)
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second of t	ter usage hot water overson per Mar day for ear 93.79 used - calce 135.38 ing at point 20.31 including and no talce the water storage eclared of factor fr	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Color or W velling, e acludes in por is knowear	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(44 (45 (46 (47 (48 (49 (50
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second sector from water sectors of the sectors	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared less torage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

	/ lost fro	m water	storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54))
•		(54) in (5	_	,								0	(55)	
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56))
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57))
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58))
Primar	y circuit	loss cal	culated	for each	month (59)m = 0	(58) ÷ 36	55 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59))
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41))m						
(61)m=	50.96	44.86	47.8	44.44	44.05	40.81	42.17	44.05	44.44	47.8	48.07	50.96	(61))
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23	(62))
Solar DH	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63))
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63)	(G2)
Output	from w	ater hea	ter											
(64)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23		
'		•	•	•	•	•	•	Outp	out from w	ater heate	r (annual) ₁	12	1997.22 (64))
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	62.62	54.84	56.96	50.35	48.67	42.7	40.65	45.56	46.08	52.7	56.5	61.04	(65)	١
inclu							ı			_			(00)	'
	ıde (57)ı	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling		ater is fr	om com		·	
				of (65)m and 5a	•	ylinder i	s in the	dwelling			om com		·	
5. Int	ernal ga		e Table 5	and 5a	•	eylinder i	s in the o	dwelling			om com		·	
5. Int	ernal ga	ains (see	e Table 5	and 5a	•	ylinder i	s in the o	dwelling Aug			om com		·	
5. Int	ernal ga	ains (see	Table 5	and 5a):				or hot w	rater is fr		munity h	·	
5. Int Metabo (66)m=	ernal gain Jan 121.59	rins (see reb reb 121.59	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m=	ernal gain Jan 121.59	rins (see reb reb 121.59	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun 121.59	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m= Lightin (67)m=	ernal gan Dlic gain Jan 121.59 g gains	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m=	ernal gain Jan 121.59 g gains 20.26	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated in 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated in 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reins (see Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 16 calcula 17 calcula 18	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	Apr 121.59 pendix 11.08 Appendix 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	and 5a tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatice gains (see less (Table Feb 121.59) (calcula 18 ins (calcula 35.16) as gains 3 aporatic -97.27 gains (Table Feb 121.59)	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 tted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 35.16	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatice gains (see less (Table Feb 121.59) (calcula 18 ins (calcula 35.16) as gains 3 appropriate 97.27 gains (Table Feb 121.59) gains (Table Feb 121.59) (calcula 35.16) as gains (Table Feb 121.59)	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 tted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 3 -97.27	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	х	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	X	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.7	=	15.55	(76)
East	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.7	=	5.16	(76)
East	0.9x	0.77	x	2.59	x	38.42	x	0.63	x	0.7	=	30.41	(76)
East	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.7	=	10.1	(76)
East	0.9x	0.77	x	2.59	x	63.27	x	0.63	x	0.7	=	50.08	(76)
East	0.9x	0.77	x	0.86	x	63.27	x	0.63	x	0.7	=	16.63	(76)
East	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.7	=	73.04	(76)
East	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.7	=	89.52	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	x	0.7	=	29.72	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.7	=	91.64	(76)
East	0.9x	0.77	X	0.86	x	115.77	x	0.63	X	0.7	=	30.43	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.7	=	87.24	(76)
East	0.9x	0.77	X	0.86	X	110.22	x	0.63	X	0.7	=	28.97	(76)
East	0.9x	0.77	X	2.59	x	94.68	x	0.63	X	0.7	=	74.94	(76)
East	0.9x	0.77	X	0.86	X	94.68	X	0.63	X	0.7	=	24.88	(76)
East	0.9x	0.77	X	2.59	X	73.59	x	0.63	X	0.7	=	58.25	(76)
East	0.9x	0.77	X	0.86	x	73.59	X	0.63	x	0.7	=	19.34	(76)
East	0.9x	0.77	X	2.59	X	45.59	x	0.63	X	0.7	=	36.09	(76)
East	0.9x	0.77	X	0.86	x	45.59	X	0.63	x	0.7	=	11.98	(76)
East	0.9x	0.77	X	2.59	x	24.49	x	0.63	x	0.7	=	19.38	(76)
East	0.9x	0.77	X	0.86	x	24.49	x	0.63	x	0.7	=	6.44	(76)
East	0.9x	0.77	X	2.59	x	16.15	x	0.63	x	0.7	=	12.78	(76)
East	0.9x	0.77	X	0.86	X	16.15	X	0.63	X	0.7	=	4.24	(76)

South 0.9x	0.77	x	2.14	x	46	6.75	1 x	0.63	×	0.7		30.58	(78)
South 0.9x	0.77	$=$ $\begin{bmatrix} x \\ x \end{bmatrix}$	2.14	^ x		6.57] ^] _x	0.63	X	0.7		50.08	(78)
South 0.9x	0.77		2.14	^ x		7.53] ^] _x	0.63	X	0.7		63.79	(78)
South 0.9x	0.77	X	2.14	= ^		0.23] ^] x	0.63	^_ x	0.7	= =	72.09	(78)
South 0.9x	0.77		2.14	^ x		4.87] ^] _X	0.63	X	0.7	= =	75.13	(78)
South 0.9x	0.77	×	2.14	×	-	0.55] x	0.63	X	0.7	= =	72.3	(78)
South 0.9x	0.77	×	2.14	ا ×		8.01]] _X	0.63	ا ×	0.7	= =	70.64	(78)
South 0.9x	0.77	×	2.14	ا ×		4.89]]	0.63	ا ×	0.7	= =	68.6	(78)
South 0.9x	0.77	×	2.14	= x		1.89) x	0.63	= x	0.7	= =	66.63	(78)
South 0.9x	0.77	x	2.14	×		2.59	X	0.63	×	0.7	=	54.01	(78)
South _{0.9x}	0.77	x	2.14	×	_	5.42	X	0.63	×	0.7	=	36.24	(78)
South _{0.9x}	0.77	x	2.14	×	4	0.4	x	0.63	×	0.7	= =	26.42	(78)
Rooflights _{0.9x}	1	x	1.33	×	47	7.01	x	0.63	×	0.7	_ =	49.63	(82)
Rooflights 0.9x	1	x	1.33	×	8:	3.9	х	0.63	×	0.7	=	88.58	(82)
Rooflights 0.9x	1	x	1.33	x	12	2.73	x	0.63	×	0.7	=	129.57	(82)
Rooflights 0.9x	1	x	1.33	x	16	1.74	x	0.63	×	0.7	=	170.76	(82)
Rooflights 0.9x	1	X	1.33	x	18	7.38	x	0.63	x	0.7	=	197.83	(82)
Rooflights 0.9x	1	X	1.33	x	18	8.06	x	0.63	X	0.7	=	198.54	(82)
Rooflights _{0.9x}	1	X	1.33	x	18	0.51	x	0.63	x	0.7	=	190.58	(82)
Rooflights 0.9x	1	X	1.33	X	16	1.54	X	0.63	X	0.7	=	170.54	(82)
Rooflights _{0.9x}	1	X	1.33	X	13	36.5	X	0.63	X	0.7	=	144.11	(82)
Rooflights _{0.9x}	1	X	1.33	X	95	5.08	X	0.63	X	0.7	=	100.38	(82)
Rooflights _{0.9x}	1	X	1.33	X	57	7.06	X	0.63	X	0.7	=	60.24	(82)
Rooflights 0.9x	1	X	1.33	X	39).72	X	0.63	X	0.7	=	41.93	(82)
Solar gains in					T		<u> </u>	s = Sum(74)m.				1	(00)
(83)m= 111.45 Total gains – i		294.26 d solar			72.11 83\m	451.37	397	.63 329.45	226.4	1 135.29	94.16		(83)
(84)m= 494.41		660.59	739.19 78		72.06	737.69	690	.57 634.15	553.5	3 488.04	466.04	l	(84)
(4)					72.00	707.00	1 000	.07 004.10	000.0	3 400.04	400.04		(0.1)
7. Mean inter		`				T.I		TI 4 (00)					7(05)
Temperature	•	٠.		·			oie 9	ini (°C)				21	(85)
Utilisation fac	 -	-		```			Ι	Can	0.4	Nev	Daa]	
(86)m= 1	Feb 0.99	Mar 0.98		lay ₃₇	Jun 0.7	Jul 0.53	0.5	ug Sep i9 0.83	Oct 0.97	. Nov 0.99	Dec 1		(86)
									0.57	0.55	'		(00)
Mean interna				$\overline{}$					20.5	20.04	10.60	1	(87)
(87)m= 19.71		20.16	20.5 20		20.95	20.99	20.	!	20.5	20.04	19.69		(07)
Temperature	 -				Ť							1	(00)
(88)m= 19.92	19.92	19.92	19.94 19	94	19.95	19.95	19.	95 19.94	19.94	19.93	19.93		(88)
Utilisation fac	 -				$\overline{}$							1	
(89)m= 1	0.99	0.98	0.93 0.	32	0.61	0.41	0.4	6 0.76	0.96	0.99	1		(89)
Mean interna	ıl temperat	ure in t	he rest of d	welling	T2 (fo	llow ste	eps 3	to 7 in Tabl	e 9c)				

(90)m= 18.21	18.46	18.85	19.36	19.73	19.92	19.95	19.94	19.85	19.36	18.7	18.18		(90)
10.21	10.10	10.00	10.00	10.70	10.02	10.00	10.01			g area ÷ (4		0.23	(91)
										g aroa . (., –	0.23	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(92)
Apply adjustr	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(93)
8. Space hea	ıting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:				•				•		
(94)m= 1	0.99	0.97	0.93	0.82	0.63	0.44	0.49	0.77	0.95	0.99	1		(94)
Useful gains,	hmGm ,	W = (94	l)m x (84	4)m									
(95)m= 491.97	573.41	643.2	685.66	644.99	483.53	324.19	339.18	486.26	526.41	483.09	464.29		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8		•						
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	e for mea	an intern	al tempe	erature, l	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1347.38	1308.62	1188.81	993.13	764.64	506.81	327.4	344.65	548.62	833.3	1106.17	1338.22		(97)
Space heating	g require	ement fo	r each n	nonth, k\	/Vh/mont	h = 0.02	24 x [(97)m – (95)m] x (4 ⁻	1)m			
98)m= 636.43	494.06	405.93	221.38	89.01	0	0	0	0	228.33	448.62	650.21		
											L		_
	!						Tota	l per year	(kWh/year) = Sum(9)	8) _{15,912} =	3173.97	(98)
Snace heatin	a require	ement in	k\\/h/m²	!/vear			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Space heatin	• ,			•					(kWh/year) = Sum(9	8)15,912 =	3173.97 40.48	(98)
9a. Energy red	quiremer			•	ystems i	ncluding			(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Pa. Energy red Space heating	quiremer ng:	nts – Indi	vidual h	eating sy					(kWh/year) = Sum(9	8) _{15,912} =	40.48	(99)
Space heating Fraction of sp	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system	micro-C	CHP)	(kWh/year) = Sum(9	8)15.912 =		(99)
Pa. Energy red Space heating	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system		CHP)	(kWh/year) = Sum(9	8)15,912 =	40.48	(99)
Space heating Fraction of sp	quiremenng: Dace head	nts – Indi nt from se nt from m	vidual h econdar ain syst	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15.912 =	40.48	(201
Space heating Fraction of space Fraction Fraction Of space Fraction Fractio	quiremen ng: pace hea pace hea pace heatin	nts - Indi at from se at from m	vidual h econdary ain syst	eating sy y/supple em(s) stem 1		system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912	0	(99) (201 (202 (204
Space heating Fraction of space Fraction of space Fraction of to	quirement ng: pace hea pace hea patal heatin main spa	nts – Indi at from se at from m ag from i	vidual hecondary ain systemain system	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1	CHP) - (201) =) = Sum(9	8)15.912 =	0 1	(99) (201 (202 (204 (206
Space heating Fraction of space Fraction of to Efficiency of	quirement ng: pace hea pace hea patal heatii main spa seconda	nts – Indi	vidual hecondary ain systemain systemain systementar	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	micro-C (202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 93.4	(201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of Jan	quirement ng: pace heat pace heat tal heatin main spa seconda	nts – Indi at from se at from m ng from i ace heati ry/supple Mar	vidual h econdary ain syst main sys ng syste ementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1	CHP) - (201) =) = Sum(9	8) _{15,912} =	0 1 1 93.4	(99) (201 (202 (204 (206 (208
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating	quirement ng: pace heat pace heat stal heatin main spa seconda Feb	nts – Indi	vidual hecondary ain systemain systemain systementary Apralculated	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system 1, % Jul	micro-C (202) = 1 - (204) = (2	CHP) - (201) = 02) × [1 - ((203)] =	Nov	Dec	0 1 1 93.4	(99) (201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43	quirement of the property of t	nts – Indi	econdary ain systemain systemain systementar Apralculated	eating sylv/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system	micro-C (202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 93.4	(99) (201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43	puirement pace hea pace hea pace hea patal heatin main spa seconda Feb g require 494.06	nts - Indi	econdary eain systemain systemain systementar Apralculated 221.38 00 ÷ (20	eating sylv/supple em(s) stem 1 em 1 May dabove) 89.01	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 - 6	(203)] = Oct	Nov 448.62	Dec 650.21	0 1 1 93.4	(99) (201 (202 (204 (206 (208
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43	quirement of the property of t	nts – Indi	econdary ain systemain systemain systementar Apralculated	eating sylv/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system 1, % Jul	micro-C (202) = 1 · (204) = (2 Aug	Sep 0	(203)] = Oct 228.33	Nov 448.62 480.32	Dec 650.21	0 1 1 93.4 0 kWh/ye	(201 (202 (204 (206 (208 ear
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43	puirement pace hea pace hea pace hea patal heatin main spa seconda Feb g require 494.06	nts - Indi	econdary eain systemain systemain systementar Apralculated 221.38 00 ÷ (20	eating sylv/supple em(s) stem 1 em 1 May dabove) 89.01	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 - 6	(203)] = Oct 228.33	Nov 448.62 480.32	Dec 650.21	0 1 1 93.4	(201 (202 (204 (206 (208 ear
Space heating Fraction of space heating Fraction of to Efficiency of Efficiency of Space heating 636.43 (211)m = {[(986) 681.4]	quirement of the property of t	at from set from many from the condary. At from many from the	vidual hecondary ain systemain systemantar Apr alculated 221.38 00 ÷ (20 237.02	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 89.01	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	Sep 0	(203)] = Oct 228.33	Nov 448.62 480.32	Dec 650.21	0 1 1 93.4 0 kWh/ye	(201 (202 (204 (206 (208 ear
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43 (211)m = {[(98)	quirement of the property of t	at from set from many from the condary. At from many from the	vidual hecondary ain systemain systemantar Apr alculated 221.38 00 ÷ (20 237.02	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 89.01	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	Sep 0	(203)] = Oct 228.33	Nov 448.62 480.32	Dec 650.21	0 1 1 93.4 0 kWh/ye	(201 (202 (204 (206 (208 ear
Space heating Fraction of space heating Fraction of to Efficiency of Efficiency of Space heating 636.43 (211)m = {[(986) 681.4]	quirement of the property of t	at from set from many from the condary. At from many from the	vidual hecondary ain systemain systemantar Apr alculated 221.38 00 ÷ (20 237.02	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 89.01	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating 636.43 [211] m = {[(98)	quirement of the property of t	nts - Indicate from set from many from the from	vidual hecondary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sylv/supple em(s) stem 1 em 1 y heating May d above) 89.01 e6) 95.3 emonth	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	Sep 0 (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(201) (202) (204) (206) (208) ear
Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating 636.43 (211)m = {[(98)	quirement of the property of t	nts - Indicate from set from many from the from	vidual hecondary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sylv/supple em(s) stem 1 em 1 y heating May d above) 89.01 e6) 95.3 emonth	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
Space heating Fraction of space fraction of space fraction of to Efficiency of Image: Space heating fraction of the Image: Space heating fraction of the Image: Space heating fraction of Image: Space heating from the	puirement of the property of t	ter (calci	vidual hecondary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02 y), kWh/ 8) 0	eating sylv/supple em(s) stem 1 em 1 y heating May d above) 89.01 95.3 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	Sep 0 1 (kWh/yea	Oct 228.33 244.47 ar) =Sum(2	Nov 448.62 480.32 211) _{15,1012} 0	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201 (202 (204 (206 (208 ear
Space heating Fraction of space fraction of space fraction of to Efficiency of Efficie	puirement of the property of t	nts – Indi	econdary ain systemain systemain systementar Apr alculated 221.38 00 ÷ (20 237.02	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 89.01 95.3 month	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 228.33 244.47 ar) = Sum(2	Nov 448.62 480.32 211) _{15,1012}	Dec 650.21 696.15	0 1 1 93.4 0 kWh/ye	(99) (201) (202) (204) (206) (208)

				1	i		1	(a.a.)
` '	80.3 80.3	80.3	80.3	85.79	87.24	87.84		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m								
` '	72.53 165.29	184.27	186.3	198.57	208.45	223.4		
	•	Tota	I = Sum(2	19a) ₁₁₂ =			2356.83	(219)
Annual totals				k'	Wh/year	•	kWh/year	_
Space heating fuel used, main system 1							3398.26	
Water heating fuel used							2356.83	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a)	(230g) =	:		75	(231)
Electricity for lighting							357.88	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b)	=				6268.27	(338)
12a. CO2 emissions – Individual heating systems	s including mi	icro-CHP)					_
	Energy			Emiss	ion fac	tor	Emissions	
	kWh/year			kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1)	(211) x			0.2	16	=	734.02	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	509.08	(264)
Space and water heating	(261) + (262)	+ (263) + (264) =				1243.1	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	185.74	(268)
				((005)				_
Total CO2, kg/year			sum c	of (265)(271) =		1467.76	(272)

TER =

(273)

18.72

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Property Details: HOUSE E - IMPROVED

Dwelling type: Semi-detached House

Located in: England

Region: South East England

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters:

Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 534 (P1)

Transmission heat loss coefficient: 57.1

Summer heat loss coefficient: 591.1 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
North (W1-2 FRONT N)	0	1
East (W3 - SIDE E)	0	1
East (W4 - SIDE E)	0	1
South (W5 - REAR S)	0	1
South (RW1-2 REAR S)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North (W1-2 FRONT N)	0.98	1	1	0.98	(P8)
East (W3 - SIDE E)	0.98	1	1	0.98	(P8)
East (W4 - SIDE E)	0.98	1	1	0.98	(P8)
South (W5 - REAR S)	0.98	1	1	0.98	(P8)
South (RW1-2 REAR S)	0.98	1	1	0.98	(P8)

Solar gains:

Orientation		Area	Flux	g _	FF	Shading	Gains
North (W1-2 FRONT N)	1 x	3.24	86.66	0.63	0.8	0.98	125.45
East (W3 - SIDE E)	1 x	2.59	124.8	0.63	0.8	0.98	144.42
East (W4 - SIDE E)	1 x	0.86	124.8	0.63	0.8	0.98	47.95
South (W5 - REAR S)	1 x	2.14	118.4	0.63	0.8	0.98	113.21
	1 x	2.66	202.31	0.63	0.8	0.98	240.45
						Total	671.47 (P3/P4)

Internal gains:

	June	July	August
Internal gains	422.24	404.7	412.74
Total summer gains	1133.38	1076.17	1007.8 (P5)
Summer gain/loss ratio	1.92	1.82	1.7 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5

SAP 2012 Overheating Assessment

Thermal mass temperature increment 0.25 0.25

Threshold temperature 17.57 19.47 19.45 (P7)

Likelihood of high internal temperature Not significant Not significant

Assessment of likelihood of high internal temperature: Not significant

APPENDIX D: SAP Calculation Worksheets – IMPROVED (BE GREEN)

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 *Printed on 25 February 2021 at 14:04:47*

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Detached House

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 81.5m²

Site Reference: WOODWELL Plot Reference: HOUSE C - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.9 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

11.11 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 57.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 48.2 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	OK
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	OK
Openings	1.37 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 4.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 %

Secondary heating system: None

OK

Regulations Compliance Report

5 Cylinder insulation			
Hot water Storage:	No cylinder		
6 Controls			
Space heating controls Hot water controls:	TTZC by plumbing and e No cylinder thermostat No cylinder	· · · · · · · · · · · · · · · · · · ·	
Boiler interlock:	Yes		OK
7 Low energy lights			
Percentage of fixed lights wit Minimum	h low-energy fittings	100.0% 75.0%	ок
8 Mechanical ventilation			
Not applicable			
9 Summertime temperature			
Overheating risk (South East	England):	Slight	OK
Based on:			
Overshading:		Average or unknown	
Windows facing: West		4.86m²	
Windows facing: North		1.62m²	
Windows facing: South		6.08m²	
Windows facing: East		2.14m²	
Roof windows facing: West		2.66m²	
Roof windows facing: East		2.66m²	
Roof windows facing: East		1.1m²	
Roof windows facing: East		0.78m²	
Ventilation rate:		8.00	
Blinds/curtains:		Dark-coloured curtain or roller Closed 10% of daylight hours	blind

10 Key features

Photovoltaic array

Thermal Bridge Report

Property Details: HOUSE C - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges

Thermal bridges: User-defined = UD

Default = D Approved = A

User-defined (individual PSI-values) Y-Value = 0.0578

External Junctions Details:

Junction Type	PSI-Value	Length	Reference	Type
Other lintels (including other steel lintels)	0.05	9.97	E2	[UD]
Sill	0.04	5.4	E3	[A]
Jamb	0.05	22.8	E4	[A]
Ground floor (normal)	0.08	25.7	E5	[UD]
Intermediate floor within a dwelling	0.07	25.7	E6	[A]
Eaves (insulation at rafter level)	0.04	15.65	E11	[A]
Gable (insulation at rafter level)	0.04	19.28	E13	[A]
Corner (normal)	0.09	15.8	E16	[A]

Roof Junctions Details:					
Head	0.08	9.47	R1	[D]	
Sill	0.06	9.47	R2	[D]	
Jamb	0.08	17.2	R3	[D]	
Ridge (vaulted ceiling)	0.08	9.3	R4	[D]	

SAP Input

Property Details: HOUSE C - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House
Detachment: Detached
Year Completed: 2021

Floor Location: Floor area:

Storey height:

Floor 0 40.75 m^2 2.6 m Floor 1 40.75 m^2 2.24 m

Living area: 18.3 m² (fraction 0.225)

Front of dwelling faces: Wes

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
FRONT DOOR	Manufacturer	Solid			Wood
W1-3 FRONT	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - SIDE S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W6 - REAR E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 FRONT W	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW3-4 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW5 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal
RW6 REAR E	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Name:	Gap:	Frame Factor	g-value:	U-value:	Area:	No. of Openings:
FRONT DOOR	mm	0.8	0	1.4	1.93	1
W1-3 FRONT	16mm or more	0.8	0.63	1.4	1.62	3
W4 - SIDE N	16mm or more	0.8	0.63	1.4	1.62	1
W5 - SIDE S	16mm or more	0.8	0.63	1.4	6.08	1
W6 - REAR E	16mm or more	0.8	0.63	1.4	2.14	1
RW1-2 FRONT W	16mm or more	0.8	0.63	1.3	1.33	2
RW3-4 REAR E	16mm or more	0.8	0.63	1.3	1.33	2
RW5 REAR E	16mm or more	0.8	0.63	1.3	1.1	1
RW6 REAR E	16mm or more	0.8	0.63	1.3	0.78	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	West	0	0
W1-3 FRONT		EXTERNAL WALLS	West	0	0
W4 - SIDE N		EXTERNAL WALLS	North	0	0
W5 - SIDE S		EXTERNAL WALLS	South	0	0
W6 - REAR E		EXTERNAL WALLS	East	0	0
RW1-2 FRONT W		ROOF	West	0.001	0

SAP Input

RW3-4 REAR E	ROOF	East	0.001	0
RW5 REAR E	ROOF	East	0.001	0
RW6 REAR E	ROOF	East	0.001	0

54.1

Overshading: Average or unknown

61.3

40.75

Typo	Cross areas	Oponings	Net area:	U-value:	Ru value:	Curtain wall	Kappa:
Туре:	Gross area:	Openings:	ivet area.	u-value.	Ru value.	Curtain wall:	карра.
External Element	<u>:S</u>						
EXTERNAL WALLS	102.95	16.63	86.32	0.2	0	False	N/A
DORMER CHEEKS	2	0	2	0.2	0	False	N/A

0.14

0.17

0

GROUND FLOOR
Internal Elements
Party Elements

ROOF

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0578

7.2

	Length	Psi-value		
	9.97	0.05	E2	Other lintels (including other steel lintels)
[Approved]	5.4	0.04	E3	Sill
[Approved]	22.8	0.05	E4	Jamb
	25.7	0.08	E5	Ground floor (normal)
[Approved]	25.7	0.07	E6	Intermediate floor within a dwelling
[Approved]	15.65	0.04	E11	Eaves (insulation at rafter level)
[Approved]	19.28	0.04	E13	Gable (insulation at rafter level)
[Approved]	15.8	0.09	E16	Corner (normal)
	9.47	0.08	R1	Head
	9.47	0.06	R2	Sill
	17.2	0.08	R3	Jamb
	9.3	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys: 0
Number of open flues: 0
Number of fans: 3
Number of passive stacks: 0
Number of sides sheltered: 0
Pressure test: 4

Main heating system

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

N/A

N/A

SAP Input

Boiler interlock: Yes Delayed start

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

Water heating

Water heating: From main heating system

Water code: 901
Fuel :mains gas
No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 100%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No

Photovoltaics: Photovoltaic 1

Installed Peak power: 1.36 Tilt of collector: 45°

Overshading: None or very little Collector Orientation: East

Assess Zero Carbon Home: No

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nui	mbor	STPO	030065	
Software Name:	Stroma FSAP 2012	Software V			n: 1.0.5.25	
Continui o Italiio.		Property Address: HOU		7 07010	11010120	
Address :	Woodwell Cottage P2, Woo	·				
1. Overall dwelling dime	•					
		Area(m²)	Av. Height(m)	Volume(m³))
Ground floor		40.75 (1a) x	2.6	(2a) =	105.95	(3a)
First floor		40.75 (1b) x	2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	1) 81.5 (4)				_
Dwelling volume		(3a)+(3	3b)+(3c)+(3d)+(3e)+.	(3n) =	197.23	(5)
2. Ventilation rate:						
	main seconda heating heating	ry other	total		m³ per houi	٢
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent far	าร		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fin	es		0	x 40 =	0	(7c)
				A * I		_
Infilmation due to object	fl	70) ((7h) ((7o)		r	anges per ho	_
•	rs, flues and fans = (6a)+(6b)+(7 een carried out or is intended, procee		30 from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in th		· //	() ()	Г	0	(9)
Additional infiltration	• , ,		[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	struction	Ī	0	(11)
if both types of wall are pr deducting areas of openin	esent, use the value corresponding to	o the greater wall area (after				_
=	oor, enter 0.2 (unsealed) or 0	.1 (sealed), else enter ()	[0	(12)
If no draught lobby, ent				Ī	0	(13)
Percentage of windows	and doors draught stripped			Ì	0	(14)
Window infiltration		0.25 - [0.2 x (14) -	- 100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	Ī	0	(16)
Air permeability value,	q50, expressed in cubic metre	es per hour per square	metre of envelop	e area	4	(17)
If based on air permeabili	ty value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16)	·	Ī	0.35	(18)
Air permeability value applies	s if a pressurisation test has been do	ne or a degree air permeabili	ty is being used			_
Number of sides sheltere	d				0	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =	Į	1	(20)
Infiltration rate incorporati	ng shelter factor	(21) = (18) x (20) :	=		0.35	(21)
Infiltration rate modified for	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Ser	Oct Nov	/ Dec		
Monthly average wind spe	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for st	nelter an	d wind s	speed) =	(21a) x	(22a)m	•	•			
0.45	0.44	0.43	0.39	0.38	0.33	0.33	0.33	0.35	0.38	0.4	0.41	1	
Calculate effe		•	rate for t	he appli	cable ca	ise	!	<u>!</u>	!	ļ.	ļ.	J	
If mechanic			andiv N. 72	12h) - (22c) v Emy (nguation (N	VEVV otho	nvico (22h) = (23a)			0	(23a)
If balanced wi		0		, ,	,	. ,	,, .	,) = (23a)			0	(23b)
a) If balance		•	•	J		,		,	Oh)m ı ((22h) v [1 (22a)	0	(23c)
(24a)m= 0		o lical ve	0	0	0	0	0	0	0	(230) x [0] - 100j	(24a)
b) If balanc					L					(23h)		J	()
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole I	nouse ex	tract ver	tilation o	r positiv	e input	ventilatio	on from (utside				J	
,	m < 0.5 ×			•	•				.5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m= 0.6	0.6	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59]	(24d)
Effective ai	r change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)	!	ļ.	ļ.	J	
(25)m= 0.6	0.6	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59]	(25)
3. Heat losse	es and he	eat loss r	paramete	er.		•						•	
0													
ELEMENT	Gros	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
		SS	Openin	gs	Net Ar A ,r	m²			A X U (W/	K)			
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x	W/m2	2K = [0.04] = [(W/ 2.702	K)			kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r	m ² x x1. x1.	W/m2 1.4 /[1/(1.4)+		2.702 2.15	K)			kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 1.93 1.62	m ² x x ¹ x ¹ x ¹ x ¹	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & \\ & & 0.04 & = \\ 0.04 & & & \\ 0.04 & & & \\ 0.04 & & & \\ \end{array} $	2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area e 1 e 2 e 3 e 4	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08	m ² x x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729	K) 			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area e 1 e 2 e 3 e 4 be 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	$ \begin{array}{ccc} 2K & & & & \\ & & & & \\ & & & & \\ & & & &$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729	K) 			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} 2K & & & & \\ \hline & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & & & \\ \end{array} $	2.702 2.15 2.15 8.06 2.84 1.729 1.729	K) 			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.37	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} 2K & & & & \\ \hline & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & & & \\ \end{array} $	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43	K) 			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4	ss (m²)	Openin	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	EK = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4	ss (m²)	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102.	95	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Type2 Roof	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61.	95 3	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of *for windows and	Gros area e 1 e 2 e 3 e 4 De 1 De 2 De 3 De 4 102. 2 elements	95 3 , m ² ows, use e	Openin m 16.6 0 7.2	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	m²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	EK = [0.04] =	(W/ 2.702 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of * for windows an ** include the area	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61. elements d roof winders on both	95 3 , m ² ows, use e sides of in	16.6. 0 7.2 effective winternal wal	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3] + /	$ \begin{array}{cccc} 2K & & & & & \\ & & & & & \\ & & & & & \\ & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of *for windows an **include the are Fabric heat loo	Gros area e 1 e 2 e 3 e 4 De 1 De 2 De 3 De 4 102. 2 elements d roof wind as on both	95 3 , m ² ows, use e sides of in = S (A x	16.6. 0 7.2 effective winternal wal	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	n 3.2	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of * for windows an ** include the area	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61. elements d roof wind as on both ss, W/K: Cm = S(95 95 3 , m ² ows, use e sides of in = S (A x (A x k)	16.6. 0 7.2 effective winternal wall	gs 1 ² 3 indow U-va Is and pan	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1 207 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3] + /	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)

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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

can be used inste	ad of a dei	tailed calci	ulation.										
Thermal bridge				using Ap	pendix I	K						11.97	(36)
if details of therma	al bridging	are not kn	own (36) =	= 0.05 x (3	1)								
Total fabric he	at loss							(33) +	(36) =			75.23	(37)
Ventilation hea	at loss ca	alculated	monthly	У		,		(38)m	= 0.33 × (25)m x (5))	ı	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 39.1	38.85	38.6	37.42	37.21	36.18	36.18	36	36.58	37.21	37.65	38.11		(38)
Heat transfer of	coefficier	nt, W/K					_	(39)m	= (37) + (3	38)m		•	
(39)m= 114.33	114.08	113.83	112.65	112.43	111.41	111.41	111.22	111.81	112.43	112.88	113.34		_
Heat loss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷		12 /12=	112.65	(39)
(40)m= 1.4	1.4	1.4	1.38	1.38	1.37	1.37	1.36	1.37	1.38	1.38	1.39		
Number of day	e in moi	oth (Tab	lo 1a)						Average =	Sum(40) ₁	12 /12=	1.38	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u>!</u>		<u>!</u>	<u> </u>			
4. Water heat	ting ener	rgy requi	irement:								kWh/ye	ear:	
	J											ı	
Assumed occu	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.49		(42)
if TFA £ 13.9 Annual average	•	ater usad	ae in litre	es per da	ıv Vd.av	erage =	(25 x N)	+ 36		93	3.35		(43)
Reduce the annua	al average	hot water	usage by	5% if the a	lwelling is	designed			se target o				(10)
not more that 125	litres per p	person per	r day (all w r	ater use, f	not and co	ld) 						ı	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in	,	,	1				· <i>'</i>					1	
(44)m= 102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49	95.22	98.96	102.69	1400.05	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600		Total = Su oth (see Ta		c, 1d)	1120.25	(44)
(45)m= 152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48		
			Į.			!	!		Total = Su	m(45) ₁₁₂ =	=	1468.83	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)	-				
(46)m= 22.84	19.98	20.62	17.97	17.25	14.88	13.79	15.82	16.01	18.66	20.37	22.12		(46)
Water storage Storage volum		includin	na anv so	olar or M	///HRS	storana	within s	ame ves	امء		0		(47)
If community h	, ,		•			_		arric ves	001		U		(47)
Otherwise if no	-			•			, ,	ers) ente	er '0' in (47)			
Water storage			`					,	,	•			
a) If manufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature fa	actor fro	m Table	2b								0		(49)
Energy lost fro		_	-				(48) x (49)) =			0		(50)
b) If manufactHot water stora			-								0		(51)
If community h	•			- (NVVI	, C /Uc	^У <i>)</i>					0		(51)
Volume factor	•										0		(52)
Temperature f	actor fro	m Table	2b								0		(53)

Liloigy io	st fron	n water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50	0) or (5	4) in (5	55)									0		(55)
Water sto	orage lo	oss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinder co	ontains o	dedicated	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (57	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary c	circuit le	oss (an	nual) fro	m Table	3							0		(58)
Primary c		`	,			59)m = ((58) ÷ 36	5 × (41)	m				•	
(modifie	ed by f	actor fr	om Tab	le H5 if t	here is s	olar wat	er heatir	ng and a	cylinde	r thermo	stat)	_	_	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi los	ss calc	ulated	for each	month ((61)m =	(60) ÷ 36	65 × (41)	m						
(61)m= 1	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total hea	at requi	red for	water he	eating ca	alculated	for eacl	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
_		144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12	1 ` ′ ′	(62)
Solar DHW	input ca	lculated	using App	endix G oı	· Appendix	H (negati	ve quantity	') (enter '0'	if no sola	r contributi	on to wate	er heating)	1	
(add addi	itional l	ines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix G	€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	•	(63) (G2)
Output fro	om wat	ter heat	ter											
(64)m= 16	64.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
								Outp	out from wa	ater heater	(annual)	12	1617.66	(64)
Heat gain	ns from	water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m	 :1	
	53.8	47.14	48.86	42.9	41.39	36.05	33.73	38.24	38.56	44.53	48.21	52.2	1	(65)
include	e (57)m	in calc	ulation o	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Interr	nal gai	ns (see	Table 5	and 5a):	•						•		
Metabolio		•			,									
	Jan J	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	r	1	
_	-	149.44	149.44	149.44	149.44	149.44		- 3				l Dec		
Lighting o	gains (d	 calculat	l : A		l		149.44	149.44	149.44	149.44	149.44	Dec 149.44		(66)
	'		ea in Ar	pendix	L. eguat					149.44				(66)
	49.6	44.05	35.83	pendix 27.12	L, equat 20.28			149.44 lso see		149.44]	(66) (67)
` '			35.83	27.12	20.28	ion L9 oi	r L9a), a 18.5	lso see 24.04	Table 5 32.27	40.97	149.44	149.44]	,
Appliance	es gain	s (calc	35.83 ulated in	27.12 Append	20.28 dix L, eq	ion L9 or 17.12 uation L	18.5 13 or L1	lso see 24.04 3a), also	Table 5 32.27 see Tal	40.97 ble 5	149.44 47.82	149.44 50.98]	(67)
Appliance (68)m= 33	es gain 32.16	s (calc 335.61	35.83 ulated in 326.92	27.12 Append 308.43	20.28 dix L, eq 285.09	17.12 uation L	18.5 13 or L1 248.49	24.04 3a), also 245.05	Table 5 32.27 see Tal 253.73	40.97 ble 5 272.22	149.44	149.44]	,
Appliance (68)m= 33	es gain 32.16 gains (s (calc 335.61 calcula	35.83 ulated in 326.92 ted in A	27.12 Append 308.43 opendix	20.28 dix L, eq 285.09 L, equat	17.12 uation L 263.15 ion L15	r L9a), a 18.5 13 or L1 248.49 or L15a)	24.04 3a), also 245.05 , also se	Table 5 32.27 see Table 253.73	40.97 ble 5 272.22	149.44 47.82 295.57	149.44 50.98 317.5		(67) (68)
Appliance (68) m= 33 Cooking (69) m= 5	es gain 32.16 gains (s (calc 335.61 calcula 52.43	35.83 ulated in 326.92 ted in A ₁ 52.43	27.12 Append 308.43 opendix 52.43	20.28 dix L, eq 285.09	17.12 uation L	18.5 13 or L1 248.49	24.04 3a), also 245.05	Table 5 32.27 see Tal 253.73	40.97 ble 5 272.22	149.44 47.82	149.44 50.98		(67)
Appliance $(68)m = 33$ Cooking $(69)m = 5$ Pumps ar	es gain 32.16 gains (52.43 nd fans	s (calc 335.61 calcula 52.43 s gains	35.83 ulated in 326.92 ted in Ap 52.43 (Table 5	27.12 Append 308.43 opendix 52.43	20.28 dix L, eq 285.09 L, equat 52.43	17.12 uation L 263.15 ion L15 52.43	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43	24.04 3a), also 245.05 , also se 52.43	Table 5 32.27 see Tal 253.73 ee Table 52.43	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43	149.44 50.98 317.5 52.43		(67) (68) (69)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m=	es gain 32.16 gains (52.43 nd fans	s (calcostates) s (calculas 52.43 s gains 3	35.83 ulated in 326.92 ted in A 52.43 (Table 5	27.12 Append 308.43 Appendix 52.43 5a) 3	20.28 dix L, eq 285.09 L, equat 52.43	17.12 uation L 263.15 ion L15 52.43	r L9a), a 18.5 13 or L1 248.49 or L15a)	24.04 3a), also 245.05 , also se	Table 5 32.27 see Table 253.73	40.97 ble 5 272.22	149.44 47.82 295.57	149.44 50.98 317.5		(67) (68)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m= Losses e.	es gains (gains (52.43 nd fans 3	s (calcula 335.61 calcula 52.43 s gains 3	35.83 ulated in 326.92 ted in A 52.43 (Table 5 3 n (negation)	27.12 Append 308.43 Expendix 52.43 Sa) 3 Exive value	20.28 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	17.12 uation L 263.15 ion L15 52.43 3 le 5)	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43	24.04 3a), also 245.05 , also se 52.43	Table 5 32.27 see Tal 253.73 ee Table 52.43	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43	149.44 50.98 317.5 52.43		(67) (68) (69) (70)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m= Losses e. (71)m= -9	es gain 32.16 gains (52.43 nd fans 3 .g. eva	s (calcula 335.61 calcula 52.43 s gains 3 poratio	35.83 ulated in 326.92 ted in Ap 52.43 (Table 5 3 n (negation 199.63)	27.12 Append 308.43 Appendix 52.43 5a) 3	20.28 dix L, eq 285.09 L, equat 52.43	17.12 uation L 263.15 ion L15 52.43	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43	24.04 3a), also 245.05 , also se 52.43	Table 5 32.27 see Tal 253.73 ee Table 52.43	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43	149.44 50.98 317.5 52.43		(67) (68) (69)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m= Losses e. (71)m= -9 Water hea	es gains (gains (52.43 nd fans 3 .g. eva 99.63 eating g	s (calcula 335.61 calcula 52.43 s gains 3 poratio -99.63 ains (T	35.83 ulated in 326.92 ted in A 52.43 (Table 5 3 n (negation 199.63) fable 5)	27.12 Append 308.43 Appendix 52.43 Sa) 3 tive valu -99.63	20.28 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	17.12 uation L 263.15 ion L15 52.43 3 le 5)	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43	24.04 3a), also 245.05 , also se 52.43 3	Table 5 32.27 see Tal 253.73 ee Table 52.43 3 -99.63	40.97 ble 5 272.22 5 52.43	149.44 47.82 295.57 52.43 3	149.44 50.98 317.5 52.43 3		(67) (68) (69) (70)
Appliance $(68)m = 33$ Cooking ($(69)m = 5$ Pumps ar $(70)m = $ Losses e. $(71)m = -9$ Water hea $(72)m = 7$	es gains (gains (52.43 nd fans 3 .g. eva 99.63 eating g	s (calcula 335.61 calcula 52.43 s gains 3 poratio -99.63 ains (T	35.83 ulated in 326.92 ted in A 52.43 (Table 5 3 n (negation of the second of the s	27.12 Append 308.43 Expendix 52.43 Sa) 3 Exive value	20.28 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	17.12 uation L 263.15 ion L15 52.43 3 le 5) -99.63	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43 3 -99.63	24.04 3a), also 245.05 , also se 52.43 3 -99.63	Table 5 32.27 see Tal 253.73 ee Table 52.43 3 -99.63	40.97 ble 5 272.22 5 52.43 3 -99.63	149.44 47.82 295.57 52.43 3 -99.63	149.44 50.98 317.5 52.43 3 -99.63		(67) (68) (69) (70)
Appliance (68)m= 33 Cooking (69)m= 5 Pumps ar (70)m= Losses e. (71)m= -9 Water hea (72)m= 7 Total inter	es gains (gains (52.43 nd fans 3 .g. eva 99.63 eating g	s (calcula 335.61 calcula 52.43 s gains 3 poratio -99.63 ains (T	35.83 ulated in 326.92 ted in A 52.43 (Table 5 3 n (negation of the second of the s	27.12 Append 308.43 Appendix 52.43 Sa) 3 tive valu -99.63	20.28 dix L, eq 285.09 L, equat 52.43 3 es) (Tab	17.12 uation L 263.15 ion L15 52.43 3 le 5) -99.63	r L9a), a 18.5 13 or L1: 248.49 or L15a) 52.43 3 -99.63	24.04 3a), also 245.05 , also se 52.43 3 -99.63	Table 5 32.27 see Tal 253.73 ee Table 52.43 3 -99.63	40.97 ble 5 272.22 5 52.43 3	149.44 47.82 295.57 52.43 3 -99.63	149.44 50.98 317.5 52.43 3 -99.63		(67) (68) (69) (70)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientati	on:	Access Factor Table 6d	7	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	7.81	(74)
North	0.9x	1	X	1.62	x	20.32	х	0.63	X	0.8	=	14.93	(74)
North	0.9x	1	X	1.62	x	34.53	X	0.63	X	0.8	=	25.37	(74)
North	0.9x	1	X	1.62	x	55.46	х	0.63	x	0.8	=	40.76	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	54.9	(74)
North	0.9x	1	x	1.62	x	79.99	x	0.63	x	0.8	=	58.78	(74)
North	0.9x	1	X	1.62	x	74.68	x	0.63	x	0.8	=	54.87	(74)
North	0.9x	1	x	1.62	x	59.25	x	0.63	x	0.8	=	43.54	(74)
North	0.9x	1	x	1.62	x	41.52	x	0.63	x	0.8	=	30.51	(74)
North	0.9x	1	x	1.62	x	24.19	x	0.63	x	0.8	=	17.78	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	9.64	(74)
North	0.9x	1	x	1.62	x	8.86	x	0.63	x	0.8	=	6.51	(74)
East	0.9x	1	x	2.14	x	19.64	x	0.63	x	0.8	=	19.06	(76)
East	0.9x	1	x	2.14	x	38.42	x	0.63	x	0.8	=	37.29	(76)
East	0.9x	1	x	2.14	x	63.27	x	0.63	x	0.8	=	61.42	(76)
East	0.9x	1	x	2.14	x	92.28	x	0.63	x	0.8	=	89.58	(76)
East	0.9x	1	x	2.14	x	113.09	x	0.63	x	0.8	=	109.78	(76)
East	0.9x	1	x	2.14	x	115.77	x	0.63	x	0.8	=	112.38	(76)
East	0.9x	1	x	2.14	x	110.22	x	0.63	x	0.8	=	106.99	(76)
East	0.9x	1	X	2.14	x	94.68	x	0.63	X	0.8	=	91.9	(76)
East	0.9x	1	X	2.14	x	73.59	x	0.63	X	0.8	=	71.43	(76)
East	0.9x	1	X	2.14	x	45.59	x	0.63	X	0.8	=	44.25	(76)
East	0.9x	1	X	2.14	X	24.49	X	0.63	X	0.8	=	23.77	(76)
East	0.9x	1	X	2.14	x	16.15	x	0.63	X	0.8	=	15.68	(76)
South	0.9x	1	X	6.08	x	46.75	X	0.63	X	0.8	=	128.94	(78)
South	0.9x	1	X	6.08	x	76.57	X	0.63	x	0.8	=	211.17	(78)
South	0.9x	1	X	6.08	x	97.53	X	0.63	X	0.8	=	268.99	(78)
South	0.9x	1	X	6.08	x	110.23	X	0.63	X	0.8	=	304.01	(78)
South	0.9x	1	X	6.08	X	114.87	X	0.63	X	0.8	=	316.8	(78)
South	0.9x	1	X	6.08	X	110.55	х	0.63	X	0.8	=	304.88	(78)
South	0.9x	1	X	6.08	x	108.01	X	0.63	X	0.8	=	297.88	(78)
South	0.9x	1	X	6.08	x	104.89	x	0.63	x	0.8	=	289.29	(78)
South	0.9x	1	X	6.08	x	101.89	x	0.63	x	0.8	=	280.99	(78)
South	0.9x	1	X	6.08	x	82.59	x	0.63	x	0.8	=	227.76	(78)
South	0.9x	1	X	6.08	x	55.42	x	0.63	x	0.8	=	152.83	(78)
South	0.9x	1	X	6.08	X	40.4	X	0.63	X	0.8	=	111.41	(78)

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West 0.9x	1	X	1.62	X	19.64	X	0.63	X	0.8	=	43.3	(80)
West 0.9x	1	X	1.62	X	38.42	X	0.63	X	0.8	=	84.7	(80)
West 0.9x	1	X	1.62	X	63.27	X	0.63	X	0.8	=	139.49	(80)
West 0.9x	1	X	1.62	X	92.28	X	0.63	X	0.8	=	203.43	(80)
West 0.9x	1	X	1.62	X	113.09	X	0.63	X	0.8	=	249.31	(80)
West 0.9x	1	X	1.62	X	115.77	X	0.63	X	0.8	=	255.22	(80)
West 0.9x	1	X	1.62	X	110.22	X	0.63	x	0.8	=	242.98	(80)
West 0.9x	1	X	1.62	X	94.68	X	0.63	X	0.8	=	208.71	(80)
West 0.9x	1	X	1.62	X	73.59	X	0.63	X	0.8	=	162.23	(80)
West 0.9x	1	X	1.62	x	45.59	X	0.63	X	0.8	=	100.5	(80)
West 0.9x	1	X	1.62	x	24.49	x	0.63	x	0.8	=	53.99	(80)
West 0.9x	1	X	1.62	x	16.15	X	0.63	x	0.8	=	35.61	(80)
Rooflights 0.9x	1	X	1.33	x	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9x	1	x	1.33	x	25.93	x	0.63	x	0.8	=	31.28	(82)
Rooflights 0.9x	1	x	1.1	x	25.93	x	0.63	x	0.8	=	12.94	(82)
Rooflights 0.9x	1	X	0.78	x	25.93	X	0.63	x	0.8	=	9.17	(82)
Rooflights 0.9x	1	X	1.33	x	51.88	X	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9x	1	x	1.33	x	51.88	X	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9x	1	X	1.1	x	51.88	X	0.63	x	0.8	=	25.88	(82)
Rooflights 0.9x	1	X	0.78	x	51.88	X	0.63	x	0.8	=	18.35	(82)
Rooflights 0.9x	1	x	1.33	x	88.38	X	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9x	1	x	1.33	x	88.38	x	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9x	1	x	1.1	x	88.38	x	0.63	x	0.8] =	44.1	(82)
Rooflights 0.9x	1	x	0.78	x	88.38	X	0.63	x	0.8] =	31.27	(82)
Rooflights 0.9x	1	x	1.33	x	133.65	x	0.63	x	0.8] =	161.26	(82)
Rooflights 0.9x	1	x	1.33	x	133.65	x	0.63	x	0.8] =	161.26	(82)
Rooflights 0.9x	1	x	1.1	x	133.65	X	0.63	x	0.8] =	66.69	(82)
Rooflights 0.9x	1	x	0.78	x	133.65	x	0.63	x	0.8	=	47.29	(82)
Rooflights 0.9x	1	x	1.33	x	168.1	x	0.63	x	0.8	=	202.82	(82)
Rooflights 0.9x	1	x	1.33	x	168.1	x	0.63	x	0.8	j =	202.82	(82)
Rooflights 0.9x	1	x	1.1	x	168.1	х	0.63	x	0.8	j =	83.87	(82)
Rooflights 0.9x	1	x	0.78	x	168.1	x	0.63	x	0.8	j =	59.47	(82)
Rooflights 0.9x	1	x	1.33	x	174	x	0.63	x	0.8	j =	209.95	(82)
Rooflights 0.9x	1	x	1.33	x	174	х	0.63	x	0.8	j =	209.95	(82)
Rooflights 0.9x	1	x	1.1	х	174	x	0.63	x	0.8	j =	86.82	(82)
Rooflights 0.9x	1	x	0.78	x	174	x	0.63	x	0.8	=	61.56	(82)
Rooflights 0.9x	1	x	1.33	x	164.87	x	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9x	1	x	1.33	x	164.87	x	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9x	1	x	1.1	×	164.87	X	0.63	X	0.8	=	82.26	(82)
Rooflights 0.9x	1	X	0.78	x	164.87	X	0.63	x	0.8	=	58.33	(82)
Rooflights 0.9x		X	1.33	x	138.72	X	0.63	X	0.8	 =	167.38	(82)
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Dooflighto o a					_		٦ .		_				— (22)
Rooflights 0.9x	1	X	1.3		×	138.72	X	0.63	X	0.8	=	167.38	(82)
Rooflights 0.9x	1	X	1.	1	X	138.72	X	0.63	×	0.8	=	69.22	(82)
Rooflights 0.9x	1	X	0.7	8	X	138.72	X	0.63	X	0.8	=	49.08	(82)
Rooflights 0.9x	1	X	1.3	3	X	104.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.3	3	x	104.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.	1	X	104.33	X	0.63	X	0.8	=	52.05	(82)
Rooflights 0.9x	1	X	0.7	'8	x	104.33	×	0.63	X	0.8	=	36.91	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.	1	x	62.32	X	0.63	x	0.8	=	31.1	(82)
Rooflights 0.9x	1	x	0.7	'8	x	62.32	X	0.63	x	0.8		22.05	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	32.54	X	0.63	x	0.8	=	39.26	(82)
Rooflights 0.9x	1	X	1.3	3	x	32.54	i x	0.63	x	0.8	-	39.26	(82)
Rooflights _{0.9x}	1	x	1.	1	x	32.54	X	0.63	×	0.8	_ =	16.23	(82)
Rooflights _{0.9x}	1	X	0.7	8	x	32.54	X	0.63	×	0.8	=	11.51	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	21.19	J X	0.63	×	0.8		25.57	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	21.19	X	0.63	×	0.8		25.57	(82)
Rooflights 0.9x	1	X	1.		x	21.19	」 】 x	0.63	= x	0.8	╡ -	10.57	(82)
Rooflights 0.9x	<u>·</u> 1	x	0.7		x	21.19] x	0.63	X	0.8	╡ -	7.5	(82)
	· ·		<u> </u>		<u> </u>			0.00		0.0			
Solar gains in	watte ca	alculated	for eac	n month			(83)m	n = Sum(74)m	(82)m				
(83)m= 283.79	517.51	783.91	1074.27		1	3 1241.16	`		593.8	4 346.49	238.42]	(83)
Total gains – ir	nternal a	nd solar	(84)m =	= (73)m ·	+ (83)n	n , watts	!	Į.	<u> </u>	_!		ı	
(84)m= 843.11	1072.57	1317.58	1574.66	1746.04	1735.1	1 1658.74	1512	2.22 1330.68	1072.1	3 862.09	782.31]	(84)
7. Mean inter	nal temn	erature	(heating	season)								
Temperature						from Ta	hle 9	Th1 (°C)				21	(85)
Utilisation fac	ŭ	٠.			Ū		DIC O,	, 1111 (0)				21	
Jan	Feb	Mar	Apr	May	Jun	Jul	ΤΔ	ug Sep	Oct	Nov	Dec]	
(86)m= 0.98	0.96	0.89	0.75	0.57	0.41	0.29	0.3		0.85	0.97	0.99		(86)
` ′						_!		!	0.00	1 0.01	0.00		, ,
Mean interna				· •	ı	-i	1		T 00.74	1 00 40	10.75	1	(07)
(87)m= 19.81	20.11	20.47	20.8	20.95	20.99	21	2	1 20.97	20.71	20.19	19.75		(87)
Temperature	during h					g from Ta	able 9	9, Th2 (°C)			1	1	
(88)m= 19.76	19.76	19.77	19.78	19.78	19.79	19.79	19.	79 19.78	19.78	19.77	19.77		(88)
Utilisation fac	tor for ga	ains for ı	est of d	welling,	h2,m (s	see Table	9a)						
(89)m= 0.98	0.94	0.86	0.7	0.51	0.33	0.21	0.2	25 0.47	0.8	0.95	0.98		(89)
Mean interna	temper	ature in	the rest	of dwelli	ina T2	follow ste	eps 3	to 7 in Tab	le 9c)		-		
(90)m= 18.24	18.66	19.16	19.58	19.74	19.78	19.79	19.		19.49	18.79	18.16]	(90)
						<u> </u>			fLA = Liv	/ing area ÷ (ļ	0.22	(91)
Maan !mt=======	tomer = -	oturo /t-	n 4la a · · · · ·	احمام	llin a'	fl A T 4	. /4	fl A\ . TO					
Mean interna (92)m= 18.59	18.99	19.46	r the wh	ole dwe 20.01	lling) =	1LA × 11 20.06	+ (1		19.77	19.1	18.52	1	(92)
							1				10.52		(34)
Apply adjustn	iciil lo li	ie illean	ппеша	remper	ature II	om rable	± 4€,	wilete appr	opnate				

(00)	40.44	40.04	40.04	40.7	40.00	40.0	10.04	1004	40.00	40.00	40.05	40.07		(93)
(93)m=	18.44	18.84	19.31	19.7	19.86	19.9	19.91	19.91	19.88	19.62	18.95	18.37		(93)
			uirement				44 -4	Table 0	41	4 T: /	70\	-11-	lata	
			or gains	•		ed at ste	ер ттог	rable 9	b, so tha	t 11,m=(rojm an	d re-caid	culate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			ains, hm					,						
(94)m=	0.97	0.93	0.85	0.7	0.51	0.34	0.22	0.26	0.48	0.79	0.94	0.98		(94)
Usefu	ıl gains,		W = (94)				ı	,			ı	ı	ı	
(95)m=	817.77	999.45	1120.57	1096.36	890.05	587.53	368.37	389.7	632.15	846.78	811.82	764.08		(95)
	nly aver	age exte	rnal tem	perature	r		•	,						
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			i				-``	- ` 	– (96)m					
	1616.85		1457.8	1216.79	917.29	591	368.76	390.45	646.59		<u> </u>	1605.8		(97)
Space		· · ·	ı	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m	1	1	
(98)m=	594.51	396.63	250.9	86.71	20.27	0	0	0	0	124.18	378.75	626.24		_
								Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	2478.19	(98)
Space	e heatin	g require	ement in	kWh/m²	²/year								30.41	(99)
9a En	erav rec	wiremer	nts – Indi	vidual h	eating s	vstems i	ncluding	ı micro-C	:HP)					
	e heatir		no ma	Madain	oamig oʻ	y otorno r	rioraanig	, moro c)					
•		•	at from s	econdar	v/supple	mentary	system						0	(201)
	•		at from m			,	•	(202) = 1	- (201) =				1	(202)
	•		ng from	-	, ,			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficie	ency of r	nain spa	ace heat	ing syste	em 1								89.9	(206)
Efficie	ency of s	seconda	ry/supple	ementar	y heating	g systen	າ, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space	e heatin	g require	ement (c	alculate	d above)								
	594.51	396.63	250.9	86.71	20.27	0	0	0	0	124.18	378.75	626.24		
(211)m	n = {[(98)m x (20	(4)] } x 1	00 ÷ (20)6)			•	•		•			(211)
(/	661.3	441.2	279.09	96.45	22.55	0	0	0	0	138.13	421.3	696.6		
								Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	<u> </u>	2756.61	(211)
Space	e heatin	a fuel (s	econdar	v) kWh/	month									J
•		•	00 ÷ (20	• , .										
(215)m=		0	0	0	0	0	0	0	0	0	0	0		
					<u> </u>		Į.	Tota	ıl (kWh/yea	ar) =Sum(2	1 215) _{15,1012}	<u> </u>	0	(215)
Water	heating	1												_
	_		ter (calc	ulated a	bove)									
	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
Efficier	ncy of w	ater hea	ıter										87.3	(216)
(217)m=	89.32	89.19	88.91	88.31	87.65	87.3	87.3	87.3	87.3	88.52	89.15	89.36		(217)
Fuel fo	r water	heating,	kWh/mo	onth				•	•		•		•	
, ,) ÷ (217)										ı	
(219)m=	184.64	162.13	168.8	149.53	145.6	127.66	119.79	135.32	136.3	154.84	166.05	179.19		7
								Tota	I = Sum(2	19a) ₁₁₂ =			1829.87	(219)
	l totals									k'	Wh/year	•	kWh/year	7
Space	neating	tuel use	ed, main	system	1								2756.61	

				_
Water heating fuel used			1829.87	_
Electricity for pumps, fans and electric keep-hot				
central heating pump:		30		(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (23	0a)(230g) =	75	(231)
Electricity for lighting			350.38	(232)
Electricity generated by PVs			-928.1	(233)
Total delivered energy for all uses (211)(221)	+ (231) + (232)(237b) =		4171.07	(338)
10a. Fuel costs - individual heating systems:				
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating - main system 1	(211) x	3.48 × 0.01 =	95.93	(240)
Space heating - main system 2	(213) x	0 x 0.01 =	0	(241)
Space heating - secondary	(215) x	13.19 x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)	3.48 × 0.01 =	63.68	(247)
Pumps, fans and electric keep-hot	(231)	13.19 x 0.01 =	9.89	(249)
(if off-peak tariff, list each of (230a) to (230g) sepenged for lighting	parately as applicable and ap	oply fuel price according to		(250)
Additional standing charges (Table 12)			120	
	one of (233) to (235) x)	13.19 x 0.01 =	-122.42	コ フ(252)
Appendix Q items: repeat lines (253) and (254) a		13.19	-122.42	_(232)
	(47) + (250)(254) =		213.3	(255)
11a. SAP rating - individual heating systems				
Energy cost deflator (Table 12)			0.42	(256)
Energy cost factor (ECF) [(255) x (256)] ÷ [(4) + 45.0] =		0.71	(257)
SAP rating (Section 12)			90.12	(258)
12a. CO2 emissions – Individual heating system	ms including micro-CHP			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/yea	
Space heating (main system 1)	(211) x	0.216 =	595.43	(261)
Space heating (secondary)	(215) x	0.519 =	0	(263)
Water heating	(219) x	0.216 =	395.25	(264)
Space and water heating	(261) + (262) + (263) + (264) =	=	990.68	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93	(267)
Electricity for lighting	(232) x	0.519 =	181.85	(268)
Energy saving/generation technologies				

Item 1		0.519	=	-481.68	(269)
Total CO2, kg/year	sum	of (265)(271) =		729.77	(272)
CO2 emissions per m ²	(272	2) ÷ (4) =		8.95	(273)
El rating (section 14)				92	(274)
13a. Primary Energy					
	Energy kWh/year	Primary factor		P. Energy kWh/year	
Space heating (main system 1)	(211) x	1.22	=	3363.07	(261)
Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	1.22	=	2232.44	(264)
Space and water heating	(261) + (262) + (263) + (264) =			5595.5	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	230.25	(267)
Electricity for lighting	(232) x	0	=	1075.68	(268)

3.07

sum of (265)...(271) =

 $(272) \div (4) =$

-2849.26

4052.18

49.72

(269)

(272)

(273)

Energy saving/generation technologies

Item 1

'Total Primary Energy

Primary energy kWh/m²/year

		User Details:				
Assessor Name:	Jemma Mclaughlan		Number:	STRO	030065	
Software Name:	Stroma FSAP 2012		e Version:		n: 1.0.5.25	
		Property Address: I	HOUSE C - FINAL			
Address :	Woodwell Cottage P2, W	oodwell Road, BRIS	TOL, BS11 9XU			
1. Overall dwelling dime	nsions:					
		Area(m²)	Av. Height(Volume(m³))
Ground floor		40.75	(a) x 2.6	(2a) =	105.95	(3a)
First floor		40.75	lb) x 2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+	.(1n) 81.5	1)			
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e))+(3n) =	197.23	(5)
2. Ventilation rate:						
	main secon heating heati		total		m³ per hou	r
Number of chimneys	0 + 0	-	= 0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0	= 0	x 20 =	0	(6b)
Number of intermittent far	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fin	res		0	x 40 =	0	(7c)
				۸ir.ch	anges per ho	
Infiltration due to chimne	vo fluor and fano - (63)±(6t))_(72)_(7b)_(7c) =		,		_
•	ys, flues and fans = $(6a)+(6b)$ een carried out or is intended, pro		30 ntinue from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in th		, ,,	, , ,	[0	(9)
Additional infiltration				[(9)-1]x0.1 =	0	(10)
	25 for steel or timber frame	•			0	(11)
if both types of wall are pr deducting areas of openin	resent, use the value correspondi nas): if equal user 0.35	ng to the greater wall area	(after			
	loor, enter 0.2 (unsealed) o	or 0.1 (sealed), else e	nter 0		0	(12)
If no draught lobby, ent	ter 0.05, else enter 0			İ	0	(13)
Percentage of windows	s and doors draught strippe	ed			0	(14)
Window infiltration			(14) ÷ 100] =		0	(15)
Infiltration rate			(11) + (12) + (13) + (15)	ļ	0	(16)
•	q50, expressed in cubic m			ope area	5	(17)
•	ity value, then $(18) = [(17) \div 2]$ s if a pressurisation test has been				0.4	(18)
Number of sides sheltere		rdone or a degree air perm	leability is being used	Ī	0	(19)
Shelter factor	-	(20) = 1 - [0	.075 x (19)] =		1	(20)
Infiltration rate incorporat	ing shelter factor	(21) = (18)	(20) =	[0.4	(21)
Infiltration rate modified for	or monthly wind speed			·		_
Jan Feb	Mar Apr May Ju	ın Jul Aug	Sep Oct N	ov Dec		
Monthly average wind sp	eed from Table 7					

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind F	actor (2	22a)m =	(22)m ÷	4										
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjuste	ed infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
	0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47		
		<i>tive air</i> o	change i	rate for t	he appli	cable ca	se	•	•					(220)
			using Appe	endix N. (2	(3b) = (23a	a) × Fmv (e	eguation (N	N5)) . othe	rwise (23b	o) = (23a)			0	(23a) (23b)
			overy: effici		, ,	,	. `	,, .	,	, , ,			0	(23c)
a) If b	palance	d mecha	anical ve	entilation	with he	at recov	erv (MVI	HR) (24a	a)m = (2:	2b)m + (23b) x [1 – (23c)		(200)
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If b	balance	d mecha	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24b	m = (22)	2b)m + (23b)	1	ı	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If v	whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	n from o	outside				•	
i <u>f</u>	f (22b)m	า < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	.5 × (23k	o)		_	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
			on or wh							0.51				
Г	<u> </u>	0.63	en (24d) _{0.62}	M = (221)	0.59	0.57	r ´	- ``			0.6	0.61	1	(24d)
(24d)m=					<u> </u>	<u> </u>	0.57	0.57	0.58	0.59	0.6	0.61	J	(240)
(25)m=	0.63	0.63	rate - en	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	1	(25)
` ′ L						0.57	0.57	0.57	0.50	0.59	0.0	0.01		(20)
			eat loss p											
ELEM	IENT	Gros	SS	Openin	as	NIO+ Ar								
		area	(m²)	m		Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-		A X k kJ/K
Doors		area	(m²)				m²							
Doors Window	vs Type		(m²)			A ,r	m ² x	W/m2	2K =	(W/				kJ/K
	,,	e 1	(m²)			A ,r	m² x x1/2	W/m2	eK = 0.04] =	(W/ 1.93				kJ/K (26)
Window	vs Type	e 1 e 2	(m²)			A ,r 1.93	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1 /[1/(1.4)+	eK = 0.04] = 0.04] =	(W/ 1.93 1.8				kJ/K (26) (27)
Window	vs Type vs Type	2 3	(m²)			A ,r 1.93 1.36	x1/2 x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] =	(W/ 1.93 1.8 1.8				kJ/K (26) (27) (27)
Window Window Window	vs Type vs Type vs Type	2 2 3	(m²)			A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] =	(W/ 1.93 1.8 1.8 6.79	K)			kJ/K (26) (27) (27) (27) (27)
Window Window Window Window	vs Type vs Type vs Type hts Typ	e 1 e 2 e 3 e 4 e 1	(m²)			A ,r 1.93 1.36 1.36 5.12	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K	(W/ 1.93 1.8 1.8 6.79 2.39	K)			kJ/K (26) (27) (27) (27) (27) (27)
Window Window Window Window Roofligh	vs Type vs Type vs Type hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligl Roofligl	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3	(m²)			A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498	K) 99 94 97			kJ/K (26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Roofligl Roofligl Roofligl	vs Type vs Type vs Type hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3			ļ2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	e 1 e 2 e 3 e 4 e 1 e 2 e 3 e 4		m	ļ2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1/2 x1/2 x1/452	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	(W/ 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b)
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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

an be u														
	Ū	,	,		using Ap	•	K						13.06	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) ±	(36) =			00.00	
			alculator	l monthly	M					•	25)m x (5)		69.82	(37
Cillia	Jan	Feb	Mar		<u></u>	Jun	Jul	Δυα	Sep	Oct	Nov	Dec	1	
88)m=	41.1	40.76	40.44	Apr 38.91	May 38.62	37.29	37.29	37.05	37.8	38.62	39.2	39.81		(38
,	L I			00.01	00.02	07.20	01.20	01.00		<u> </u>	<u> </u>	00.01		(
19)m=	ansfer c	110.59	11, VV/K	108.73	108.45	107.11	107.11	106.87	107.63	108.45	109.03	109.63	1	
9)111=	110.92	110.59	110.20	100.73	100.45	107.11	107.11	100.07			Sum(39) ₁ .		108.73	(39
leat lo	ss para	meter (H	HLP), W/	m²K						$= (39)m \div$		12712-	100.70	(
0)m=	1.36	1.36	1.35	1.33	1.33	1.31	1.31	1.31	1.32	1.33	1.34	1.35		
		_							,	Average =	Sum(40) ₁ .	12 /12=	1.33	(40
lumbe			nth (Tab	<u> </u>			.		_				1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(4.
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
												40	1	(4
ssum	ea occu	pancy, I	V									44		
if TF	A > 13.9			[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		49	I	
if TF if TF	A > 13.9 A £ 13.9	9, N = 1 9, N = 1	+ 1.76 x							ΓFA -13.	.9)		1	·
if TF if TF nnual	A > 13.9 A £ 13.9 I averag	9, N = 1 9, N = 1 e hot wa	+ 1.76 x ater usaç	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		93	.35]	•
if TF if TF nnual educe	A > 13.9 A £ 13.9 I average the annua	9, N = 1 9, N = 1 e hot wa d average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed		+ 36		93			•
if TF if TF nnual educe	A > 13.9 A £ 13.9 I average the annua	9, N = 1 9, N = 1 e hot wa d average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		93]	•
if TF if TF nnual educe ot more	A > 13.9 A £ 13.9 I average the annual of that 125 Jan	P, N = 1 P, N = 1 P hot was I average Silter per p Feb	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	.35		·
if TF if TF nnual educe of more	A > 13.9 A £ 13.9 I average the annual of that 125 Jan	P, N = 1 P, N = 1 P hot was I average Silter per p Feb	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 93	.35		·
if TF if TF nnual educe ot more ot wate 4)m=	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49	Oct 95.22 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ =	Dec 102.69	1120.25	(4
if TF if TF innual educe of more of wate	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug	+ 36 a water us Sep 91.49	Oct 95.22 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ =	Dec 102.69	1120.25	(4
if TF if TF nnual educe of more of wate 4)m=	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 91.49	es per da 5% if the d vater use, I May Vd,m = fa 87.75	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 84.02	(25 x N) to achieve Aug (43) 87.75	+ 36 a water us Sep 91.49 0 kWh/mon 106.76	Oct 95.22 Total = Su 124.42	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81	.35 Dec 102.69	1120.25	(4
if TF if TF innual educe of more of wate (4)m= nergy (4)m=	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 102.69 content of 152.29	P, N = 1 P, N = 1 P, N = 1 P hot was all average litres per properties per proper	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - cale 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated me	es per da 5% if the do ater use, l May Vd,m = fa 87.75 onthly = 4.	ay Vd,av lwelling is hot and co Jun ctor from 7 84.02 190 x Vd,r 99.21	erage = designed old) Jul Table 1c x 84.02 m x nm x E 91.94	(25 x N) to achieve Aug (43) 87.75 27m / 3600 105.5	+ 36 a water us Sep 91.49 0 kWh/more 106.76	Oct 95.22 Total = Su 124.42	9) 93 Nov 98.96 m(44)112 = ables 1b, 1	.35 Dec 102.69	1120.25	(4
if TF if TF innual educe of more dot wate (4)m= inergy (5)m=	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan er usage in 102.69 content of 152.29	P, N = 1 P, N = 1 P hot was all average litres per p Peb n litres per 98.96 hot water 133.19	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - call 137.44	Apr Apr ach month 91.49 culated mo 119.82	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97	ay Vd,av liwelling is that and co Jun ctor from 7 84.02 190 x Vd,r 99.21 r storage),	erage = designed Id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46)	+ 36 a water us Sep 91.49 0 kWh/mon 106.76	Oct 95.22 Total = Su 124.42 Total = Su	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69		(4
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if TF if TF nnual educe ot more ot wate 4)m= nergy of 5)m= instant 6)m= /ater	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 taneous with a storage in 102.69	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - calc 137.44 ng at point 0	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water	ay Vd,av lwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage),	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0	Oct 95.22 Total = Su 124.42 Total = Su 0	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69		(4
if TF if TF innual educe of more of wate 4)m= hergy of instant 6)m= /ater	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 102.69 content of 152.29 taneous w 0 storage e volume	P, N = 1 P,	ter usaghet water usaghet water person per Mar day for ear 95.22 used - call 137.44 and at point 0	ge in litre usage by day (all w Apr ach month 91.49 culated me 119.82 of use (no	es per da 5% if the of vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0	ay Vd,av lwelling is hot and co Jun ctor from 7 84.02 190 x Vd,r 99.21 r storage), 0	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46) 0 within sa	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0	Oct 95.22 Total = Su 124.42 Total = Su 0	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69		(44
if TF if TF innual educe of more of wate 4)m= hergy of instant 6)m= /ater torag comr	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 taneous with annual enthat 125 taneous with 125 taneous with 125 taneous with 125 taneous with 125 taneous	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early 137.44 and at point 0 including and no tare.	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or W velling, e	ay Vd,av lwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46) 0 within sa	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44)112 = ables 1b, 1 135.81 m(45)112 =	.35 Dec 102.69		(44
if TF if TF nnual educe of more of wate 4)m= hergy of instant 6)m= /ater torag comr	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 taneous with annual enthat 125 taneous with 125 taneous with 125 taneous with 125 taneous with 125 taneous	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early 137.44 and at point 0 including and no tare.	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or W velling, e	ay Vd,av lwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS	erage = designed ld) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44)112 = ables 1b, 1 135.81 m(45)112 =	.35 Dec 102.69		(4
if TF if TF innual educe of more of wate 4)m= hergy of instant 6)m= /ater torag commetherw /ater	A > 13.9 A £ 13.9 I average the annual of that 125 Jan 102.69 2001tent of 152.29 storage e volumemunity he vise if no storage	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - calc 137.44 ag at point 0 includir nd no tal hot water	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw er (this in	es per da 5% if the d vater use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or W velling, e	ay Vd,av lwelling is hot and co Jun ctor from 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	.35 Dec 102.69		(4)
if TF if TF innual educe of more of wate 4)m= nergy of 5)m= instant torag comr otherw /ater a) If m	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 storage enumity here is an ufactors.	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 95.22 used - calc 137.44 ag at point 0 includir nd no tal hot water	Apr Apr Ach month 91.49 culated mo 119.82 of use (no o and any so ank in dw er (this in	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o loar or W welling, e ancludes i	ay Vd,av lwelling is hot and co Jun ctor from 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	Dec 102.69 c, 1d) 147.48 0		(4)
if TF innual educe of more lot water (14)m= inergy (15)m= lotstant (15)m= lots	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 102.69 content of 152.29 storage e volume munity he vise if no storage lanufaction anu	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early sed - cally	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no o ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or Water velling, encludes i or is known	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed ild) Jul Table 1c x 84.02 m x nm x E 91.94 enter 0 in 0 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 87.75 DTm / 3600 105.5 boxes (46) 0 within sa (47)	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ =	.35 Dec 102.69 c, 1d) 147.48 0		(4)
if TF if TF innual educe of more of wate 4)m= hergy of 5)m= instant forms forms forms instant forms forms forms instant forms	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 storage e volume munity h vise if no storage anufactor erature far	P, N = 1 P,	ter usage hot water person per day for early 137.44 137.44 137.44 109 at point of the person per day for early 137.44 137.44 137.44 137.44 137.44 137.44 137.44	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no 0 ag any so ank in dw er (this in coss facto 2b , kWh/ye cylinder l	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o lar or W welling, e ncludes i or is kno ear loss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	.35 Dec 102.69 c, 1d) 147.48 0 0 0		(4) (4) (4) (4) (5)
if TF innual educe of more of wate (4)m= instant (6)m= Vater of torag torag of mergy of torag	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we are t	P, N = 1 P,	ter usage hot water overson per Mar day for ear 95.22 used - calcate 137.44 ag at point 0 including at point water overson per day for ear day for	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no o ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water 0 olar or Water velling, encludes i or is known	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	Dec 102.69 = c, 1d) 147.48 = 0		(4: (4: (4: (4: (4: (5:
if TF innual educe of more fot water (14)m= instant (15)m= vater vater of torag commotherw vater empe inergy of torag of	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 102.69 content of 152.29 content of 152.29 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havise if no estorage enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we annuity havis enthal 125 content of taneous we are t	Poly N = 1 Poly N = 1	ter usage hot water person per day for ear 95.22 used - call 137.44 ng at point of the colored lem Table storage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 91.49 culated mo 119.82 of use (no o ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fa 87.75 onthly = 4. 114.97 o hot water o lar or W welling, e ncludes i or is kno ear loss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 84.02 190 x Vd,r 99.21 r storage), 0 /WHRS enter 110 nstantar wn (kWh	erage = designed old) Jul Table 1c x 84.02 m x nm x L 91.94 enter 0 in 0 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 87.75 0Tm / 3600 105.5 boxes (46 0 within sa (47) pmbi boil	+ 36 a water us Sep 91.49 0 kWh/mor 106.76 0 to (61) 0 ame vess ers) ente	Oct 95.22 Total = Su 124.42 Total = Su 0 sel	9) 93 Nov 98.96 m(44) ₁₁₂ = ables 1b, 1 135.81 m(45) ₁₁₂ = 0	.35 Dec 102.69 c, 1d) 147.48 0 0 0		(4- (4- (4- (4- (4- (5- (5- (5- (5-

Energy lost from wa		(47) x (51)) x (52) x (53) =		0		(54)				
Enter (50) or (54) in Water storage loss of	` '	for each	month									
	0	0	0	0	0	0	0	0	0	0	1	(56)
(56)m= 0 0 If cylinder contains dedic					_	_	_		_	_] lix H	(30)
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss	annual) fr	om Table	e 3							0		(58)
Primary circuit loss	alculated	for each	month ((59)m = $($	(58) ÷ 36	65 × (41)	m					
(modified by facto	r from Tab	ole H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		1	
(59)m = 0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calculate	d for each	n month	(61)m =	(60) ÷ 30	65 × (41)m	_		_		_	
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required t	or water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 129.44 113.2	1 116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		(62)
Solar DHW input calculat								r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or\	//WHRS	applies	, see Ap	pendix (G)	,			1	
(63)m = 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from water h	eater										,	
(64)m= 129.44 113.2	1 116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		_
						Outp	out from w	ater heate	r (annual)₁	12	1248.5	(64)
Heat gains from wat	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 >	k [(46)m	+ (57)m	+ (59)m]	
(65)m= 32.36 28.3	29.21	25.46	24.43	21.08	19.54	22.42	22.69	26.44	28.86	31.34		(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal gains (s	ee Table :	5 and 5a):									
Metabolic gains (Tal	ole 5), Wa	tts										
Jan Fe) Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 124.54 124.5	4 124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54		(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m= 19.84 17.6	14.33	10.85	8.11	6.85	7.4	9.62	12.91	16.39	19.13	20.39		(67)
Appliances gains (ca	lculated in	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m= 222.55 224.8	6 219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03	212.73		(68)
Cooking gains (calc	ılated in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5			_	
(69)m= 35.45 35.4	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45	35.45		(69)
Pumps and fans gai	ns (Table	5a)									-	
(70)m= 0 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapora	tion (nega	tive valu	es) (Tab	le 5)							•	
(71)m= -99.63 -99.6	3 -99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63	-99.63		(71)
Water heating gains	(Table 5)			•							•	
(72)m= 43.5 42.1	39.26	35.36	32.84	29.28	26.26	30.13	31.51	35.54	40.08	42.12		(72)
Total internal gains	· =	•	•	(66)	m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72)	m	•	
(73)m= 346.24 344.9		313.22	292.32	272.8	260.51	264.29	274.78	294.68	317.6	335.6		(73)
		•		•								

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r Area m²		Flux Table 6a			g_ Table 6b		FF Table 6c	Gains (W)		
North	0.9x	0.77	x	1.36	x	10.63	x	0.63	x	0.7	=	4.42	(74)
North	0.9x	0.77	x	1.36	x	20.32	х	0.63	X	0.7	=	8.45	(74)
North	0.9x	0.77	x	1.36	x	34.53	X	0.63	X	0.7	=	14.35	(74)
North	0.9x	0.77	x	1.36	x	55.46	х	0.63	x	0.7	=	23.05	(74)
North	0.9x	0.77	x	1.36	x	74.72	x	0.63	x	0.7	=	31.05	(74)
North	0.9x	0.77	x	1.36	x	79.99	x	0.63	x	0.7	=	33.24	(74)
North	0.9x	0.77	x	1.36	x	74.68	x	0.63	x	0.7	=	31.04	(74)
North	0.9x	0.77	x	1.36	x	59.25	x	0.63	x	0.7	=	24.62	(74)
North	0.9x	0.77	x	1.36	x	41.52	x	0.63	x	0.7	=	17.26	(74)
North	0.9x	0.77	x	1.36	x	24.19	x	0.63	x	0.7	=	10.05	(74)
North	0.9x	0.77	x	1.36	x	13.12	x	0.63	x	0.7	=	5.45	(74)
North	0.9x	0.77	x	1.36	x	8.86	x	0.63	x	0.7	=	3.68	(74)
East	0.9x	0.77	x	1.8	x	19.64	x	0.63	x	0.7	=	10.8	(76)
East	0.9x	0.77	x	1.8	x	38.42	x	0.63	x	0.7	=	21.14	(76)
East	0.9x	0.77	x	1.8	x	63.27	x	0.63	x	0.7	=	34.81	(76)
East	0.9x	0.77	x	1.8	x	92.28	x	0.63	x	0.7	=	50.76	(76)
East	0.9x	0.77	x	1.8	x	113.09	x	0.63	x	0.7	=	62.21	(76)
East	0.9x	0.77	x	1.8	x	115.77	x	0.63	x	0.7	=	63.69	(76)
East	0.9x	0.77	x	1.8	x	110.22	x	0.63	x	0.7	=	60.63	(76)
East	0.9x	0.77	x	1.8	x	94.68	X	0.63	x	0.7	=	52.08	(76)
East	0.9x	0.77	X	1.8	x	73.59	x	0.63	X	0.7	=	40.48	(76)
East	0.9x	0.77	X	1.8	x	45.59	x	0.63	X	0.7	=	25.08	(76)
East	0.9x	0.77	X	1.8	X	24.49	X	0.63	X	0.7	=	13.47	(76)
East	0.9x	0.77	X	1.8	x	16.15	x	0.63	X	0.7	=	8.88	(76)
South	0.9x	0.77	X	5.12	X	46.75	X	0.63	X	0.7	=	73.15	(78)
South	0.9x	0.77	X	5.12	x	76.57	X	0.63	X	0.7	=	119.81	(78)
South	0.9x	0.77	X	5.12	x	97.53	X	0.63	X	0.7	=	152.61	(78)
South	0.9x	0.77	X	5.12	x	110.23	x	0.63	X	0.7	=	172.49	(78)
South	0.9x	0.77	X	5.12	x	114.87	X	0.63	X	0.7	=	179.74	(78)
South	0.9x	0.77	X	5.12	X	110.55	X	0.63	x	0.7	=	172.98	(78)
South	0.9x	0.77	X	5.12	x	108.01	X	0.63	X	0.7	=	169.01	(78)
South	0.9x	0.77	X	5.12	x	104.89	X	0.63	X	0.7	=	164.13	(78)
South	0.9x	0.77	X	5.12	x	101.89	x	0.63	x	0.7	=	159.42	(78)
South	0.9x	0.77	X	5.12	x	82.59	x	0.63	x	0.7	=	129.22	(78)
South	0.9x	0.77	X	5.12	x	55.42	x	0.63	x	0.7	=	86.71	(78)
South	0.9x	0.77	X	5.12	X	40.4	X	0.63	X	0.7	=	63.21	(78)

\Most			1		1		1		1		1		7,00
West 0.9		0.77	X	1.36	X	19.64	X	0.63	X	0.7] = 1	24.49	(80)
West 0.9	_	0.77	X	1.36	X	38.42	X	0.63	X	0.7	=	47.91	(80)
West 0.9		0.77	X	1.36	X	63.27	X	0.63	X	0.7] =	78.9	(80)
West 0.9		0.77	X	1.36	X	92.28	X	0.63	X	0.7	=	115.06	(80)
West 0.9	_	0.77	X	1.36	X	113.09	X	0.63	X	0.7	=	141.02	(80)
West 0.9	_	0.77	X	1.36	X	115.77	X	0.63	X	0.7	=	144.35	(80)
West 0.9	<u> </u>	0.77	X	1.36	X	110.22	X	0.63	X	0.7	=	137.43	(80)
West 0.9	(0.77	X	1.36	X	94.68	X	0.63	X	0.7	=	118.05	(80)
West 0.9	(0.77	X	1.36	X	73.59	X	0.63	X	0.7	=	91.76	(80)
West 0.9	(0.77	X	1.36	X	45.59	X	0.63	X	0.7	=	56.85	(80)
West 0.9	(0.77	X	1.36	X	24.49	X	0.63	X	0.7	=	30.54	(80)
West 0.9		0.77	X	1.36	X	16.15	X	0.63	X	0.7	=	20.14	(80)
Rooflights 0.9		1	X	1.12	X	25.93	Х	0.63	X	0.7	=	23.06	(82)
Rooflights 0.9		1	X	1.12	X	25.93	X	0.63	X	0.7	=	23.06	(82)
Rooflights 0.9	(1	X	0.93	X	25.93	X	0.63	x	0.7	=	9.53	(82)
Rooflights 0.9	(1	X	0.66	X	25.93	X	0.63	x	0.7	=	6.76	(82)
Rooflights 0.9	(1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights 0.9	(1	X	1.12	X	51.88	X	0.63	x	0.7	=	46.13	(82)
Rooflights 0.9	(1	x	0.93	X	51.88	x	0.63	x	0.7	=	19.08	(82)
Rooflights 0.9	•	1	X	0.66	X	51.88	x	0.63	x	0.7	=	13.53	(82)
Rooflights 0.9	(1	X	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights 0.9	<	1	x	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights 0.9	<	1	x	0.93	x	88.38	х	0.63	x	0.7	=	32.5	(82)
Rooflights 0.9	•	1	x	0.66	x	88.38	х	0.63	x	0.7] =	23.04	(82)
Rooflights 0.9	(1	x	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights 0.9	(1	x	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights 0.9	(1	x	0.93	x	133.65	x	0.63	x	0.7	j =	49.15	(82)
Rooflights 0.9	(1	x	0.66	x	133.65	x	0.63	x	0.7	=	34.85	(82)
Rooflights 0.9	(1	x	1.12	x	168.1	х	0.63	x	0.7	=	149.47	(82)
Rooflights 0.9	(1	x	1.12	x	168.1	x	0.63	x	0.7	j =	149.47	(82)
Rooflights 0.9	(1	x	0.93	x	168.1	х	0.63	x	0.7	j =	61.81	(82)
Rooflights 0.9	(1	x	0.66	x	168.1	х	0.63	x	0.7	j =	43.83	(82)
Rooflights 0.9x	(1	x	1.12	x	174	x	0.63	X	0.7	j =	154.72	(82)
Rooflights 0.9	•	1	x	1.12	x	174	x	0.63	x	0.7	j =	154.72	(82)
Rooflights 0.9	•	1	x	0.93	x	174	х	0.63	x	0.7	j =	63.98	(82)
Rooflights 0.9	,	1	x	0.66	x	174	x	0.63	x	0.7	=	45.37	(82)
Rooflights 0.9	(1	×	1.12	x	164.87	x	0.63	x	0.7	i =	146.6	(82)
Rooflights 0.9		1	X	1.12	X	164.87	X	0.63	x	0.7	=	146.6	(82)
Rooflights 0.9	(1	X	0.93	X	164.87	X	0.63	X	0.7	=	60.62	(82)
Rooflights 0.9	(1	X	0.66	X	164.87	X	0.63	X	0.7	=	42.99	(82)
Rooflights 0.9		1	X	1.12	X	138.72	X	0.63	x	0.7	, 	123.35	(82)
									ı				_ ′

Pooflighto o o F					_		1						— (00)
Rooflights 0.9x	1	X	1.1		_	38.72	X	0.63	×	0.7	=	123.35	(82)
Rooflights 0.9x	1	X	0.9)3	-	38.72	X	0.63	x	0.7	_ =	51.01	(82)
Rooflights 0.9x	1	X	0.6	66	X 1	38.72	X	0.63	X	0.7	_ =	36.17	(82)
Rooflights 0.9x	1	X	1.1	2	x 1	04.33	X	0.63	X	0.7	=	92.77	(82)
Rooflights 0.9x	1	X	1.1	2	X 1	04.33	X	0.63	X	0.7	=	92.77	(82)
Rooflights 0.9x	1	X	0.9)3	X1	04.33	X	0.63	Х	0.7	=	38.36	(82)
Rooflights 0.9x	1	X	0.6	66	X 1	04.33	X	0.63	X	0.7	=	27.2	(82)
Rooflights 0.9x	1	X	1.1	2	X	62.32	X	0.63	X	0.7	=	55.42	(82)
Rooflights 0.9x	1	X	1.1	2	X	62.32	X	0.63	X	0.7	=	55.42	(82)
Rooflights 0.9x	1	X	0.9)3	X	62.32	x	0.63	X	0.7	=	22.92	(82)
Rooflights 0.9x	1	X	0.6	66	X	62.32	X	0.63	Х	0.7	=	16.25	(82)
Rooflights _{0.9x}	1	x	1.1	2	x	32.54	x	0.63	х	0.7	=	28.93	(82)
Rooflights 0.9x	1	x	1.1	2	x	32.54	x	0.63	x	0.7	=	28.93	(82)
Rooflights _{0.9x}	1	x	0.9)3	х :	32.54	x	0.63	x	0.7		11.96	(82)
Rooflights _{0.9x}	1	x	0.6	66	x	32.54	X	0.63	x	0.7	-	8.48	(82)
Rooflights _{0.9x}	1	x	1.1	2	x	21.19] x	0.63	x	0.7		18.84	(82)
Rooflights _{0.9x}	1	X	1.1	2	x	21.19	X	0.63	x	0.7		18.84	(82)
Rooflights 0.9x	1	x	0.9	_		21.19]]	0.63	x	0.7	= =	7.79	(82)
Rooflights 0.9x	<u>·</u> 1	x	0.6			21.19]]	0.63	x	0.7	= =	5.53	(82)
J 11 L	· · · · ·						J	0.00				0.00	(- /
Solar gains in	watts ca	lculated	for eac	h month			(83)m	n = Sum(74)n	n (82)m				
(83)m= 175.27	322.15	493.39	683.05	818.61	833.06	794.92	692		 		146.93]	(83)
Total gains – ir	Total gains – internal and solar (84)m = (73)m + (83)m , watts									ı			
(84)m= 521.52	667.11	826.37	996.27	1110.93	1105.86	1055.43	957	.06 834.8	665.8	8 532.08	482.53]	(84)
7. Mean inter	nal temn	erature	(heating	season)			·					
Temperature						from Tal	hle 9	Th1 (°C)				21	(85)
Utilisation fac	Ū	٠.			Ū		010 0	, , , , , , , , , , , , , , , , , , , ,				21	(00)
Jan	Feb	Mar	Apr	May	Jun	Jul	Δ	ug Sep	Oct	t Nov	Dec]	
(86)m= 1	0.99	0.97	0.91	0.78	0.59	0.44	0.		0.96		1	1	(86)
					<u>Į</u>	<u> </u>			0.00	1 0.00	<u> </u>	J	, ,
Mean interna	r	The state of the s		· ·	1	i 	1		1 00 45	- 1 400	1 40 40	1	(07)
(87)m= 19.52	19.76	20.12	20.54	20.84	20.96	20.99	20.	99 20.89	20.45	19.9	19.49		(87)
Temperature	during h				dwelling	from Ta	able 9	9, Th2 (°C))			1	
(88)m= 19.79	19.8	19.8	19.81	19.82	19.83	19.83	19.	83 19.82	19.82	19.81	19.81		(88)
Utilisation fac	tor for ga	ains for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 1	0.99	0.96	0.88	0.71	0.49	0.33	0.3	0.68	0.94	0.99	1		(89)
Mean internal	l temper	ature in t	he rest	of dwell	ina T2 (1	follow ste	eps 3	to 7 in Ta	ble 9c)	•	-	•	
(90)m= 18.46	18.7	19.06	19.47	19.72	19.82	19.83	19.	T I		18.85	18.44]	(90)
					I .					ving area ÷ (4) =	0.22	(91)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$													
	18.94	19.29	19.71	ole dwe 19.97	1 20.07	20.09	+ (1		1	1 19.09	10.67	1	(92)
	l l				l	l					18.67	J	(34)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate													

(93)m=	18.7	18.94	19.29	19.71	19.97	20.07	20.09	20.09	20.02	19.64	19.09	18.67		(93)
` '			uirement	L							1000			
					re ohtair	ed at st	en 11 of	Tahle 9k	n so tha	t Ti m-(76)m an	d re-calc	rulate	
			or gains	•		iod at ot	SP 11 01	Table of), 30 tria	· · · · · · · · · · · · · · · · · · ·	r Ojiii aii	a re oaic	diato	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	1:									ı	
(94)m=	1	0.99	0.96	0.88	0.72	0.52	0.35	0.41	0.69	0.94	0.99	1		(94)
Usefu	I gains,	hmGm	, W = (9 ²	4)m x (8	4)m									
(95)m=	518.97	657.85	792.33	874.48	800.81	570.14	371.55	390.01	579.41	622.9	526.31	480.83		(95)
Month	nly avera	age exte	rnal tem	perature	from T	able 8					!			
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	oss rate	for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]	•			
(97)m=	1597.31	1552.34	1410.64	1175.48	896.69	586.24	373.77	394.2	637.07	979.96	1307.18	1586.67		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97)	m – (95)m] x (4	1)m	•		
(98)m=	802.29	601.1	460.02	216.72	71.33	0	0	0	0	265.65	562.23	822.74		
'								Tota	l per year	(kWh/yeaı	r) = Sum(9	8)15,912 =	3802.08	(98)
Space	e heatin	a require	ement in	kWh/m²	2/vear								46.65	(99)
		•			/ y ou!								40.00	
			quiremen			1.01								
Calcu			July and				11	۸۰۰۰	Con	Oct	Nov	Doo		
Hoot	Jan	Feb	Mar	Apr	May So into	Jun	Jul	Aug	Sep	Oct	Nov o from T	Dec able 10)		
(100)m=	055 Tale	0 LIII (Ca	0	0	0	1006.88	792.65	812.2	0	o 0	0	0		(100)
` ′	-	tor for lo			0	1000.00	792.03	012.2	U	0				(100)
(101)m=		0	0	0	0	0.91	0.95	0.93	0	0	0	0		(101)
	-					l	0.95	0.93	U	0				(101)
(102)m=	0	0	Vatts) = (0	0	915.36	753.23	755.14	0	0	0	0		(102)
			lculated		<u> </u>		<u> </u>			0				(102)
(103)m=		gairis ca 0	0		0	1314.8		1154.83	0	0	0	0		(103)
				L	l	l	l					102)m]:	 v (41)m	(100)
			(104)m <			iwening,	COMMINA	Jus (KVV	11) – 0.0.	24 X [(10)3)III — (102)111])	x (4 1)111	
(104)m=	0	0	0	0	0	287.59	375.27	297.37	0	0	0	0		
l		<u> </u>			<u>!</u>				Total	= Sum(1.0.4)	=	960.24	(104)
Cooled	I fraction	า									area ÷ (4	4) =	1	(105)
Intermi	ttency f	actor (Ta	able 10b)										
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
·	·		<u> </u>	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·			Total	l = Sum((104)	=	0	(106)
		requirer	ment for	month =	(104)m	× (105)	× (106)r	n						
(107)m=	0	0	0	0	0	71.9	93.82	74.34	0	0	0	0		
									Total	= Sum((107)	=	240.06	(107)
Space cooling requirement in kWh/m²/year $(107) \div (4) =$											2.95	(108)		
8f. Fab	ric En <u>e</u> i	rgy Effi <u>c</u>	iency (ca	alcul <u>ate</u> d	l only un	der spec	cial cond	litions, <u>s</u> e	ee sectio	on 1 <u>1</u>) _				
Fabrio	Energy	y Efficier	ncy						(99)	+ (108) :	=		49.6	(109)
			y Efficie	encv (TF	EE)				. ,	. ,			57.04	(109)
3-		9	,	- 7 (,									」 ` ′

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU	ISE C - FINAL			
Address:	Woodwell Cottage P2, W	oodwell Road, BRISTOL	, BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(m)	Volume(m³)
Ground floor		40.75 (1a) >	2.6	(2a) =	105.95	(3a)
First floor		40.75 (1b) >	2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 81.5 (4)				_
Dwelling volume		(3a)+((3b)+(3c)+(3d)+(3e)	+(3n) =	197.23	(5)
2. Ventilation rate:						
	main second heating heatin	dary other	total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Air ch	anges per ho	NII T
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)$)+(7a)+(7b)+(7c) =	30	÷ (5) =	0.15	(8)
•	peen carried out or is intended, proc			+ (3) =	0.15	(0)
Number of storeys in the	he dwelling (ns)			[0	(9)
Additional infiltration				[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame	or 0.35 for masonry con	struction	Ì	0	(11)
if both types of wall are pa deducting areas of openia	resent, use the value correspondin	g to the greater wall area (after		•		_
	floor, enter 0.2 (unsealed) o	r 0.1 (sealed), else enter	0	[0	(12)
If no draught lobby, en	ter 0.05, else enter 0			İ	0	(13)
Percentage of windows	s and doors draught strippe	d		Ì	0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =	Ì	0	(15)
Infiltration rate		(8) + (10) + (11) -	+ (12) + (13) + (15)	=	0	(16)
Air permeability value,	q50, expressed in cubic me	etres per hour per square	metre of envelo	pe area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20]$)]+(8), otherwise (18) = (16)		Ì	0.35	(18)
Air permeability value applie	es if a pressurisation test has been	done or a degree air permeabil	lity is being used	L		_
. , , , , , , , , , , , , , , , , , , ,				[(19)
Number of sides sheltere	ed			I	0	(/
	ed	(20) = 1 - [0.075]	x (19)] =	ļ	1	(20)
Number of sides sheltere		(20) = 1 - [0.075: $(21) = (18) \times (20)$		[⊣ ``
Number of sides sheltere Shelter factor	ting shelter factor			[1	(20)
Number of sides sheltere Shelter factor Infiltration rate incorporat	ting shelter factor	(21) = (18) x (20)	=	ov Dec	1	(20)

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind F	actor (2	2a)m =	(22)m ÷	4										
(22a)m=	1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjuste	ed infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
	0.45	0.44	0.43	0.39	0.38	0.33	0.33	0.33	0.35	0.38	0.4	0.41		
		<i>tive air</i> o	change i	rate for t	he appli	cable ca	se	•		•				(23a)
_			using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23a)
			overy: effici		, ,	,	. ,	,, .	,	, , ,			0	(23c)
a) If b	palance	d mecha	anical ve	ntilation	with hea	at recov	erv (MVI	HR) (24a	a)m = (2)	2b)m + (23b) x [1 – (23c)		(200)
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If b	balance	d mecha	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24b	m = (22)	2b)m + (23b)		ı	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If v	whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	n from o	outside					
if	f (22b)m	า < 0.5 x	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	5 × (23k	o)		-	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,			on or wh		•					0.51				
г	0.6	0.6	en (24d) _{0.59}	m = (221)	0.57	0.56		- `			0.50	0.50	1	(24d)
(24d)m=						<u> </u>	0.56	0.55	0.56	0.57	0.58	0.59		(24u)
(25)m=	0.6	cnange _{0.6}	rate - er	o.58) or (240 0.57	0.56 O.56	c) or (24 0.56	0.55	0.56	0.57	0.58	0.59	1	(25)
(23)111=	0.0	0.0	0.59	0.50	0.57	0.30	0.30	0.55	0.30	0.57	0.50	0.59		(20)
			eat loss p											
ELEM	IFNT	O												
		Gros area	_	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²·l		A X k kJ/K
Doors	LIVI		_				m²				K)			
Doors Windov		area	_			A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
	ws Type	area	_			A ,r	m ² x x 10	W/m2	eK = [0.04] = [(W/ 2.702	K)			kJ/K (26)
Windov	vs Type vs Type	area	_			A ,r	m ² x x1 x1 x1	W/m2 1.4 /[1/(1.4)+	eK = [0.04] = [0.04] = [2.702 2.15	K)			kJ/K (26) (27)
Window	vs Type vs Type vs Type	area	_			A ,r 1.93 1.62	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} & & & \\ & & & &$	2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
Window Window Window	vs Type vs Type vs Type vs Type	area	_			A ,r 1.93 1.62 1.62 6.08	x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	K = 0.04 = 0.0	2.702 2.15 2.15 8.06	K)			kJ/K (26) (27) (27) (27) (27)
Window Window Window Window	vs Type vs Type vs Type vs Type hts Typ	area 1 2 2 3 4 4 e 1	_			A ,r 1.93 1.62 1.62 6.08 2.14	x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27) (27)
Window Window Window Roofligh	vs Type vs Type vs Type vs Type hts Typ hts Typ	area : 1 : 2 : 3 : 4 : e 1 : e 2	_			A ,r 1.93 1.62 1.62 6.08 2.14 1.33	x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) +	$ \begin{array}{ccc} & & & & \\ & & & \\ & & $	2.702 2.15 2.15 8.06 2.84 1.729	K)			(26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Roofligh Roofligh	vs Type vs Type vs Type vs Type hts Typ hts Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	_			A ,r 1.93 1.62 1.62 6.08 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) +	$ \begin{array}{ccc} $	2.702 2.15 2.15 8.06 2.84 1.729	K)			kJ/K (26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Window Roofligl Roofligl	vs Type vs Type vs Type vs Type hts Typ hts Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	_			A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} $	2.702 2.15 2.15 8.06 2.84 1.729 1.729	K)			kJ/K (26) (27) (27) (27) (27) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	(m²)		<u>,</u>	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.37	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	K	2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	area 41 42 43 44 61 62 63 64	(m²)	m	<u>,</u>	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	K	2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b)
Window Window Window Roofligh Roofligh Roofligh Roofligh Floor Walls T	vs Type vs Type vs Type hts Typ hts Typ hts Typ hts Typ	area 1 2 3 4 e 1 e 2 e 3 e 4 e 4 102.9	95	16.6:	<u>,</u>	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ 0.17 0.2	K	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26	K)			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b) (28)
Window Window Window Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Floor Walls T Roof	vs Type vs Type vs Type hts Typ hts Typ hts Typ ts Typ	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4	95 3	16.63 0	<u>,</u>	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.2	K	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
Window Window Window Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Roofligh Tloor	vs Type vs Type vs Type hts Typ hts Typ hts Typ ts Typ Type1 Type2 rea of e	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4 102.9 102.9 103.9 104.9	95 3 , m²	16.63 0	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	EK 0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Roofligl Tloor Walls T Walls T Roof Total an * for wind ** include	vs Type vs Type vs Type hts Typ hts Typ hts Typ Type1 Type2 rea of e dows and e the area	area area a 1 a 2 a 3 a 4 a e 1 a e 2 a 3 a e 4 b e 1 a e 2 a 1 a 102.9 a 102.	95 3 , m² ows, use e sides of in	16.63 0 7.2 ffective will ternal wall	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207 alue calculations	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & &$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Roofligl Tloor Walls T Walls T Roof Total an ** for wind ** include Fabric I	vs Type vs Type vs Type hts Typ hts Typ hts Typ ts Typ cype1 cype2 rea of e dows and e the area heat los	area a1 a2 a3 a4 e1 e2 e3 e4 102.9 a1 a2 a1 a2 a1 a2 a3 a4 b4 b5 c6 a1 c7 c7 c7 c7 c7 c7 c7 c7 c7 c7 c7 c7 c7	95 3 , m² ows, use e sides of in = S (A x	16.63 0 7.2 ffective will ternal wall	3	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.31 1.1 0.78 40.79 86.32 2 54.1 207 alue calculations	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} & & & & & & & \\ & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & \\$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l		(26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Window Window Window Window Roofligl Roofligl Roofligl Roofligl Floor Walls T Walls T Roof Total an * for wind ** include Fabric I Heat ca	vs Type vs Type vs Type vs Type hts Typ hts Typ hts Typ Type1 Type2 rea of e dows and e the area heat los	area a 1 a 2 a 3 a 4 b 1 b 2 c 3 b 4 b 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 7 c 7 c 7 c 7 c 7 c 7 c 7	95 3 , m² ows, use e sides of in = S (A x	16.63 0 7.2 ffective winternal walk	3 ndow U-va	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1 207 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} & & & & & & & \\ & & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & \\$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	3.2	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)

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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

and have a disease	- 1 -6 - 1-	1-9-dl-	de Cere										
can be used instead Thermal bridge				ısina An	nendiy l	K						11.97	(36)
if details of therma	,	,			•							11.97	(30)
Total fabric hea	0 0		()	(0	.,			(33) +	(36) =			75.23	(37)
Ventilation hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × ((25)m x (5))		_
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 39.1	38.85	38.6	37.42	37.21	36.18	36.18	36	36.58	37.21	37.65	38.11		(38)
Heat transfer of	oefficier	nt, W/K			-	-		(39)m	= (37) + (37)	38)m	-		
(39)m= 114.33	114.08	113.83	112.65	112.43	111.41	111.41	111.22	111.81	112.43	112.88	113.34		
Heat loss para	meter (H	HLP), W/	m²K			-			Average = = (39)m ÷		12 /12=	112.65	(39)
(40)m= 1.4	1.4	1.4	1.38	1.38	1.37	1.37	1.36	1.37	1.38	1.38	1.39		
Number of day	s in moi	nth (Tab	le 1a)						Average =	Sum(40) ₁	12 /12=	1.38	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ing ener	rgy requi	rement:								kWh/ye	ear:	
Assumed occu	inancy I	N									40		(42)
if TFA > 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.49		(42)
Annual averag	e hot wa										3.35		(43)
Reduce the annua not more that 125	_				_	_	to achieve	a water us	se target o	f		•	
Jan	Feb	Mar			Jun	Jul	L	Sep	Oct	Nov	Dec		
Hot water usage in			Apr ach month	May Vd,m = fa			Aug (43)	Sep	Oct	I NOV	Dec		
(44)m= 102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49	95.22	98.96	102.69		
` ,						ļ			I Total = Su	<u>I</u> m(44) ₁₁₂ =	<u> </u>	1120.25	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48		_
If instantaneous w	ator hoatii	na at noint	of use (no	hot water	r storaga)	anter () in	hoves (16		Total = Su	m(45) ₁₁₂ =	=	1468.83	(45)
			•					. ,	Ι ,	Ι ,	Ι ,	1	(46)
(46)m= 0 Water storage	0 loss:	0	0	0	0	0	0	0	0	0	0		(40)
Storage volum		includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	eating a	nd no ta	nk in dw	elling, e	nter 110	litres in	(47)					•	
Otherwise if no		hot wate	er (this in	ıcludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage		odorod I	ooo foot	ar ia kna		2/d0x/):						Ī	(40)
a) If manufact				JI IS KIIO	WII (KVVI	i/uay).					0		(48)
Temperature fa				oor			(49) v (40)				0		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)	, =			0		(50)
Hot water stora	age loss	factor fr	om Tabl								0		(51)
If community h	_		on 4.3									Ī	
Volume factor Temperature fa			2h							_	0		(52) (53)
romporature it	20101 110	Table	_~								U	I	(53)

Energy lost from		•	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or	` , ` `	,									0		(55)
Water storage	loss cal	culated t	for each	month			((56)m = (55) × (41)ı	m -			•	
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H -	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circui	t loss (ar	nual) fro	om Table	3							0		(58)
Primary circui				`	•	,	, ,						
(modified by		i							 			1	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m					•	
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water h	eating ca	alculated	for eacl	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 129.44	113.21	116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		(62)
Solar DHW input	calculated	using App	endix G or	· Appendix	H (negati	ve quantity	v) (enter '0	' if no sola	r contribut	on to wate	er heating)		
(add additiona	al lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from w	ater hea	ter											
(64)m= 129.44	113.21	116.82	101.85	97.73	84.33	78.15	89.67	90.74	105.75	115.44	125.36		_
							Outp	out from wa	ater heate	r (annual) ₁	12	1248.5	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	د [(46)m	+ (57)m	+ (59)m]	
(65)m= 32.36	28.3	29.21	25.46	24.43	21.08	19.54	22.42	22.69	26.44	28.86	31.34		(65)
include (57)	m in cal	culation	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal g	ains (see	Table 5	and 5a):									
Metabolic gair	ns (Table	. 5). Wat	ts										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54	124.54		(66)
Lighting gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	!			•	
(67)m= 19.84	17.62	14.33	10.85	8.11	6.85	7.4	9.62	12.91	16.39	19.13	20.39		(67)
Appliances ga	ins (calc	ulated ir										l	
(68)m= 222.55	`	uiaicu ii	ı Append	dix L. eq	uation L	13 or L1	3a), also	see Ta	ble 5				
(00)111= 222.33	224.86	219.04	206.65	dix L, eq	uation L ²	13 or L1 166.49	3a), also	see Ta	ble 5 182.39	198.03	212.73	1	(68)
` '	ļ	219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03	212.73		(68)
Cooking gains (69)m= 35.45	ļ	219.04	206.65	191.01	176.31	166.49	164.18	170	182.39	198.03 35.45	212.73] 	(68) (69)
Cooking gains (69)m= 35.45	s (calcula 35.45	219.04 Ited in A 35.45	206.65 ppendix 35.45	191.01 L, equat	176.31 tion L15	166.49 or L15a)	164.18 , also se	170 ee Table	182.39]	
Cooking gains	s (calcula 35.45	219.04 Ited in A 35.45	206.65 ppendix 35.45	191.01 L, equat	176.31 tion L15	166.49 or L15a)	164.18 , also se	170 ee Table	182.39				
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0	35.45 ns gains	219.04 Ited in A 35.45 (Table \$	206.65 ppendix 35.45 5a)	191.01 L, equat 35.45	176.31 tion L15 35.45	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45	182.39 5 35.45	35.45	35.45] 	(69)
Cooking gains (69)m= 35.45 Pumps and fa	35.45 ns gains	219.04 Ited in A 35.45 (Table \$	206.65 ppendix 35.45 5a)	191.01 L, equat 35.45	176.31 tion L15 35.45	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45	182.39 5 35.45	35.45	35.45]]]	(69)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -99.63	s (calcula 35.45 ns gains 0 vaporatio	219.04 Ited in A 35.45 (Table 5 0 on (nega	206.65 ppendix 35.45 5a) 0 tive valu	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5)	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45 0	182.39 5 35.45	35.45	35.45		(69) (70)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. e	s (calcula 35.45 ns gains 0 vaporatio	219.04 Ited in A 35.45 (Table 5 0 on (nega	206.65 ppendix 35.45 5a) 0 tive valu	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5)	166.49 or L15a) 35.45	164.18 , also se 35.45	170 ee Table 35.45 0	182.39 5 35.45	35.45	35.45] 	(69) (70)
Cooking gains $(69)m= 35.45$ Pumps and fa $(70)m= 0$ Losses e.g. et $(71)m= -99.63$ Water heating $(72)m= 43.5$	s (calcula 35.45 ns gains 0 vaporatio -99.63 gains (T	219.04 ated in A 35.45 (Table § 0 on (nega -99.63 Table 5) 39.26	206.65 ppendix 35.45 5a) 0 tive valu -99.63	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5) -99.63	166.49 or L15a) 35.45 0 -99.63	164.18 , also se 35.45 0 -99.63	170 ee Table 35.45 0 -99.63	182.39 5 35.45 0	35.45 0 -99.63 40.08	35.45 0 -99.63		(69) (70) (71)
Cooking gains (69)m= 35.45 Pumps and fa (70)m= 0 Losses e.g. et (71)m= -99.63 Water heating	s (calcula 35.45 ns gains 0 vaporatio -99.63 gains (T 42.12	219.04 ated in A 35.45 (Table § 0 on (nega -99.63 Table 5) 39.26	206.65 ppendix 35.45 5a) 0 tive valu -99.63	191.01 L, equat 35.45 0 es) (Tab	176.31 tion L15 35.45 0 ole 5) -99.63	166.49 or L15a) 35.45 0 -99.63	164.18 , also se 35.45 0 -99.63	170 ee Table 35.45 0 -99.63	182.39 5 35.45 0 -99.63	35.45 0 -99.63 40.08	35.45 0 -99.63		(69) (70) (71)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	6.02	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.8	=	11.5	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	x	0.8	=	19.54	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	31.38	(74)
North	0.9x	0.77	X	1.62	x	74.72	x	0.63	x	0.8	=	42.28	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	45.26	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	42.25	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	33.52	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	23.49	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	13.69	(74)
North	0.9x	0.77	x	1.62	x	13.12	X	0.63	x	0.8	=	7.42	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	5.02	(74)
East	0.9x	0.77	x	2.14	x	19.64	x	0.63	x	0.8	=	14.68	(76)
East	0.9x	0.77	x	2.14	x	38.42	X	0.63	X	0.8	=	28.72	(76)
East	0.9x	0.77	x	2.14	x	63.27	X	0.63	X	0.8	=	47.29	(76)
East	0.9x	0.77	x	2.14	x	92.28	X	0.63	x	0.8	=	68.97	(76)
East	0.9x	0.77	X	2.14	x	113.09	X	0.63	X	0.8	=	84.53	(76)
East	0.9x	0.77	x	2.14	x	115.77	X	0.63	x	0.8	=	86.53	(76)
East	0.9x	0.77	x	2.14	x	110.22	X	0.63	x	0.8	=	82.38	(76)
East	0.9x	0.77	x	2.14	x	94.68	X	0.63	X	0.8	=	70.76	(76)
East	0.9x	0.77	x	2.14	x	73.59	X	0.63	x	0.8	=	55	(76)
East	0.9x	0.77	x	2.14	x	45.59	X	0.63	X	0.8	=	34.08	(76)
East	0.9x	0.77	X	2.14	X	24.49	X	0.63	X	0.8	=	18.3	(76)
East	0.9x	0.77	X	2.14	x	16.15	X	0.63	X	0.8	=	12.07	(76)
South	0.9x	0.77	X	6.08	X	46.75	X	0.63	X	0.8	=	99.28	(78)
South	0.9x	0.77	X	6.08	X	76.57	X	0.63	X	0.8	=	162.6	(78)
South	0.9x	0.77	x	6.08	x	97.53	x	0.63	x	0.8	=	207.12	(78)
South	0.9x	0.77	X	6.08	X	110.23	X	0.63	X	0.8	=	234.09	(78)
South	0.9x	0.77	x	6.08	X	114.87	x	0.63	x	0.8	=	243.94	(78)
South	0.9x	0.77	x	6.08	X	110.55	X	0.63	X	0.8	=	234.76	(78)
South	0.9x	0.77	X	6.08	X	108.01	X	0.63	X	0.8	=	229.37	(78)
South	0.9x	0.77	x	6.08	X	104.89	x	0.63	x	0.8	=	222.75	(78)
South	0.9x	0.77	x	6.08	x	101.89	x	0.63	x	0.8	=	216.36	(78)
South	0.9x	0.77	x	6.08	x	82.59	x	0.63	x	0.8	=	175.38	(78)
South	0.9x	0.77	x	6.08	x	55.42	x	0.63	x	0.8	=	117.68	(78)
South	0.9x	0.77	x	6.08	x	40.4	X	0.63	x	0.8	=	85.79	(78)

\Most	_		1		1		1		l		1		7,000
West 0.9	\vdash	0.77	X	1.62	X	19.64	X	0.63	X	0.8] = 1	33.34	(80)
West 0.9	\vdash	0.77	X	1.62	X	38.42	X	0.63	X	0.8	=	65.22	(80)
West 0.9		0.77	X	1.62	X	63.27	X	0.63	X	0.8	=	107.4	(80)
West 0.9	\vdash	0.77	X	1.62	X	92.28	X	0.63	X	0.8	=	156.64	(80)
West 0.9	×	0.77	X	1.62	X	113.09	X	0.63	X	0.8	=	191.97	(80)
West 0.9	×	0.77	X	1.62	X	115.77	X	0.63	X	0.8	=	196.52	(80)
West 0.9	×	0.77	X	1.62	X	110.22	Х	0.63	X	0.8	=	187.09	(80)
West 0.9	×	0.77	X	1.62	X	94.68	X	0.63	X	0.8	=	160.71	(80)
West 0.9	×	0.77	X	1.62	X	73.59	X	0.63	X	0.8	=	124.91	(80)
West 0.9	x	0.77	X	1.62	X	45.59	X	0.63	X	0.8	=	77.39	(80)
West 0.9	x 🗌	0.77	X	1.62	X	24.49	X	0.63	X	0.8	=	41.57	(80)
West 0.9	x 🗌	0.77	X	1.62	X	16.15	X	0.63	x	0.8	=	27.42	(80)
Rooflights 0.9	x 🗌	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x 🗌	1	X	1.1	X	25.93	X	0.63	X	0.8	=	12.94	(82)
Rooflights 0.9	x 🗌	1	X	0.78	x	25.93	x	0.63	x	0.8	=	9.17	(82)
Rooflights 0.9	x 🗌	1	X	1.33	x	51.88	x	0.63	X	0.8	=	62.59	(82)
Rooflights 0.9	×	1	X	1.33	x	51.88	x	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9	×	1	x	1.1	x	51.88	x	0.63	x	0.8	=	25.88	(82)
Rooflights 0.9	×	1	x	0.78	x	51.88	x	0.63	x	0.8	=	18.35	(82)
Rooflights 0.9	x	1	x	1.33	x	88.38	x	0.63	x	0.8] =	106.64	(82)
Rooflights 0.9	×	1	x	1.33	x	88.38	x	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9	×	1	x	1.1	x	88.38	x	0.63	x	0.8	=	44.1	(82)
Rooflights 0.9	×	1	x	0.78	x	88.38	x	0.63	x	0.8	j =	31.27	(82)
Rooflights 0.9	×	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	x 🔚	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	×	1	x	1.1	x	133.65	х	0.63	x	0.8	j =	66.69	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	0.78	x	133.65	x	0.63	х	0.8	j =	47.29	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	x	0.63	х	0.8	j =	202.82	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	х	0.63	x	0.8	j =	202.82	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	1.1	x	168.1	x	0.63	х	0.8	j =	83.87	(82)
Rooflights 0.9	×	1	x	0.78	x	168.1	x	0.63	x	0.8	=	59.47	(82)
Rooflights 0.9	×	1	x	1.33	x	174	x	0.63	x	0.8	j =	209.95	(82)
Rooflights 0.9	× $lacksquare$	1	x	1.33	x	174	x	0.63	x	0.8	=	209.95	(82)
Rooflights 0.9	×	1	x	1.1	x	174	x	0.63	x	0.8	=	86.82	(82)
Rooflights 0.9	×	1	X	0.78	X	174	X	0.63	x	0.8	=	61.56	(82)
Rooflights 0.9	×	1	X	1.33	X	164.87	X	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9	_	1	X	1.33	X	164.87	X	0.63	x	0.8	, 	198.92	(82)
Rooflights 0.9	_	1	X	1.1	X	164.87	X	0.63	x	0.8	, =	82.26	(82)
Rooflights 0.9		1	X	0.78	X	164.87	X	0.63	x	0.8	, =	58.33	(82)
Rooflights 0.9		1	X	1.33) x	138.72]] x	0.63	x	0.8] =	167.38	(82)
		<u> </u>	J		1		1		I		ı		_ ` ′

										_				_
Rooflights 0.9x	1	X	1.3	33	X	13	88.72	X	0.63	X	0.8	=	167.38	(82)
Rooflights 0.9x	1	X	1.	1	X	13	88.72	X	0.63	X	0.8	=	69.22	(82)
Rooflights 0.9x	1	X	0.7	' 8	X	13	88.72	X	0.63	X	0.8	=	49.08	(82)
Rooflights 0.9x	1	X	1.3	33	X	10	4.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.3	33	x	10	4.33	x	0.63	X	0.8	=	125.88	(82)
Rooflights 0.9x	1	X	1.	1	x	10	4.33	X	0.63	x	0.8	=	52.05	(82)
Rooflights 0.9x	1	X	0.7	78	X	10	14.33	X	0.63	x	0.8	=	36.91	(82)
Rooflights 0.9x	1	X	1.3	33	x	62	2.32	X	0.63	x	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.3	33	x	62	2.32	X	0.63	x	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.	1	X	62	2.32	X	0.63	x	0.8	=	31.1	(82)
Rooflights 0.9x	1	X	0.7	78	x	62	2.32	x	0.63	x	0.8	=	22.05	(82)
Rooflights 0.9x	1	X	1.3	33	x	32	2.54	x	0.63	x	0.8	=	39.26	(82)
Rooflights 0.9x	1	X	1.3	33	x	32	2.54	x	0.63	x	0.8	=	39.26	(82)
Rooflights 0.9x	1	x	1.	1	x	32	2.54	x	0.63	x	0.8	_ =	16.23	(82)
Rooflights 0.9x	1	x	0.7	78	x	32	2.54	x	0.63	x	0.8	_ =	11.51	(82)
Rooflights 0.9x	1	x	1.3	33	x	2	1.19	x	0.63	×	0.8	=	25.57	(82)
Rooflights 0.9x	1	x	1.3	33	x	2	1.19	x	0.63	x	0.8	=	25.57	(82)
Rooflights 0.9x	1	x	1.	1	x	2	1.19	x	0.63	x	0.8	=	10.57	(82)
Rooflights 0.9x	1	X	0.7	' 8	X	2	1.19	x	0.63	×	0.8		7.5	(82)
Solar gains in (83)m= 238 Total gains – i (84)m= 584.24	437.45 nternal ar 782.41	670 nd solar 1002.99	927.58 (84)m = 1240.81	1111.71 = (73)m 1404.03	11 + (8 14	31.34 33)m ,	1079.54	940 1205		504.0 798.7	7 291.24	199.5 535.11]	(83)
7. Mean inter			`				- .		TI 4 (0.0)					—
Temperature	Ū	٠.			•			ою 9,	in1 (°C)				21	(85)
Utilisation fac					Ť					0.1	l NI-		7	
(86)m= 1	Feb 0.99	Mar 0.95	Apr 0.85	May 0.68	+	Jun 0.49	Jul 0.36	_	ug Sep 2 0.68	Oct 0.93	+	Dec	-	(86)
` ′	<u> </u>	!		<u> </u>				0.4	!	0.93	0.99	1		(00)
Mean interna	, <u> </u>	ī		,	1	- i							7	(07)
(87)m= 19.54	19.83	20.23	20.66	20.9	2	0.98	21	20.	99 20.92	20.53	19.93	19.49		(87)
Temperature	during he	eating p	eriods ir	rest of	dw	elling	from Ta	ble 9	9, Th2 (°C)			T	7	
(88)m= 19.76	19.76	19.77	19.78	19.78	1	9.79	19.79	19.	79 19.78	19.78	19.77	19.77		(88)
Utilisation fac	tor for ga	ins for r	est of d	welling,	h2,	m (se	e Table	9a)				_	_	
(89)m= 0.99	0.98	0.94	0.81	0.61	(0.41	0.26	0.3	0.58	0.9	0.99	1		(89)
Mean interna	l tempera	ture in t	the rest	of dwell	ing	T2 (fc	ollow ste	ps 3	to 7 in Tabl	e 9c)				
(90)m= 18.45	18.74	19.14	19.53	19.72	1	9.78	19.79	19.	79 19.75	19.43	18.86	18.41]	(90)
				•				-	f	LA = Li	ving area ÷ (4) =	0.22	(91)
Mean interna	l tempera	ture (fo	r the wh	ole dwe	ellina	a) = fl	A x T1	+ (1	– fLA) × T2					
(92)m= 18.7	18.98	19.38	19.78	19.98	_	0.05	20.06	20.		19.68	3 19.1	18.65	7	(92)
Apply adjustr		e mean	interna	l tempei	atu	re fror	m Table	4e,	where appro			I	_	
				•				-	• •	-				

(02)	18.7	10.00	10.20	19.78	10.00	20.05	20.06	20.06	20.01	10.60	10.1	10.65		(93)
(93)m=		18.98	19.38		19.98	20.05	20.06	20.06	20.01	19.68	19.1	18.65		(93)
			uirement		بامدام می		am 11 af	Table Ob	41	4 T: /:	7C\m2 an	d == ==l=	lo4o	
				nperaturusing Ta		ied at St	ерттог	rable 9t	o, so ma	t 11,m=(rojiii an	d re-calc	uiate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm	<u> </u>	I	1 04	<u> </u>	7.09	ООР	001	1101			
(94)m=	0.99	0.98	0.93	0.81	0.62	0.43	0.29	0.34	0.6	0.9	0.98	0.99		(94)
Usefu	LLLI Il gains.	hmGm .	W = (94)	1 4)m x (8	ւ 4)m	1	l .	l .						
(95)m=	579.84	763.91	931.98	1002.79		598.4	384.22	404.67	624.29	717.12	598.28	532.26		(95)
Month	nlv avera	age exte	rnal tem	perature	e from Ta	u——— able 8	<u> </u>	<u> </u>						
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature.	Lm , W =	=[(39)m	x [(93)m·	– (96)m	1		<u> </u>		
(97)m=		1606.62		1226.08	931.44	607.21	385.38	406.97	661.21	1020.83	1354.36	1638.04		(97)
Space	e heating	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	 1)m			
(98)m=	793.24	566.3	397.47	160.77	43.92	0	0	0	0	225.96	544.37	822.7		
				I	<u>Į</u>			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3554.73	(98)
Snace	a haatin	a roquir	amont in	kWh/m²	2/voor							· [42.62	<u> </u> (99)
·	·	•			7y c ai							l	43.62	
			uiremer											
Calcu				August.										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
						·	1	and exte				T i		(400)
(100)m=		0		0	0	1047.27	824.45	845.3	0	0	0	0		(100)
		tor for lo		I <u>.</u>	I -						_			(404)
(101)m=		0	0	0	0	0.94	0.97	0.96	0	0	0	0		(101)
				(100)m x	<u> </u>		Γ	I			_	I . I		(400)
(102)m=		0	0	0	0	988.97	800.31	808.37	0	0	0	0		(102)
								e Table			_			(400)
(103)m=		0	0	0	0	1638.2	l	1424.62	0	0	0	0	(4.1)	(103)
				r month, : 3 × (98		dwelling,	continu	ous (kW	h') = 0.02	24 x [(10)3)m – (102)m] x	(41)m	
(104)m=		0	0	0	0	467.45	569.97	458.49	0	0	0	0		
(101)	Ů	Ü				107.10	000.01	100.10		= Sum(=	1495.91	(104)
Cooled	d fraction	1								,	area ÷ (4		1493.91	(105)
			able 10b)								' I	<u> </u>	 _` ′
(106)m=		0	0	0	0	0.25	0.25	0.25	0	0	0	0		
							Į.	!	Total	' = Sum((104)	=	0	(106)
Space	cooling	requirer	nent for	month =	: (104)m	× (105)	× (106)r	m		,	,	ı		
(107)m=		0	0	0	0	116.86	142.49	114.62	0	0	0	0		
									Total	= Sum(1,0,7)	=	373.98	(107)
Space	coolina	reauirer	nent in k	(Wh/m²/y	/ear				(107)	÷ (4) =		l	4.59	(108)
		•				der sper	rial cons	litions, se	` '	. ,				
			, i	alculate(r- or lly ull	ider sper	siai con c	mioris, se		· ·			40.0	(100)
rabil	- ⊏nergy	/ Efficier	юу						(99)	+ (108) =	_		48.2	(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nui	mber:		030065	
Software Name:	Stroma FSAP 2012	Software V		Versio	n: 1.0.5.25	
		Property Address: HOU				
Address:	Woodwell Cottage P2, Woo	dwell Road, BRISTOL,	BS11 9XU			
1. Overall dwelling dime	ensions.	Area(m²)	Av. Height(m	1)	Volume(m ³	3
Ground floor		40.75 (1a) x	2.6	(2a) =	105.95	(3a)
First floor		40.75 (1b) x	2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1ı	n) 81.5 (4)	L			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	197.23	(5)
2. Ventilation rate:				L		
	main seconda heating heating	ry other	total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(7a)$	7a)+(7b)+(7c) =	30	÷ (5) =	0.15	(8)
	een carried out or is intended, procee			. (5)	0.10	(-/
Number of storeys in the	ne dwelling (ns)				0	(9)
Additional infiltration			[0	(9)-1]x0.1 =	0	(10)
	.25 for steel or timber frame or	•	struction		0	(11)
if both types of wall are p deducting areas of openi	resent, use the value corresponding to pas): if equal user 0.35	o the greater wall area (after				
	floor, enter 0.2 (unsealed) or 0	.1 (sealed), else enter	0	ſ	0	(12)
If no draught lobby, en	ter 0.05, else enter 0			Ī	0	(13)
Percentage of windows	s and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14) -	÷ 100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	Ì	0	(16)
Air permeability value,	q50, expressed in cubic metre	es per hour per square	metre of envelor	oe area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] + ($	8), otherwise (18) = (16)		Ī	0.35	(18)
Air permeability value applie	es if a pressurisation test has been do	ne or a degree air permeabili	ty is being used	_		
Number of sides sheltered	ed		4		0	(19)
Shelter factor		(20) = 1 - [0.075 x]		ļ	1	(20)
Infiltration rate incorporate	_	$(21) = (18) \times (20)$	=	Ĺ	0.35	(21)
Infiltration rate modified f	- 	, , , , , , , , , , , , , , , , , , , 	, , , , , , , , , , , , , , , , , , , 			
Jan Feb	Mar Apr May Jun	Jul Aug Ser	Oct No	v Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for st	nelter an	d wind s	speed) =	(21a) x	(22a)m	•	•			
0.45	0.44	0.43	0.39	0.38	0.33	0.33	0.33	0.35	0.38	0.4	0.41	1	
Calculate effe		•	rate for t	he appli	cable ca	ise	!	<u>!</u>	!	ļ.	ļ.	J	
If mechanic			andiv N. 72	12h) - (22c) v Emy (nguation (N	VEVV otho	nvico (22h) = (23a)			0	(23a)
If balanced wi		0		, ,	,	. ,	,, .	,) = (23a)			0	(23b)
a) If balance		•	•	J		`		,	Oh)m ı ((22h) v [1 (22a)	0	(23c)
(24a)m= 0		o lical ve	0	0	0	0	0	0	0	(230) x [0] - 100j	(24a)
b) If balanc					L					(23h)		J	()
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole I	nouse ex	tract ver	tilation o	r positiv	e input	ventilatio	on from (utside				J	
,	m < 0.5 ×			•	•				.5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m= 0.6	0.6	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59]	(24d)
Effective ai	r change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)	!	ļ.	ļ.	J	
(25)m= 0.6	0.6	0.59	0.58	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.59]	(25)
3. Heat losse	es and he	eat loss r	paramete	er.		•						•	
0													
ELEMENT	Gros	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
		SS	Openin	gs	Net Ar A ,r	m²			A X U (W/	K)			
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [0.04] = [(W/ 2.702	K)			kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r	m ² x x1. x1.	W/m2 1.4 /[1/(1.4)+		2.702 2.15	K)			kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 1.93 1.62	m ² x x ¹ x ¹ x ¹ x ¹	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & & \\ & & 0.04 & & & \\ \hline 0.04 & & & & \\ 0.04 & & & & \\ \end{array} $	2.702 2.15 2.15	K)			kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area e 1 e 2 e 3 e 4	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08	m ² x x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	2.702 2.15 2.15 8.06 2.84	K)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix} \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729	K)			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area e 1 e 2 e 3 e 4 be 1	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14	m ²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	$ \begin{array}{ccc} 2K & & & & \\ & & & & \\ & & & & \\ & & & &$	(W/ 2.702 2.15 2.15 8.06 2.84 1.729	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} 2K & & & & \\ \hline & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & & & \\ \end{array} $	2.702 2.15 2.15 8.06 2.84 1.729 1.729	K) 			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3	SS	Openin	gs	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.37	m² x 1	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	$ \begin{array}{ccc} 2K & & & & \\ \hline & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & 0.04 & & & \\ & & & \\ \end{array} $	(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43	K) 			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4	ss (m²)	Openin	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78	m² x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	EK = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (27b)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4	ss (m²)	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.79 86.32	m ²	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 loe 2 loe 3 loe 4	95	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) +	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Type2 Roof	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61.	95 3	Openin m	gs ₁ 2	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1	m² x 1. x 1. x 1. x 1. x 1. x 1. x 1. x 1	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + 0.17 0.2	EK = [0.04] = [(W/ 2.702 2.15 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26	K)			kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of *for windows and	Gros area e 1 e 2 e 3 e 4 De 1 De 2 De 3 De 4 102. 2 elements	95 3 , m ² ows, use e	Openin m 16.6 0 7.2	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	m²	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	EK = [0.04] =	(W/ 2.702 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of * for windows an ** include the area	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61. elements d roof winders on both	95 3 , m ² ows, use e sides of in	16.6. 0 7.2 effective winternal wal	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3] + /	$ \begin{array}{cccc} 2K & & & & & \\ & & & & & & \\ & & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of *for windows an **include the are Fabric heat loo	Gros area e 1 e 2 e 3 e 4 De 1 De 2 De 3 De 4 102. 2 elements d roof wind as on both	95 3 , m ² ows, use e sides of in = S (A x	16.6. 0 7.2 effective winternal wal	gs ₁ 2 indow U-ve	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.10 0.78 40.79 86.32 2 54.1 207 alue calculus	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + 0.17 0.2 0.14	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	n 3.2	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of * for windows an ** include the area	Gros area e 1 e 2 e 3 e 4 be 1 be 2 be 3 be 4 102. 2 61. elements d roof wind as on both ss, W/K: Cm = S(95 95 3 , m ² ows, use e sides of in = S (A x (A x k)	16.6. 0 7.2 effective winternal wall	gs 1 ² 3 indow U-va Is and pan	A ,r 1.93 1.62 1.62 6.08 2.14 1.33 1.33 1.1 0.78 40.75 86.32 2 54.1 207 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3) + /[1/(1.3] + /	$ \begin{array}{cccc} 2K & & & & & & \\ & & & & & & \\ & & & & &$	(W/ 2.702 2.15 8.06 2.84 1.729 1.43 1.014 6.9275 17.26 0.4 7.57	K)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (29) (30) (31)

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For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f

can he i	ısed instea	ad of a de	tailed calci	ulation										
					using Ap	pendix I	K						11.97	(36)
	_	•	•		= 0.05 x (3	•								(3.27
Total fa	abric hea	at loss							(33) +	(36) =			75.23	(37)
Ventila	tion hea	it loss ca	alculated	l monthly	y				(38)m	= 0.33 × ((25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	39.1	38.85	38.6	37.42	37.21	36.18	36.18	36	36.58	37.21	37.65	38.11		(38)
Heat tr	ansfer c	oefficier	nt, W/K		-	-	-		(39)m	= (37) + (38)m	-		
(39)m=	114.33	114.08	113.83	112.65	112.43	111.41	111.41	111.22	111.81	112.43	112.88	113.34		
Heat lo	ss para	meter (H	HLP), W/	′m²K			-			Average = = (39)m ÷	Sum(39)₁ · (4)	12 /12=	112.65	(39)
(40)m=	1.4	1.4	1.4	1.38	1.38	1.37	1.37	1.36	1.37	1.38	1.38	1.39		
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.38	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31	1	(41)
					•	•	•	•		•	•	•	•	
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/y	ear:	
Λ													1	
if TF	ed occu A > 13.9 A £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.		49		(42)
Annua	l averag	e hot wa						(25 x N)				3.35]	(43)
		_			5% if the d ater use, l	_	_	to achieve	a water us	se target o	f		•	
notmore					<u> </u>		•	. .	0				1	
Hot wate	Jan er usage ir	Feb	Mar day for ea	Apr ach month	May Vd,m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec]	
(44)m=	102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49	95.22	98.96	102.69	1	
(44)111=	102.09	90.90	95.22	31.43	07.73	04.02	04.02	07.73			m(44) ₁₁₂ =		1120.25	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600					1120.20	` ′
(45)m=	152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48]	
							!			Total = Su	m(45) ₁₁₂ =	=	1468.83	(45)
If instant		ater heatir	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)				1	
(46)m=	22.84	19.98	20.62	17.97	17.25	14.88	13.79	15.82	16.01	18.66	20.37	22.12		(46)
	storage e volum		includin	na anv so	olar or W	/WHRS	storane	within sa	ame ves	ച		0	1	(47)
•		, ,			elling, e		_		arric voo	001		0		(47)
	-	_			_			mbi boil	ers) ente	er '0' in (47)			
Water	storage	loss:		`					,	·	,			
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0]	(48)
Tempe	erature fa	actor fro	m Table	2b								0]	(49)
•			storage	-				(48) x (49)) =			0]	(50)
•				-	oss fact								1	(E4)
		_	ee secti		e 2 (kW	i // ii (i C /U2	ay <i>)</i>					0	J	(51)
	e factor	-		-								0]	(52)
Tempe	rature fa	actor fro	m Table	2b								0]	(53)

- 3)	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0	(54)	
Enter	(50) or ((54) in (5	55)									0	(55)	
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56)	
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57)	
Primar	y circuit	loss (ar	nual) fro	om Table	3							0	(58)	
Primar	y circuit	loss cal	culated	for each	month ((59)m = ((58) ÷ 36	55 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59)	
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64	(61)	
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12	(62)	
Solar DF	HW input of	calculated	using App	endix G o	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add ad	dditiona	l lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63)	
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63) (G2	2)
Output	from wa	ater hea	ter											
(64)m=	164.93	144.61	150.08	132.06	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
•			•			•		Outp	out from w	ater heate	(annual)	12	1617.66 (64)	
Heat g	ains froi	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	53.8	47.14	48.86	42.9	41.39	36.05	33.73	38.24	38.56	44.53	48.21	52.2	(65)	
inclu	de (57)ı	m in cal	culation	of (65)m	only if o	ا ممامدان	. ! 4					•		
5 Int			Jaiation	01 (00)111	Offig if C	giinderi	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
O. IIII	ernal ga		e Table 5			ylinaer i	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
		ains (see	e Table 5	and 5a		ylinder i	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
		ains (see		and 5a		Jun	Jul	dwelling	or hot w Sep	oater is fr	om com	munity h	eating	
	olic gain	ains (see	Table 5	and 5a):								leating (66)	
Metabo (66)m=	olic gain Jan 124.54	s (Table Feb 124.54	E Table 5 E 5), Wat Mar 124.54	ts Apr 124.54	May	Jun	Jul 124.54	Aug 124.54	Sep 124.54	Oct	Nov	Dec		
Metabo (66)m=	olic gain Jan 124.54	s (Table Feb 124.54	E Table 5 E 5), Wat Mar 124.54	ts Apr 124.54	May	Jun 124.54	Jul 124.54	Aug 124.54	Sep 124.54	Oct	Nov	Dec		
Metabo (66)m= Lightin (67)m=	Jan 124.54 g gains	rins (see s (Table Feb 124.54 (calcula	2 Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	ts Apr 124.54 opendix 10.85	May 124.54 L, equat 8.11	Jun 124.54 ion L9 o	Jul 124.54 r L9a), a 7.4	Aug 124.54 Iso see	Sep 124.54 Table 5 12.91	Oct 124.54	Nov 124.54	Dec 124.54	(66)	
Metabo (66)m= Lightin (67)m=	Jan 124.54 g gains 19.84	reb 124.54 (calcula 17.62	2 Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	ts Apr 124.54 opendix 10.85	May 124.54 L, equat 8.11	Jun 124.54 ion L9 o 6.85	Jul 124.54 r L9a), a 7.4	Aug 124.54 Iso see	Sep 124.54 Table 5 12.91	Oct 124.54	Nov 124.54	Dec 124.54	(66)	
Metabo (66)m= Lightin (67)m= Appliar (68)m=	Jan 124.54 g gains 19.84 nces gai	representation (See See See See See See See See See Se	Mar 124.54 ted in Ap 14.33 sulated in 219.04	ts Apr 124.54 ppendix 10.85 Appendix 206.65	May 124.54 L, equat 8.11 dix L, eq 191.01	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	(66) (67)	
Metabo (66)m= Lightin (67)m= Appliar (68)m=	Jan 124.54 g gains 19.84 nces gai	representation (See See See See See See See See See Se	Mar 124.54 ted in Ap 14.33 sulated in 219.04	ts Apr 124.54 ppendix 10.85 Appendix 206.65	May 124.54 L, equat 8.11 dix L, eq 191.01	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	(66) (67)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m=	Jan 124.54 g gains 19.84 nces ga 222.55 g gains 35.45	reb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45	Mar 124.54 ted in Ap 14.33 culated ir 219.04	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a)	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39 212.73	(66) (67) (68)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m=	Jan 124.54 g gains 19.84 nces ga 222.55 g gains 35.45	reb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45	Mar 124.54 ted in Ap 14.33 culated ir 219.04 ated in A 35.45	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat	Jun 124.54 ion L9 o 6.85 uation L 176.31	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a)	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39 212.73	(66) (67) (68)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m=	Jan 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far	reb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45 ns gains 3	Mar 124.54 ted in Ap 14.33 sulated in 219.04 ated in A 35.45 (Table §	and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65 oppendix 35.45	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66) (67) (68) (69)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m=	Jan 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far	reb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45 ns gains 3	Mar 124.54 ted in Ap 14.33 culated ir 219.04 ated in A 35.45 (Table \$	and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65 oppendix 35.45	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66) (67) (68) (69)	
Metabo (66)m= Lightine (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	Jan 124.54 g gains 19.84 nces gai 222.55 g gains 35.45 and far 3 s e.g. ev -99.63	raporatic	Mar 124.54 ted in Ap 14.33 culated ir 219.04 ated in A 35.45 (Table 9 3 on (nega	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45 3 es) (Tab	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03 35.45	Dec 124.54 20.39 212.73 35.45	(66) (67) (68) (69) (70)	
Metabo (66)m= Lightine (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	polic gains 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far 3 s e.g. ev -99.63	raporatic	Mar 124.54 ted in Ap 14.33 culated ir 219.04 ated in A 35.45 (Table 9 3 on (nega	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45 3 es) (Tab	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03 35.45	Dec 124.54 20.39 212.73 35.45	(66) (67) (68) (69) (70)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	polic gains Jan 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far 3 e.g. ev -99.63 heating 72.31	raporatice sgains (See	E Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 culated in 219.04 ated in A 35.45 (Table 5 3 on (nega -99.63 Table 5) 65.67	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3 tive valu -99.63	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45 3 es) (Tab	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3	Oct 124.54 16.39 ble 5 182.39 5 35.45 3 -99.63	Nov 124.54 19.13 198.03 35.45 3 -99.63	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66) (67) (68) (69) (70) (71)	
Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	polic gains Jan 124.54 g gains 19.84 nces gains 222.55 g gains 35.45 and far 3 e.g. ev -99.63 heating 72.31	raporatic ro.15	E Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 culated in 219.04 ated in A 35.45 (Table 5 3 on (nega -99.63 Table 5) 65.67	ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3 tive valu -99.63	May 124.54 L, equat 8.11 dix L, eq 191.01 L, equat 35.45 3 es) (Tab	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3	Oct 124.54 16.39 ble 5 182.39 5 35.45 3 -99.63	Nov 124.54 19.13 198.03 35.45 3 -99.63	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66) (67) (68) (69) (70) (71)	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.8	=	6.02	(74)
North	0.9x	0.77	x	1.62	x	20.32	X	0.63	x	0.8	=	11.5	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	X	0.8	=	19.54	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	31.38	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	42.28	(74)
North	0.9x	0.77	x	1.62	x	79.99	X	0.63	X	0.8	=	45.26	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	42.25	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	X	0.8	=	33.52	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	23.49	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	X	0.8	=	13.69	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	7.42	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	5.02	(74)
East	0.9x	0.77	x	2.14	x	19.64	x	0.63	x	0.8	=	14.68	(76)
East	0.9x	0.77	x	2.14	x	38.42	x	0.63	x	0.8	=	28.72	(76)
East	0.9x	0.77	x	2.14	x	63.27	x	0.63	x	0.8	=	47.29	(76)
East	0.9x	0.77	x	2.14	x	92.28	x	0.63	x	0.8	=	68.97	(76)
East	0.9x	0.77	x	2.14	x	113.09	x	0.63	x	0.8	=	84.53	(76)
East	0.9x	0.77	x	2.14	x	115.77	x	0.63	x	0.8	=	86.53	(76)
East	0.9x	0.77	x	2.14	x	110.22	x	0.63	x	0.8	=	82.38	(76)
East	0.9x	0.77	x	2.14	x	94.68	X	0.63	x	0.8	=	70.76	(76)
East	0.9x	0.77	x	2.14	x	73.59	x	0.63	x	0.8	=	55	(76)
East	0.9x	0.77	x	2.14	x	45.59	x	0.63	x	0.8	=	34.08	(76)
East	0.9x	0.77	x	2.14	x	24.49	X	0.63	x	0.8	=	18.3	(76)
East	0.9x	0.77	X	2.14	x	16.15	X	0.63	X	0.8	=	12.07	(76)
South	0.9x	0.77	X	6.08	X	46.75	X	0.63	X	0.8	=	99.28	(78)
South	0.9x	0.77	X	6.08	x	76.57	X	0.63	X	0.8	=	162.6	(78)
South	0.9x	0.77	X	6.08	x	97.53	X	0.63	X	0.8	=	207.12	(78)
South	0.9x	0.77	X	6.08	X	110.23	X	0.63	X	0.8	=	234.09	(78)
South	0.9x	0.77	X	6.08	x	114.87	X	0.63	X	0.8	=	243.94	(78)
South	0.9x	0.77	X	6.08	x	110.55	X	0.63	X	0.8	=	234.76	(78)
South	0.9x	0.77	X	6.08	X	108.01	X	0.63	X	0.8	=	229.37	(78)
South	0.9x	0.77	X	6.08	x	104.89	X	0.63	X	0.8	=	222.75	(78)
South	0.9x	0.77	X	6.08	x	101.89	x	0.63	x	0.8	=	216.36	(78)
South	0.9x	0.77	X	6.08	x	82.59	X	0.63	x	0.8	=	175.38	(78)
South	0.9x	0.77	X	6.08	x	55.42	x	0.63	x	0.8	=	117.68	(78)
South	0.9x	0.77	X	6.08	x	40.4	x	0.63	x	0.8	=	85.79	(78)

\Most	_		1		1		1		l		1		7,000
West 0.9	\vdash	0.77	X	1.62	X	19.64	X	0.63	X	0.8] = 1	33.34	(80)
West 0.9	\vdash	0.77	X	1.62	X	38.42	X	0.63	X	0.8	=	65.22	(80)
West 0.9		0.77	X	1.62	X	63.27	X	0.63	X	0.8	=	107.4	(80)
West 0.9	\vdash	0.77	X	1.62	X	92.28	X	0.63	X	0.8	=	156.64	(80)
West 0.9	×	0.77	X	1.62	X	113.09	X	0.63	X	0.8	=	191.97	(80)
West 0.9	×	0.77	X	1.62	X	115.77	X	0.63	X	0.8	=	196.52	(80)
West 0.9	×	0.77	X	1.62	X	110.22	Х	0.63	X	0.8	=	187.09	(80)
West 0.9	×	0.77	X	1.62	X	94.68	X	0.63	X	0.8	=	160.71	(80)
West 0.9	×	0.77	X	1.62	X	73.59	X	0.63	X	0.8	=	124.91	(80)
West 0.9	x	0.77	X	1.62	X	45.59	X	0.63	X	0.8	=	77.39	(80)
West 0.9	x 🗌	0.77	X	1.62	X	24.49	X	0.63	X	0.8	=	41.57	(80)
West 0.9	x 🗌	0.77	X	1.62	X	16.15	X	0.63	x	0.8	=	27.42	(80)
Rooflights 0.9	x 🗌	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x	1	X	1.33	X	25.93	X	0.63	X	0.8	=	31.28	(82)
Rooflights 0.9	x 🗌	1	X	1.1	X	25.93	X	0.63	X	0.8	=	12.94	(82)
Rooflights 0.9	x 🗌	1	X	0.78	x	25.93	x	0.63	x	0.8	=	9.17	(82)
Rooflights 0.9	x 🗌	1	X	1.33	x	51.88	x	0.63	X	0.8	=	62.59	(82)
Rooflights 0.9	×	1	X	1.33	x	51.88	x	0.63	x	0.8	=	62.59	(82)
Rooflights 0.9	×	1	x	1.1	x	51.88	x	0.63	x	0.8	=	25.88	(82)
Rooflights 0.9	×	1	x	0.78	x	51.88	x	0.63	x	0.8	=	18.35	(82)
Rooflights 0.9	x 🗔	1	x	1.33	x	88.38	x	0.63	x	0.8] =	106.64	(82)
Rooflights 0.9	×	1	x	1.33	x	88.38	x	0.63	x	0.8	=	106.64	(82)
Rooflights 0.9	×	1	x	1.1	x	88.38	x	0.63	x	0.8	=	44.1	(82)
Rooflights 0.9	×	1	x	0.78	x	88.38	x	0.63	x	0.8	j =	31.27	(82)
Rooflights 0.9	×	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	x 🔚	1	x	1.33	x	133.65	x	0.63	x	0.8	=	161.26	(82)
Rooflights 0.9	×	1	x	1.1	x	133.65	х	0.63	x	0.8	j =	66.69	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	0.78	x	133.65	x	0.63	х	0.8	j =	47.29	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	x	0.63	х	0.8	j =	202.82	(82)
Rooflights 0.9	×	1	x	1.33	x	168.1	х	0.63	x	0.8	j =	202.82	(82)
Rooflights 0.9	× $\overline{\square}$	1	x	1.1	x	168.1	x	0.63	х	0.8	j =	83.87	(82)
Rooflights 0.9	×	1	x	0.78	x	168.1	x	0.63	x	0.8	=	59.47	(82)
Rooflights 0.9	×	1	x	1.33	x	174	x	0.63	x	0.8	j =	209.95	(82)
Rooflights 0.9	× \sqsubset	1	x	1.33	x	174	x	0.63	x	0.8	=	209.95	(82)
Rooflights 0.9	×	1	x	1.1	x	174	x	0.63	x	0.8	=	86.82	(82)
Rooflights 0.9	×	1	X	0.78	X	174	X	0.63	x	0.8	=	61.56	(82)
Rooflights 0.9	×	1	X	1.33	X	164.87	X	0.63	x	0.8	=	198.92	(82)
Rooflights 0.9	_	1	X	1.33	X	164.87	X	0.63	x	0.8	, 	198.92	(82)
Rooflights 0.9	_	1	X	1.1	X	164.87	X	0.63	x	0.8	, =	82.26	(82)
Rooflights 0.9		1	X	0.78	X	164.87	X	0.63	x	0.8	, =	58.33	(82)
Rooflights 0.9		1	X	1.33) x	138.72]] x	0.63	x	0.8] =	167.38	(82)
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Rooflights 0.9x	1	X	1.3			38.72	X	0.63	×	0.8	=	167.38	(82)
Rooflights 0.9x	1	Х	1.	1	X	38.72	X	0.63	×	0.8	=	69.22	(82)
Rooflights _{0.9x}	1	X	0.7	8	X	38.72	X	0.63	X	0.8	=	49.08	(82)
Rooflights 0.9x	1	X	1.3	3	X ·	04.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	04.33	X	0.63	X	0.8	=	125.88	(82)
Rooflights _{0.9x}	1	X	1.	1	X ·	04.33	X	0.63	X	0.8	=	52.05	(82)
Rooflights 0.9x	1	X	0.7	'8	X	04.33	X	0.63	X	0.8	=	36.91	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	X	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.3	3	x	62.32	x	0.63	X	0.8	=	75.2	(82)
Rooflights 0.9x	1	X	1.	1	x	62.32	X	0.63	X	0.8	=	31.1	(82)
Rooflights 0.9x	1	X	0.7	'8	x	62.32	x	0.63	X	0.8	=	22.05	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	32.54	x	0.63	x	0.8		39.26	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	32.54	х	0.63	x	0.8	=	39.26	(82)
Rooflights _{0.9x}	1	x	1.	1	х	32.54	x	0.63	x	0.8		16.23	(82)
Rooflights _{0.9x}	1	x	0.7	8	x	32.54	x	0.63	×	0.8	╡ =	11.51	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	21.19	X	0.63	X	0.8	=	25.57	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	21.19	X	0.63	x	0.8		25.57	(82)
Rooflights 0.9x	1	x	1.			21.19) x	0.63	= x	0.8	╡ -	10.57	(82)
Rooflights 0.9x	1	x	0.7			21.19]]	0.63	×	0.8	╡ -	7.5	(82)
, L	· ·		<u> </u>				J	0.00		0.0		7.10	(` '
Solar gains in	watte ca	lculated	for eac	n month			(83)m	n = Sum(74)m	(82)m				
(83)m= 238	437.45	670	927.58			1079.54			504.0		199.5]	(83)
Total gains – ir	nternal a	nd solar	(84)m =	: (73)m ·	+ (83)m	, watts	ļ	Į.		-!		J	
(84)m= 616.05	813.44	1032.4	1268.03	1429.82	1427.93	1362.12	1229	9.35 1060.31	826.0	6 638.72	566.14]	(84)
7. Mean inter	nal temn	erature	(heating	season)			·		<u>'</u>			
Temperature						from Tal	nle 9	Th1 (°C)				21	(85)
Utilisation fac	_				•		010 0,	, 1111 (0)				21	(00)
Jan	Feb	Mar	Apr	May	Jun	Jul	Δ	ug Sep	Oct	Nov	Dec]	
(86)m= 0.99	0.98	0.95	0.84	0.67	0.49	0.36	0.4		0.92		1	1	(86)
` ′					<u> </u>	<u> </u>		<u> </u>	0.02	1 0.00	ļ ·		, ,
Mean interna		i		· •	ì	i	1		1 00 55	1000	10.50	1	(97)
(87)m= 19.57	19.86	20.26	20.67	20.9	20.98	21	20.	99 20.93	20.55	19.96	19.52		(87)
Temperature	during h	~ ~ `			·	from Ta	able 9	9, Th2 (°C)			1	1	
(88)m= 19.76	19.76	19.77	19.78	19.78	19.79	19.79	19.	79 19.78	19.78	19.77	19.77		(88)
Utilisation fac	tor for ga	ains for r	est of d	welling,	h2,m (s	ee Table	9a)						
(89)m= 0.99	0.98	0.93	0.8	0.6	0.4	0.26	0.3	0.57	0.89	0.98	1		(89)
Mean interna	tempera	ature in t	the rest	of dwelli	na T2 (follow ste	eps 3	to 7 in Tab	le 9c)		-	-	
(90)m= 17.9	18.31	18.88	19.43	19.7	19.78	19.79	19.	1	19.3	18.48	17.83]	(90)
			<u> </u>	<u> </u>	I	1			fLA = Liv	L ∕ing area ÷ (4) =	0.22	(91)
Moon intorna	tompor	oturo /fo	r tha wh	مام طیب	llina\	: Λ T 4	. /4	fl A\ T O					
Mean interna (92)m= 18.27	18.66	19.19	19.71	19.97	20.05	20.06	+ (1		19.58	18.81	18.21	1	(92)
Apply adjustn					l	<u> </u>	<u> </u>		I		10.21	J	(02)
Apply aujustii	ioni io ii	ie ilieali	micilia	remper	ature III	יוו ומטול	, +c ,	where appr	opnate				

(00)	T	40.54	40.04	10.50	40.00	40.0	40.04	1 40 04	40.00	40.40	10.00	40.00	l	(93)
,		18.51	19.04	19.56	19.82	19.9	19.91	19.91	19.86	19.43	18.66	18.06		(93)
8. Space		· ·		nn o rotuu	o obtoin	ad at at	on 11 of	Table 0	h aa tha	tTim (76\m an	d ro colo	vuloto	
Set Ti to the utilisation				•		eu ai sii	ep 11 01	Table 9	u, su ina	t 11,111=(70)III aII	u re-caic	ulate	
	lan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisatio		Ť	i					,			,		ı	
` '	.99	0.97	0.92	0.79	0.6	0.41	0.27	0.32	0.58	0.88	0.98	0.99		(94)
Useful ga		i						T	I		T	I		(05)
` '		788.71	946.36	1002.19	861.37	583.03	367.78	388.52	612.95	726.66	623.73	561.75		(95)
Monthly (96)m=	averaç	ge exte	rnal tem 6.5	perature 8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
											7.1	4.2		(90)
Heat loss (97)m= 15		552.27	1426.98			590.27	368.65	390.24	643.49	992.87	1304.82	1570.68		(97)
Space he							l i	l .	l		l .	1370.00		(01)
· —	Ť	513.11	357.58	143.17	38.21	0	0.02	0	0	198.06	490.38	750.64		
(00)									l per year	(kWh/vear			3213.46	(98)
Cooss b				L(\ \ / / / 2	14.00				po. you.	(, Jan. (5	C)10,512		╡``
Space h													39.43	(99)
9a. Energ	i i		its – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space h	_				/I-									7,000
Fraction	•			-		mentary	•		(554)				0	(201)
Fraction	of spa	ce hea	t from m	ain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction	of tota	I heatir	ng from i	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficienc	y of m	ain spa	ice heati	ng syste	em 1								89.9	(206)
Efficienc	y of se	conda	ry/supple	ementar	y heating	g system	ո, %						0	(208)
_ ,	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space he	eating	require	ement (c	alculated	d above))		,	1		,	1	İ	
72	22.3	513.11	357.58	143.17	38.21	0	0	0	0	198.06	490.38	750.64		
(211)m =	{[(98)n	n x (20	4)] } x 1	00 ÷ (20	6)			_			_		•	(211)
80	3.45	570.76	397.75	159.26	42.5	0	0	0	0	220.31	545.48	834.97		_
								Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3574.49	(211)
Space h	•	`	•	, ,	month									
= {[(98)m								1			T	1	I	
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		7
								Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	<u></u>	0	(215)
Water he	_													
Output fro		er heat 144.61	ter (calci 150.08	<u>132.06</u>	127.61	111.45	104.58	118.14	118.99	137.06	148.04	160.12		
Efficiency				132.00	127.01	111.40	104.50	110.14	110.55	137.00	140.04	100.12	87.3	(216)
	9.41	89.32	89.12	88.63	87.89	87.3	87.3	87.3	87.3	88.82	89.28	89.43	07.5	(217)
` '					01.09	01.3	01.3	07.3	01.3	00.02	09.20	09.43		(211)
Fuel for w (219)m =		•												
(219)m= 18		161.91	168.41	148.99	145.2	127.66	119.79	135.32	136.3	154.31	165.81	179.04		
								Tota	I = Sum(2	19a) ₁₁₂ =	•	•	1827.23	(219)
Annual to	otals									k'	Wh/year	•	kWh/year	
Space he	ating f	uel use	d, main	system	1								3574.49	
												'		

					_
Water heating fuel used				1827.23	
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30]	(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (236	0a)(230g) =		75	(231)
Electricity for lighting				350.38	(232)
Electricity generated by PVs				-928.1	(233)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b) =			4986.3	(338)
12a. CO2 emissions – Individual heating system	s including micro-CHP				
	Energy	Emission fa	ctor	Emissions	
	kWh/year	kg CO2/kWh		kg CO2/yea	
Space heating (main system 1)	<u> </u>				
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh		kg CO2/yea	ar -
	kWh/year (211) x	kg CO2/kWh	=	kg CO2/yea	ar](261)
Space heating (secondary)	kWh/year (211) x (215) x	0.216 0.519 0.216	=	kg CO2/yea	(261) (263)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	0.216 0.519 0.216	=	kg CO2/yea 772.09 0 394.68	(261) (263) (264)
Space heating (secondary) Water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	0.216 0.519 0.216	= =	kg CO2/yea 772.09 0 394.68 1166.77	(261) (263) (264) (265)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x	0.216 0.519 0.216	= = =	kg CO2/yea 772.09 0 394.68 1166.77 38.93	(261) (263) (264) (265) (267)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot Electricity for lighting Energy saving/generation technologies	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x (232) x	kg CO2/kWh 0.216 0.519 0.216 0.519 0.519	= = = = =	kg CO2/yea 772.09 0 394.68 1166.77 38.93 181.85	(261) (263) (264) (265) (267) (268)

El rating (section 14)

90

(274)

		User Details:				
A NI	La grana - Malayyahla g			OTDO	000005	
Assessor Name: Software Name:	Jemma Mclaughlan Stroma FSAP 2012	Stroma Nur Software Ve			030065 n: 1.0.5.25	
Software Name.		roperty Address: HOUS		V C I SIO	11. 1.0.3.23	
Address :	Woodwell Cottage P2, Woo					
Overall dwelling dime		aweii Roda, Brito i OE,	2011 3/10			
<u> </u>		Area(m²)	Av. Height(m)	Volume(m³)	
Ground floor		40.75 (1a) x	2.6	(2a) =	105.95	(3a)
First floor		40.75 (1b) x	2.24	(2b) =	91.28	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r	n) 81.5 (4)				_
Dwelling volume		(3a)+(3	3b)+(3c)+(3d)+(3e)+.	(3n) =	197.23	(5)
2. Ventilation rate:				L		
	main seconda heating heating	y other	total		m³ per houi	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent far	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fin	res		0	× 40 =	0	(7c)
				ماه سند		<u> </u>
Infiltration due to chimne	to fluor and fano (60) (6b) (7	7a) ((7b) ((7a) —		-	anges per ho	_
•	/s, flues and fans = (6a)+(6b)+(7 een carried out or is intended, procee		30 from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in th		· //	() ()	Г	0	(9)
Additional infiltration	• , ,		[(9	9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	truction	Ī	0	(11)
if both types of wall are pr deducting areas of openin	resent, use the value corresponding to	the greater wall area (after		-		_
= -	loor, enter 0.2 (unsealed) or 0	.1 (sealed), else enter ()	Γ	0	(12)
If no draught lobby, ent		, , ,		Ì	0	(13)
Percentage of windows	and doors draught stripped			Ī	0	(14)
Window infiltration		0.25 - [0.2 x (14) ÷	100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	Ī	0	(16)
Air permeability value,	q50, expressed in cubic metre	es per hour per square i	metre of envelop	e area	5	(17)
	ty value, then (18) = [(17) ÷ 20]+(·		0.4	(18)
Air permeability value applies	s if a pressurisation test has been dor	ne or a degree air permeabili	y is being used	L		
Number of sides sheltere	d				0	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =	[1	(20)
Infiltration rate incorporat	ing shelter factor	(21) = (18) x (20) =	=		0.4	(21)
Infiltration rate modified for	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Sep	Oct Nov	Dec		
	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (2	2a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infiltra	ation rat	e (allowi	na for st	nelter an	d wind s	speed) =	(21a) x	(22a)m		-		-	
0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47	1	
Calculate effect		_	rate for t	he appli	cable ca	se							(co.).
If mechanica			endix N. (2	3b) = (23a	a) × Fmv (e	eguation (1	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced with		0		, ,	,	. ,	,, .	,	,, = (20a)			0	(23b) (23c)
a) If balance		•	•	· ·		`		,	2b)m + (23b) x [1 – (23c)		(230)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	d mecha	anical ve	ntilation	without	heat red	covery (N	иV) (24b	m = (22)	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	ouse ex	tract ven	tilation o	or positiv	e input	ventilatio	on from o	outside	•	•	•	•	
if (22b)n	า < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	.5 × (23b)			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural if (22b)m									0.51				
(24d)m= 0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61]	(24d)
Effective air	change	rate - en	nter (24a	or (24b	o) or (24	c) or (24	d) in bo	к (25)	!	!	ļ.	J	
(25)m= 0.63	0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61	1	(25)
3. Heat losse	s and he	eat loss r	paramete	er:		•		•	•			4	
ELEMENT	Gros area	-	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/l	K)	k-value		A X k kJ/K
Doors		-	Openin	gs		m²				K)			
	area	-	Openin	gs	A ,r	m ² x	W/m2	2K =	(W/I	K)			kJ/K
Doors	area	-	Openin	gs	A ,r	m² x x1	W/m2	eK = 0.04] =	(W/l	K)			kJ/K (26)
Doors Windows Type	area	-	Openin	gs	A ,r 1.93	m² x x1 x1	W/m2 1 /[1/(1.4)+	eK = 0.04] = 0.04] =	1.93 1.8	K)			kJ/K (26) (27)
Doors Windows Type Windows Type	area	-	Openin	gs	A ,r 1.93 1.36	m ² x x ¹ x ¹ x ¹	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] =	1.93 1.8 1.8	K)			kJ/K (26) (27) (27)
Doors Windows Type Windows Type Windows Type	area	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] =	1.93 1.8 1.8 6.79				kJ/K (26) (27) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type	area 1 2 2 3 4 4 e 1	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04]	(W/l 1.93 1.8 1.8 6.79 2.39	9			kJ/K (26) (27) (27) (27) (27) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ	area : 1 : 2 : 3 : 4 : 4 : e 1 : e 2	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201	x1 x1 x1 x1 76 x1 x1	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	0.04] = 0.04]	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429	9			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) +	K	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429	9 9 4			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	-	Openin	gs	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646	x1 x1 x1 x1 76 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ	area 1 1 2 2 3 4 4 e 1 6 2 6 3	(m²)	Openin	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/I 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680	9 9 4 7			kJ/K (26) (27) (27) (27) (27b) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ	area 41 42 43 44 61 62 63 64	(m²)	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1	area 1 2 3 4 e 1 e 2 e 3 e 4 e 4	95	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) +	K	(W/l 1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96	9 9 4 7			(26) (27) (27) (27) (27) (27b) (27b) (27b) (27b) (28)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1 Walls Type2	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4 102.9	95 3	Openin m	gs ²	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1/(1.7) + /[1.7) + /[1.7] +	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36	9 9 4 7			(26) (27) (27) (27) (27b) (27b) (27b) (28) (29)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Walls Type1 Walls Type2 Roof	area 1 1 2 2 3 3 4 4 e 1 e 2 e 3 e 4 102.5 104.5 105.	95 3 , m ² ows, use e	Openin m 14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and	area a 1 a 2 a 3 a 4 b 1 b 2 c 3 b 4 c 1 c 2 c 3 c 4 le 1 c 2 c 3 c 4 le 3 c 4 le 3 c 4 le 3 c 5 c 61.3	95 3 , m² ows, use e sides of in	14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²-	K	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and ** include the area	area a1 a2 a3 a4 e1 e2 e3 e4 e1 e2 e3 e4 lements roof winders on both as on both	95 3 , m² ows, use e sides of in = S (A x	14.29 0 6.06	gs 2	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculations	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [kJ/m²•	K	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (28) (29) (30) (31)
Doors Windows Type Windows Type Windows Type Windows Type Rooflights Typ Rooflights Typ Rooflights Typ Rooflights Typ Floor Walls Type1 Walls Type2 Roof Total area of e * for windows and ** include the area Fabric heat los	area a 1 a 2 a 3 a 4 b 1 b 2 c 3 b 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 1 c 2 c 3 c 4 c 7 c 61.5 c 7 c of windows as on both	95 3 , m ² ows, use e sides of in = S (A x (A x k)	14.29 0 6.06 effective winternal walk	gs 2 9 Indow U-vals and pan	A ,r 1.93 1.36 1.36 5.12 1.8 1.1201 0.92646 0.65694 40.75 88.66 2 55.24 207 alue calculatitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ /[1/(1.7)+ 0.13 0.18 0.18 0.13	K	1.93 1.8 1.8 6.79 2.39 1.90429 1.57498 1.11680 5.2975 15.96 0.36 7.18	9 9 4 7 [] as given in	kJ/m²•	1 3.2 56.77	(26) (27) (27) (27) (27b) (27b) (27b) (27b) (27b) (28) (29) (30) (31)

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oon he used insta	ad of a do	tailed color	ulation										
can be used instead Thermal bridge				usina Ar	nendix l	<						13.06	(36)
if details of therma					-	`						13.00	(30)
Total fabric hea	0 0		()	(-	• /			(33) +	(36) =			69.82	(37)
Ventilation hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5))		_
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 41.1	40.76	40.44	38.91	38.62	37.29	37.29	37.05	37.8	38.62	39.2	39.81		(38)
Heat transfer of	oefficier	nt, W/K	-	-	-	-	-	(39)m	= (37) + (37)	38)m	-		
(39)m= 110.92	110.59	110.26	108.73	108.45	107.11	107.11	106.87	107.63	108.45	109.03	109.63		
Heat loss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ · (4)	12 /12=	108.73	(39)
(40)m= 1.36	1.36	1.35	1.33	1.33	1.31	1.31	1.31	1.32	1.33	1.34	1.35		
Nivershau of day		ath /Tab	la 4a\					,	Average =	Sum(40) ₁	12 /12=	1.33	(40)
Number of day Jan	Feb	Mar		May	Jun	Jul	Δυα	Sep	Oct	Nov	Dec	1	
(41)m= 31	28	31	Apr 30	31	30	31	Aug 31	30 30	31	30	31		(41)
(11)=	20	<u> </u>		<u> </u>		<u> </u>		00	<u> </u>			J	()
4. Water heat	ing once	rav roqui	iromont:								kWh/y	oor:	
4. Water fleat	ing ener	igy requi	nement.								KVVII/y	- -	
Assumed occu	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.49		(42)
if TFA £ 13.9 Annual averag	•	ater usad	ge in litre	es per da	av Vd.av	erage =	(25 x N)	+ 36		93	3.35	1	(43)
Reduce the annua	ıl average	hot water	usage by	5% if the a	lwelling is	designed			se target o			J	(12)
not more that 125				ater use, i	not ana co I		ı				ı	1	
Jan Hot water usage ir	Feb	Mar day for ea	Apr	May	Jun	Jul Table 10 x	Aug	Sep	Oct	Nov	Dec		
	-						· ·	04.40	95.22	00.06	100.60	1	
(44)m= 102.69	98.96	95.22	91.49	87.75	84.02	84.02	87.75	91.49		98.96 m(44) ₁₁₂ =	102.69	1120.25	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600			(,		1120.23	(``)
(45)m= 152.29	133.19	137.44	119.82	114.97	99.21	91.94	105.5	106.76	124.42	135.81	147.48]	
					l .	l .			Γotal = Su	m(45) ₁₁₂ =	=	1468.83	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)				1	
(46)m= 22.84 Water storage	19.98	20.62	17.97	17.25	14.88	13.79	15.82	16.01	18.66	20.37	22.12		(46)
Storage volum		includin	ng anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	1	(47)
If community h	` ,		•			•						J	(,
Otherwise if no	•			•			` '	ers) ente	er '0' in (47)			
Water storage												•	
a) If manufact				or is kno	wn (kWł	n/day):					0]	(48)
Temperature fa											0		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)) =			0		(50)
Hot water stora			-								0]	(51)
If community h	eating s	ee secti		•									• •
Volume factor			Ol-							-	0		(52)
Temperature fa	acior tro	ın rabie	ZD								0	J	(53)

Lucigy	lost fro	m water	· storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54	1)
Enter	(50) or ((54) in (5	55)									0	(55	5)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56	5)
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57	7)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58	3)
Primar	y circuit	loss cal	culated	for each	month ((59)m = $($	(58) ÷ 36	5 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59	9)
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 36	65 × (41)	m						
(61)m=	50.96	45.55	48.52	45.12	44.72	41.43	42.82	44.72	45.12	48.52	48.8	50.96	(61	1)
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44	(62	2)
Solar DH	HW input of	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	') (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)				_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63	3)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63	3) (G2)
Output	from wa	ater hea	ter											
(64)m=	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44		
·		-	-	-	-	-	-	Outp	out from w	ater heate	r (annual)	12	2026.06 (64	1)
Heat g	ains froi	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	63.37	55.67	57.00	54.40	40.44	40.0-	44.07					1	1	
		00.07	57.83	51.12	49.41	43.35	41.27	46.26	46.78	53.5	57.36	61.78	(65	5)
inclu		<u> </u>	<u> </u>	<u> </u>		ļ	<u> </u>			53.5 rater is fr)	5)
	ıde (57)ı	m in cal	culation	<u> </u>	only if c	ļ	<u> </u>)	5)
5. Int	ide (57)i ernal ga	m in cal	culation of Table 5	of (65)m and 5a	only if c	ļ	<u> </u>)	5)
5. Int	ide (57)i ernal ga	m in cald ains (see	culation of Table 5	of (65)m and 5a	only if c	ļ	<u> </u>)	5)
5. Int	de (57) ernal ga olic gain	m in calo ains (see as (Table	culation Table 5 5), Wat	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	rater is fr	om com	munity h)	
5. Int Metabo (66)m=	ernal ga olic gain Jan 124.54	m in cald ains (see s (Table Feb 124.54	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 124.54	only if c): May 124.54	ylinder i	Jul 124.54	Aug 124.54	or hot w Sep 124.54	rater is fr	om com	munity h	neating	
5. Int Metabo (66)m=	ernal ga olic gain Jan 124.54	m in cald ains (see s (Table Feb 124.54	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 124.54	only if c): May 124.54	Jun	Jul 124.54	Aug 124.54	or hot w Sep 124.54	rater is fr	om com	munity h	neating	5)
5. Int Metabo (66)m= Lightin (67)m=	ernal ga olic gain Jan 124.54 g gains	m in calo	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	of (65)m 6 and 5a ts Apr 124.54 opendix 10.85	only if c): May 124.54 L, equat 8.11	Jun 124.54	Jul 124.54 r L9a), a	Aug 124.54 Iso see	Sep 124.54 Table 5	Oct 124.54	Nov	Dec	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m=	ernal ga olic gain Jan 124.54 g gains 19.84	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33	of (65)m 6 and 5a ts Apr 124.54 opendix 10.85	only if c): May 124.54 L, equat 8.11	Jun 124.54 ion L9 o	Jul 124.54 r L9a), a	Aug 124.54 Iso see	Sep 124.54 Table 5	Oct 124.54	Nov	Dec	neating (66	55)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal ga olic gain Jan 124.54 g gains 19.84 nces ga 222.55	m in calconing (See See See See See See See See See Se	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04	of (65)m 5 and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54	neating (66	55)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal ga olic gain Jan 124.54 g gains 19.84 nces ga 222.55	m in calconing (See See See See See See See See See Se	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04	of (65)m 5 and 5a ts Apr 124.54 opendix 10.85 Appendix 206.65	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L	Jul 124.54 r L9a), a 7.4 13 or L1 166.49	Aug 124.54 Iso see 9.62 3a), also	Sep 124.54 Table 5 12.91 see Ta	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45	m in calconing in calconing (See See See See See See See See See Se	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45	of (65)m s and 5a ts Apr 124.54 opendix 10.85 n Append 206.65 ppendix 35.45	only if construction only in construction only in construction only in c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	neating (66	5)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45	m in calconains (see Feb 124.54 (calcula 17.62 ins (calcula 224.86 (calcula 35.45	Table 5 2 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45	of (65)m s and 5a ts Apr 124.54 opendix 10.85 n Append 206.65 ppendix 35.45	only if construction only in construction only in construction only in c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a	Aug 124.54 Iso see 9.62 3a), also 164.18	Sep 124.54 Table 5 12.91 see Ta 170 ee Table	Oct 124.54 16.39 ble 5 182.39	Nov 124.54 19.13	Dec 124.54 20.39	neating (66	(5) (7) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	plic gain Jan 124.54 g gains 19.84 nces gain 222.55 ng gains 35.45 and far	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc 224.86 (calcula 35.45 ns gains	Table 5 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45 (Table 5	of (65)m 5 and 5a ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66 (67 (68	(5) (7) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	plic gain Jan 124.54 g gains 19.84 nces gain 222.55 ng gains 35.45 and far	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calc 224.86 (calcula 35.45 ns gains	Table 5 5), Wat Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ated in A 35.45 (Table 5	of (65)m 5 and 5a ts Apr 124.54 ppendix 10.85 Appendix 206.65 ppendix 35.45 5a) 3	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73	(66 (67 (68	55) 7) 3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga plic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 s e.g. ev	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ns gains 3	Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ted in A 35.45 (Table 9 3 on (nega	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 n Append 206.65 opendix 35.45 opendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73 35.45	(66 (68 (69	55) 7) 3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga plic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 s e.g. ev	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ins gains 3 raporatio -99.63	Mar 124.54 ted in Ap 14.33 ulated ir 219.04 ted in A 35.45 (Table 9 3 on (nega	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 n Append 206.65 opendix 35.45 opendix 35.45	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45	Oct 124.54 16.39 ble 5 182.39 5 35.45	Nov 124.54 19.13 198.03	Dec 124.54 20.39 212.73 35.45	(66 (68 (69	(5) (7) (3) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 e.g. ev -99.63 heating	m in calc ains (see s (Table Feb 124.54 (calcula 17.62 ins (calcula 35.45 ns gains 3 raporatic -99.63 gains (T	ted in April 124.54 ted in	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 Appendix 206.65 opendix 35.45 oa) 3 tive valu -99.63	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3 -99.63	Oct 124.54 16.39 ble 5 182.39 2 5 35.45	Nov 124.54 19.13 198.03 35.45 3	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66 (67 (68 (70	(5) (7) (3) (3)
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	de (57)i ernal ga blic gain Jan 124.54 g gains 19.84 nces ga 222.55 ig gains 35.45 and far 3 e.g. ev -99.63 heating	m in calconins (see Feb 124.54 (calcula 17.62 ins (calcula 35.45 ins gains 3 raporatio -99.63 gains (Table 82.85	ted in April 124.54 ted in	of (65)m of (65)m of and 5a tts Apr 124.54 opendix 10.85 Appendix 206.65 opendix 35.45 oa) 3 tive valu -99.63	only if construction only if c	Jun 124.54 ion L9 o 6.85 uation L 176.31 tion L15 35.45 3 ble 5) -99.63	Jul 124.54 r L9a), a 7.4 13 or L1 166.49 or L15a) 35.45	Aug 124.54 Iso see 9.62 3a), also 164.18 , also se 35.45 3	Sep 124.54 Table 5 12.91 see Ta 170 ee Table 35.45 3 -99.63	Oct 124.54 16.39 ble 5 182.39 5 35.45 3 -99.63	Nov 124.54 19.13 198.03 35.45 3	Dec 124.54 20.39 212.73 35.45 3 -99.63	(66 (67 (68 (70	(5) (7) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.36	x	10.63	x	0.63	x	0.7	=	4.42	(74)
North	0.9x	0.77	x	1.36	x	20.32	x	0.63	X	0.7	=	8.45	(74)
North	0.9x	0.77	x	1.36	x	34.53	X	0.63	X	0.7	=	14.35	(74)
North	0.9x	0.77	x	1.36	x	55.46	х	0.63	x	0.7	=	23.05	(74)
North	0.9x	0.77	x	1.36	x	74.72	x	0.63	x	0.7	=	31.05	(74)
North	0.9x	0.77	x	1.36	x	79.99	x	0.63	x	0.7	=	33.24	(74)
North	0.9x	0.77	x	1.36	x	74.68	x	0.63	x	0.7	=	31.04	(74)
North	0.9x	0.77	x	1.36	x	59.25	x	0.63	x	0.7	=	24.62	(74)
North	0.9x	0.77	x	1.36	x	41.52	x	0.63	x	0.7	=	17.26	(74)
North	0.9x	0.77	x	1.36	x	24.19	x	0.63	x	0.7	=	10.05	(74)
North	0.9x	0.77	x	1.36	x	13.12	x	0.63	x	0.7	=	5.45	(74)
North	0.9x	0.77	x	1.36	x	8.86	x	0.63	x	0.7	=	3.68	(74)
East	0.9x	0.77	x	1.8	x	19.64	x	0.63	x	0.7	=	10.8	(76)
East	0.9x	0.77	x	1.8	x	38.42	x	0.63	X	0.7	=	21.14	(76)
East	0.9x	0.77	X	1.8	x	63.27	x	0.63	x	0.7	=	34.81	(76)
East	0.9x	0.77	x	1.8	x	92.28	x	0.63	x	0.7	=	50.76	(76)
East	0.9x	0.77	X	1.8	x	113.09	x	0.63	x	0.7	=	62.21	(76)
East	0.9x	0.77	X	1.8	x	115.77	x	0.63	x	0.7	=	63.69	(76)
East	0.9x	0.77	x	1.8	x	110.22	x	0.63	x	0.7	=	60.63	(76)
East	0.9x	0.77	X	1.8	x	94.68	x	0.63	x	0.7	=	52.08	(76)
East	0.9x	0.77	X	1.8	x	73.59	x	0.63	X	0.7	=	40.48	(76)
East	0.9x	0.77	X	1.8	x	45.59	x	0.63	X	0.7	=	25.08	(76)
East	0.9x	0.77	X	1.8	X	24.49	X	0.63	X	0.7	=	13.47	(76)
East	0.9x	0.77	X	1.8	x	16.15	x	0.63	X	0.7	=	8.88	(76)
South	0.9x	0.77	X	5.12	X	46.75	X	0.63	X	0.7	=	73.15	(78)
South	0.9x	0.77	X	5.12	x	76.57	X	0.63	X	0.7	=	119.81	(78)
South	0.9x	0.77	X	5.12	x	97.53	X	0.63	X	0.7	=	152.61	(78)
South	0.9x	0.77	X	5.12	x	110.23	x	0.63	X	0.7	=	172.49	(78)
South	0.9x	0.77	X	5.12	x	114.87	X	0.63	X	0.7	=	179.74	(78)
South	0.9x	0.77	X	5.12	X	110.55	X	0.63	x	0.7	=	172.98	(78)
South	0.9x	0.77	X	5.12	x	108.01	X	0.63	X	0.7	=	169.01	(78)
South	0.9x	0.77	X	5.12	x	104.89	X	0.63	X	0.7	=	164.13	(78)
South	0.9x	0.77	X	5.12	x	101.89	x	0.63	x	0.7	=	159.42	(78)
South	0.9x	0.77	X	5.12	x	82.59	x	0.63	x	0.7	=	129.22	(78)
South	0.9x	0.77	X	5.12	x	55.42	x	0.63	x	0.7	=	86.71	(78)
South	0.9x	0.77	X	5.12	X	40.4	X	0.63	X	0.7	=	63.21	(78)

West	ر م می ا		1		1		1		١		1		7(00)
	0.9x	0.77	X	1.36	X	19.64	X 1	0.63	X	0.7	= 1	24.49	(80)
	0.9x	0.77	X	1.36	X	38.42	X	0.63	X	0.7	=	47.91	(80)
	0.9x	0.77	X	1.36	X	63.27	X I	0.63	X	0.7] = 1	78.9	(80)
	0.9x	0.77	X	1.36	X	92.28	X	0.63	X	0.7	=	115.06	(80)
	0.9x	0.77	X	1.36	X	113.09	X	0.63	X	0.7] = 1	141.02	(80)
	0.9x	0.77	X	1.36	X	115.77	X	0.63	X	0.7] = 1	144.35	(80)
	0.9x	0.77	X	1.36	X	110.22	X	0.63	X	0.7] = 1	137.43	(80)
	0.9x	0.77	X	1.36	X	94.68	X	0.63	X	0.7	=	118.05	(80)
	0.9x	0.77	X	1.36	X	73.59	X	0.63	X	0.7	=	91.76	(80)
	0.9x	0.77	X	1.36	X	45.59	X	0.63	X	0.7	=	56.85	(80)
	0.9x	0.77	X	1.36	X	24.49	X	0.63	X	0.7	=	30.54	(80)
	0.9x	0.77	X	1.36	X	16.15	X	0.63	X	0.7	=	20.14	(80)
Rooflights		1	X	1.12	X	25.93	Х	0.63	X	0.7	=	23.06	(82)
Rooflights	<u> </u>	1	X	1.12	X	25.93	X	0.63	X	0.7	=	23.06	(82)
Rooflights	<u> </u>	1	X	0.93	X	25.93	X	0.63	X	0.7	=	9.53	(82)
Rooflights	<u> </u>	1	X	0.66	X	25.93	X	0.63	X	0.7	=	6.76	(82)
Rooflights		1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights		1	X	1.12	X	51.88	X	0.63	X	0.7	=	46.13	(82)
Rooflights		1	X	0.93	X	51.88	x	0.63	X	0.7	=	19.08	(82)
Rooflights	0.9x	1	X	0.66	X	51.88	X	0.63	X	0.7	=	13.53	(82)
Rooflights	0.9x	1	X	1.12	x	88.38	x	0.63	X	0.7	=	78.59	(82)
Rooflights	0.9x	1	X	1.12	x	88.38	x	0.63	x	0.7	=	78.59	(82)
Rooflights	0.9x	1	X	0.93	x	88.38	x	0.63	x	0.7	=	32.5	(82)
Rooflights	0.9x	1	X	0.66	x	88.38	x	0.63	x	0.7	=	23.04	(82)
Rooflights	0.9x	1	X	1.12	x	133.65	x	0.63	x	0.7	=	118.84	(82)
Rooflights	0.9x	1	X	1.12	X	133.65	X	0.63	X	0.7	=	118.84	(82)
Rooflights	0.9x	1	X	0.93	x	133.65	x	0.63	X	0.7	=	49.15	(82)
Rooflights	0.9x	1	X	0.66	x	133.65	x	0.63	x	0.7	=	34.85	(82)
Rooflights	0.9x	1	X	1.12	x	168.1	x	0.63	x	0.7	=	149.47	(82)
Rooflights	0.9x	1	X	1.12	x	168.1	x	0.63	x	0.7	=	149.47	(82)
Rooflights	0.9x	1	X	0.93	x	168.1	x	0.63	x	0.7	=	61.81	(82)
Rooflights	0.9x	1	X	0.66	x	168.1	x	0.63	x	0.7	=	43.83	(82)
Rooflights	0.9x	1	X	1.12	x	174	x	0.63	x	0.7	=	154.72	(82)
Rooflights	0.9x	1	x	1.12	x	174	x	0.63	x	0.7	=	154.72	(82)
Rooflights	0.9x	1	X	0.93	x	174	x	0.63	x	0.7	=	63.98	(82)
Rooflights	0.9x	1	x	0.66	x	174	x	0.63	x	0.7	=	45.37	(82)
Rooflights	0.9x	1	x	1.12	x	164.87	x	0.63	x	0.7	=	146.6	(82)
Rooflights	0.9x	1	x	1.12	x	164.87	x	0.63	x	0.7	j =	146.6	(82)
Rooflights	0.9x	1	x	0.93	x	164.87	x	0.63	x	0.7	j =	60.62	(82)
Rooflights	0.9x	1	x	0.66	x	164.87	x	0.63	x	0.7	j =	42.99	(82)
Rooflights	0.9x	1	X	1.12	x	138.72	x	0.63	x	0.7	=	123.35	(82)

																_
Rooflights 0.9x	1	X	1.1	2	x	13	38.72	X	0.63	,	x	0.7		=	123.35	(82)
Rooflights 0.9x	1	X	0.9)3	X	13	38.72	X	0.63	,	x	0.7		=	51.01	(82)
Rooflights 0.9x	1	X	0.6	66	x	13	38.72	X	0.63	,	x	0.7		=	36.17	(82)
Rooflights 0.9x	1	X	1.1	2	x	10	04.33	X	0.63	,	x	0.7		=	92.77	(82)
Rooflights 0.9x	1	X	1.1	2	x	10)4.33	x	0.63	,	x	0.7		=	92.77	(82)
Rooflights 0.9x	1	Х	0.9)3	x	10	04.33	x	0.63	,	x	0.7		=	38.36	(82)
Rooflights 0.9x	1	X	0.6	66	x	10	04.33	x	0.63	,	x [0.7		=	27.2	(82)
Rooflights 0.9x	1	X	1.1	2	x	6	2.32	X	0.63	,	x	0.7		=	55.42	(82)
Rooflights 0.9x	1	X	1.1	2	x	6	2.32	x	0.63	,	x	0.7		=	55.42	(82)
Rooflights 0.9x	1	X	0.9)3	x	6	2.32	x	0.63	,	x [0.7		=	22.92	(82)
Rooflights 0.9x	1	х	0.6	66	x	6	2.32	x	0.63	,	x	0.7		=	16.25	(82)
Rooflights 0.9x	1	Х	1.1	2	x	3	2.54	x	0.63	,	x	0.7		=	28.93	(82)
Rooflights 0.9x	1	х	1.1	2	x	3	2.54	x	0.63	,	x [0.7		=	28.93	(82)
Rooflights 0.9x	1	x	0.9)3	x	3	2.54	x	0.63	 ,	x į	0.7		=	11.96	(82)
Rooflights 0.9x	1	X	0.6	66	x	3	2.54	x	0.63	 ,	x	0.7		=	8.48	(82)
Rooflights 0.9x	1	x	1.1	2	x	2	1.19	x	0.63	,	x İ	0.7	\equiv	=	18.84	(82)
Rooflights 0.9x	1	x	1.1	2	x	2	1.19	x	0.63	,	x İ	0.7	司	=	18.84	(82)
Rooflights 0.9x	1	х	0.9)3	x	2	1.19	x	0.63	,	x İ	0.7		=	7.79	(82)
Rooflights 0.9x	1	X	0.6	66	x	2	1.19	x	0.63		x İ	0.7	司	=	5.53	(82)
Solar gains in (83)m= 175.27 Total gains – in (84)m= 566.2	322.15 nternal a 710.84	493.39 Ind solar 867.85	683.05 (84)m = 1034.91	818.61 = (73)m 1147.5	83 + (8	33.06 33)m ,	794.92	692		2 371	.21	-	146 526			(83)
7. Mean inter			`													_
Temperature	Ū	٠.			•			ole 9	, Th1 (°C)						21	(85)
Utilisation fac					ì							1	_		I	
Jan	Feb	Mar	Apr	May	-	Jun	Jul	_	ug Ser	_	ct oc	+	-	ec		(06)
(86)m= 1	0.99	0.97	0.9	0.76	<u> </u>).58	0.43	0.4		0.0	95	0.99	1			(86)
Mean interna					_							_			Ī	
(87)m= 19.57	19.8	20.16	20.57	20.85	20	0.97	20.99	20.	99 20.9	20.	.49	19.95	19.	53		(87)
Temperature	during h	eating p	eriods ir	rest of	dw	elling	from Ta	ble 9	9, Th2 (°C	;)						
(88)m= 19.79	19.8	19.8	19.81	19.82	19	9.83	19.83	19.	83 19.82	2 19.	.82	19.81	19.	81		(88)
Utilisation fac	tor for g	ains for	rest of d	welling,	h2,ı	m (se	e Table	9a)								
(89)m= 0.99	0.99	0.96	0.87	0.7	0).48	0.32	0.3	0.66	0.0	93	0.99	1			(89)
Mean interna	l temper	ature in	the rest	of dwell	ing	T2 (fc	ollow ste	eps 3	to 7 in Ta	able 9c	;)					
(90)m= 17.92	18.26	18.77	19.34	19.68	Ť	9.81	19.83	19.		1	_	18.48	17.	87		(90)
					_	!				fLA =	Liv	ring area ÷ (4	4) =		0.22	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwe	llinc	n) = fl	A x T1	+ (1	– fLA) ⊻ T	- 2						_
(92)m= 18.29	18.6	19.08	19.62	19.95	_	0.07	20.09	20.			.53	18.81	18.	25		(92)
Apply adjustn					<u> </u>										1	
,				•				•		•						

(93)m=	18.29	18.6	19.08	19.62	19.95	20.07	20.09	20.09	20.01	19.53	18.81	18.25		(93)
8. Spa	ace heat	ting requ	uirement								•			
				•		ed at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	:ulate	
the uti	T		or gains						I -			I _ 1	l	
<u>[</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Г			ains, hm										l	(0.4)
(94)m=	0.99	0.98	0.95	0.86	0.7	0.5	0.34	0.39	0.67	0.92	0.98	0.99		(94)
			, W = (94	ŕ		574.50	074.70	000.50	505.40	0.40.07	T 505 50	500.40	l	(OE)
(95)m=	561.93	697.24	823.49	892.3	807.5	571.53	371.78	390.52	585.48	649.07	565.56	523.49		(95)
	-		r	. 	from Ta		40.0	404	444	40.0	7.4	4.0		(06)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2	I	(96)
					erature, l		- ` 	X [(93)m	<u> </u>	968.46	4070 00	4500.0		(07)
L	1551.47			L	894.17	585.94	373.75	l	636	L	1276.32	1539.8	I	(97)
	i	•	ı	i	nonth, k\		l e		i i	ŕ	·	75044	l	
(98)m=	736.22	549.89	419.13	196.75	64.49	0	0	0	0	237.63	511.75	756.14		٦
								Tota	l per year	(kWh/yea	r) = Sum(9	8) _{15,912} =	3471.98	(98)
Space	e heating	g require	ement in	kWh/m²	/year								42.6	(99)
9a. Ene	ergy req	uiremer	nts – Indi	ividual h	eating sy	/stems i	ncluding	micro-C	CHP)					_
	e heatin													
-		•	at from s	econdar	y/supple	mentary	system						0	(201)
Fraction	on of sp	ace hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$							1	(204)						
Efficiency of main space heating system 1								(206)						
	-	•					0.1						93.4	╡
Efficie	ency of s	econda	ry/suppl	ementar	y heating	g system	า, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
			<u> </u>		d above)		•			1			•	
L	736.22	549.89	419.13	196.75	64.49	0	0	0	0	237.63	511.75	756.14		
(211)m	= {[(98)	m x (20	(4)] } x 1	00 ÷ (20	06)									(211)
	788.24	588.74	448.75	210.65	69.05	0	0	0	0	254.42	547.91	809.57		
_	-		-	-	-		-	Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}		3717.33	(211)
Space	e heating	g fuel (s	econdar	y), kWh/	month							'		_
-		-	00 ÷ (20											
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
_	•						•	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	-	0	(215)
Water I	heating											1		_
	_		ter (calc	ulated al	bove)						-			
	203.24	178.74	185.96	164.94	159.69	140.65	134.75	150.22	151.87	172.94	184.61	198.44		
Efficien	cy of wa	ater hea	iter		-		-			-	-		80.3	(216)
(217)m=	88.01	87.69	87.04	85.5	82.97	80.3	80.3	80.3	80.3	85.85	87.48	88.1		(217)
Fuel for	r water l	neating,	kWh/mo	onth										
		•	÷ (217)										•	
(219)m=	230.95	203.82	213.66	192.92	192.48	175.15	167.81	187.07	189.13	201.44	211.02	225.25		_
								Tota	I = Sum(2	19a) ₁₁₂ =			2390.71	(219)
Annual										k'	Wh/year	•	kWh/year	-
Space I	heating	fuel use	ed, main	system	1								3717.33	_
												•		

					7			
Water heating fuel used				2390.71	╛			
Electricity for pumps, fans and electric keep-hot								
central heating pump:			30		(230c)			
boiler with a fan-assisted flue		(230e)						
Total electricity for the above, kWh/year		75	(231)					
Electricity for lighting	350.38	(232)						
Total delivered energy for all uses (211)(221) + (231) + (232)(237b) = 6613.72 (338)								
12a. CO2 emissions – Individual heating systems including micro-CHP								
	Energy kWh/year	Emission fa		Emissions kg CO2/yea				
Space heating (main system 1)	(211) x	0.216	=	802.94	(261)			
Space heating (secondary)	(215) x	0.519	=	0	(263)			
Water heating	(219) x	0.216	=	516.39	(264)			
Space and water heating	(261) + (262) + (263) + (264) =			1319.34	(265)			
-								
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)			
·	(231) x (232) x	0.519	=	38.93 181.85	(267) (268)			
Electricity for pumps, fans and electric keep-hot	(232) x							

TER =

(273)

18.9

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Dwelling type: Detached House Located in:

England

Region: South East England

Cross ventilation possible: Yes Number of storeys: 2 Front of dwelling faces: West

Overshading: Average or unknown

Overhangs:

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters: Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Summer ventilation heat loss coefficient: (P1) 520.69

Transmission heat loss coefficient: 75.2

Summer heat loss coefficient: 595.92 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
West (W1-3 FRONT)	0	1
North (W4 - SIDE N)	0	1
South (W5 - SIDE S)	0	1
East (W6 - REAR E)	0	1
West (RW1-2 FRONT W)	0 (1
East (RW3-4 REAR E)	0	1
East (RW5 REAR E)	0	1
East (RW6 REAR E)	0	1

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
West (W1-3 FRONT)	0.98	1	1	0.98	(P8)
North (W4 - SIDE N)	0.98	1	1	0.98	(P8)
South (W5 - SIDE S)	0.98	1	1	0.98	(P8)
East (W6 - REAR E)	0.98	1	1	0.98	(P8)
West (RW1-2 FRONT V	V) 0.98	1	1	0.98	(P8)
East (RW3-4 REAR E)	0.98	1	1	0.98	(P8)
East (RW5 REAR E)	0.98	1	1	0.98	(P8)
East (RW6 REAR E)	0.98	1	1	0.98	(P8)

Orientation		Area	Flux	\mathbf{g}_{-}	FF	Shading	Gains
West (W1-3 FRONT)	1 x	4.86	124.8	0.63	0.8	0.98	270.99
North (W4 - SIDE N)	1 x	1.62	86.66	0.63	8.0	0.98	62.72
South (W5 - SIDE S)	1 x	6.08	118.4	0.63	8.0	0.98	321.63
East (W6 - REAR E)	1 x	2.14	124.8	0.63	8.0	0.98	119.32
	1 x	2.66	187.8	0.63	8.0	0.98	223.2
	1 x	2.66	187.8	0.63	8.0	0.98	223.2
	1 x	1.1	187.8	0.63	8.0	0.98	92.3
	1 x	0.78	187.8	0.63	0.8	0.98	65.45

SAP 2012 Overheating Assessment

		Total	1378.81 (P3/P4)
Internal gains:			
	June	July	August
Internal gains	432.58	414.57	422.73
Total summer gains	1893.39	1793.39	1640.4 (P5)
Summer gain/loss ratio	3.18	3.01	2.75 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5
Thermal mass temperature increment	0.25	0.25	0.25
Threshold temperature	18.83	20.66	20.5 (P7)
Likelihood of high internal temperature	Not significant	Slight	Slight
Assessment of likelihood of high internal temperature:	Slight		

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 Printed on 25 February 2021 at 14:04:44

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Semi-detached House

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 78.4m²

Site Reference: WOODWELL Plot Reference: HOUSE D - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.72 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 11.59 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.0 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	OK
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	OK
Openings	1.38 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 4.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

5 Cylinder insulation No cylinder Hot water Storage: 6 Controls TTZC by plumbing and electrical services **OK** Space heating controls Hot water controls: No cylinder thermostat No cylinder **OK** Boiler interlock: Yes 7 Low energy lights Percentage of fixed lights with low-energy fittings 100.0% 75.0% **OK** 8 Mechanical ventilation Not applicable 9 Summertime temperature Overheating risk (South East England): Not significant **OK** Based on: Overshading: Average or unknown Windows facing: North 3.24m² 2.59m² Windows facing: West 0.86m² Windows facing: West Windows facing: South 2.14m² 2.66m² Roof windows facing: South Ventilation rate: 8.00 Dark-coloured curtain or roller blind Blinds/curtains: Closed 10% of daylight hours

10 Key features

Party Walls U-value

Photovoltaic array

Thermal Bridge Report

Property Details: HOUSE D - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges

Thermal bridges: User-defined = UD

 $\begin{array}{l} \mathsf{Default} &= \mathsf{D} \\ \mathsf{Approved} &= \mathsf{A} \end{array}$

User-defined (individual PSI-values) Y-Value = 0.0583

External Junctions Details:

Junction Type	PSI-Value	Length	Reference	Туре
Other lintels (including other steel lintels)	0.05	6.44	E2	[UD]
Sill	0.04	2.7	E3	[A]
Jamb	0.05	20.7	E4	[A]
Ground floor (normal)	0.08	18.11	E5	[UD]
Intermediate floor within a dwelling	0.07	18.11	E6	[A]
Eaves (insulation at rafter level)	0.04	12.43	E11	[A]
Gable (insulation at rafter level)	0.04	18.49	E13	[A]
Corner (normal)	0.09	12.6	E16	[A]
Staggered party wall between dwellings	0.12	6.4	E25	[D]
Party Junctions Details:				
Ground floor	0.16	6.15	P1	[D]
Roof (insulation at rafter level)	0.08	8.98	P5	[D]
Roof Junctions Details:				
Head	0.08	2.95	R1	[D]
Sill	0.06	2.95	R2	[D]
Jamb	0.08	5.4	R3	[D]
Ridge (vaulted ceiling)	0.08	7.6	R4	[D]

SAP Input

Property Details: HOUSE D - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House

Detachment: Semi-detached

Year Completed: 2021

Floor Location: Floor area:

Storey height:

Floor 0 39.2 m^2 2.6 m Floor 1 39.2 m^2 2.56 m

Living area: 18.35 m² (fraction 0.234)

Front of dwelling faces: North

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
FRONT DOOR	Manufacturer	Solid			Wood
W1-2 FRONT N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W3 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - REAR S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 REAR S	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Name:	Gap:	Frame Fac	tor: g-value:	U-value:	Area:	No. of Openings:
FRONT DOOR	mm	0.8	0	1.4	2.07	1
W1-2 FRONT N	16mm or more	0.8	0.63	1.4	1.62	2
W3 - SIDE E	16mm or more	0.8	0.63	1.4	2.59	1
W4 - SIDE E	16mm or more	0.8	0.63	1.4	0.86	1
W5 - REAR S	16mm or more	0.8	0.63	1.4	2.14	1
RW1-2 REAR S	16mm or more	0.8	0.63	1.3	1.33	2

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	North	0	0
W1-2 FRONT N		EXTERNAL WALLS	North	0	0
W3 - SIDE E		EXTERNAL WALLS	West	0	0
W4 - SIDE E		EXTERNAL WALLS	West	0	0
W5 - REAR S		EXTERNAL WALLS	South	0	0
RW1-2 REAR S		ROOF	South	0.001	0

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Element	<u>S</u>						
EXTERNAL WALLS	80.83	10.9	69.93	0.2	0	False	N/A
DORMER CHEEKS	2.12	0	2.12	0.2	0	False	N/A

SAP Input

 ROOF
 57.4
 2.66
 54.74
 0.14
 0
 N/A

 GROUND FLOOR
 39.2
 0.17
 N/A

 Internal Elements
 0.17
 N/A

Internal Elements
Party Elements

PARTY WALL 29.73

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0583

	Length	Psi-value		
	6.44	0.05	E2	Other lintels (including other steel lintels)
[Approved]	2.7	0.04	E3	Sill
[Approved]	20.7	0.05	E4	Jamb
	18.11	0.08	E5	Ground floor (normal)
[Approved]	18.11	0.07	E6	Intermediate floor within a dwelling
[Approved]	12.43	0.04	E11	Eaves (insulation at rafter level)
[Approved]	18.49	0.04	E13	Gable (insulation at rafter level)
[Approved]	12.6	0.09	E16	Corner (normal)
	6.4	0.12	E25	Staggered party wall between dwellings
	6.15	0.16	P1	Ground floor
	8.98	0.08	P5	Roof (insulation at rafter level)
	2.95	0.08	R1	Head
	2.95	0.06	R2	Sill
	5.4	0.08	R3	Jamb
	7.6	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys: 0
Number of open flues: 0
Number of fans: 3
Number of passive stacks: 0
Number of sides sheltered: 1
Pressure test: 4

Main heating system

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

Boiler interlock: Yes Delayed start

Main heating Control

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

SAP Input

Water heating

Water heating: From main heating system

Water code: 901 Fuel :mains gas No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 100%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No

Photovoltaics: Photovoltaic 1

Installed Peak power: 1.02 Tilt of collector: 45°

Overshading: None or very little

Collector Orientation: South

Assess Zero Carbon Home: No

		User Details:				
A NI	la grana Malayyahlan			OTDO	000005	
Assessor Name: Software Name:	Jemma Mclaughlan Stroma FSAP 2012	Stroma Nur Software V		RO030065 rsion: 1.0.5.25		
Software Name.		roperty Address: HOU		V C I SIO	11. 1.0.3.23	
Address :	Woodwell Cottage P2, Wood					
Overall dwelling dime	•	awen Road, Brilo i OE,	DOTT ONC			
<u> </u>		Area(m²)	Av. Height(m)	Volume(m³)	
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r	78.4 (4)				_
Dwelling volume		(3a)+(3	3b)+(3c)+(3d)+(3e)+.	(3n) =	202.27	(5)
2. Ventilation rate:				L		
	main secondar heating heating	y other	total		m³ per houi	•
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent far	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fin	res		0	x 40 =	0	(7c)
				A: a.l.		-
Inditantian due to object	va fluor and fana (60) (6b) (7	(a) ((7a) -	Г	-	anges per ho	_
•	/s, flues and fans = (6a)+(6b)+(7 een carried out or is intended, proceed		30 from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in th		· //	() ()	Г	0	(9)
Additional infiltration	• · · ·		[(9	9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	struction	Ī	0	(11)
if both types of wall are pr deducting areas of openin	resent, use the value corresponding to	the greater wall area (after		•		_
= -	loor, enter 0.2 (unsealed) or 0.	.1 (sealed), else enter ()	[0	(12)
If no draught lobby, ent		, ,		Ì	0	(13)
Percentage of windows	and doors draught stripped			Ī	0	(14)
Window infiltration	5	0.25 - [0.2 x (14) -	- 100] =	Ì	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	Ī	0	(16)
Air permeability value,	q50, expressed in cubic metre	s per hour per square	metre of envelop	e area	4	(17)
	ity value, then (18) = [(17) ÷ 20]+(8		·	Ī	0.35	(18)
Air permeability value applies	s if a pressurisation test has been dor	ne or a degree air permeabili	ty is being used	L		
Number of sides sheltere	d				1	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =		0.92	(20)
Infiltration rate incorporat	ing shelter factor	$(21) = (18) \times (20) =$	=		0.32	(21)
Infiltration rate modified for	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Ser	Oct Nov	Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor	· (22a)m =	(22)m ÷	4										
(22a)m= 1.27	7 1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted inf	iltration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.41	1 -	0.39	0.35	0.35	0.31	0.31	0.3	0.32	0.35	0.36	0.38]	
Calculate et	<i>fective air</i> iical ventila	-	rate for t	he appli	cable ca	se	•		•	•			(23a)
	r heat pump		endix N. (2	(23a) = (23a	a) × Fmv (e	eguation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
	with heat reco								, (===,			0	(23c)
a) If balar	nced mech	anical ve	ntilation	with he	at recov	erv (MVI	HR) (24a	· a)m = (2;	2b)m + (23b) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balar	nced mech	anical ve	entilation	without	heat red	covery (N	лV) (24k	m = (22)	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
,	e house ex o)m < 0.5 >			•	•				5 × (23h	n)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
	al ventilation	on or wh	ole hous	e positiv	/e input	ı ventilatio	on from	loft				J	
,	o)m = 1, th			•	•				0.5]				
(24d)m = 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.57	0.57		(24d)
	air change	rate - er	<u> </u>	^ `	_ ` 	``		x (25)		1	1	1	
(25)m= 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.57	0.57		(25)
2 Heatles													
3. Heat los	ses and ne	eat loss p	paramete	er:									
ELEMEN		SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/	K)	k-value kJ/m²-l		A X k kJ/K
	F Gros	SS	Openin	gs		m²				K)			
ELEMEN	F Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMEN Doors	F Gros area /pe 1	SS	Openin	gs	A ,r	m ² x x10	W/m2	2K = [- 0.04] = [(W/ 2.898	K)			kJ/K (26)
ELEMEN Doors Windows Ty	Gros area /pe 1 /pe 2	SS	Openin	gs	A ,r 2.07	m ² x x10 x10	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15	K)			kJ/K (26) (27)
Doors Windows Ty Windows Ty	Gros area /pe 1 /pe 2 /pe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.898 2.15 3.43	K)			kJ/K (26) (27) (27)
Doors Windows Ty Windows Ty Windows Ty	Gros area /pe 1 /pe 2 /pe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14	K)			kJ/K (26) (27) (27) (27)
Doors Windows Ty Windows Ty Windows Ty Windows Ty	Gros area /pe 1 /pe 2 /pe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84	k)			kJ/K (26) (27) (27) (27) (27)
Doors Windows Ty Windows Ty Windows Ty Windows Ty Windows Ty Rooflights	Gros area vpe 1 vpe 2 vpe 3 vpe 4	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84	K)			kJ/K (26) (27) (27) (27) (27) (27) (27b)
Doors Windows Ty Windows Ty Windows Ty Windows Ty Rooflights Floor	reading Gross area for the following Gross ar	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.729 6.664	K)			(26) (27) (27) (27) (27) (27b) (28)
Doors Windows Ty Windows Ty Windows Ty Windows Ty Rooflights Floor Walls Type 1	rpe 1 rpe 2 rpe 3 rpe 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99	K)			kJ/K (26) (27) (27) (27) (27) (27b) (28)
Doors Windows Ty Windows Ty Windows Ty Windows Ty Rooflights Floor Walls Type2	rea Gros area rea rea rea rea rea rea rea rea re	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29)
Doors Windows Ty Windows Ty Windows Ty Windows Ty Rooflights Floor Walls Type 1 Walls Type 2 Roof	rea Gros area rea rea rea rea rea rea rea rea re	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3) + 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42	K)			kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
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Doors Windows Ty Windows Ty Windows Ty Windows Ty Rooflights Floor Walls Type 1 Walls Type 2 Roof Total area of Party wall * for windows a	rpe 1 rpe 2 rpe 3 rpe 4 80.8 2 2.1 57. If elements	33 2 4 5, m ² sows, use e	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66		kJ/m²-l	k	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
Doors Windows Ty Windows Ty Windows Ty Windows Ty Windows Ty Rooflights Floor Walls Type 1 Walls Type 2 Roof Total area of Party wall * for windows a ** include the a	rpe 1 rpe 2 rpe 3 rpe 4 80.8 2 2.1 57. If elements and roof wind areas on both loss, W/K	33 2 4 5, m ² sows, use e sides of ir = S (A x	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14 0 formula 1	2K	(W// 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66		kJ/m²-l	K	(26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Ty Windows Ty Windows Ty Windows Ty Rooflights Floor Walls Type 2 Roof Total area of Party wall * for windows at ** include the at Fabric heat	Gros area Type 1 Type 2 Type 3 Type 4 Solution in the second	33 2 4 5, m ² cows, use easides of in a sides of in a S (A x k)	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14 0 formula 1	2K	(W// 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	as given in (2) + (32a).	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

an be us							<i>Z</i>							(36
	Ū	,	,		using Ap	•							10.48	(50
	of therma Ibric hea		are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			F7.4	(37
			alculated	l monthly	A.					, ,	25)m x (5)		57.1	(37
Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m=	39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38
Ĺ	enefer o	coefficier	nt M/K				!	!	(39)m	= (37) + (37)	1	<u> </u>	l	
39)m= [96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Ĺ							!	!	,	Average =	Sum(39) ₁ .	₁₂ /12=	94.67	(39
leat lo	ss para	meter (F	ILP), W/	m²K					(40)m	= (39)m ÷	(4)			
10)m=	1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		— .
lumbe	r of day	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.21	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
11)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
I. Wat	ter heat	ing ener	gy requi	rement:								kWh/y	ear:	
ssume	ed occu	nancy I	NI.										1	(4
if TF	۹ > 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43	I	(4
if TF/ if TF/ nnual	A > 13.9 A £ 13.9 averag	9, N = 1 9, N = 1 e hot wa	+ 1.76 x ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.96]	•
if TFA if TFA nnual educe t	A > 13.9 A £ 13.9 averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed		+ 36		9)			(4:
if TFA if TFA nnual educe t	A > 13.9 A £ 13.9 averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)			•
if TFA if TFA nnual educe to ot more	A > 13.9 A £ 13.9 averag the annua that 125	P, N = 1 P, N = 1 P hot was Al average Stress per p Feb	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		,
if TFA if TFA nnual educe to tot more fot water	A > 13.9 A £ 13.9 averag the annua that 125	P, N = 1 P, N = 1 P hot was Al average Stress per p Feb	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		,
if TFA if TFA nnual educe to tot more ot water 4)m=	A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 82.76	(25 x N) to achieve Aug	+ 36 a water us Sep 90.12	Oct 93.79 Fotal = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(4
if TFA if TFA nnual educe to ot more ot water 4)m= [nergy co	A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir 101.15	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Fotal = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(4
if TFA if TFA innual Reduce to ot more [dot water 44)m= [A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - cale	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76	erage = designed ld) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mon 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15	1103.46	(4-
if TFA if TFA innual Reduce to ot more flot water inergy co	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the dater use, has 5% May 5% 5% 5% 5% 5% 5% 5% 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r	erage = designed ld) Jul Table 1c x 82.76 m x nm x L 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15		•
if TFA if TFA nnual educe to the more of water 4)m= nergy co instanta 6)m=	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the dater use, has 5% May 5% 5% 5% 5% 5% 5% 5% 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r	erage = designed ld) Jul Table 1c x 82.76 m x nm x L 90.56	(25 x N) to achieve Aug (43) 86.44 27m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15		(4
if TFA if TFA nnual educe to ot more of water (4)m= [nergy co instanta (6)m= [Vater s	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
if TFA if TFA nnual educe to ot more ot water 4)m= [nergy co instanta 6)m= [Jater s torage	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av lwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
if TFA if TFA nnual educe to the more of water 4)m= finergy co instanta 6)m= /ater s torage comm	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calce 135.38 ng at point 20.31 including and no talce 1.76 x	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw	es per da 5% if the d vater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66	erage = designed ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) Nov 97.47 m(44) ₁₁₂ = 20.07	.96 Dec 101.15		(4
if TFA if TFA nnual educe to ot more ot water 4)m= [hergy or 5)m= [Jater s torage comm therwite	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calce 135.38 ng at point 20.31 including and no talce 1.76 x	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw	es per da 5% if the d vater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 IWHRS	erage = designed ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) Nov 97.47 m(44) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
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if TFA if TFA nnual educe to ot more (4)m= (5)m= (instanta) (ater s torage comm otherwi /ater s a) If ma	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufacti	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calcal 135.38 and at point 20.31 including and no tal hot water water series are series at the calcal c	Apr Apr Ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in	es per da 5% if the d vater use, f May Vd,m = fac 86.44 2011 13.25 20 hot water 16.99 Color or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4 (4 (4 (4
if TFA if TFA if TFA nnual educe to ot more (4)m= (5)m= (5)m= (7ater sectorage commontherwither	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum hunity h ise if no storage anufaction rature fallost fro	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calc 135.38 ang at point 20.31 including and no talchot water eclared leared leared storage	Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the d rater use, I May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Collar or W Velling, e includes in por is knowear	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar	erage = designed ild) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4)
if TFA if TFA if TFA nnual educe to the more (a) the mergy of the mergy of the mergy of the mergy	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufact rature fa lost fro anufact	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31 including and no talce the hot water eclared lear to storage eclared of the stora	ge in litre usage by day (all w Apr ach month 90.12 culated mo 17.7 ag any so ank in dw er (this in coss facto 2b , kWh/ye cylinder l	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4) (4) (4) (4) (5)
if TFA if TFA if TFA nnual educe to the more of water 4)m= [nergy color instanta 6)m= [/ater so torage commontherwith /ater sa a) If material emperiments of water of water of water of water instanta for material of water of water of water instanta for material of water of water of water instanta for water of wate	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufaction rature fa lost fro anufaction ter storage	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31 including and no talce the hot water eclared lear to storage eclared of the stora	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, I May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Collar or W Velling, e includes in por is knowear	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4 (4 (4 (4 (4 (5
if TFA if TFA innual leduce to ot more lot water laym= [linergy column lisym= [lotwater s lotwa	A > 13.9 A £ 13.9 average the annual that 125 Jan rusage ir 101.15 ontent of 150 aneous w 22.5 storage e volum hunity he ise if no storage anufaction anufa	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 and at point 20.31 including and no talc hot water eclared less storage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4

Energy	y lost fro	m watei	· storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0]	(54)
Enter	(50) or	(54) in (5	55)									0]	(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0]	(58)
Primar	y circuit	loss cal	culated	for each	month ((59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add a	dditiona	I lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output	t from w	ater hea	ter											
(64)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
								Outp	out from w	ater heate	r (annual)	l12	1595.65	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
inclu	ide (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	e Table 5	and 5a):									
Metab	olic gair	ıs (Table	e 5), Wat	ts										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	1	(66)
Lightin	g gains	(calcula	ted in A	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	•	•	•	•	
(67)m=	48.45	43.03	35	26.5	19.81	16.72	18.07	23.48	31.52	40.02	46.71	49.8]	(67)
Applia	nces ga	ins (calc	ulated ir	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5		•	•	
(68)m=	322.48	325.83	317.4	299.44	276.78	255.48	241.26	237.91	246.34	264.29	286.96	308.25]	(68)
Cookir	ng gains	(calcula	ted in A	ppendix	L, equa	tion L15	or L15a), also se	e Table	5			•	
(69)m=	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02]	(69)
Pumps	and fa	ns gains	(Table :	 5а)		•					<u>I</u>			
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3]	(70)
Losses	s e.g. ev	aporatio	n (nega	tive valu	es) (Tab	ole 5)	!	!		!	<u> </u>	!	ı	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
	heating	gains (1	able 5)	<u> </u>	<u> </u>	1	<u> </u>	<u> </u>		<u> </u>	ı	1	ı	
(72)m=	71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17]	(72)
		gains =		I	I	ļ	<u> </u>	n + (68)m -		<u> </u>		ļ	J	
(73)m=	545.88	541.68	520.8	488.35	455.11	425.24	407.7	415.74	434.33	466.99	503.35	530.88]	(73)
• •	<u> </u>	L	L	L	L	L	L	L	L	L	L	<u> </u>	J	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientati	on:	Access Factor Table 6d	7	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	15.63	(74)
North	0.9x	1	X	1.62	x	20.32	х	0.63	X	0.8	=	29.86	(74)
North	0.9x	1	X	1.62	x	34.53	x	0.63	X	0.8	=	50.75	(74)
North	0.9x	1	X	1.62	x	55.46	х	0.63	x	0.8	=	81.51	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	109.81	(74)
North	0.9x	1	x	1.62	x	79.99	x	0.63	x	0.8	=	117.55	(74)
North	0.9x	1	X	1.62	x	74.68	x	0.63	x	0.8	=	109.75	(74)
North	0.9x	1	X	1.62	x	59.25	x	0.63	x	0.8	=	87.07	(74)
North	0.9x	1	x	1.62	x	41.52	x	0.63	x	0.8	=	61.02	(74)
North	0.9x	1	x	1.62	x	24.19	x	0.63	x	0.8	=	35.55	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	19.28	(74)
North	0.9x	1	x	1.62	x	8.86	x	0.63	x	0.8	=	13.03	(74)
South	0.9x	1	x	2.14	x	46.75	x	0.63	x	0.8	=	45.38	(78)
South	0.9x	1	x	2.14	x	76.57	x	0.63	x	0.8	=	74.32	(78)
South	0.9x	1	x	2.14	x	97.53	x	0.63	x	0.8	=	94.68	(78)
South	0.9x	1	x	2.14	x	110.23	x	0.63	x	0.8	=	107.01	(78)
South	0.9x	1	X	2.14	x	114.87	x	0.63	X	0.8	=	111.51	(78)
South	0.9x	1	X	2.14	x	110.55	x	0.63	X	0.8	=	107.31	(78)
South	0.9x	1	x	2.14	x	108.01	x	0.63	x	0.8	=	104.85	(78)
South	0.9x	1	X	2.14	x	104.89	x	0.63	X	0.8	=	101.82	(78)
South	0.9x	1	X	2.14	x	101.89	x	0.63	X	0.8	=	98.9	(78)
South	0.9x	1	X	2.14	x	82.59	x	0.63	X	0.8	=	80.17	(78)
South	0.9x	1	X	2.14	X	55.42	X	0.63	X	0.8	=	53.79	(78)
South	0.9x	1	X	2.14	x	40.4	x	0.63	X	0.8	=	39.21	(78)
West	0.9x	1	X	2.59	x	19.64	X	0.63	X	0.8	=	23.07	(80)
West	0.9x	1	X	0.86	x	19.64	X	0.63	X	0.8	=	7.66	(80)
West	0.9x	1	X	2.59	x	38.42	X	0.63	X	0.8	=	45.14	(80)
West	0.9x	1	X	0.86	x	38.42	x	0.63	X	0.8	=	14.99	(80)
West	0.9x	1	X	2.59	x	63.27	X	0.63	X	0.8	=	74.33	(80)
West	0.9x	1	X	0.86	X	63.27	X	0.63	x	0.8	=	24.68	(80)
West	0.9x	1	X	2.59	x	92.28	X	0.63	X	0.8	=	108.41	(80)
West	0.9x	1	X	0.86	x	92.28	X	0.63	X	0.8	=	36	(80)
West	0.9x	1	X	2.59	x	113.09	x	0.63	X	0.8	=	132.86	(80)
West	0.9x	1	X	0.86	x	113.09	x	0.63	x	0.8	=	44.12	(80)
West	0.9x	1	X	2.59	x	115.77	x	0.63	x	0.8	=	136.01	(80)
West	0.9x	1	X	0.86	X	115.77	X	0.63	X	0.8	=	45.16	(80)

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West 0.9		1	X	2.5		X	_	10.22	X	0.6		X	0.8	_	= [129.49	(80)
West 0.9	-	1	X	0.8	6	X	1	10.22	X	0.6	3	X	0.8	_	=	43	(80)
West 0.9	9x	1	X	2.5	9	X	9	4.68	X	0.6	3	X	0.8		=	111.23	(80)
West 0.9	9x	1	X	0.8	6	X	9	4.68	X	0.6	3	X	0.8		=	36.93	(80)
West 0.9	Эх	1	X	2.5	9	X	7	3.59	X	0.6	3	X	0.8		=	86.45	(80)
West 0.9	9x	1	X	8.0	6	X	7	3.59	X	0.6	3	X	0.8		= [28.71	(80)
West 0.9	Эх	1	X	2.5	9	x	4	5.59	X	0.6	3	X	0.8		= [53.56	(80)
West 0.9	Эх	1	X	0.8	6	X	4	5.59	X	0.6	3	x	0.8		= [17.78	(80)
West 0.9	Эх	1	X	2.5	9	x	2	4.49	X	0.6	3	X	0.8		= [28.77	(80)
West 0.9	Эх	1	X	8.0	6	X	2	4.49	X	0.6	3	X	0.8		= [9.55	(80)
West 0.9	9x	1	X	2.5	i9	x	1	6.15	x	0.6	3	X	0.8		= [18.97	(80)
West 0.9	Эх	1	x	0.8	6	x	1	6.15	x	0.6	3	X	0.8		= [6.3	(80)
Rooflights 0.9	Эх	1	X	1.3	3	x	4	7.01	x	0.6	3	x	0.8		= [56.72	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	8	33.9	x	0.6	3	x	0.8		= [101.23	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	12	22.73	X	0.6	3	X	0.8		= [148.08	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	16	61.74	х	0.6	3	x	0.8		= [195.15	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	18	87.38	х	0.6	3	X	0.8		= [226.09	(82)
Rooflights 0.9	Эх	1	X	1.3	3	x	18	88.06	X	0.6	3	X	0.8		= [226.91	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	18	80.51	x	0.6	3	x	0.8		= [217.8	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	16	61.54	x	0.6	3	x	0.8	\equiv	= [194.91	(82)
Rooflights 0.	Эх	1	X	1.3	3	x	1	36.5	x	0.6	3	x	0.8		= [164.7	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	9	5.08	x	0.6	3	x	0.8	T	=	114.72	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	5	7.06	x	0.6	3	x	0.8	ī	= [68.85	(82)
Rooflights 0.9	Эх	1	x	1.3	3	x	3	9.72	x	0.6	3	x	0.8		= [47.92	(82)
															_		
Solar gains										n = Sum(7							
(83)m= 148.									531	.96 439	.78	301.78	180.24	125.4	14		(83)
Total gains		al and		<u> </u>	<u> </u>	<u> </u>											
(84)m= 694.	35 807.	23 913	3.32	1016.43	1079.4	9 10)58.18	1012.58	947	7.7 874	.11	768.77	683.59	656.3	32		(84)
7. Mean ir	ternal te	empera	ture (heating	seaso	n)											
Temperati	ıre durir	ıg heati	ing pe	eriods ir	the liv	/ing	area f	from Tab	ole 9	, Th1 (°0	C)					21	(85)
Utilisation	factor fo	r gains	for li	ving are	ea, h1,	m (s	ее Та	ble 9a)									
Ja	n Fe	b N	/lar	Apr	May	/	Jun	Jul	Α	ug S	ер	Oct	Nov	De	c		
(86)m= 0.9	9 0.9	8 0.	95	0.87	0.73		0.55	0.4	0.4	15 0.6	69	0.91	0.98	0.99)		(86)
Mean inte	nal tem	peratur	e in li	iving are	ea T1 (follo	w ste	ps 3 to 7	7 in T	able 9c)		-				
(87)m= 19.9			.38	20.7	20.9	\neg	20.98	21	20.			20.67	20.23	19.8	8		(87)
Temperati	ıre durin	ng heati	ina na	eriode ir	rest	of dv	/elling	from Ta	hle (Th2/9	.C)						
(88)m= 19.			9.9	19.91	19.92	\neg	9.92	19.92	19.	<u>`</u>	$\overline{}$	19.92	19.91	19.9	1		(88)
		-											1				•
Utilisation (89)m= 0.9			93	0.84	welling 0.67	\neg	,m (se _{0.46}	e Table 0.31	9a) 0.3	35 0.	<u>в</u> Т	0.88	0.97	0.99			(89)
` ′		-								!			0.91	0.98			(55)
Mean inte	mal tem	peratur	e in t	he rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in	Table	9c)					

									ı —	i		1	
(90)m= 18.49	18.77	19.16	19.58	19.83	19.91	19.92	19.92	19.88	19.56	18.96	18.44		(90)
								f	LA = Livin	g area ÷ (4	4) =	0.23	(91)
Mean_interna	al temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.82	19.08	19.45	19.84	20.08	20.16	20.17	20.17	20.13	19.82	19.25	18.78		(92)
Apply adjust	ment to t	ne mean	interna	temper	ature fro	m Table	4e, whe	re appro	opriate			1	
(93)m= 18.67	18.93	19.3	19.69	19.93	20.01	20.02	20.02	19.98	19.67	19.1	18.63		(93)
8. Space he	ating requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa				iviay	Odii	Oui	l //ug	СОР		1101	200		
(94)m= 0.98	0.96	0.92	0.83	0.67	0.47	0.32	0.36	0.61	0.87	0.96	0.98		(94)
Useful gains	, hmGm	W = (94)	1)m x (84	L 4)m			l	<u> </u>					
(95)m= 681.18	1	843.63	844.46	725.3	499.3	319.77	337.28	529.06	669.23	659.06	646.38		(95)
Monthly ave	rage exte	rnal tem	perature	from Ta	able 8				<u>I</u>	<u>I</u>			
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for mea	an intern	al tempe	erature, l	Lm , W =	=[(39)m	x [(93)m	– (96)m]			l	
(97)m= 1381.46	1345.57	1224.39	1021.91	777.3	506.67	320.58	338.71	552.48	857	1138.76	1374.21		(97)
Space heati	ng require	ement fo	r each n	nonth, k\	Wh/mon	h = 0.02	24 x [(97)m – (95)m] x (4	1)m		l.	
(98)m= 521.01	381.62	283.28	127.76	38.69	0	0	0	0	139.7	345.38	541.5		
												0070.04	┓
		-					Tota	l per year	(kWh/yeai) = Sum(9)	8) _{15,912} =	2378.94	(98)
Space heati	ng require	ement in	kWh/m²	²/year			Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	30.34	(98)
Space heati	<u> </u>			•	vstems i	ncluding			(kWh/yeaı	') = Sum(9	8)15,912 =		╡``
9a. Energy re	quiremer			•	ystems i	ncluding			(kWh/yeaı) = Sum(9	8) _{15,912} =		╡``
·	quiremer	nts – Indi	vidual h	eating sy			micro-C		(kWh/yeaı	') = Sum(9	8) _{15,912} =		(99)
9a. Energy re Space heat Fraction of s	quiremer ng: pace hea	nts – Indi	vidual h	eating sy		system	micro-C	CHP)	(kWh/yeai) = Sum(9	8)15,912 =	30.34	(99)
9a. Energy re Space heat Fraction of s Fraction of s	quiremer ng: pace hea pace hea	nts – Indi at from se at from m	vidual h econdary	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15,912 =	30.34	(201)
9a. Energy re Space heat Fraction of s Fraction of to	quiremer ng: pace hea pace hea otal heati	nts - Indi	ividual h econdary nain syst main sys	eating sy y/supple em(s) stem 1		system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	30.34 0 1	(99) (201) (202) (204)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of	quirement ng: pace hea pace hea otal heatil main spa	nts – Indi at from se at from m ag from a ace heati	vidual hecondary nain systemain syst	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	30.34 0 1 1 89.9	(99) (201) (202) (204) (206)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of	quirement ng: pace heat pace heat total heat in main space seconda	nts – Indi	econdary nain systemain systemain systemain systematory	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan	quirement ng: pace heat pace heat otal heat main space seconda	nts – Indi at from so at from m ng from a ace heati ry/supplo	vidual hecondary nain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1	CHP) - (201) =		Nov	Dec	30.34 0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require	nts - Indi	econdary nain systemain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system n, % Jul	(202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =	Nov	Dec	0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from set from many from mace heating ry/supplement (co. 283.28	econdary nain systemain systementar Apr alculatee	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system	(202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from so at from m ace heati ry/supple Mar ement (c 283.28	econdary nain systemain systemater Apr alculater 127.76 00 ÷ (20	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 -	(203)] = Oct	Nov 345.38	Dec 541.5	0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from set from many from mace heating ry/supplement (co. 283.28	econdary nain systemain systementar Apr alculatee	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system n, % Jul	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from so at from m ace heati ry/supple Mar ement (c 283.28	econdary nain systemain systemater Apr alculater 127.76 00 ÷ (20	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54]	quirement ng: pace heat pa	at from set from mace heating ry/supplement (c 283.28 4)] } x 1 315.1	econdary nain systemain systematrar Apr alculated 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01 (211)m = {[(9) 579.54} Space heati = {[(98)m x (2)	quiremer ng: pace hea pace hea patal heatil main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1	nts - Indicate from some set from many from the set of	econdary nain systemain systematar Apr nalculater 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0	(203)] = Oct 139.7 155.4 ar) =Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54]	quirement ng: pace heat pa	at from set from mace heating ry/supplement (c 283.28 4)] } x 1 315.1	econdary nain systemain systematrar Apr alculated 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54} Space heati = {[(98)m x (2) (215)m= 0	quiremer ng: pace hea pace hea patal heatil main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1	nts - Indicate from some set from many from the set of	econdary nain systemain systematar Apr nalculater 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54 Space heati = {[(98)m x (2) (215)m=0	quirement ng: pace heat pa	t from set from many from	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/8) 0	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of s Fraction of te Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54 Space heati = {[(98)m x (2) (215)m= 0 Water heating	quiremer ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1 0 g vater hea	trom so that from many from the many from th	econdary nain systemain systemater Apr alculatee 127.76 00 ÷ (20 142.12 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 emonth 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) =Sum(2	Nov 345.38 384.18 211) _{15,1012} 0	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy respectively space heating fraction of some services of the energy of the e	quiremer ng: pace hea pace hea patal heatif main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1 0 g vater hea 142.61	ter (calce	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/8) 0	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 month	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear

(217)m= 89.27 89.18 88.99 88.57 87.9	87.3 87.3	87.3	87.3	88.6	89.11	89.3		(217)
Fuel for water heating, kWh/month								
(219) m = (64) m x $100 \div (217)$ m (219)m = 182.2 159.92 166.33 147.07 143.22	125.96 118.21	133.51 1	34.47	152.58	163.85	176.83]	
		Total =	Sum(21	9a) ₁₁₂ =		<u> </u>	1804.16	(219)
Annual totals				k۱	Nh/yeaı	r	kWh/year	⊒ _
Space heating fuel used, main system 1							2646.21	
Water heating fuel used							1804.16	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45]	(230e)
Total electricity for the above, kWh/year		sum of	(230a)	(230g) =			75	(231)
Electricity for lighting							342.26	(232)
Electricity generated by PVs							-871.55	(233)
Total delivered energy for all uses (211)(221) -	+ (231) + (232).	(237b) =					4083.39	(338)
10a. Fuel costs - individual heating systems:								
	Fuel			Fuel P	rice		Fuel Cost	
	kWh/year			(Table			£/year	
Space heating - main system 1	(211) x			3.4	8	x 0.01 =	92.09	(240)
Space heating - main system 2	(213) x			0		x 0.01 =	0	(241)
Space heating - secondary	(215) x			13.1	19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)			3.4	8	x 0.01 =	62.78	(247)
Pumps, fans and electric keep-hot	(231)			13.1	19	x 0.01 =	9.89	(249)
(if off-peak tariff, list each of (230a) to (230g) sep Energy for lighting	parately as app	licable and	apply	fuel prio		rding to x 0.01 =	Table 12a 45.14	(250)
Additional standing charges (Table 12)							120	(251)
	one of (233) to	o (235) x)		13.1	19	x 0.01 =	-114.96	
Appendix Q items: repeat lines (253) and (254) a	as needed			10.1			114.00	
	47) + (250)(254)	=					214.95	(255)
11a. SAP rating - individual heating systems								
Energy cost deflator (Table 12)							0.42	(256)
Energy cost factor (ECF) [(255) x (256)] ÷ [(4) + 45.0]	=					0.73	(257)
SAP rating (Section 12)							89.79	(258)
12a. CO2 emissions – Individual heating system	ms including mi	cro-CHP						
	Energy			Emissi	ion fac	tor	Emissions	
	kWh/year			kg CO2			kg CO2/yea	
Space heating (main system 1)	(211) x			0.21	16	=	571.58	(261)

Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	389.7	(264)
Space and water heating	(261) + (262) + (263) + (264) =			961.28	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	177.63	(268)
Energy saving/generation technologies Item 1		0.519 =	=	-452.33	(269)
Total CO2, kg/year	sum	of (265)(271) =		725.51	(272)
CO2 emissions per m²	(272) ÷ (4) =		9.25	(273)
El rating (section 14)				92	(274)

13a. Primary Energy

	Energy kWh/year	Primary factor		P. Energy kWh/year	
Space heating (main system 1)	(211) x	1.22	=	3228.38	(261)
Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	1.22	=	2201.08	(264)
Space and water heating	(261) + (262) + (263) + (264) =			5429.46	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	230.25	(267)
Electricity for lighting	(232) x	0	=	1050.75	(268)
Energy saving/generation technologies					_
Item 1		3.07	=	-2675.64	(269)
'Total Primary Energy	sum	of (265)(271) =		4034.81	(272)
Primary energy kWh/m²/year	(272	?) ÷ (4) =		51.46	(273)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU				
Address :	Woodwell Cottage P2, Woo	odwell Road, BRISTOL,	BS11 9XU			
1. Overall dwelling dime	ensions:					
Ground floor		Area(m²) 39.2 (1a) x	Av. Height(n	n) (2a) = [Volume(m³)	(3a)
First floor				⊣ ¦		Ⅎ
	-	39.2 (1b) x	2.56	(2b) =	100.35	(3b)
·	a)+(1b)+(1c)+(1d)+(1e)+(1	,		_		_
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:	main accorde	an athan	4 a 4 a l		ma man have	-
	main seconda heating heating	ary other	total	_	m³ per houi	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
					_	_
				Air ch	anges per ho	ur —
•	ys, flues and fans = (6a)+(6b)+		30	÷ (5) =	0.15	(8)
Number of storeys in the	een carried out or is intended, proce ne dwelling (ns)	ea to (17), otnerwise continue	e trom (9) to (16)	Г	0	(9)
Additional infiltration	ic awaiiing (115)		Γ	(9)-1]x0.1 =	0	(10)
	.25 for steel or timber frame of	or 0.35 for masonry cons		[0	(11)
	resent, use the value corresponding	•		L	<u> </u>	_ '` ′
	loor, enter 0.2 (unsealed) or (0.1 (sealed), else enter	0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) +	- (12) + (13) + (15) =	•	0	(16)
Air permeability value,	q50, expressed in cubic metr	es per hour per square	metre of envelo	pe area	5	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] +$	+(8), otherwise (18) = (16)			0.4	(18)
Air permeability value applie	s if a pressurisation test has been do	one or a degree air permeabil	ity is being used	_		_
Number of sides sheltere	ed	(00) 4 [0.075]	. (40)1	-	1	(19)
Shelter factor		$(20) = 1 - [0.075 \times$		<u></u>	0.92	(20)
Infiltration rate incorporat		$(21) = (18) \times (20)$	=		0.37	(21)
Infiltration rate modified f		, , , , , , , , , , , , , , , , , , , 	 			
Jan Feb	Mar Apr May Jun	Jul Aug Sep	p Oct No	v Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infil	tration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43]	
Calculate eff If mechani		-	rate for t	he appli	cable ca	ise	-	-	-	-	-		(23a)
If exhaust air			endix N. (2	(3b) = (23a	a) × Fmv (e	eguation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced w									, (===,			0	(23c)
a) If baland	ced mech	anical ve	ntilation	with he	at recovi	erv (MVI	HR) (24:	′ a)m = (2)	2b)m + (23h) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balan	ced mech	anical ve	entilation	without	heat red	covery (N	лV) (24k	o)m = (22	2b)m + (23b)	<u> </u>	J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from (outside					
if (22b)m < 0.5 >	< (23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
,	m = 1, th	` ′	<u> </u>		<u>`</u>			- 		0.50	T 0.50	1	(24d)
(24d)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(24u)
Effective a (25)m= 0.61	o.61	rate - er	nter (24a 0.58	0.58	0) or (24)	c) or (24 0.56	0.56	X (25) 0.57	0.58	0.59	0.59	1	(25)
(23)111= 0.01	0.01	0.0	0.30	0.30	0.30	0.30	0.50	0.57	0.30	0.59	0.59		(20)
3. Heat loss	بط لمصم مما												
		•											
ELEMENT		SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [- 0.04] = [(W/				kJ/K (26)
ELEMENT Doors Windows Tyl	Gros area pe 1 pe 2	SS	Openin	gs	A ,r 2.07	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.07 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.07 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ \end{array} $	2.07 2.15 3.43 1.14				kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl	Gros area oe 1 oe 2 oe 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43 1.14 2.84	K) 			kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights	Gros area oe 1 oe 2 oe 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43 1.14 2.84 2.261	K) 			kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor	Gros area pe 1 pe 2 pe 3 pe 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096	K) 			(26) (27) (27) (27) (27) (27b)
Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1	Gros area De 1 De 2 De 3 De 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= = [2.07 2.15 3.43 1.14 2.84 2.261 5.096	K) 			(26) (27) (27) (27) (27) (27b) (28) (29)
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ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57. Telements and roof wind reas on both ross, W/K	33 2 4 5, m ² sows, use e sides of in = S (A x	10.9 10.9 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1/2 x1/2 x1/4 x1/4 x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12 0	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Tyl Windows Tyl Windows Tyl Windows Tyl Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows all ** include the all Fabric heat le	Gros area De 1 De 2 De 3 De 4 80.8 2.1 57. Telements and roof wind reas on both oss, W/K Ty Cm = Si	33 2 4 5, m ² ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1/2 x1/2 x1/4 x1/5 x x1/4 x x1/5 x x1/6 x x	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12 0	K)	kJ/m²•	1 3.2 43.19	(26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

				ulation.										
	ŭ	`	,		using Ap	•	K						10.55	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			52.74	(37
			alculated	l monthly	V						25)m x (5)		53.74	(0,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(3
eat tr	ansfer c	coefficier	nt W/K	<u> </u>	<u> </u>	<u> </u>	!	!	(39)m	= (37) + (37)		ļ	l	
9)m=	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		
oot lo	oo poro	motor (b	JI D) \\\	/m²l/	I	I	l			Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	92.59	(3
)m=	1.21	1.2	HLP), W/	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		
5)111-	1.21	1.2	1.2	1.10	1.10	1.10	1.10	1.10			Sum(40) ₁ .		1.18	(4
umbe	er of day	s in mor	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
eum	ad occu	ipancy, I	NI									40	1	(4
				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43		(
f TF	A £ 13.9	9, N = 1											-	
nnual	OVOROR													
								(25 x N) to achieve		se taraet o		.96		(-
duce	the annua	al average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target o		.96		(4
duce	the annua	al average	hot water	usage by a day (all w	5% if the a	lwelling is	designed	to achieve	a water us	se target o		.96 Dec]	(-
duce t more	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d ater use, l	lwelling is hot and co Jun	designed (Aug		_	,	1		(
duce t more t t wate	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed (Aug	a water us	_	,	1		(
duce t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in 101.15	Feb 197.47	Mar day for ea	Apr ach month 90.12	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$	Jun ctor from 3	designed and desig	Aug (43)	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	90.12 90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(₍
educe It more It wate It wate It may come to the company come to the company come to the company compa	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1	Dec 101.15 = c, 1d) 145.27	1103.46	(₍
t water ergy comparisons instant	the annual that 125 Jan ar usage in 101.15 content of 150 taneous w	Feb 11 Per per per per per per per per per per p	Mar day for ea 93.79 used - cale 135.38	Apr ach month 90.12 culated mo 118.03	May Vd,m = fa 86.44 201113.25 20 hot water	Jun ctor from 82.76 190 x Vd,r 97.73	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/more 105.16	Oct 93.79 Total = Su 122.55 Total = Su	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		(
t water length of the control of th	Jan er usage ir 101.15 content of	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		
duce the more t	Jan 101.15 content of 150 aneous w 0 storage	Feb 11 per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage),	designed and desig	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		
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duce t more literative water ergy of mostant mostant orage commister ater: orage if me	Jan 101.15 101.1	Feb 1 litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de	Mar 93.79 used - calc 135.38 ng at point and no tal hot water eclared le m Table	Apr ach month 90.12 culated me 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 lar or Water 20 ling, each or is known	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/more 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4)
duce to more that water that wate	the annual that 125 Jan 101.15 content of 150 storage e volum munity helise if no storage example anufact example that 125	Feb n litres per p 97.47 hot water 131.19 loss: e (litres) eating a o stored loss: urer's de actor fro m water	Mar day for ea 93.79 used - cale 135.38 ng at point nd no tale hot water eclared le m Table storage	Apr ach month 90.12 culated mo 118.03 of use (no ng any so nk in dw er (this in oss facto 2b	5% if the orater use, I May $Vd,m = fa$ 86.44 0 0 0 0 0 0 0	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/more 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		(4)
duce t more	the annual that 125 Jan 101.15 content of 150 storage e volum munity h vise if no storage canufact rature fa	Feb plitres per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point of including and no tall hot water eclared left m Table storage eclared colored	Apr ach month 90.12 culated mo 118.03 of use (no ank in dw er (this ir oss facto 2b cylinder l	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 lar or Water 113.25 21 large of the control of the contr	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at wate 4)m= anergy of anstant b)m= atternation att	the annual that 125 Jan 101.15 content of 150 anneous w o storage e volum munity h vise if no storage anufact rature fa to lost fro anufact ter stora	Feb n litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de	Mar day for ea 93.79 used - call 135.38 ng at point of including and no tall hot water eclared left m Table storage eclared colored	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this in oss facto 2b cylinder l com Table	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at more at more at more at more at more at more at wate at more	the annual the annual that 125 Jan 101.15 content of 150 storage in the annual that 125 content of 150 storage in the annual that it is a content of the annual that it is a content of the annual that it is a content of the annual that it is a content of the annual that is a con	Feb 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	Mar day for ea 93.79 used - calc 135.38 ng at point on includir and no talc hot water eclared left m Table storage eclared of factor free sections	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this ir oss facto 2b cylinder I com Tabl on 4.3	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4) (4) (4) (4) (5) (5) (5) (5)

Energy	/ lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)	x (52) x ((53) =		0] ((54)
Enter	(50) or	(54) in (5	55)									0	((55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	J lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0] ((58)
Primar	y circuit	loss cal	culated	for each	month (59)m =	(58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wa	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	((59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48	((62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	-	
(add a	dditiona	I lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)	_			_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	((63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	((63) (G2)
Output	from w	ater hea	ter										_	
(64)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		
								Outp	out from w	ater heate	r (annual)	12	1229.79	(64)
Heat g	ains fro	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8	x [(46)m	+ (57)m	+ (59)m	1	
(65)m=	31.88	27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87	((65)
inclu	ıde (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	Table 5	and 5a):									
Metab	olic gair	s (Table	5), Wat	ts									_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	((66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m=	20.26	18	14.64	11.08	8.28	6.99	7.56	9.82	13.18	16.74	19.54	20.83	((67)
Applia	nces ga	ins (calc	ulated ir	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m=	216.06	218.31	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	((68)
Cookir	ng gains	(calcula	ited in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5				
(69)m=	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	((69)
Pumps	and fa	ns gains	(Table	5a)	-	-	-	-			-	-		
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	((70)
Losses	e.g. ev	aporatic	n (nega	tive valu	es) (Tab	ole 5)							-	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water	heating	gains (T	able 5)										-	
(72)m=	42.84	41.49	38.67	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49	((72)
Total i	nternal	gains =	;			(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72))m	-	
(73)m=	338.65	337.27	325.44	306.02	285.55	266.49	254.54	258.38	268.75	288.3	310.76	328.33	((73)
		•	•	•	•	•	•	•		•		•	•	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	ion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	x	20.32	х	0.63	X	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	x	55.46	х	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.7	=	30.58	(78)
South	0.9x	0.77	x	2.14	x	76.57	x	0.63	x	0.7	=	50.08	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	x	0.7	=	63.79	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.7	=	72.09	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	x	0.7	=	75.13	(78)
South	0.9x	0.77	x	2.14	x	110.55	x	0.63	x	0.7	=	72.3	(78)
South	0.9x	0.77	x	2.14	x	108.01	x	0.63	x	0.7	=	70.64	(78)
South	0.9x	0.77	X	2.14	x	104.89	x	0.63	X	0.7	=	68.6	(78)
South	0.9x	0.77	x	2.14	x	101.89	x	0.63	X	0.7	=	66.63	(78)
South	0.9x	0.77	X	2.14	x	82.59	x	0.63	X	0.7	=	54.01	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.7	=	36.24	(78)
South	0.9x	0.77	X	2.14	x	40.4	x	0.63	X	0.7	=	26.42	(78)
West	0.9x	0.77	X	2.59	X	19.64	X	0.63	X	0.7	=	15.55	(80)
West	0.9x	0.77	X	0.86	x	19.64	X	0.63	X	0.7	=	5.16	(80)
West	0.9x	0.77	X	2.59	x	38.42	x	0.63	X	0.7	=	30.41	(80)
West	0.9x	0.77	X	0.86	X	38.42	X	0.63	X	0.7	=	10.1	(80)
West	0.9x	0.77	X	2.59	x	63.27	X	0.63	X	0.7	=	50.08	(80)
West	0.9x	0.77	X	0.86	x	63.27	X	0.63	X	0.7	=	16.63	(80)
West	0.9x	0.77	X	2.59	x	92.28	x	0.63	X	0.7	=	73.04	(80)
West	0.9x	0.77	X	0.86	X	92.28	X	0.63	X	0.7	=	24.25	(80)
West	0.9x	0.77	X	2.59	x	113.09	x	0.63	x	0.7	=	89.52	(80)
West	0.9x	0.77	X	0.86	x	113.09	x	0.63	X	0.7	=	29.72	(80)
West	0.9x	0.77	X	2.59	x	115.77	X	0.63	x	0.7	=	91.64	(80)
West	0.9x	0.77	X	0.86	X	115.77	x	0.63	x	0.7	=	30.43	(80)

West 0.9x	0.77	×	2.59	x	110.22	X	0.63	×	0.7	=	87.24	(80)
West 0.9x	0.77	→ ×	0.86] x	110.22	X	0.63	≓ ×	0.7	= =	28.97	(80)
West 0.9x	0.77	×	2.59	X	94.68	i x	0.63	= x	0.7	-	74.94	(80)
West 0.9x	0.77	×	0.86	X	94.68	X	0.63	×	0.7	-	24.88	(80)
West 0.9x	0.77	×	2.59	i x	73.59	×	0.63	×	0.7		58.25	(80)
West 0.9x	0.77	×	0.86	X	73.59	X	0.63	x	0.7	= =	19.34	(80)
West 0.9x	0.77	×	2.59	X	45.59	×	0.63	×	0.7	= =	36.09	(80)
West 0.9x	0.77	×	0.86	X	45.59	×	0.63	×	0.7	=	11.98	(80)
West 0.9x	0.77	x	2.59	x	24.49	X	0.63	x	0.7	=	19.38	(80)
West 0.9x	0.77	x	0.86	x	24.49	X	0.63	x	0.7	=	6.44	(80)
West 0.9x	0.77	x	2.59	x	16.15	X	0.63	×	0.7	=	12.78	(80)
West 0.9x	0.77	x	0.86	x	16.15	X	0.63	x	0.7	=	4.24	(80)
Rooflights 0.9x	1	x	1.33	x	47.01	X	0.63	x	0.7	=	49.63	(82)
Rooflights 0.9x	1	x	1.33	X	83.9	X	0.63	x	0.7	=	88.58	(82)
Rooflights _{0.9x}	1	X	1.33	X	122.73	X	0.63	×	0.7	=	129.57	(82)
Rooflights 0.9x	1	x	1.33	X	161.74	X	0.63	x	0.7	=	170.76	(82)
Rooflights 0.9x	1	x	1.33	X	187.38	X	0.63	x	0.7	=	197.83	(82)
Rooflights 0.9x	1	x	1.33	X	188.06	X	0.63	×	0.7	=	198.54	(82)
Rooflights _{0.9x}	1	X	1.33	Х	180.51	X	0.63	X	0.7	=	190.58	(82)
Rooflights 0.9x	1	x	1.33	X	161.54	X	0.63	×	0.7	=	170.54	(82)
Rooflights _{0.9x}	1	X	1.33	X	136.5	X	0.63	×	0.7	=	144.11	(82)
Rooflights _{0.9x}	1	X	1.33	X	95.08	x	0.63	X	0.7	=	100.38	(82)
Rooflights _{0.9x}	1	x	1.33	X	57.06	X	0.63	x	0.7	=	60.24	(82)
Rooflights 0.9x	1	X	1.33	X	39.72	X	0.63	X	0.7	=	41.93	(82)
Solar gains in	1	T	ı		70.44 454.07	1	n = Sum(74)m.		1	04.40	1	(93)
(83)m= 111.45 Total gains – i		94.26 solar	$\begin{array}{c c} 395.07 & 466.7 \\ \hline (84)m - (73) \end{array}$		72.11 451.37 83\m watts	397	7.63 329.45	226.4	1 135.29	94.16		(83)
(84)m= 450.1		19.7	701.09 751.7	`	738.6 705.91	656	5.01 598.19	514.7	1 446.05	422.49	1	(84)
` '	LL_				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 000		3 1 1 1 1	. 1			
7. Mean inter	·				araa fram Ta	shlo O	Th1 (°C)				24	7(05)
Utilisation fac	ŭ	٠.		•			, IIII (C)				21	(85)
Jan	 -	Mar	Apr Ma	Ť	Jun Jul		ug Sep	Oct	Nov	Dec]	
(86)m= 1	 	0.99	0.96 0.88		0.72 0.55	0.6	<u> </u>	0.98	1	1		(86)
Mean interna	l tomporatu	ıro in li	ving area T1	(follo	w stops 2 to	7 in 7			<u> </u>		I	
(87)m= 19.66	 	20.11	20.47 20.7		20.94 20.99	20.		20.46	19.99	19.64]	(87)
` ′	<u> </u>		!	!	!		l		1		J	, ,
Temperature (88)m= 19.92	 	9.92	19.94 19.9		19.95 19.95	19.		19.94	19.93	19.93	1	(88)
` ′	<u> </u>			!	!		10.34	10.04	10.90	10.00	J	(55)
Utilisation fac	 			Ť	<u>`</u>		10 0 70	0.07	0.00	1	1	(89)
(89)m= 1	<u> </u>	0.98	0.94 0.84		0.63 0.43	0.4		0.97	0.99	1	l	(03)
Mean interna	ıl temperatu	ıre in t	he rest of dw	elling	T2 (follow st	teps 3	to 7 in Tabl	e 9c)				

(90)m=														
	18.7	18.87	19.15	19.51	19.78	19.92	19.95	19.95	19.86	19.5	19.04	18.68		(90) —
									f	LA = Livin	g area ÷ (4	ł) =	0.23	(91)
Mean	internal	temper	ature (fo	r the wh	ole dwel	ling) = fl	_A × T1	+ (1 – fL	.A) × T2					
(92)m=	18.92	19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(92)
Apply	adjustm	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.92	19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(93)
8. Spa	ace heat	ting requ	uirement											
Set Ti	i to the r	nean int	ernal ter	nperatu	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m and	d re-calc	ulate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a									
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	ation fac		ains, hm											
(94)m=	1	0.99	0.98	0.94	0.84	0.65	0.46	0.52	8.0	0.96	0.99	1		(94)
Usefu	ıl gains,		W = (94)	4)m x (8	4)m						· · · · · · · · · · · · · · · · · · ·			
(95)m=		532.72	607.76	659.91	631.38	479.8	323.54	337.91	475.61	496.09	443.22	421.57		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
						Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m=	1381.67	1337.36	1209.01	1002.99	767.52	507.12	327.41	344.65	549.56	842.77	1129.49	1373.09		(97)
Space	e heating	g require	ement fo	r each n	nonth, k\	Wh/mont	h = 0.02	4 x [(97)m – (95)m] x (4	1)m			
(98)m=	694.08	540.72	447.32	247.02	101.29	0	0	0	0	257.93	494.11	707.93		_
								Tota	l per year	(kWh/year) = Sum(98	8) _{15,912} =	3490.42	(98)
Space	e heating	g require	ement in	kWh/m²	² /year								44.52	(99)
8c Sr	nace cod	olina rea	uiremen	nt								L		
		Ĭ	July and		See Tak	ole 10h								
Oulou	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug						
Heat				•					l Sepl	Oct	l Nov l	Dec		
(100)m=		0		using Z	o°C inter	nal temp	erature		Sep ernal ten	Oct nperatur	Nov e from T	Dec able 10)		
Utilisa	ation fac	tor for lo	0	0	o o inter	nal temp 857.31	674.9				Nov e from T			(100)
(101)m=	0							and exte	ernal ten	nperatur	e from T	able 10)		(100)
Usefu	ıl loss. h	0						and exte	ernal ten	nperatur	e from T	able 10)		(100) (101)
1			oss hm	0	0	857.31 0.86	674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0		, ,
(102)m =			ss hm	0	0	857.31 0.86	674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0		, ,
	0	mLm (W	oss hm 0 /atts) = (0 0 (100)m x	0 0 (101)m 0	857.31 0.86 738.17	0.92	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0		(101)
	0 (solar g	mLm (W	oss hm 0 /atts) = (0 0 (100)m x	0 0 (101)m 0	0.86 738.17	0.92	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0		(101)
Gains (103)m=	0 s (solar g	mLm (W 0 gains cal	oss hm 0 /atts) = (0 culated 0	0 (100)m x 0 for appli	0 (101)m 0 cable we	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0	c (41)m	(101)
Gains (103)m=	0 (solar g	mLm (W 0 gains ca 0 g require	oss hm 0 /atts) = (0 culated 0	0 100)m x 0 for appli	0 0 (101)m 0 cable we 0 whole c	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0	c (41)m	(101)
Gains (103)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains ca 0 g require	oss hm 0 /atts) = (0 culated 0 ement fo	0 100)m x 0 for appli	0 0 (101)m 0 cable we 0 whole c	0.86 738.17 eather re 920.76	674.9 0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0	c (41)m	(101)
Gains (103)m= Space set (1	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W gains cal grequire zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 0/h) = 0.00	0 0 0 0 24 x [(10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 102)m] x	c (41)m 478.84	(101)
Gains (103)m= <i>Space</i> set (1 (104)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains ca 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >		(101) (102) (103)
Gains (103)m= Space set (1 (104)m=	s (solar coling 04)m to 0 d fraction	mLm (W 0 gains cal 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month, 3 x (98	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (oss hm 0 /atts) = (0 lculated 0 ement for 104)m <	0 (100)m x 0 for appli 0 r month, 3 x (98	0 0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continue	and exte 691.53 0.9 621.41 e Table 828.78 ous (kW	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m= Coolec Intermi	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0	oss hm o /atts) = (o culated o ement fo 104)m < o	0 (100)m x 0 for appli 0 r month, 3 x (98	0 (101)m 0 cable we 0 whole co	0.86 738.17 eather re 920.76 //welling,	674.9 0.92 622.55 egion, se 882.07 continuo	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	478.84	(101) (102) (103)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta	oss hm o /atts) = (o culated o ement fo 104)m < o	0 100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	0.86 738.17 eather re 920.76 //welling, 131.47	674.9 0.92 622.55 egion, se 882.07 continue 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta	oss hm 0 /atts) = (0 /culated 0 ement for 104)m < 0 able 10b	0 100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	0.86 738.17 eather re 920.76 //welling, 131.47	674.9 0.92 622.55 egion, se 882.07 continue 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m=	o (solar go o o o o o o o o o o o o o o o o o o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta 0	oss hm o /atts) = (o lculated o ement for able 10b o ment for	0 (100)m x 0 for appli 0 r month, (3 x (98) 0	0 0 (101)m 0 cable we 0 whole come 0 0	0.86 738.17 eather re 920.76 //welling, 131.47 0.25 × (105)	674.9 0.92 622.55 egion, se 882.07 continue 193.09 0.25 × (106)r	and exte 691.53 0.9 621.41 e Table 828.78 Dus (kW 154.28	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)
Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m= Space (107)m=	o (solar coling o) cooling o	mLm (W 0 gains cal 0 g require zero if (0 n actor (Ta 0 requirer 0	oss hm o /atts) = (o lculated o ement for able 10b o ment for	0 (100)m x 0 for appli 0 r month, 3 x (98 0	0 0 (101)m 0 cable we 0 whole o)m 0	0.86 738.17 eather re 920.76 //welling, 131.47 0.25 × (105)	674.9 0.92 622.55 egion, se 882.07 continue 193.09 0.25 × (106)r	and exte 691.53 0.9 621.41 e Table 828.78 Dus (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under sp	pecial conditions, see section 11)		
Fabric Energy Efficiency	(99) + (108) =	46.05	(109)
Target Fabric Energy Efficiency (TFEE)		52.95	(109)

			5							
			User D	etails:						
Assessor Name:	Jemma Mclaug				a Num				030065	
Software Name:	Stroma FSAP 2				are Ve			Versio	n: 1.0.5.25	
			•			ED-FIN				
Address:	Woodwell Cottag	je P2, Wood	well Ro	oad, BRI	STOL, E	8S11 9XI	J			
Overall dwelling dimer	ISIONS.		Aros	a(m²)		Av. Hei	iaht/m\		Volume(m³)	
Ground floor				39.2	(1a) x		2.6	(2a) =	101.92	(3a)
First floor				39.2	(1b) x	2.	.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+	(1e)+(1n)		78.4	(4)			-		_
Dwelling volume			<u>-</u>		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:										
	main heating	secondary heating	1	other		total			m³ per hour	•
Number of chimneys	0 +		+	0	= [0	X	40 =	0	(6a)
Number of open flues	0 +	0	+ [0	= [0	Х	20 =	0	(6b)
Number of intermittent fan	ns					3	х	10 =	30	(7a)
Number of passive vents						0	X	10 =	0	(7b)
Number of flueless gas fire	es					0	X	40 =	0	(7c)
								Air ch	anges per ho	ur
Infiltration due to chimney	s, flues and fans =	(6a)+(6b)+(7a	a)+(7b)+(7c) =	Г	30		÷ (5) =	0.15	(8)
If a pressurisation test has be	en carried out or is inte	ended, proceed	to (17), d	otherwise	continue fi	om (9) to ((16)			_
Number of storeys in the	e dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.2					•	ruction			0	(11)
if both types of wall are pre deducting areas of opening		rresponaing to	tne great	er wall are	ea (after					
If suspended wooden flo		ealed) or 0.1	l (seale	ed), else	enter 0				0	(12)
If no draught lobby, ente	er 0.05, else enter	0							0	(13)
Percentage of windows	and doors draugh	t stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (12) + (13) +	+ (15) =		0	(16)
Air permeability value, o	q50, expressed in	cubic metres	per ho	our per s	quare m	etre of e	nvelope	area	4	(17)
If based on air permeabilit	ty value, then (18) =	= [(17) ÷ 20]+(8)), otherwi	ise (18) =	(16)				0.35	(18)
Air permeability value applies		t has been done	or a deg	gree air pe	ermeability	is being us	sed	,		_
Number of sides sheltered	d			(20) – 1	[0.075 x (10)] _			1	(19)
Shelter factor						[9]] =			0.92	(20)
Infiltration rate incorporation	_	1		(21) = (18) X (2U) =				0.32	(21)
Infiltration rate modified fo		1 1	, .	T .					1	
<u> </u>	Mar Apr Ma	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	eed from Table 7									

4.9

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor ((22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.41	0.4	0.39	0.35	0.35	0.31	0.31	0.3	0.32	0.35	0.36	0.38]	
Calculate effe		-	rate for t	he appli	cable ca	se	!	!	!	!	!	,	(00.)
If mechanic			andiv N (2	3h) - (23s	a) v Emy (4	aguation (N	V5)) othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balanc		,	,			`		,	2h\m + (23h) v [1 – (23c)	0 - 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balanc	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from	outside	l			J	
if (22b)	m < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
	m = 1, th 0.58	en (24d) _{0.58}	m = (221)	0.56	0.55	(4d)m = 0.55	$0.5 + [(2)]_{0.54}$	(2b)m² x 0.55		0.57	0.57	1	(24d)
` ′	<u>.</u> !	<u> </u>		<u> </u>	l				0.56	0.57	0.57	J	(240)
Effective ai (25)m= 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.57	0.57	1	(25)
(),	1	1	1 3133					1]	. ,
3. Heat loss		•							A 37.11				A 3/ I
3. Heat loss	es and he Gros area	SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [- 0.04] = [(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r 2.07	m ² x x10 x10	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area ne 1 ne 2 ne 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements	33 2 4 , m ²	Openin m 10.9 0 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof winder eas on both	33 2 4 , m ² ows, use e	10.9 10.9 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [= [= [= [= [= [= [= [= [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K:	33 2 4 , m ² ows, use e sides of in = S (A x	10.9 10.9 2.66	gs p ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the are Fabric heat lo	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K: y Cm = S(33 2 4 , m ² ows, use e sides of in = S (A x (A x k)	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²•	n 3.2	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

can he u	sed inste	ad of a de	tailed calcı	ulation										
					using Ap	pendix I	K						10.48	(36)
	•	,	•		= 0.05 x (3	•								(==)
Total fa	bric hea	at loss							(33) +	(36) =			57.1	(37)
Ventilat	tion hea	it loss ca	alculated	monthl	y				(38)m	= 0.33 × (25)m x (5)			
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Heat lo	ss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	94.67	(39)
(40)m=	1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		
Numbe	r of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.21	(40)
ſ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
_	-			-	-	-		-		-	-	-	•	
4. Wat	ter heat	ing ener	gy requi	irement:								kWh/ye	ear:	
Accum	od occu	nanov I	NI.									10	Ī	(40)
if TF				[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.43		(42)
Annual	averag	e hot wa						(25 x N)				.96		(43)
		_			5% if the d ater use, l	_	_	to achieve	a water us	se target o	f			
Г	-				<u> </u>		•	Ι	0		N			
Hot wate	Jan r usage in	Feb	Mar day for ea	Apr ach month	May Vd,m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	101.15	97.47	93.79	90.12	86.44	82.76	82.76	86.44	90.12	93.79	97.47	101.15		
(44)111-	101.10	37.47	33.73	30.12	00.44	02.70	02.70	00.44		Total = Su			1103.46	(44)
Energy c	ontent of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			(,		1.000	` ′
(45)m=	150	131.19	135.38	118.03	113.25	97.73	90.56	103.92	105.16	122.55	133.77	145.27		
_							!			Total = Su	m(45) ₁₁₂ =	=	1446.81	(45)
If instanta	aneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)	,	,	,	•	
(46)m=	0 storage	0	0	0	0	0	0	0	0	0	0	0		(46)
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	me ves	sel		0		(47)
_		` ,		•	velling, e		_			00.		0		()
	-	_			_			ombi boil	ers) ente	er '0' in (47)			
Water s	storage	loss:												
a) If ma	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature fa	actor fro	m Table	2b								0		(49)
•			storage	-		:4		(48) x (49)	=			0		(50)
•				-	loss fact le 2 (kW							0		(51)
		•	ee secti		(1.00)	, 0, 00	-1/					<u> </u>	1	(01)
	-	from Ta										0		(52)
Tempe	rature fa	actor fro	m Table	2b								0		(53)

Energy lost from wa	•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54) in	, ,									0		(55)
Water storage loss of	alculated	for each	month			((56)m = (55) × (41)	m -			_	
(56)m= 0 0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains dedicate	ted solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss (annual) fr	om Table	e 3							0		(58)
Primary circuit loss of					` '	` '						
(modified by facto	1	1		1	1			1	'	i	1	4
(59)m= 0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calculate	d for eacl	n month ((61)m =	(60) ÷ 30	65 × (41))m						
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required f	or water h	eating ca	alculated	d for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		(62)
Solar DHW input calculat	ed using App	pendix G o	r Appendix	κ Η (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or \	//WHRS	applies	, see Ap	pendix (3)				•	
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output from water h	eater										_	
(64)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		_
						Outp	out from w	ater heate	r (annual) ₁	12	1229.79	(64)
Heat gains from wat	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 x	x [(46)m	+ (57)m	+ (59)m	1	
(65)m= 31.88 27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87		(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gains (s	ee Table	5 and 5a):									
Metabolic gains (Tal	ole 5), Wa	tts									_	
Jan Fel		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 121.59 121.5	9 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59		(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	-	-	-		
(67)m= 19.76 17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31		(67)
Appliances gains (ca	lculated i	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5	•		•	
(68)m= 216.06 218.3	1 212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53		(68)
Cooking gains (calc	ılated in A	ppendix	L, equa	tion L15	or L15a	, also se	ee Table	5	•			
(69)m= 35.16 35.10	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16		(69)
Pumps and fans gai	ns (Table	5a)			l					ı	ı	
(70)m= 0 0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. evapora	tion (nega	ative valu	es) (Tab	ole 5)							1	
(71)m= -97.27 -97.2		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water heating gains	(Table 5)	<u> </u>						•			ı	
(72)m= 42.84 41.49	<u>` </u>	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49		(72)
Total internal gains	=		I	(66)	ım + (67)m	ı + (68)m -	L + (69)m + ∈	(70)m + (7	1)m + (72)	m	I	
(73)m= 338.14 336.8		305.74	285.34	266.31	254.35	258.13	268.42	287.88	310.27	327.81		(73)
		1		1	· · · · · ·						I	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	х	34.53	X	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	X	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	X	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.8	=	10.03	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.8	=	34.94	(78)
South	0.9x	0.77	x	2.14	x	76.57	x	0.63	x	0.8	=	57.23	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	x	0.8	=	72.9	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.8	=	82.39	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	x	0.8	=	85.86	(78)
South	0.9x	0.77	x	2.14	x	110.55	X	0.63	x	0.8	=	82.63	(78)
South	0.9x	0.77	x	2.14	x	108.01	x	0.63	x	0.8	=	80.73	(78)
South	0.9x	0.77	x	2.14	x	104.89	X	0.63	x	0.8	=	78.4	(78)
South	0.9x	0.77	x	2.14	x	101.89	X	0.63	x	0.8	=	76.15	(78)
South	0.9x	0.77	x	2.14	x	82.59	X	0.63	X	0.8	=	61.73	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.8	=	41.42	(78)
South	0.9x	0.77	X	2.14	x	40.4	X	0.63	x	0.8	=	30.2	(78)
West	0.9x	0.77	X	2.59	x	19.64	X	0.63	X	0.8	=	17.77	(80)
West	0.9x	0.77	X	0.86	X	19.64	X	0.63	X	0.8	=	5.9	(80)
West	0.9x	0.77	x	2.59	X	38.42	x	0.63	x	0.8	=	34.76	(80)
West	0.9x	0.77	X	0.86	X	38.42	X	0.63	X	0.8	=	11.54	(80)
West	0.9x	0.77	X	2.59	X	63.27	X	0.63	X	0.8	=	57.24	(80)
West	0.9x	0.77	x	0.86	X	63.27	x	0.63	x	0.8	=	19.01	(80)
West	0.9x	0.77	X	2.59	X	92.28	X	0.63	X	0.8	=	83.48	(80)
West	0.9x	0.77	X	0.86	X	92.28	X	0.63	X	0.8	=	27.72	(80)
West	0.9x	0.77	X	2.59	x	113.09	X	0.63	X	0.8	=	102.31	(80)
West	0.9x	0.77	x	0.86	x	113.09	x	0.63	x	0.8	=	33.97	(80)
West	0.9x	0.77	x	2.59	x	115.77	x	0.63	x	0.8	=	104.73	(80)
West	0.9x	0.77	x	0.86	x	115.77	×	0.63	x	0.8	=	34.77	(80)

West 0.9x	0.77	x	2.5	9	X	1	10.22	x	0.63		x	0.8		_ [99.71	(80)
West 0.9x	0.77	×	0.8		x	_	10.22) x	0.63		X	0.8		_	33.11	(80)
West 0.9x	0.77	×	2.5		x	_	4.68]]	0.63		X	0.8	_	_	85.65	(80)
West 0.9x	0.77	x	0.8		x		4.68) x	0.63		x	0.8		<u> </u>	28.44	(80)
West 0.9x	0.77	x	2.5	9	x	7	3.59	X	0.63		X	0.8		_ [66.57	(80)
West 0.9x	0.77	x	0.8	6	x	7	3.59	X	0.63		x	0.8		<u> </u>	22.1	(80)
West 0.9x	0.77	x	2.5	9	x	4	5.59	X	0.63		X	0.8		<u> </u>	41.24	(80)
West 0.9x	0.77	x	0.8	6	x	4	5.59	j×	0.63		x	0.8	_	<u> </u>	13.69	(80)
West 0.9x	0.77	x	2.5	9	x	2	4.49	x	0.63		x	0.8		= [22.15	(80)
West 0.9x	0.77	x	0.8	6	x	2	4.49	x	0.63		x	0.8		= [7.36	(80)
West 0.9x	0.77	x	2.5	9	x	1	6.15	x	0.63		x	0.8	<u> </u>	<u> </u>	14.61	(80)
West 0.9x	0.77	x	8.0	6	x	1	6.15	X	0.63		x	0.8		= [4.85	(80)
Rooflights _{0.9x}	1	x	1.3	3	x	4	7.01	x	0.63		x	0.8		= [56.72	(82)
Rooflights _{0.9x}	1	x	1.3	3	x	8	33.9	X	0.63		x	0.8		= [101.23	(82)
Rooflights _{0.9x}	1	X	1.3	3	x	1:	22.73	X	0.63		x	0.8		= [148.08	(82)
Rooflights 0.9x	1	X	1.3	3	x	10	61.74	X	0.63		x	0.8		= [195.15	(82)
Rooflights 0.9x	1	X	1.3	3	X	18	87.38	X	0.63		x	0.8		= [226.09	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	18	88.06	X	0.63		x	0.8	:	= [226.91	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	18	80.51	X	0.63		x	0.8	:	= [217.8	(82)
Rooflights _{0.9x}	1	x	1.3	3	X	10	61.54	X	0.63		X	0.8		= [194.91	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	1	36.5	X	0.63		X	0.8		= [164.7	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	9	5.08	X	0.63		x	0.8	:	= [114.72	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	5	7.06	X	0.63		x	0.8	:	= [68.85	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	3	9.72	X	0.63		X	0.8		= [47.92	(82)
Solar gains in		I				20.55	F4F 0C	T T	n = Sum(74)ı			154.00	407.0			(92)
(83)m= 127.37 Total gains – i		336.3 d solar	451.51 (84)m =	532.77 (73)m		39.55 83\m	515.86 watts	454	.44 376.5	1 25	8.76	5 154.62	107.6)1		(83)
(84)m= 465.51		661.37	757.25	818.12	<u> </u>	05.87	770.21	712	.57 644.9	3 54	6.63	3 464.89	435.4	2		(84)
` ′	<u> </u>	!														
7. Mean inter						area f	from Tak	hla 0	Th1 (°C)					ſ	21	(85)
Utilisation fac	_	• .			_			oic o	, 1111 (0)					L	21	
Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	ΙΑ	ug Ser	0 (Oct	Nov	De	С		
(86)m= 1	0.99	0.98	0.95	0.86	-	0.69	0.52	0.5	 	_	.97	1	1			(86)
Mean interna	l temnerat	ture in l	iving ar	22 T1 (follo	w ste	ns 3 to 7	7 in T		·						
(87)m= 19.65		20.13	20.49	20.79	$\overline{}$	20.95	20.99	20.		7 20	0.47	19.99	19.62	2		(87)
Temperature	during he	ating n	oriode ir	rosto	of du	/olling	from To	hla (D_Th2 (°C	.)		Į .				
(88)m= 19.9	19.9	19.9	19.91	19.92	$\overline{}$	9.92	19.92	19.	<u>`</u>		9.92	19.91	19.9 ²	1		(88)
												1				
Utilisation fac	0.99	0.98	0.93	veiling 0.81	\neg	,m (se 0.59	0.4	9a) 0.4	16 0.75	1 0	.96	0.99	1	\neg		(89)
									<u>l</u>			0.59	'			(00)
Mean interna	ıı temperat	ture in t	ne rest	ot dwe	ıııng	12 (fo	DIIOW Ste	eps 3	to / in Ta	able 9	C)					

()														
(90)m=	18.68	18.86	19.15	19.51	19.78	19.9	19.92	19.92	19.85	19.49	19.02	18.65		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.23	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llina) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m=	18.9	19.09	19.38	19.74	20.01	20.15	20.17	20.17	20.09	19.72	19.25	18.88		(92)
Apply	adjustn	nent to t	he mean	internal	l tempera	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.9	19.09	19.38	19.74	20.01	20.15	20.17	20.17	20.09	19.72	19.25	18.88		(93)
8. Sp	ace hea	tina reau	uirement											
					re obtain	ed at ste	ep 11 of	Table 9l	o. so tha	t Ti.m=(76)m an	d re-calc	ulate	
			or gains	•			- F		o, ooa	(. 0,	u . o oao		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	1	0.99	0.98	0.93	0.81	0.62	0.43	0.49	0.77	0.96	0.99	1		(94)
Usefu	ıl gains,	hmGm ,	W = (94	4)m x (84	4)m		•	•						
(95)m=	463.91	559.64	645.43	702.3	663.96	495.8	331.09	346.46	495.49	522.92	461.4	434.32		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	1				
(97)m=	1403.7	1360.91		1026.55		519.2	334.35	352.26	562.54	861.83	1152.19	1398.25		(97)
Space	e heating	g require	ement fo	r each n	nonth, k\	Nh/mont	th = 0.02	24 x [(97)m – (95)m] x (4 ²	1)m			
(98)m=	699.2	538.46	436.77	233.46	90.48	0	0	0	0	252.16	497.37	717.16		
							l	Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3465.06	(98)
Space	o bootin	a roquir	omont in	k\A/b/m²	2/voor				. ,	` •	,	, , [44.0	
•	· ·	•	ement in		7уваі								44.2	(99)
8c. S	pace co	olina rec												
		oning rec	luiremen	nt										
Calcu	lated fo	r June, J	luly and	August.										
	lated fo	r June, c Feb	luly and Mar	August. Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	Jan Jan loss rate	r June, c Feb e Lm (ca	luly and Mar Iculated	August. Apr using 2	May 5°C inter	Jun nal temp	perature	and ext	ernal ten	nperatur	e from T	able 10)		(400)
Heat (100)m=	Jan Jan loss rate	r June, c Feb Lm (ca	luly and Mar Iculated	August. Apr	May	Jun	<u> </u>							(100)
Heat (100)m=	Jan Jan loss rate 0 ation fac	r June, c Feb e Lm (ca o tor for lo	Mar Mar Iculated 0	August. Apr using 25	May 5°C inter	Jun nal temp 879.9	692.69	and ext	ernal ten	nperatur 0	e from T	able 10)		, ,
Heat (100)m= Utilisa (101)m=	Jan Jan loss rate 0 ation fac	r June, c Feb E Lm (ca 0 tor for lo	Mar Iculated 0 oss hm	August. Apr using 25	May 5°C inter 0	Jun nal temp 879.9	perature	and ext	ernal ten	nperatur	e from T	able 10)		(100)
Heat (100)m= Utilisa (101)m= Usefu	Jan loss rate 0 ation fac	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W	luly and Mar lculated 0 ess hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun nal temp 879.9	692.69 0.93	and external and e	ernal ten 0	o 0	e from T 0	able 10) 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m=	Jan Jan Joss rate 0 ation fac 0 I loss, h	r June, c Feb e Lm (ca 0 tor for lo 0 mLm (W	July and Mar Iculated 0 oss hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9 0.88 771.09	0.93 645.44	and exter 710.17 0.91	ernal ten 0 0	nperatur 0	e from T	able 10)		` ,
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains	Jan loss rate 0 ation fac 0 Il loss, h 0 (solar o	r June, c Feb e Lm (ca 0 tor for lo 0 mLm (W	luly and Mar lculated 0 ess hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9 0.88 771.09 eather re	0.93 0.93 645.44 egion, se	and external and e	ernal ten 0 0	o 0	e from T 0 0	able 10) 0 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	Jan Jan Joss rate 0 ation fac I loss, h 0 s (solar o	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca	July and Mar Journal of the second of the se	August. Apr using 25 0 100)m x 0 for appli	May 5°C inter 0 (101)m 0 cable we	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 0 10)	0 0 0	0 0 0	able 10) 0 0 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space	lated for Jan loss rate 0 ation facult loss, he cooling e cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole c	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 0 10)	0 0 0	0 0 0	able 10) 0 0	c (41)m	(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1	Jan loss rate 0 ation fac 0 ul loss, h 0 s (solar o e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 grequire zero if (luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	August. Apr using 25 0 100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 (h) = 0.0	0 0 0 0 24 x [(10	0 0 0 0 0 0	able 10) 0 0 0 102)m]	c (41)m	(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	Jan loss rate 0 ation fac 0 ul loss, h 0 s (solar o e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole c	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and exter 710.17 0.91 645.45 ee Table 890.45	0 0 10) 0 0/h) = 0.00	0 0 0 0 24 x [(10	0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>		(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar of 0 c) e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 grequire zero if (luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	August. Apr using 25 0 100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar g 0 d fraction d	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>		(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar o 0 0 0 0 0 0 0 0 0 0 0 0 d fraction fattency factors	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement for 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 0.93 645.44 egion, se 952.37 continuo	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar o 0 0 0 0 0 0 0 0 0 0 0 0 d fraction fattency factors	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continue	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	571.39 1	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermit (106)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar c 0 04)m to 0 d fractior ittency fac 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Iculated 0 Pss hm 0 Jatts) = (0 Iculated 0 Pement fo 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 645.44 egion, se 952.37 continue 228.36	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated for Jan loss rate 0 ation face 0 loss, he cooling cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0 month =	May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]> 0 = 4) =	571.39 1	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated for Jan loss rate 0 ation face 0 loss, he cooling cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Iculated 0 Pss hm 0 Jatts) = (0 Iculated 0 Pement fo 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 645.44 egion, se 952.37 continue 228.36	and external and e	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermi (106)m= Space (107)m=	lated for Jan loss rate 0 ation fac 0 loss, h 0 s (solar g 0 4)m to 0 d fractior ittency fac 0 cooling 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require correquirer 0	luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	May 5°C inter 0 (101)m 0 cable we 0 whole co m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10) 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]> 0 = 4) =	571.39 1 0	(101) (102) (103) (104) (105) (106)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m= Space (107)m=	lated for Jan loss rate 0 ation fac 0 loss, h 0 s (solar g 0 4)m to 0 d fractior ittency fac 0 cooling 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require correquirer 0	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	May 5°C inter 0 (101)m 0 cable we 0 whole co m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25 × (106)r	and external and e	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11)

Fabric Energy Efficiency

(99) + (108) =

46.02

(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	ımher	STRO	030065	
Software Name:	Stroma FSAP 2012	Software \			n: 1.0.5.25	
		operty Address: HOL				
Address :	Woodwell Cottage P2, Wood	· · · · · ·				
1. Overall dwelling dime	-					
		Area(m²)	Av. Height(r	n)	Volume(m³)
Ground floor		39.2 (1a)	x 2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b)	x 2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1n	78.4 (4)				
Dwelling volume		(3a)+	(3b)+(3c)+(3d)+(3e)	+(3n) =	202.27	(5)
2. Ventilation rate:				-		
	main secondary heating heating	y other	total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Air ch	anges per ho	r
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a	a)+(7b)+(7c) =	20	÷ (5) =		(8)
•	een carried out or is intended, proceed		30 ne from (9) to (16)	÷ (5) =	0.15	(6)
Number of storeys in the	ne dwelling (ns)				0	(9)
Additional infiltration				[(9)-1]x0.1 =	0	(10)
	.25 for steel or timber frame or	•			0	(11)
if both types of wall are pa deducting areas of openir	resent, use the value corresponding to nas): if equal user 0.35	the greater wall area (afte	r			
•	floor, enter 0.2 (unsealed) or 0.	1 (sealed), else enter	0	[0	(12)
If no draught lobby, en	ter 0.05, else enter 0			Ī	0	(13)
Percentage of windows	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =	Ī	0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15) =	= [0	(16)
Air permeability value,	q50, expressed in cubic metres	s per hour per square	metre of envelo	pe area	4	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] + (8)$	(18)), otherwise $(18) = (16)$			0.35	(18)
	s if a pressurisation test has been done	e or a degree air permeab	ility is being used			_
Number of sides sheltere	ed	(20) – 1 [0.075	v (10)1 –		1	(19)
Shelter factor	Consideration for all	(20) = 1 - [0.075]		ļ	0.92	(20)
Infiltration rate incorporat	_	$(21) = (18) \times (20)$) =		0.32	(21)
Infiltration rate modified f				 _ 		
Jan Feb	Mar Apr May Jun	Jul Aug Se	ep Oct No	ov Dec		
Monthly average wind sp	eed from Table 7					

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor ((22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.41	0.4	0.39	0.35	0.35	0.31	0.31	0.3	0.32	0.35	0.36	0.38]	
Calculate effe		-	rate for t	he appli	cable ca	se	!	!	!	!	!	,	(00.)
If mechanic			andiv N (2	3h) - (23s	a) v Emy (4	aguation (N	V5)) othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balanc		,	,			`		,	2h\m + (23h) v [1 – (23c)	0 - 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balanc	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)	<u> </u>	J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from	outside	l			J	
if (22b)	m < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
	m = 1, th 0.58	en (24d) _{0.58}	m = (221)	0.56	0.55	(4d)m = 0.55	$0.5 + [(2)]_{0.54}$	(2b)m² x 0.55		0.57	0.57	1	(24d)
` ′	<u>.</u> !	<u> </u>		<u> </u>	l				0.56	0.57	0.57	J	(240)
Effective ai (25)m= 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.57	0.57	1	(25)
(),	1	1	1 3133					1]	. ,
3. Heat loss		•							A 37.11				A 3/ I
3. Heat loss	es and he Gros area	SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [- 0.04] = [(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r 2.07	m ² x x10 x10	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area ne 1 ne 2 ne 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
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ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K:	33 2 4 , m ² ows, use e sides of in = S (A x	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the are Fabric heat lo	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K: y Cm = S(33 2 4 , m ² ows, use e sides of in = S (A x	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²•	n 3.2	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

		laneu calci	ulation.										
Thermal bridg	jes : S (L	x Y) cal	culated (using Ap	pendix I	K						10.48	(36)
f details of therm	0 0	are not kn	own (36) =	= 0.05 x (3	1)			(00)	(0.0)				<u> </u>
Total fabric h								` '	(36) =			57.1	(37
entilation he			·	<u> </u>					= 0.33 × (· · · · · ·	<u> </u>	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m= 39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38
Heat transfer	coefficie	nt, W/K	•		•			(39)m	= (37) + (3	38)m		1	
39)m= 96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Heat loss par	ameter (H	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	94.67	(39
40)m= 1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		_
Number of da	ys in mo	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.21	(40
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41
												-	
4. Water hea	atina ene	rav reaui	irement:								kWh/y	ear:	
	<u> </u>									1			
ssumed occ. if TFA > 13 if TFA £ 13	.9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		43		(4
	,	ater usac	ge in litre	es per da	av Vd,av	erage =	(25 x N)	+ 36		91	.96	1	(43
Annual avera Reduce the annu	ge hot wa lal average	hot water	usage by	5% if the a	lwelling is	designed			se target o		.96]	(43
Annual avera Reduce the annu	ge hot wa lal average	hot water	usage by	5% if the a	lwelling is	designed		a water us	se target o]	(43
Annual avera Reduce the annual not more that 12	ge hot wa gal average 5 litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d vater use, I May	lwelling is not and co Jun	designed ld) Jul	to achieve Aug		se target o		.96]	(43
Annual avera Reduce the annu not more that 12	ge hot wa lal average 5 litres per l Feb in litres per	hot water person per Mar day for ea	usage by aday (all was Aprach month	5% if the divater use, I May Vd,m = fa	welling is not and co	designed Id) Jul Table 1c x	Aug (43)	a water us Sep	Oct	Nov	Dec]	(43
Annual avera Reduce the annual not more that 12	ge hot wa lal average 5 litres per l Feb in litres per	hot water person per Mar	usage by day (all w	5% if the d vater use, I May	lwelling is not and co Jun	designed ld) Jul	to achieve Aug	Sep	Oct 93.79	Nov 97.47	Dec 101.15]	
Annual avera Reduce the annual not more that 12: Jan Hot water usage	ge hot wa nal average 5 litres per p Feb in litres per 97.47	hot water person per Mar day for ea	usage by a day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 86.44	Jun ctor from 7	designed ld) Jul Table 1c x	Aug (43) 86.44	Sep	93.79 Total = Su	Nov 97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	`
Annual avera Reduce the annual not more that 12. Jan Hot water usage 44)m= 101.15	ge hot wa nal average 5 litres per p Feb in litres per 97.47	hot water person per Mar day for ea	usage by a day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 86.44	Jun ctor from 7	designed ld) Jul Table 1c x	Aug (43) 86.44	Sep	93.79 Total = Su	Nov 97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	`
Annual avera Reduce the annual rot more that 12. Jan Hot water usage 101.15 Energy content of	ge hot wa nal average litres per litres per gen gen gen gen gen gen gen gen gen gen	Mar day for ea	usage by a day (all was Apr ach month 90.12	5% if the orater use, I May Vd,m = fa 86.44 conthly = 4.	Jun ctor from 1 82.76	designed ld) Jul Table 1c x 82.76	Aug (43) 86.44 PTm / 3600	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27	1103.46	(44
Annual avera Reduce the annual reduce the annual reduce the annual reduced the annual red	ge hot wa yel average 5 litres per yel yel yel yel yel yel yel yel yel yel	Mar day for ea 93.79 used - calc	Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44 onthly = 4.	Jun Ctor from 1 82.76 190 x Vd,r	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su th (see Ta 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(44
Jan dot water usage 44)m= 101.15 Energy content of 15)m= 150 instantaneous 46)m= 22.5	ge hot wa yal average 5 litres per yer yer yer yer yer yer yer yer yer y	Mar day for ea 93.79 used - calc	Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44 onthly = 4.	Jun Ctor from 1 82.76 190 x Vd,r	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su th (see Ta 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(44
Annual avera Reduce the annual	ge hot water heatile 19.68	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31	Apr ach month 90.12 culated mo 118.03	5% if the director use, I May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage),	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59	90.12 90.12 0 kWh/mor 105.16 0 to (61)	93.79 Total = Sunth (see Tall 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
Annual avera Reduce the annual reduce the annual	ge hot wa yal average 5 litres per yer yer yer yer yer yer yer yer yer y	Mar day for ea 93.79 used - calc 135.38 ng at point 20.31	Apr ach month 90.12 culated mo 118.03 for use (no	5% if the orater use, I May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W	Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	90.12 90.12 0 kWh/mor 105.16 0 to (61)	93.79 Total = Sunth (see Tall 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27		(4:
Annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 f instantaneous 46)m= 22.5 Vater storage Storage volur f community	ge hot water leading and average for litres per leading and litres per leading and litres per leading and litres per leading and litres per leading and litres leadin	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31 includin	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 Diar or Water Velling, e	Jun storage), 14.66 /WHRS Not and co	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage Ulitres in	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
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Annual avera Reduce the annual reduce the annual reduce the annual reduce the annual reduced that 12: Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 f instantaneous 46)m= 22.5 Vater storage Storage voluri	ge hot water sper sper sper sper sper sper sper sp	Mar Mar 93.79 used - calc 135.38 ng at point 20.31 includin and no tal hot water	Apr ach month 90.12 culated mo 118.03 r of use (no 17.7 ang any so ank in dw er (this in	May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame ves	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(45) (45) (46) (47)
Annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera I Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 If instantaneous A6)m= 22.5 Vater storage Storage volur If community Otherwise if r Vater storage a) If manuface Temperature	ge hot water sper per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared lem Table	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in oss facto 2b	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 20 lar or Water 20 yelling, each or is known is	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0		(45) (46) (47) (48) (49)
Annual avera Reduce the annual reduce the annual	ge hot wa value average to litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared left marger.	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 ag any so ank in dw er (this in oss facto 2b	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or Water $velling, e$	Jun ctor from 7 82.76 82.76 97.73 14.66 WHRS nter 110 nstantar wn (kWł	designed des	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(444 (45) (46) (47) (48) (49)
Annual avera Reduce the annual reduce the annual	ge hot wa yal average 5 litres per l Feb in litres per 97.47 f hot water 131.19 water heatil 19.68 e loss: ne (litres) heating a no stored e loss: sturer's de factor fro om water sturer's de rage loss	Mar Mar 93.79 used - calc 135.38 ng at point 20.31 includin and no ta hot water eclared le storage eclared of factor fr	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in coss facto 2b cylinder l com Table	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0		(44 (45 (46 (47 (48 (49 (50
Annual avera Reduce the annual reduce the annual	ge hot water sper per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared left actor fractor fractor fractor fractor fractor security and no talchot water eclared contactor fr	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in coss facto 2b cylinder l com Table	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(44 (45 (46 (47 (48 (49 (50 (51
Annual avera Reduce the annual reduce the annual	ge hot way and average to litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 135.38 including and no talchot water eclared left m Table storage eclared of factor from the section of the	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 ang any so ank in dw er (this in coss facto 2b cylinder I com Tabl con 4.3	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 c, 1d) 145.27 21.79 0 0 0		(43 (44 (46 (47 (48 (49 (50 (51 (52 (53

Energy lost fr	om watei	r storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0]	(54)
Enter (50) or	(54) in (5	55)									0]	(55)
Water storage	e loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primary circu	it loss (ar	nnual) fro	om Table	e 3							0]	(58)
Primary circu	•	,			(59)m = ((58) ÷ 36	65 × (41)	m				-	
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		_	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m= 12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total heat red	quired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar DHW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	4	
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
FHRS 0	0	0	0	0	0	0	0	0	0	0	0	-	(63) (G2)
Output from v	vater hea	iter											
(64)m= 162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
	•					!	Outp	out from w	ater heate	r (annual)	12	1595.65	(64)
Heat gains fro	om water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	ı + (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m	.]	_
(65)m= 53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
include (57)m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal of	ains (see	e Table 5	and 5a):									
Metabolic gai				,									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m= 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	1	(66)
Lighting gains	s (calcula	ted in A	ppendix	L. equat	ion L9 o	r L9a). a	lso see	Lable 5	!	<u>I</u>	!	J	
(67)m= 19.76	17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31	1	(67)
Appliances ga	ains (calc	ulated ir	. Append	dix L. ea	uation L	13 or L1	3a), also	see Ta	ble 5		<u>!</u>	J	
(68)m= 216.06	- ` 	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	1	(68)
Cooking gain	s (calcula	ted in A	nnendix	I equat	tion I 15	or I 15a) also se	ee Table	1			J	
(69)m= 35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16]	(69)
Pumps and fa			<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>		<u> </u>	J	
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3	1	(70)
Losses e.g. e	vaporatio	n (nega	tive valu	es) (Tab	le 5)					<u> </u>	<u> </u>	J	
(71)m= -97.27		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
Water heating			I	I						l	1	J	
(72)m= 71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17]	(72)
Total interna				L	ļ	<u> </u>	<u> </u>		(70)m + (7		ļ	J	-
(73)m= 369.58	-	354.15	332.66	310.86	289.85	276.2	282.14	293.19	314.89	339.81	358.48]	(73)
, 2,	1	1	1	1	1 ======	I =: •:=	I ===···		1	1	1	J	•

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	x	1.62	x	20.32	х	0.63	X	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	X	0.63	X	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	х	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	х	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	X	0.63	X	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	X	0.8	=	10.03	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.8	=	34.94	(78)
South	0.9x	0.77	x	2.14	x	76.57	х	0.63	X	0.8	=	57.23	(78)
South	0.9x	0.77	x	2.14	x	97.53	x	0.63	x	0.8	=	72.9	(78)
South	0.9x	0.77	x	2.14	x	110.23	x	0.63	x	0.8	=	82.39	(78)
South	0.9x	0.77	x	2.14	x	114.87	x	0.63	X	0.8	=	85.86	(78)
South	0.9x	0.77	x	2.14	x	110.55	x	0.63	x	0.8	=	82.63	(78)
South	0.9x	0.77	x	2.14	x	108.01	х	0.63	X	0.8	=	80.73	(78)
South	0.9x	0.77	x	2.14	x	104.89	x	0.63	X	0.8	=	78.4	(78)
South	0.9x	0.77	x	2.14	x	101.89	x	0.63	x	0.8	=	76.15	(78)
South	0.9x	0.77	x	2.14	x	82.59	x	0.63	x	0.8	=	61.73	(78)
South	0.9x	0.77	x	2.14	x	55.42	x	0.63	x	0.8	=	41.42	(78)
South	0.9x	0.77	X	2.14	x	40.4	x	0.63	X	0.8	=	30.2	(78)
West	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.8	=	17.77	(80)
West	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.8	=	5.9	(80)
West	0.9x	0.77	X	2.59	x	38.42	x	0.63	X	0.8	=	34.76	(80)
West	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.8	=	11.54	(80)
West	0.9x	0.77	X	2.59	x	63.27	X	0.63	X	0.8	=	57.24	(80)
West	0.9x	0.77	X	0.86	x	63.27	x	0.63	X	0.8	=	19.01	(80)
West	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.8	=	83.48	(80)
West	0.9x	0.77	X	0.86	x	92.28	X	0.63	X	0.8	=	27.72	(80)
West	0.9x	0.77	X	2.59	x	113.09	x	0.63	x	0.8	=	102.31	(80)
West	0.9x	0.77	X	0.86	x	113.09	x	0.63	x	0.8	=	33.97	(80)
West	0.9x	0.77	X	2.59	x	115.77	X	0.63	x	0.8	=	104.73	(80)
West	0.9x	0.77	x	0.86	x	115.77	X	0.63	x	0.8	=	34.77	(80)

West 0.9	× 0.77		x	2.5	0	x	1.	10.22] _x	0.63		x	0.8	- 1 .		99.71	(80)
West 0.9			x	0.8		x	_	10.22	」^]	0.63	=	^ [x	0.8	=		33.11	(80)
West 0.9			x			_ ^ х	_] ^] x			^ x		=	<u> </u>		(80)
West 0.9				2.5		l I	_	14.68	」^] x	0.63			0.8	=		85.65	(80)
West 0.9			X	0.8		X	_	94.68 70.50	1	0.63		X	0.8	=	\vdash	28.44	= ' '
West 0.9		=	X	2.5		X	_	'3.59] X] ,,	0.63		X	0.8	=	<u> </u>	66.57	(80)
West 0.9		==	X	0.8		X		3.59] X] ,	0.63		X	0.8	=	<u> </u>	22.1	(80)
		==	X	2.5		X I	_	5.59] X]	0.63		X	0.8	=	<u> </u>	41.24	(80)
			X	0.8		X	_	5.59] X]	0.63		X	0.8	=	<u> </u>	13.69	(80)
			X	2.5		X		4.49	X	0.63		X	0.8	=	·	22.15	(80)
West 0.9	-	=	X	0.8		X		24.49] X]	0.63		X	0.8	=	<u> </u>	7.36	(80)
West 0.9			X	2.5		X		6.15] X	0.63		X	0.8	╡	·	14.61	(80)
West 0.9			X	0.8	6	Х	1	6.15	X	0.63		X	0.8	:	<u> </u>	4.85	(80)
Rooflights 0.9			X	1.3	3	X	4	7.01	X	0.63		X	0.8	•	•	56.72	(82)
Rooflights 0.9			X	1.3	3	X	8	33.9	X	0.63		X	0.8	:	• <u>L</u>	101.23	(82)
Rooflights 0.9			X	1.3	3	X	12	22.73	X	0.63		X	0.8	:	• <u> </u>	148.08	(82)
Rooflights 0.9			X	1.3	3	X	16	61.74	X	0.63		X	0.8		• <u> </u>	195.15	(82)
Rooflights 0.9			X	1.3	3	X	18	87.38	X	0.63		X	0.8	:	• <u> </u>	226.09	(82)
Rooflights 0.9	x 1		X	1.3	3	x	18	88.06	X	0.63		X	0.8			226.91	(82)
Rooflights 0.9	x 1		X	1.3	3	X	18	80.51	X	0.63		X	0.8		=	217.8	(82)
Rooflights 0.9	x 1		x	1.3	3	X	16	61.54	X	0.63		X	0.8		-	194.91	(82)
Rooflights 0.9	x 1		X	1.3	3	x	1	36.5	X	0.63		X	0.8	-		164.7	(82)
Rooflights 0.9	x 1		x	1.3	3	x	9	5.08	x	0.63		x	0.8			114.72	(82)
Rooflights 0.9	x 1		x	1.3	3	x	5	7.06	x	0.63		x	0.8	╗.	- 🗀	68.85	(82)
Rooflights 0.9	x 1		x	1.3	3	x	3	9.72	X	0.63		x	0.8	╡:	• 🗔	47.92	(82)
						•											
Solar gains									_	n = Sum(74					_		
(83)m= 127.3	227.75	336	.3	451.51	532.7	7 5	39.55	515.86	454	.44 376.	51 2	258.76	154.62	107.6	1		(83)
Total gains -	- internal a	and so	olar	(84)m =	: (73)n	า + (83)m	, watts							_		
(84)m= 496.9	595.24	690.	45	784.17	843.63	3 8	329.4	792.06	736	.58 669	.7 5	73.65	494.43	466.1			(84)
7. Mean int	ernal tem	peratu	ıre (heating	seaso	n)											
Temperatu	re during l	heatin	g pe	eriods ir	the li	ving	area f	from Tal	ble 9	, Th1 (°C	;)					21	(85)
Utilisation f	actor for g	jains f	or li	ving are	a, h1,	m (s	ee Ta	ble 9a)									
Jar	n Feb	Ма	ar	Apr	Ma	/	Jun	Jul	Α	ug Se	эр	Oct	Nov	Dec	;		
(86)m= 1	0.99	0.9	8	0.94	0.85		0.67	0.51	0.5	0.8	2	0.97	0.99	1			(86)
Mean inter	nal tempe	rature	in li	ving are	ea T1	(follo	w ste	ns 3 to 7	7 in T	able 9c)	•						
(87)m= 19.69		20.1	$\overline{}$	20.52	20.8	`	20.95	20.99	20.		38 2	20.49	20.02	19.66			(87)
	ro durina l	nootin	- L		root	of du	, alling	from To	hla (!_		!				
Temperatu (88)m= 19.9		19.9		19.91	19.92	\neg	9.92	19.92	19.			19.92	19.91	19.91	\neg		(88)
								Į		10.0	<u>- L</u>	. 0.02	1 . 5.5 1	10.01			(/
Utilisation f		1	$\overline{}$			$\overline{}$	<u> </u>		T –	u	<u>, I</u>	0.05	0.00	4	\neg		(90)
(89)m= 1	0.99	0.98		0.92	0.79		0.58	0.39	0.4			0.95	0.99	1			(89)
Mean inter	nal tempe	rature	in tl	he rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in T	able	9c)					

	1				1	l							(00)
(90)m= 18.16	18.43	18.85	19.36	19.73	19.89	19.92	19.92	19.83	19.34	18.65	18.12		(90)
								ı	LA = LIVIN	g area ÷ (4	+) =	0.23	(91)
Mean interna	ıl temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m= 18.52	18.77	19.16	19.63	19.98	20.14	20.17	20.17	20.07	19.61	18.97	18.48		(92)
Apply adjustr	ment to t	he mean	interna	temper	ature fro	m Table	4e, whe	re appro	priate				
(93)m= 18.37	18.62	19.01	19.48	19.83	19.99	20.02	20.02	19.92	19.46	18.82	18.33		(93)
8. Space hea	iting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	L		•			J 311	1 119						
(94)m= 0.99	0.99	0.97	0.91	0.79	0.59	0.4	0.45	0.74	0.94	0.99	1		(94)
Useful gains,	hmGm	, W = (9 ⁴	4)m x (84	4)m	ı								
(95)m= 494.31	587.84	668.62	715.59	664.63	486.21	317.96	334.07	493.16	541.06	488.89	464.24		(95)
Monthly aver	age exte	ernal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	e for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(<mark>97)</mark> m= 1352.22	1315.64	1196.57	1001.74	768.2	504.73	320.28	338.19	547.11	836.81	1112.17	1345.98		(97)
Space heating	g require	ement fo	r each n	nonth, k\	Nh/mon	th = 0.02	24 x [(97)	m – (95)m] x (4	1)m			
(98)m= 638.29	489.08	392.79	206.03	77.05	0	0	0	0	220.04	448.76	656.02		
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3128.06	(98)
Space heating	ig require	ement in	kWh/m²	²/year								39.9	(99)
·	• •				vstems i	ncludina	micro-C	HP)				39.9	(99)
9a. Energy re	quiremer				ystems i	ncluding	micro-C	HP)				39.9	(99)
·	quiremer	nts – Indi	vidual h	eating s		_	micro-C	CHP)				39.9	
9a. Energy red Space heati	quiremer ng: pace hea	nts – Indi	vidual h	eating s		system	micro-C (202) = 1 -						(20
Space heating Fraction of space heating Fraction of space heating Fraction of space heating fraction of space heating fraction of space heating fraction fraction of space heating fraction frac	quiremerng: pace head	nts – Indi at from se at from m	vidual h econdary	eating sy y/supple em(s)		system		- (201) =	(203)] =			0	(20)
9a. Energy reconstruction of space heating fraction of space fraction of to	quirements ng: pace head pace head pace head patal heati	nts — Indi at from se at from m ng from i	ividual h econdary nain syst main sys	eating sy/supple em(s) stem 1		system	(202) = 1 -	- (201) =	(203)] =			0 1 1	(202
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of	quirement ng: pace hea pace hea patal heati main spa	nts – Indi at from se at from m ng from l ace heati	vidual hecondary nain systemain syst	eating sy/supple em(s) stem 1	mentary	system	(202) = 1 -	- (201) =	(203)] =			0 1 1 89.9	(20 ²) (20 ²) (20 ⁴) (20 ⁶)
9a. Energy red Space heati Fraction of space fraction of to Efficiency of	quirement ng: pace hea pace hea patal heati main spa seconda	at from se at from m ng from m ace heati	econdary nain systemain systemain systemain systematory	eating syysupple em(s) stem 1 em 1	mentary g system	system	(202) = 1 - (204) = (2	- (201) = 02) × [1 –				0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of Efficiency of Jan	quirement ng: pace hea pace hea patal heati main spa seconda	nts – Indi at from se at from m ng from a ace heati ary/supple Mar	vidual hecondary nain systemain systementar Apr	eating sy/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 -	- (201) =	(203)] =	Nov	Dec	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recomplete Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating	quirement ng: pace heat to tal heat it main sparseconda Feb	nts – Indi at from se at from m ng from n ace heati ary/supple Mar ement (c	econdary nain systemain systemain systementar Apr	eating syysupple em(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 -	Oct			0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of Efficiency of Jan	quirement ng: pace hea pace hea patal heati main spa seconda	nts – Indi at from se at from m ng from a ace heati ary/supple Mar	vidual hecondary nain systemain systementar Apr	eating sy/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 - (204) = (2	- (201) = 02) × [1 –		Nov 448.76	Dec 656.02	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Efficiency of Space heating 638.29	quirement of the property of t	at from seat from mace heating/supplement (compared)	econdary nain systemain systementar Apr alculatee	eating syy/supplem(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 -	Oct		656.02	0 1 1 89.9	(20 ²) (20 ²) (20 ⁶) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Efficiency of Space heating 638.29	quirement ng: pace heat pace heat pace heat patal heat it main spates secondar rebuire require 489.08	at from seat from mace heating/supplement (constant)	econdary nain systemain systementar Apr alculatee	eating syy/supplem(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76 499.18	656.02 729.72	0 1 1 89.9	(20 ²) (20 ²) (20 ⁸) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211) m = {[(98)]	quirement of the property of t	at from so at from m age heati ary/supple Mar ement (c 392.79	econdary nain systemain systementar Apr alculated 206.03 00 ÷ (20	eating sy/supple em(s) stem 1 em 1 May dabove 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76	656.02 729.72	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(986) 710]	quirement of the property of t	at from seat from mace heating/supplement (compared as 192.79) 1436.92	econdary nain systemain systematrar Apr alculated 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 y heating May d above 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76 499.18	656.02 729.72	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) m x (20) modes]	quirement ng: pace heat pa	at from so at from m ng from m ace heati ary/supple Mar ement (c 392.79 04)] } x 1 436.92	econdary nain systemain systematar Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	729.72 =	0 1 1 89.9 0 kWh/ye	(20 ²) (20 ²) (20 ⁸) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) m x (20) modes]	quirement of the property of t	at from seat from mace heating/supplement (compared as 192.79) 1436.92	econdary nain systemain systematrar Apr alculated 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 y heating May d above 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Ef	quirement ng: pace heat pa	at from so at from m ng from m ace heati ary/supple Mar ement (c 392.79 04)] } x 1 436.92	econdary nain systemain systematar Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98)	quirement pace heat pace h	at from seat from mace heating/supplement (compared) 392.79 04)] } x 1 436.92 econdary 00 ÷ (20 0	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating syy/supple em(s) stem 1 em 1 y heating dabove 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Efficiency of Space heating (211)m = {[(98) m x (215)m= 0]} Water heating Output from we	quirement ng: pace heat pa	at from so at from mace heating mar lement (c 392.79 lecondary 00 ÷ (20 lecondary on the following states of the following sta	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/ 8) 0	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71 fmonth 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 = 0	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ar
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) 710} Space heating {[(98) m x (20) 215)m=0} Water heating	quirement ng: pace heat pa	at from so at from mace heating/supplement (c 392.79) 436.92 econdary 00 ÷ (20 0)	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating syy/supple em(s) stem 1 em 1 y heating dabove 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(99) (201 (202 (204 (208 (208 ar (211)

(217)m= 89.36 89.3 89.17 88.87 88.27	87.3 87.3	87.3	87.3	88.89	89.25	89.38		(217)
Fuel for water heating, kWh/month	•					•	•	
(219) m = (64) m x $100 \div (217)$ m (219)m = 182.01 159.7 165.99 146.57 142.62	125.96 118.21	133.51	134.47	152.09	163.6	176.67		
(210)111 102.01 100.11 100.00 140.01 142.02	120.00	<u> </u>		19a) ₁₁₂ =	100.0	170.07	1801.39	(219)
Annual totals			`		Wh/year		kWh/year](210)
Space heating fuel used, main system 1							3479.49	
Water heating fuel used							1801.39]
Electricity for pumps, fans and electric keep-hot								_
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum (of (230a).	(230g) =			75	(231)
Electricity for lighting							348.92	(232)
Electricity generated by PVs							-871.55	(233)
Total delivered energy for all uses (211)(221) +	+ (231) + (232)	(237b) =	=				4920.55	(338)
12a. CO2 emissions – Individual heating system	ns including mi	cro-CHP						
	Energy kWh/year			Emiss kg CO2	ion fac 2/kWh	tor	Emissions kg CO2/yea	r
Space heating (main system 1)	(211) x			0.2	16	=	751.57	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	389.1	(264)
Space and water heating	(261) + (262)	+ (263) + (2	264) =				1140.67	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	181.09	(268)

Energy saving/generation technologies

Dwelling CO2 Emission Rate

Item 1

Total CO2, kg/year

El rating (section 14)

(269)

(272)

(273)

(274)

-452.33

908.35

11.59

90

0.519

sum of (265)...(271) =

 $(272) \div (4) =$

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU	ISE D - FINAL			
Address :	Woodwell Cottage P2, Wo	odwell Road, BRISTOL	, BS11 9XU			
1. Overall dwelling dime	ensions:					
		Area(m²)	Av. Height(r	n)	Volume(m³))
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) >	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n) 78.4 (4)				
Dwelling volume		(3a)+((3b)+(3c)+(3d)+(3e)	+(3n) =	202.27	(5)
2. Ventilation rate:						
	main second heating heating	ary other	total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				Air ch	anges per ho	ur
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)$ -	+(7a)+(7b)+(7c) =	30	÷ (5) =	0.15	(8)
	een carried out or is intended, proc				0.10	(``
Number of storeys in the	ne dwelling (ns)				0	(9)
Additional infiltration			1	[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame	or 0.35 for masonry con	struction	Ī	0	(11)
if both types of wall are pa deducting areas of openia	resent, use the value corresponding	to the greater wall area (after		•		
	floor, enter 0.2 (unsealed) or	0.1 (sealed), else enter	0	[0	(12)
If no draught lobby, en	ter 0.05, else enter 0			Ì	0	(13)
• •	s and doors draught stripped			Ī	0	(14)
Window infiltration	•	0.25 - [0.2 x (14)	÷ 100] =	[0	(15)
Infiltration rate		(8) + (10) + (11) -	+ (12) + (13) + (15) =	- I	0	(16)
Air permeability value,	q50, expressed in cubic met	res per hour per square	metre of envelo	pe area	5	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20]$	+(8), otherwise (18) = (16)			0.4	(18)
		lone or a degree air permeabil	ity is being used	<u> </u>		
Air permeability value applie	s it a pressurisation test has been d					
Air permeability value applie Number of sides sheltere			, .		1	(19)
		(20) = 1 - [0.075 :			1 0.92	(19) (20)
Number of sides sheltered	ed		x (19)] =	[[⊣ ``
Number of sides sheltere Shelter factor	ed ting shelter factor	(20) = 1 - [0.075 :	x (19)] =	[0.92	(20)
Number of sides sheltere Shelter factor Infiltration rate incorporate	ed ting shelter factor	(20) = 1 - [0.075 : (21) = (18) x (20)	x (19)] = =	ov Dec	0.92	(20)

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		-	rate for t	he appli	cable ca	se	-	-	-	-	-		(23a)
If exhaust air h			endix N. (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced wit									, (,			0	(23c)
a) If balance	ed mecha	anical ve	ntilation	with he	at recov	· erv (MVI	HR) (24a	a)m = (22	2b)m + (23b) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	иV) (24t	m = (22)	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from o	outside		•	•	•	
if (22b)	m < 0.5 ×	(23b), t	hen (24)	c) = (23b); other	wise (24	c) = (22k	o) m + 0.	5 × (23b) 		1	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m = 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.51	0.59	0.59	1	(24d)
Effective air					l	l			0.00	1 0.00	0.00	J	,
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(25)
3. Heat losse	oc and he	nat loce r	paramete	or:									
ELEMENT	Gros		Openin		Net Ar	ea	U-val	ue	AXU		k-value	<u>.</u>	ΑΧk
	area	_	m	-	A ,r		W/m2		(W/I	K)	kJ/m²-l		kJ/K
Doors					2.07	Х	1	=	2.07				(26)
Windows Typ	e 1				1.62	x1,	/[1/(1.4)+	0.04] =	2.15				(27)
Windows Typ	e 2				2.59	x1,	/[1/(1.4)+	0.04] =	3.43				(27)
Windows Typ	e 3				0.86	x1,	/[1/(1.4)+	0.04] =	1.14				(27)
Windows Typ	e 4				2.14	x1,	/[1/(1.4)+	0.04] =	2.84				(27)
Rooflights					1.33	x1,	/[1/(1.7) +	0.04] =	2.261				(27b)
Floor					39.2	X	0.13	= [5.096				(28)
Walls Type1	80.8	33	10.9		69.93	3 X	0.18	= [12.59				(29)
Walls Type2	2.12	2	0		2.12	х	0.18	= [0.38				(29)
Daaf		4	2.66	;	54.74	, x	0.13	= [7.12				(30)
Roof	57.4	·											
Total area of					179.5	5							(31)
					179.5 29.73	=	0	= [0				(31)
Total area of o	elements	, m² ows, use e	ffective wi		29.73	x	L			as given in	paragraph	3.2	``
Total area of o	elements d roof winder eas on both	, m² ows, use e sides of ir	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu		as given in	paragraph		(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	L	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)
Total area of o	elements d roof winder eas on both ess, W/K: Cm = S(ows, use e sides of ir = S (A x (A x k)	iffective wi ternal wali U)	ls and par	29.73 alue calcul titions	X ated using	formula 1	/[(1/U-valu) + (32) = ((28)	ie)+0.04] a	2) + (32a).			(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)

an be use	ea instea						,							(26)
Thermal	bridge	s : S (L	x Y) cal	culated i	using Ap	pendix I	1						10.55	(36)
		0 0	are not kn	own (36) =	= 0.05 x (3	1)			(0.0)	(2.5)				_
Total fab									` '	(36) =			53.74	(37
entilatio/			alculated				<u> </u>				25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(38
Heat tran	nsfer c	oefficier	nt, W/K			T		1	(39)m	= (37) + (3	38)m	ı	1	
39)m= 9	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		— ,
leat loss	s parar	meter (H	ILP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	92.59	(39
40)m=	1.21	1.2	1.2	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		_
Number	of day:	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.18	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
													-	
4. Wate	er heati	ing ener	gy requi	rement:								kWh/y	ear:	
			k I											
if TFA if TFA	> 13.9 £ 13.9), N = 1), N = 1	+ 1.76 x)2)] + 0.(ΓFA -13.	.9)	43	1	
if TFA if TFA annual a Reduce the	> 13.9 £ 13.9 average e annual), N = 1), N = 1 e hot wa l average	+ 1.76 x ater usag	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed)2)] + 0.0 (25 x N) to achieve	+ 36		91	.96]	•
if TFA if TFA innual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		91]	·
if TFA if TFA Annual a Reduce the of more th	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96]	·
if TFA if TFA Annual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		•
if TFA if TFA Annual a Reduce the not more the dot water to	> 13.9 £ 13.9 average e annual hat 125 lusage in 101.15	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43)	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the not more th dot water the 44)m= 1	> 13.9 £ 13.9 average e annual hat 125 lusage in 101.15	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the lot more the dot water the 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in 5% is the da 5% in 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15 c, 1d) 145.27	1103.46	(4:
if TFA if TFA Annual a Reduce the not more the Hot water to 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in 5% is the da 5% in 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= instantan 46)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l 150 neous wa	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19 ater heatin 19.68	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in 5% is the da 5% in 5%	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(44
if TFA if TFA if TFA annual a Reduce the ot more th lot water th the standard stan	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa	P, N = 1 P, N = 1 P hot was a verage litres per p Peb litres per p 97.47 Phot water 131.19 Pater heatin 19.68	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA Annual a Reduce the bot more the dot water the 44)m= 1 Energy cor 45)m= finstantan 46)m= Vater sto	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 150 150 meous wa 22.5 orage volume	Post N = 1 Post N = 1	ter usaghot water berson per Mar day for ea 93.79 used - calcate 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av Iwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27		(44)
if TFA if TFA if TFA Annual a Reduce the lot more th dot water the start and the start and the finstantan 46)m= Vater start Storage of the start and the finstantan 46)m= Vater start f community	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa 22.5 Iorage volume unity he	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA if TFA Annual a Reduce the ot more if dot water i 44)m= 1 Energy cor 45)m= Vater sto Storage value Communication	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the control	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= Vater sto Storage of Communication Otherwis Vater sto	> 13.9 £	P, N = 1 P, N = 1 P hot was I average litres per p P hot water 131.19 P hot water 131.19 P hot water 19.68 P litres P cating a stored P stored P stored P stored P stored	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw er (this in	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45)
if TFA if TFA if TFA Annual a Reduce the not more if that water if 44)m= Tenergy cor 45)m= Vater sta Storage if from to the rwis Vater sta a) If mar	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the state	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	Apr Apr Ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in	es per da 5% if the d vater use, f May Vd,m = fac 86.44 2011 13.25 20 hot water 16.99 Color or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45) (45) (46) (47)
if TFA Annual a Reduce the not more the state of the stat	> 13.9 £	Power of the company	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared lem Table storage	Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the d rater use, I May Vd,m = fat 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e ancludes in or is known	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed and ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(48)
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second of t	ter usage hot water overson per Mar day for ear 93.79 used - calce 135.38 including at point 20.31 including and no talce the water eclared lear to factor fr	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, I May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Collar or W Velling, e includes in por is knowear	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(44 (45 (46 (47 (48 (49 (50
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second of t	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared less torage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

	/ lost fro	m water	storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54))
•		(54) in (5	_	,								0	(55)	
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56))
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57))
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58))
Primar	y circuit	loss cal	culated	for each	month (59)m = 0	(58) ÷ 36	55 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59))
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41))m						
(61)m=	50.96	44.86	47.8	44.44	44.05	40.81	42.17	44.05	44.44	47.8	48.07	50.96	(61))
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23	(62))
Solar DH	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63))
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63)	(G2)
Output	from w	ater hea	ter											
(64)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23		
'		•	•	•	•	•	•	Outp	out from w	ater heate	r (annual) ₁	12	1997.22 (64))
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	62.62	54.84	56.96	50.35	48.67	42.7	40.65	45.56	46.08	52.7	56.5	61.04	(65)	١
inclu							ı			_			(00)	'
	ıde (57)ı	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling		ater is fr	om com		<u> </u>	
				of (65)m and 5a	•	ylinder i	s in the	dwelling			om com		<u> </u>	
5. Int	ernal ga		e Table 5	and 5a	•	eylinder i	s in the o	dwelling			om com		<u> </u>	
5. Int	ernal ga	ains (see	e Table 5	and 5a	•	ylinder i	s in the o	dwelling Aug			om com		<u> </u>	
5. Int	ernal ga	ains (see	Table 5	and 5a):				or hot w	rater is fr		munity h	<u> </u>	
5. Int Metabo (66)m=	olic gain Jan 121.59	rins (see reb reb 121.59	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m=	olic gain Jan 121.59	rins (see	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun 121.59	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m= Lightin (67)m=	ernal gan Dlic gain Jan 121.59 g gains	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m=	ernal gain Jan 121.59 g gains 20.26	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reins (see Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 16 calcula 17 calcula 18	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	Apr 121.59 pendix 11.08 Appendix 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	and 5a tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal gard Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 and fair 3 s e.g. ev -97.27	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a) 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal gard Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 and fair 3 s e.g. ev -97.27	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a) 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatic	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 35.16	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatice gains (see less (Table Feb 121.59) (calcula 18 ins (calcula 35.16) as gains 3 aporatice 197.27 gains (Table Feb 121.59) gains (Table Feb 121.59) (calcula 35.16 ins gains 3	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 3 -97.27	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	x	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	X	0.63	X	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	X	0.63	x	0.7	=	8.78	(74)
South	0.9x	0.77	x	2.14	x	46.75	x	0.63	x	0.7	=	30.58	(78)
South	0.9x	0.77	X	2.14	x	76.57	X	0.63	X	0.7	=	50.08	(78)
South	0.9x	0.77	x	2.14	x	97.53	X	0.63	X	0.7	=	63.79	(78)
South	0.9x	0.77	x	2.14	x	110.23	X	0.63	x	0.7	=	72.09	(78)
South	0.9x	0.77	X	2.14	x	114.87	X	0.63	X	0.7	=	75.13	(78)
South	0.9x	0.77	x	2.14	x	110.55	X	0.63	X	0.7	=	72.3	(78)
South	0.9x	0.77	x	2.14	x	108.01	X	0.63	x	0.7	=	70.64	(78)
South	0.9x	0.77	x	2.14	x	104.89	X	0.63	X	0.7	=	68.6	(78)
South	0.9x	0.77	x	2.14	x	101.89	X	0.63	x	0.7	=	66.63	(78)
South	0.9x	0.77	x	2.14	x	82.59	X	0.63	X	0.7	=	54.01	(78)
South	0.9x	0.77	X	2.14	X	55.42	X	0.63	X	0.7	=	36.24	(78)
South	0.9x	0.77	x	2.14	x	40.4	x	0.63	x	0.7	=	26.42	(78)
West	0.9x	0.77	X	2.59	X	19.64	X	0.63	X	0.7	=	15.55	(80)
West	0.9x	0.77	x	0.86	X	19.64	x	0.63	x	0.7	=	5.16	(80)
West	0.9x	0.77	x	2.59	X	38.42	X	0.63	x	0.7	=	30.41	(80)
West	0.9x	0.77	x	0.86	X	38.42	x	0.63	X	0.7	=	10.1	(80)
West	0.9x	0.77	x	2.59	X	63.27	X	0.63	x	0.7	=	50.08	(80)
West	0.9x	0.77	x	0.86	X	63.27	X	0.63	X	0.7	=	16.63	(80)
West	0.9x	0.77	X	2.59	X	92.28	X	0.63	X	0.7	=	73.04	(80)
West	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(80)
West	0.9x	0.77	x	2.59	x	113.09	x	0.63	x	0.7	=	89.52	(80)
West	0.9x	0.77	x	0.86	x	113.09	x	0.63	x	0.7	=	29.72	(80)
West	0.9x	0.77	x	2.59	x	115.77	x	0.63	x	0.7	=	91.64	(80)
West	0.9x	0.77	x	0.86	x	115.77	X	0.63	X	0.7	=	30.43	(80)

West 0.9	0.7	7	x	2.5	0	x		10.22] x	0.63		x [0.7	_	_	87.24	(80)
West 0.9] ^] x	0.8		, ^ x	_	10.22	」^] _×	0.63	=	^ [x [0.7	\dashv	_	28.97	(80)
West 0.9] ^] x			_^ х	_		」^] _×		_	^ [x [ᅥ	_		(80)
West 0.9]]	2.5		, ^ x	_	4.68	」^]	0.63	_	_ L	0.7	ᅥ	_	74.94	(80)
West 0.9) X] ,,	0.8			_	4.68	1	0.63	_	х [., [0.7	=		24.88	=
West 0.9			X	2.5		X	_	3.59	」× 1、	0.63	_	x , [0.7	븜	=	58.25	(80)
West 0.9			X	0.8		X		3.59] X] ,,	0.63	_	x , [0.7	믬	=	19.34	(80)
			X	2.5		X	_	5.59] X]	0.63	=	х [0.7	\dashv	=	36.09	(80)
			X	0.8		X	_	5.59] X]	0.63	=	х [0.7	ᆗ	=	11.98	(80)
			X	2.5		X		4.49	X	0.63	_	X [0.7	픰	=	19.38	(80)
West 0.9			X	0.8		X		4.49	J X	0.63	_	X]	0.7	_	=	6.44	(80)
West 0.9			X	2.5		Х		6.15	」 X ¬	0.63	_	X [0.7	4	=	12.78	(80)
West 0.9		7	X	0.8		X		6.15	X	0.63		X [0.7	4	=	4.24	(80)
Rooflights 0.9			X	1.3	3	X	4	7.01	X	0.63		x [0.7	_	=	49.63	(82)
Rooflights 0.9			X	1.3	3	X		33.9	X	0.63		x	0.7	_	=	88.58	(82)
Rooflights 0.9			X	1.3	3	X	12	22.73	X	0.63		× [0.7		=	129.57	(82)
Rooflights 0.9			X	1.3	3	X	16	61.74	X	0.63		x [0.7		=	170.76	(82)
Rooflights 0.9			X	1.3	3	X	18	87.38	X	0.63		x [0.7		=	197.83	(82)
Rooflights 0.9			X	1.3	3	X	18	88.06	X	0.63		x	0.7		=	198.54	(82)
Rooflights 0.9			X	1.3	3	X	18	80.51	X	0.63		x [0.7		=	190.58	(82)
Rooflights 0.9)x 1		X	1.3	3	X	16	61.54	X	0.63		x [0.7		=	170.54	(82)
Rooflights 0.9)x 1		X	1.3	3	x	1	36.5	X	0.63		x [0.7		=	144.11	(82)
Rooflights 0.9)x 1		x	1.3	3	x	9	5.08	X	0.63		x [0.7		=	100.38	(82)
Rooflights 0.9)x 1		x	1.3	3	x	5	7.06	X	0.63		x	0.7		=	60.24	(82)
Rooflights 0.9)x 1		x	1.3	3	х	3	9.72	X	0.63		x [0.7		=	41.93	(82)
									_								
Solar gains									_	n = Sum(74)r						•	
(83)m= 111.4									397	.63 329.4	5 226	5.41	135.29	94.1	6		(83)
Total gains		and s	olar	(84)m =	: (73)n	า + (83)m	, watts									
(84)m= 494.4	41 579.67	660	.59	739.19	787.8	7	72.06	737.69	690	.57 634.1	5 553	3.53	488.04	466.	04		(84)
7. Mean in	ternal ten	nperat	ure (heating	seaso	n)											
Temperatu	ire during	heatir	ng pe	eriods ir	the li	ving	area f	from Tal	ble 9	, Th1 (°C)						21	(85)
Utilisation	factor for	gains	for li	ving are	ea, h1,	m (s	ee Ta	ble 9a)									_
Ja	n Feb	М	lar	Apr	Ma	/	Jun	Jul	А	ug Sep		Oct	Nov	De	ЭС		
(86)m= 1	0.99	0.9	98	0.95	0.87		0.7	0.53	0.5	0.83	0.	97	0.99	1			(86)
Mean inter	nal tempe	erature	e in li	iving are	ea T1	(follo	w ste	ps 3 to 7	7 in T	able 9c)						•	
(87)m= 19.7		20.	$\overline{}$	20.5	20.79	`	20.95	20.99	20.		20).5	20.04	19.6	69		(87)
Temperatu	ıro durina	hootii	20.00	oriode in	roct	of dva	(alling	from To	abla (Th2 (°C	<u> </u>						
(88)m= 19.9		19.		19.94	19.94	\neg	9.95	19.95	19.			.94	19.93	19.9	93		(88)
. ,	ļ					_!_				10.04	1 13		1 .5.55				(= =)
Utilisation		-				$\overline{}$	<u> </u>		T	10 0 70			1 0 00			1	(90)
(89)m= 1	0.99	0.9		0.93	0.82		0.61	0.41	0.4			96	0.99	1			(89)
Mean inter	Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)																

(90)m= 18.21	18.46	18.85	19.36	19.73	19.92	19.95	19.94	19.85	19.36	18.7	18.18		(90)
10.21	10.10	10.00	10.00	10.70	10.02	10.00	10.01			g area ÷ (4		0.23	(91)
										g aroa . (., –	0.23	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(92)
Apply adjustr	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(93)
8. Space hea	ıting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:				•				•		
(94)m= 1	0.99	0.97	0.93	0.82	0.63	0.44	0.49	0.77	0.95	0.99	1		(94)
Useful gains,	hmGm ,	W = (94	l)m x (84	4)m									
(95)m= 491.97	573.41	643.2	685.66	644.99	483.53	324.19	339.18	486.26	526.41	483.09	464.29		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8		•						
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1347.38	1308.62	1188.81	993.13	764.64	506.81	327.4	344.65	548.62	833.3	1106.17	1338.22		(97)
Space heating	g require	ement fo	r each n	nonth, k\	/Vh/mont	h = 0.02	24 x [(97)m – (95)m] x (4 ⁻	1)m			
98)m= 636.43	494.06	405.93	221.38	89.01	0	0	0	0	228.33	448.62	650.21		
											L		_
							Tota	l per year	(kWh/year) = Sum(9)	8) _{15,912} =	3173.97	(98)
Snace heatin	a require	ement in	k\\/h/m²	!/vear			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Space heatin	• ,			•					(kWh/year) = Sum(9	8)15,912 =	3173.97 40.48	(98)
9a. Energy red	quiremer			•	ystems i	ncluding			(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Pa. Energy red Space heating	quiremer ng:	nts – Indi	vidual h	eating sy					(kWh/year) = Sum(9	8) _{15,912} =	40.48	(99)
Space heating Fraction of sp	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system	micro-C	CHP)	(kWh/year) = Sum(9	8)15.912 =		(99)
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				1	i		1	(a.a.)	
` '	80.3 80.3	80.3	80.3	85.79	87.24	87.84		(217)	
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m									
` '	72.53 165.29	184.27	186.3	198.57	208.45	223.4			
	•	Tota	I = Sum(2	19a) ₁₁₂ =			2356.83	(219)	
Annual totals				k'	Wh/year	•	kWh/year	_	
Space heating fuel used, main system 1 3398.26									
Water heating fuel used 2356.83									
Electricity for pumps, fans and electric keep-hot									
central heating pump:						30		(230c)	
boiler with a fan-assisted flue									
Total electricity for the above, kWh/year sum of (230a)(230g) =									
Electricity for lighting 357.88 (232)									
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b)	=				6268.27	(338)	
12a. CO2 emissions – Individual heating systems	s including mi	icro-CHP)					_	
	Energy			Emiss	ion fac	tor	Emissions		
	kWh/year			kg CO	2/kWh		kg CO2/yea	ar	
Space heating (main system 1)	(211) x			0.2	16	=	734.02	(261)	
Space heating (secondary)	(215) x			0.5	19	=	0	(263)	
Water heating	(219) x			0.2	16	=	509.08	(264)	
Space and water heating	(261) + (262)	+ (263) + (264) =				1243.1	(265)	
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)	
Electricity for lighting	(232) x			0.5	19	=	185.74	(268)	
				((005)				_	
Total CO2, kg/year			sum c	of (265)(271) =		1467.76	(272)	

TER =

(273)

18.72

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Property Details: HOUSE D - FINAL

Dwelling type: Semi-detached House

Located in: England

Region: South East England

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters:

Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 534 (P1)

Transmission heat loss coefficient: 57.1

Summer heat loss coefficient: 591.1 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
North (W1-2 FRONT N)	0	1
West (W3 - SIDE E)	0	1
West (W4 - SIDE E)	0	1
South (W5 - REAR S)	0	1
South (RW1-2 REAR S)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North (W1-2 FRONT N)	0.98	1	1	0.98	(P8)
West (W3 - SIDE E)	0.98	1	1	0.98	(P8)
West (W4 - SIDE E)	0.98	1	1	0.98	(P8)
South (W5 - REAR S)	0.98	1	1	0.98	(P8)
South (RW1-2 REAR S)	0.98	1	1	0.98	(P8)

Solar gains:

Orientation		Area	Flux	g _	FF	Shading	Gains
North (W1-2 FRONT N)	1 x	3.24	86.66	0.63	0.8	0.98	125.45
West (W3 - SIDE E)	1 x	2.59	124.8	0.63	0.8	0.98	144.42
West (W4 - SIDE E)	1 x	0.86	124.8	0.63	0.8	0.98	47.95
South (W5 - REAR S)	1 x	2.14	118.4	0.63	0.8	0.98	113.21
	1 x	2.66	202.31	0.63	0.8	0.98	240.45
						Total	671.47 (P3/P4)

Internal gains:

	June	July	August
Internal gains	422.24	404.7	412.74
Total summer gains	1133.38	1076.17	1007.8 (P5)
Summer gain/loss ratio	1.92	1.82	1.7 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5

SAP 2012 Overheating Assessment

Thermal mass temperature increment 0.25 0.25

Threshold temperature 17.57 19.47 19.45 (P7)

Likelihood of high internal temperature Not significant Not significant

Assessment of likelihood of high internal temperature: Not significant

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.25 *Printed on 25 February 2021 at 14:04:40*

Project Information:

Assessed By: Jemma Mclaughlan (STRO030065) Building Type: Semi-detached House

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 78.4m²

Site Reference: WOODWELL Plot Reference: HOUSE E - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.72 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 9.66 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.0 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.17 (max. 0.25)	0.17 (max. 0.70)	OK
Roof	0.14 (max. 0.20)	0.14 (max. 0.35)	OK
Openings	1.38 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals
4.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Database: (rev 472, product index 017179):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal

Model: LOGIC CODE COMBI

Model qualifier: ES33

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

Cylinder insulation				
Hot water Storage:	No cylinder			
Controls				
Chara hasting controls	TTTC by plumbing and a	leatrical comices	OK	
Space heating controls Hot water controls:	TTZC by plumbing and el	ectrical services	OK	
Hot water controls.	•	No cylinder thermostat		
Boiler interlock:	No cylinder Yes		OK	
200	res		OK	
Low energy lights	d I	400.00/		
Percentage of fixed lights wi	th low-energy fittings	100.0%	-	
Minimum		75.0%	ОК	
Mechanical ventilation				
Not applicable				
Summertime temperature				
Overheating risk (South Eas	t England):	Not significant	OK	
ised on:				
Overshading:		Average or unknown		
Windows facing: North		3.24m²		
Windows facing: East		2.59m²		
Windows facing: East		0.86m²		
Windows facing: South		2.14m²		
Roof windows facing: South		2.66m²		
Ventilation rate:		8.00		
Blinds/curtains:		Dark-coloured curtain or roller	blind	
		Closed 10% of daylight hours		

Party Walls U-value

Photovoltaic array

0 W/m²K

Thermal Bridge Report

Property Details: HOUSE E - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England

Thermal bridges:

Thermal bridges: User-defined = UD

 $\begin{array}{l} \mathsf{Default} &= \mathsf{D} \\ \mathsf{Approved} &= \mathsf{A} \end{array}$

User-defined (individual PSI-values) Y-Value = 0.0583

External Junctions Details:

Junction Type	PSI-Value	Length	Reference	Туре
Other lintels (including other steel lintels)	0.05	6.44	E2	[UD]
Sill	0.04	2.7	E3	[A]
Jamb	0.05	20.7	E4	[A]
Ground floor (normal)	0.08	18.11	E5	[UD]
Intermediate floor within a dwelling	0.07	18.11	E6	[A]
Eaves (insulation at rafter level)	0.04	12.43	E11	[A]
Gable (insulation at rafter level)	0.04	18.49	E13	[A]
Corner (normal)	0.09	12.6	E16	[A]
Staggered party wall between dwellings	0.12	6.4	E25	[D]
Party Junctions Details:				
Ground floor	0.16	6.15	P1	[D]
Roof (insulation at rafter level)	0.08	8.98	P5	[D]
Roof Junctions Details:				
Head	0.08	2.95	R1	[D]
Sill	0.06	2.95	R2	[D]
Jamb	0.08	5.4	R3	[D]
Ridge (vaulted ceiling)	0.08	7.6	R4	[D]

SAP Input

Property Details: HOUSE E - FINAL

Address: Woodwell Cottage P2, Woodwell Road, BRISTOL, BS11 9XU

Located in: England

Region: South East England UPRN: 0125535868
Date of assessment: 24 February 2021
Date of certificate: 25 February 2021

Assessment type: New dwelling design stage

Transaction type: Marketed sale
Tenure type: Unknown
Related party disclosure: No related party
Thermal Mass Parameter: Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 472

Property description:

Dwelling type: House

Detachment: Semi-detached

Year Completed: 2021

Floor Location: Floor area:

Storey height:

Floor 0 39.2 m^2 2.6 m Floor 1 39.2 m^2 2.56 m

Living area: 18.35 m² (fraction 0.234)

Front of dwelling faces: North

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
FRONT DOOR	Manufacturer	Solid			Wood
W1-2 FRONT N	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W3 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W4 - SIDE E	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
W5 - REAR S	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	Wood
RW1-2 REAR S	Manufacturer	Roof Windows	low-E, $En = 0.05$, soft coat	Yes	Metal

Name:	Gap:	Frame F	actor: g-value:	U-value:	Area:	No. of Openings:	
FRONT DOOR	mm	8.0	0	1.4	2.07	1	
W1-2 FRONT N	16mm or more	8.0	0.63	1.4	1.62	2	
W3 - SIDE E	16mm or more	8.0	0.63	1.4	2.59	1	
W4 - SIDE E	16mm or more	8.0	0.63	1.4	0.86	1	
W5 - REAR S	16mm or more	0.8	0.63	1.4	2.14	1	
RW1-2 RFAR S	16mm or more	0.8	0.63	1.3	1.33	2	

Name:	Type-Name:	Location:	Orient:	Width:	Height:
FRONT DOOR		EXTERNAL WALLS	North	0	0
W1-2 FRONT N		EXTERNAL WALLS	North	0	0
W3 - SIDE E		EXTERNAL WALLS	East	0	0
W4 - SIDE E		EXTERNAL WALLS	East	0	0
W5 - REAR S		EXTERNAL WALLS	South	0	0
RW1-2 REAR S		ROOF	South	0.001	0

Overshading: Average or unknown

Opaque Elements

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:
External Element	<u>S</u>						
EXTERNAL WALLS	80.83	10.9	69.93	0.2	0	False	N/A
DORMER CHEEKS	2.12	0	2.12	0.2	0	False	N/A

SAP Input

 ROOF
 57.4
 2.66
 54.74
 0.14
 0
 N/A

 GROUND FLOOR
 39.2
 0.17
 N/A

 Internal Elements
 0.17
 N/A

Internal Elements
Party Elements

PARTY WALL 29.73

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0583

	Length	Psi-value		
	6.44	0.05	E2	Other lintels (including other steel lintels)
[Approved]	2.7	0.04	E3	Sill
[Approved]	20.7	0.05	E4	Jamb
	18.11	0.08	E5	Ground floor (normal)
[Approved]	18.11	0.07	E6	Intermediate floor within a dwelling
[Approved]	12.43	0.04	E11	Eaves (insulation at rafter level)
[Approved]	18.49	0.04	E13	Gable (insulation at rafter level)
[Approved]	12.6	0.09	E16	Corner (normal)
	6.4	0.12	E25	Staggered party wall between dwellings
	6.15	0.16	P1	Ground floor
	8.98	0.08	P5	Roof (insulation at rafter level)
	2.95	0.08	R1	Head
	2.95	0.06	R2	Sill
	5.4	0.08	R3	Jamb
	7.6	0.08	R4	Ridge (vaulted ceiling)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys: 0
Number of open flues: 0
Number of fans: 3
Number of passive stacks: 0
Number of sides sheltered: 1
Pressure test: 4

Main heating system

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 472, product index 017179) Efficiency: Winter 87.3 % Summer: 89.9

Has integral PFGHRD Brand name: Ideal

Model: LOGIC CODE COMBI Model qualifier: ES33 (Combi boiler) Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature >45°C

Open

Boiler interlock: Yes Delayed start

Main heating Control

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

SAP Input

Water heating

Water heating: From main heating system

Water code: 901 Fuel :mains gas No hot water cylinder

Flue Gas Heat Recovery System: Database (rev 472, product index)

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: Yes

Conservatory: No conservatory

Low energy lights: 100%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No

Photovoltaics: Photovoltaic 1

Installed Peak power: 1.36 Tilt of collector: 45°

Overshading: None or very little Collector Orientation: South

Assess Zero Carbon Home: No

		User Details:				
A NI	la grana Malayyahlan			OTDO	000005	
Assessor Name: Software Name:	Jemma Mclaughlan Stroma FSAP 2012	Stroma Nur Software V			030065 n: 1.0.5.25	
Software Name.		roperty Address: HOU		V C I SIO	11. 1.0.3.23	
Address :	Woodwell Cottage P2, Wood					
Overall dwelling dime	•	awen Road, Brilo i OE,	DOTT ONC			
		Area(m²)	Av. Height(m)	Volume(m³)	
Ground floor		39.2 (1a) x	2.6	(2a) =	101.92	(3a)
First floor		39.2 (1b) x	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r	78.4 (4)				_
Dwelling volume		(3a)+(3	3b)+(3c)+(3d)+(3e)+.	(3n) =	202.27	(5)
2. Ventilation rate:				L		
	main secondar heating heating	y other	total		m³ per houi	•
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent far	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fin	res		0	x 40 =	0	(7c)
				A: a.l.		-
Inditantian due to abiene	fl (60) (6b) (7	(a) ((7b) ((7a)		-	anges per ho	_
•	/s, flues and fans = (6a)+(6b)+(7 een carried out or is intended, proceed		30 from (9) to (16)	÷ (5) =	0.15	(8)
Number of storeys in th		· //	() ()	Г	0	(9)
Additional infiltration			[(9	9)-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber frame or	0.35 for masonry cons	struction	Ī	0	(11)
if both types of wall are pr deducting areas of openin	resent, use the value corresponding to	the greater wall area (after		•		_
= -	loor, enter 0.2 (unsealed) or 0.	.1 (sealed), else enter ()	[0	(12)
If no draught lobby, ent		, ,		Ì	0	(13)
Percentage of windows	and doors draught stripped			Ī	0	(14)
Window infiltration	5	0.25 - [0.2 x (14) -	- 100] =	Ì	0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	Ī	0	(16)
Air permeability value,	q50, expressed in cubic metre	s per hour per square	metre of envelop	e area	4	(17)
	ty value, then (18) = [(17) ÷ 20]+(8		·		0.35	(18)
Air permeability value applies	s if a pressurisation test has been don	ne or a degree air permeabili	ty is being used	L		
Number of sides sheltere	d				1	(19)
Shelter factor		(20) = 1 - [0.075 x]	(19)] =		0.92	(20)
Infiltration rate incorporat	ing shelter factor	(21) = (18) x (20) =	=		0.32	(21)
Infiltration rate modified for	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Ser	Oct Nov	Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4.3

4.5

4.7

(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18	
Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m	
0.41 0.4 0.39 0.35 0.35 0.31 0.31 0.3 0.32 0.35 0.36 0.38	7
Calculate effective air change rate for the applicable case If mechanical ventilation:	
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)	0 (23a) 0 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0 (23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) \times [1 – (23c)	
(24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0	(24a)
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)	
(24b)m= 0 0 0 0 0 0 0 0 0 0 0 0	(24b)
c) If whole house extract ventilation or positive input ventilation from outside if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b)m + 0.5 \times (23b)$	
(24c)m =	(24c)
d) If natural ventilation or whole house positive input ventilation from loft	_
if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$	_
(24d)m= 0.58 0.58 0.58 0.56 0.56 0.55 0.55 0.54 0.55 0.56 0.57 0.57	(24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)	_
(25)m= 0.58 0.58 0.58 0.56 0.56 0.55 0.55 0.54 0.55 0.56 0.57 0.57	(25)
3. Heat losses and heat loss parameter:	
ELEMENTGrossOpeningsNet AreaU-valueA X Uk-valuearea (m²)m²A ,m²W/m2K(W/K)kJ/m²	
Doors 2.07 x 1.4 = 2.898	
	(26)
Windows Type 1 1.62 $x^{1/[1/(1.4) + 0.04]} = 2.15$	(26) (27)
Windows Type 1	,
	(27)
Windows Type 2 2.59 $x^{1/[1/(1.4)+0.04]} = 3.43$	(27) (27)
Windows Type 2 $ 2.59 $	(27) (27) (27)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$	(27) (27) (27) (27)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$	(27) (27) (27) (27) (27b)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$ Floor 39.2 x 0.17 0.664	(27) (27) (27) (27) (27b) (28)
Windows Type 2 2.59 $x1/[1/(1.4) + 0.04] = 3.43$ Windows Type 3 0.86 $x1/[1/(1.4) + 0.04] = 1.14$ Windows Type 4 2.14 $x1/[1/(1.4) + 0.04] = 2.84$ Rooflights 1.33 $x1/[1/(1.3) + 0.04] = 1.729$ Floor 39.2 x 0.17 $=$ 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 $=$ 13.99	(27) (27) (27) (27) (27b) (28) (29)
Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4)+0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3)+0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type2 2.12 0 2.12 x 0.2 = 0.42	(27) (27) (27) (27) (27b) (28) (29) (29)
Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4)+0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3)+0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66	(27) (27) (27) (27) (27b) (28) (29) (29) (30)
Windows Type 2 2.59 x1/[1/(1.4) + 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4) + 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4) + 0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3) + 0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66 Total area of elements, m² 179.55 Party wall 29.73 x 0 = 0 0 * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31)
Windows Type 2 2.59 x1/[1/(1.4) + 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4) + 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4) + 0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3) + 0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type 1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type 2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66 Total area of elements, m² 179.55 Party wall 29.73 x 0 = 0 * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragra, include the areas on both sides of internal walls and partitions	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32)
Windows Type 2 Windows Type 3 Windows Type 4 Rooflights 1.33 X1/[1/(1.4)+0.04] = 1.14 Walls Type 1 80.83 10.9 69.93 Walls Type 2 2.12 0 2.12 0 2.12 0 2.12 0 2.12 0 2.12 0 1.729 Walls Type 2 1.729 Total area of elements, m² Party wall *for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragragum in class of internal walls and partitions Fabric heat loss, W/K = S (A x U) *1/[1/(1.4)+0.04] = 3.43 *X1/[1/(1.4)+0.04] = 1.14 *X1/[1/(1.4)+0.04] = 2.84 *X1/[1/(1.4)+0.04] = 1.729 *1.729 **Include the areas on both sides of internal walls and partitions **Construction*	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32) oh 3.2
Windows Type 2 2.59 x1/[1/(1.4) + 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4) + 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4) + 0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3) + 0.04] = 1.729 Floor 39.2 x 0.17 = 6.664 Walls Type 1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type 2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66 Total area of elements, m² 179.55 Party wall 29.73 x 0 = 0 * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragra, include the areas on both sides of internal walls and partitions	(27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32) (32) (33)

an be us							<i>Z</i>							(36
	Ū	,	,		using Ap	•							10.48	(50
	of therma Ibric hea		are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			F7.4	(37
			alculated	l monthly	A.					, ,	25)m x (5)		57.1	(37
Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
38)m=	39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38
Ĺ	enefer o	coefficier	nt M/K				!	!	(39)m	= (37) + (37)	1	<u> </u>	l	
39)m= [96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Ĺ							!	!	,	Average =	Sum(39) ₁ .	₁₂ /12=	94.67	(39
leat lo	ss para	meter (F	ILP), W/	m²K					(40)m	= (39)m ÷	(4)			
10)m=	1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		— .
lumbe	r of day	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.21	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
11)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
I. Wat	ter heat	ing ener	gy requi	rement:								kWh/y	ear:	
ssume	ed occu	nancy I	NI.										1	(4
if TF	۹ > 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43	l	(4
if TF/ if TF/ nnual	A > 13.9 A £ 13.9 averag	9, N = 1 9, N = 1 e hot wa	+ 1.76 x ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.96		•
if TFA if TFA nnual educe t	A > 13.9 A £ 13.9 averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed		+ 36		9)			(4:
if TFA if TFA nnual educe t	A > 13.9 A £ 13.9 averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)			•
if TFA if TFA nnual educe to ot more	A > 13.9 A £ 13.9 averag the annua that 125	P, N = 1 P, N = 1 P hot was Al average Stress per p Feb	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		,
if TFA if TFA nnual educe to tot more fot water	A > 13.9 A £ 13.9 averag the annua that 125	P, N = 1 P, N = 1 P hot was Al average Stress per p Feb	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		,
if TFA if TFA nnual educe to ot more ot water 4)m=	A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 82.76	(25 x N) to achieve Aug	+ 36 a water us Sep 90.12	Oct 93.79 Fotal = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(4
if TFA if TFA nnual educe to ot more ot water 4)m= [nergy co	A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir 101.15	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed Id) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Fotal = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(4
if TFA if TFA innual Reduce to ot more [dot water 44)m= [A > 13.9 A £ 13.9 averag the annua that 125 Jan r usage ir	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - cale	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76	erage = designed ld) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mon 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15	1103.46	(4-
if TFA if TFA innual Reduce to ot more flot water inergy co	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the dater use, has $Vd,m = factorized$ 86.44 $to onthly = 4$.	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r	erage = designed ld) Jul Table 1c x 82.76 m x nm x L 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15		•
if TFA if TFA nnual educe to the more of water 4)m= nergy co instanta 6)m=	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the dater use, has $Vd,m = factorized$ 86.44 $to onthly = 4$.	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r	erage = designed ld) Jul Table 1c x 82.76 m x nm x L 90.56	(25 x N) to achieve Aug (43) 86.44 27m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/more 105.16	Oct 93.79 Fotal = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15		(4
if TFA if TFA nnual educe to ot more of water (4)m= [nergy co instanta (6)m= [Vater s	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
if TFA if TFA nnual educe to ot more ot water 4)m= [nergy co instanta 6)m= [Jater s torage	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av welling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed Id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
if TFA if TFA nnual educe to the more of water 4)m= finergy co instanta 6)m= /ater s torage comm	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calce 135.38 ng at point 20.31 including and no talce 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw	es per da 5% if the d vater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 IWHRS	erage = designed ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) Nov 97.47 m(44) ₁₁₂ = 20.07	.96 Dec 101.15		(4
if TFA if TFA nnual educe to ot more ot water 4)m= [hergy or 5)m= [Jater s torage comm therwite	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calce 135.38 ng at point 20.31 including and no talce 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw	es per da 5% if the d vater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 IWHRS	erage = designed ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) Nov 97.47 m(44) ₁₁₂ = 20.07	.96 Dec 101.15		(4)
if TFA if TFA innual reduce to the otherwice the interest of t	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calcal 135.38 and at point 20.31 including and no tal hot water water series are series at the content of the co	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw er (this in	es per da 5% if the d vater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15		(4 (4 (4
if TFA if TFA nnual educe to ot more (4)m= (5)m= (instanta) (ater s torage comm otherwi /ater s a) If ma	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufacti	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calcal 135.38 and at point 20.31 including and no tal hot water water series are series at the content of the co	Apr Apr Ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in	es per da 5% if the d vater use, f May Vd,m = fac 86.44 2011 13.25 20 hot water 16.99 Dolar or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed Id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4 (4 (4 (4
if TFA if TFA if TFA nnual educe to ot more (4)m= (5)m= (5)m= (7ater sectorage commontherwither	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum hunity h ise if no storage anufaction rature fallost fro	P, N = 1 P,	+ 1.76 x ater usage hot water person per day for early so and so	Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Collar or W velling, e acludes in por is knowear	ay Vd,av fwelling is foot and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed ild) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within said (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4)
if TFA if TFA if TFA nnual educe to the more (a) the mergy of the mergy of the mergy of the mergy	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufact rature fa lost fro anufact	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31 including and no talce hot water eclared left marge eclared of the storage eclare	ge in litre usage by day (all w Apr ach month 90.12 culated mo 17.7 ag any so ank in dw er (this in coss facto 2b , kWh/ye cylinder l	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor coss factor	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0 0 0		(4) (4) (4) (4) (5)
if TFA if TFA if TFA nnual educe to the more of water 4)m= [nergy color to the more to the recommendate of the more a) If may emperimently of the more to the more to the more to the more a) If may emperimently of the more to the mo	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage in 101.15 ontent of 150 aneous w 22.5 storage e volum nunity h ise if no storage anufaction rature fa lost fro anufaction ter storage	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31 including and no talce hot water eclared left marge eclared of the storage eclare	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Collar or W velling, e acludes in por is knowear	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(4 (4 (4 (4 (4 (5
if TFA if TFA innual leduce to ot more lot water laym= [linergy column lisym= [lotwater s lotwa	A > 13.9 A £ 13.9 averag the annual that 125 Jan r usage ir 101.15 ontent of 150 aneous w 22.5 storage e volum hunity h ise if no storage anufaction rature fa lost fro anufaction anufaction ter storage hunity h	P, N = 1 P,	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 and at point 20.31 including and no talc hot water eclared less storage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor coss factor	ay Vd,av welling is not and co	erage = designed old) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47) pmbi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 Sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0 0 0		(4

Energy	y lost fro	m watei	· storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0]	(54)
Enter	(50) or	(54) in (5	55)									0]	(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0]	(58)
Primar	y circuit	loss cal	culated	for each	month ((59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m						
(61)m=	12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add a	dditiona	I lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0		(63) (G2)
Output	t from w	ater hea	ter											
(64)m=	162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
								Outp	out from w	ater heate	r (annual)	l12	1595.65	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
inclu	ide (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	e Table 5	and 5a):									
Metab	olic gair	ıs (Table	e 5), Wat	ts										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	145.91	1	(66)
Lightin	g gains	(calcula	ted in A	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5	•	•	•	•	
(67)m=	48.45	43.03	35	26.5	19.81	16.72	18.07	23.48	31.52	40.02	46.71	49.8]	(67)
Applia	nces ga	ins (calc	ulated ir	n Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5		•	•	
(68)m=	322.48	325.83	317.4	299.44	276.78	255.48	241.26	237.91	246.34	264.29	286.96	308.25]	(68)
Cookir	ng gains	(calcula	ted in A	ppendix	L, equa	tion L15	or L15a), also se	e Table	5			•	
(69)m=	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02	52.02]	(69)
Pumps	and fa	ns gains	(Table :	 5а)		•					<u>I</u>			
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3]	(70)
Losses	s e.g. ev	aporatio	n (nega	tive valu	es) (Tab	ole 5)	!	!		!	<u>I</u>	!	ı	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
	heating	gains (1	able 5)	<u> </u>	<u> </u>	1	<u> </u>	<u> </u>		<u> </u>	ı	1	ı	
(72)m=	71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17]	(72)
		gains =		I	I	ļ	<u> </u>	n + (68)m -		<u> </u>		ļ	J	
(73)m=	545.88	541.68	520.8	488.35	455.11	425.24	407.7	415.74	434.33	466.99	503.35	530.88]	(73)
• •	<u> </u>	L	L	L	L	L	L	L	L	L	L	<u> </u>	J	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientati	on:	Access Factor Table 6d	7	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	1	X	1.62	x	10.63	x	0.63	x	0.8	=	15.63	(74)
North	0.9x	1	X	1.62	x	20.32	х	0.63	X	0.8	=	29.86	(74)
North	0.9x	1	X	1.62	x	34.53	X	0.63	X	0.8	=	50.75	(74)
North	0.9x	1	X	1.62	x	55.46	x	0.63	x	0.8	=	81.51	(74)
North	0.9x	1	X	1.62	x	74.72	x	0.63	x	0.8	=	109.81	(74)
North	0.9x	1	x	1.62	x	79.99	x	0.63	x	0.8	=	117.55	(74)
North	0.9x	1	x	1.62	x	74.68	x	0.63	x	0.8	=	109.75	(74)
North	0.9x	1	x	1.62	x	59.25	x	0.63	x	0.8	=	87.07	(74)
North	0.9x	1	x	1.62	x	41.52	x	0.63	x	0.8	=	61.02	(74)
North	0.9x	1	x	1.62	x	24.19	x	0.63	x	0.8	=	35.55	(74)
North	0.9x	1	x	1.62	x	13.12	x	0.63	x	0.8	=	19.28	(74)
North	0.9x	1	x	1.62	x	8.86	x	0.63	x	0.8	=	13.03	(74)
East	0.9x	1	x	2.59	x	19.64	x	0.63	x	0.8	=	23.07	(76)
East	0.9x	1	x	0.86	x	19.64	x	0.63	X	0.8	=	7.66	(76)
East	0.9x	1	x	2.59	x	38.42	x	0.63	x	0.8	=	45.14	(76)
East	0.9x	1	x	0.86	x	38.42	x	0.63	x	0.8	=	14.99	(76)
East	0.9x	1	X	2.59	x	63.27	x	0.63	X	0.8	=	74.33	(76)
East	0.9x	1	X	0.86	x	63.27	x	0.63	X	0.8	=	24.68	(76)
East	0.9x	1	x	2.59	x	92.28	x	0.63	x	0.8	=	108.41	(76)
East	0.9x	1	X	0.86	x	92.28	x	0.63	X	0.8	=	36	(76)
East	0.9x	1	X	2.59	x	113.09	x	0.63	X	0.8	=	132.86	(76)
East	0.9x	1	X	0.86	x	113.09	x	0.63	X	0.8	=	44.12	(76)
East	0.9x	1	X	2.59	X	115.77	X	0.63	X	0.8	=	136.01	(76)
East	0.9x	1	X	0.86	x	115.77	x	0.63	X	0.8	=	45.16	(76)
East	0.9x	1	X	2.59	x	110.22	X	0.63	X	0.8	=	129.49	(76)
East	0.9x	1	X	0.86	x	110.22	X	0.63	X	0.8	=	43	(76)
East	0.9x	1	X	2.59	x	94.68	x	0.63	X	0.8	=	111.23	(76)
East	0.9x	1	X	0.86	x	94.68	x	0.63	X	0.8	=	36.93	(76)
East	0.9x	1	X	2.59	x	73.59	X	0.63	X	0.8	=	86.45	(76)
East	0.9x	1	X	0.86	x	73.59	x	0.63	X	0.8	=	28.71	(76)
East	0.9x	1	X	2.59	x	45.59	X	0.63	X	0.8	=	53.56	(76)
East	0.9x	1	X	0.86	x	45.59	X	0.63	X	0.8	=	17.78	(76)
East	0.9x	1	X	2.59	x	24.49	x	0.63	x	0.8	=	28.77	(76)
East	0.9x	1	X	0.86	x	24.49	x	0.63	x	0.8	=	9.55	(76)
East	0.9x	1	X	2.59	x	16.15	x	0.63	x	0.8	=	18.97	(76)
East	0.9x	1	X	0.86	X	16.15	X	0.63	X	0.8	=	6.3	(76)

South 0.9x	1		x	2.14		X	4	6.75] _x	0.63		x	0.8	一.	. Г	45.38	(78)
South 0.9x		\equiv	X	2.14	_	x		6.57] ^] _X	0.63	\dashv	X	0.8	=	┇┝	74.32	(78)
South 0.9x			X	2.14		x		7.53] ^] _x	0.63	\exists	x	0.8	=	.	94.68	(78)
South 0.9x		\equiv	X	2.14	〓	x		0.23] ^] _X	0.63	\dashv	X	0.8	=	┇┝	107.01	(78)
South 0.9x		=	X	2.14	一	x		4.87] ^] _X	0.63	퓜	X	0.8	=	┇┝	111.51	(78)
South 0.9x			X	2.14	_	x		0.55] ^] _x	0.63	\dashv	x	0.8	=	.	107.31	(78)
South 0.9x			X	2.14	\dashv	x		0.00] ^] _X	0.63	\dashv	X	0.8	=	┇┝	104.85	(78)
South 0.9x			X	2.14	_	x)4.89] x	0.63	=	X	0.8	=	┇┝	101.82	(78)
South 0.9x			x	2.14		X)1.89]]	0.63	=	X	0.8	=	┇┝	98.9	(78)
South 0.9x		一	x	2.14	一	X		2.59]]	0.63	一	X	0.8	=	┇	80.17	」、 / (78)
South 0.9x	1		x	2.14		X		5.42	X	0.63	=	X	0.8	╡.	┇	53.79	(78)
South 0.9x			x	2.14		X		0.4	X	0.63	=	х	0.8	= =	. ř	39.21	(78)
Rooflights 0.9x	1		x	1.33		X	4	7.01) x	0.63		х	0.8	╡.	<u> </u>	56.72	(82)
Rooflights 0.9x	1		x	1.33		X		33.9	X	0.63	一	X	0.8		. F	101.23	(82)
Rooflights 0.9x	1		x	1.33		X	12	22.73	X	0.63	一	х	0.8	=	. T	148.08	(82)
Rooflights 0.9x	1		x	1.33		X	16	61.74	X	0.63		X	0.8	一 .	. T	195.15	(82)
Rooflights 0.9x	1		x	1.33		X	18	37.38	x	0.63		X	0.8	〓.	- Ē	226.09	(82)
Rooflights 0.9x	1		x	1.33		x	18	38.06	x	0.63		x	0.8		- [226.91	(82)
Rooflights 0.9x	1		x	1.33	一	x	18	30.51	x	0.63	一	x	0.8		- Ī	217.8	(82)
Rooflights 0.9x	1		x	1.33		X	16	61.54	x	0.63		X	0.8	<u> </u>	- Ī	194.91	(82)
Rooflights 0.9x	1		x	1.33		X	1:	36.5	x	0.63		x	0.8	-	• Ī	164.7	(82)
Rooflights 0.9x	1		x	1.33		X	9:	5.08	x	0.63		x	0.8	=	- Ī	114.72	(82)
Rooflights 0.9x	1		x	1.33		X	5	7.06	x	0.63		x	0.8		• [68.85	(82)
Rooflights 0.9x	1		x	1.33		X	3	9.72	x	0.63		X	0.8		- [47.92	(82)
Solar gains in		ı				1			r i	n = Sum(74)m	T		_		_		(00)
(83)m= 148.47 Total gains –					24.38		32.94	604.88	531	.96 439.78	3 30)1.78	180.24	125.4	4		(83)
(84)m= 694.35	-	913.		1016.43		<u> </u>			947	7.7 874.11	1 76	88.77	683.59	656.3	2		(84)
,							,50.10	1012.30	J 347	074.11	' '		000.00	000.0			(0.)
7. Mean inte			· ·	Ť			oroo f	rom Tok	olo O	Th4 (9C)					г	04	7(05)
Utilisation fa	ŭ		٠.			·			JIE 9	, IIII (C)					L	21	(85)
Jan	Feb	Ma	$\overline{}$	Apr	May	Ť	Jun	Jul	Α	ug Sep	<u>, </u>	Oct	Nov	Dec			
(86)m= 0.99	0.98	0.9	$\overline{}$		0.73	+	0.55	0.4	0.4		+).91	0.98	0.99	\dashv		(86)
	al tompor	oturo.	in li	ving area	T1 /f	مالہ	w stor	oc 2 to 7	L 7 in T	able (le)					_		
Mean internation (87)m= 19.92	20.11	20.3	$\overline{}$		20.9	$\overline{}$	0.98	21	20.		20	0.67	20.23	19.88			(87)
. ,		<u> </u>		ļ											_		` ,
Temperature (88)m= 19.9	19.9	19.9			19.92	_	9.92	19.92	19.		$\overline{}$	9.92	19.91	19.91	\neg		(88)
		<u> </u>		ļ						10.02		J.UL	1 .0.01	70.01			()
Utilisation fa	ctor for g	ains f 0.93	-		elling, 0.67	$\overline{}$	m (se	e Table 0.31	9a) 0.3	35 0.6	T ^	0.88	0.97	0.99	\neg		(89)
, ,				!									0.97	0.55			(00)
Mean interna	al temper	ature	in th	ne rest of	dwell	ing	T2 (fc	ollow ste	eps 3	to 7 in Tal	ble 9	C)					

									ı —	i		1	
(90)m= 18.49	18.77	19.16	19.58	19.83	19.91	19.92	19.92	19.88	19.56	18.96	18.44		(90)
								f	LA = Livin	g area ÷ (4	4) =	0.23	(91)
Mean_interna	al temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.82	19.08	19.45	19.84	20.08	20.16	20.17	20.17	20.13	19.82	19.25	18.78		(92)
Apply adjust	ment to t	ne mean	interna	temper	ature fro	m Table	4e, whe	re appro	opriate			1	
(93)m= 18.67	18.93	19.3	19.69	19.93	20.01	20.02	20.02	19.98	19.67	19.1	18.63		(93)
8. Space he	ating requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa				iviay	Odii	Oui	l //ug	СОР		1101	200		
(94)m= 0.98	0.96	0.92	0.83	0.67	0.47	0.32	0.36	0.61	0.87	0.96	0.98		(94)
Useful gains	, hmGm	W = (94)	1)m x (84	L 4)m			l	<u> </u>					
(95)m= 681.18	1	843.63	844.46	725.3	499.3	319.77	337.28	529.06	669.23	659.06	646.38		(95)
Monthly ave	rage exte	rnal tem	perature	from Ta	able 8				<u>I</u>	<u>I</u>			
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for mea	an intern	al tempe	erature, l	Lm , W =	=[(39)m	x [(93)m	– (96)m]			l	
(97)m= 1381.46	1345.57	1224.39	1021.91	777.3	506.67	320.58	338.71	552.48	857	1138.76	1374.21		(97)
Space heati	ng require	ement fo	r each n	nonth, k\	Wh/mon	h = 0.02	24 x [(97)m – (95)m] x (4	1)m		l.	
(98)m= 521.01	381.62	283.28	127.76	38.69	0	0	0	0	139.7	345.38	541.5		
												0070.04	┓
		-					Tota	l per year	(kWh/yeai) = Sum(9)	8) _{15,912} =	2378.94	(98)
Space heati	ng require	ement in	kWh/m²	²/year			Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	30.34	(98)
Space heati	<u> </u>			•	vstems i	ncluding			(kWh/yeaı) = Sum(9	8)15,912 =		╡``
9a. Energy re	quiremer			•	ystems i	ncluding			(kWh/yeaı) = Sum(9	8) _{15,912} =		╡``
·	quiremer	nts – Indi	vidual h	eating sy			micro-C		(kWh/yeaı	') = Sum(9	8) _{15,912} =		(99)
9a. Energy re Space heat Fraction of s	quiremer ng: pace hea	nts – Indi	vidual h	eating sy		system	micro-C	CHP)	(kWh/yeai) = Sum(9	8)15,912 =	30.34	(99)
9a. Energy re Space heat Fraction of s Fraction of s	quiremer ng: pace hea pace hea	nts – Indi at from se at from m	vidual h econdary	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15,912 =	30.34	(201)
9a. Energy re Space heat Fraction of s Fraction of to	quiremer ng: pace hea pace hea otal heati	nts - Indi	ividual h econdary nain syst main sys	eating sy y/supple em(s) stem 1		system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	30.34 0 1	(99) (201) (202) (204)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of	quirement ng: pace heat pace heat total heat in main spa	nts – Indi at from se at from m ag from a ace heati	vidual hecondary nain systemain syst	eating sy y/supple em(s) stem 1	mentary	system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	30.34 0 1 1 89.9	(99) (201) (202) (204) (206)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of	quirement ng: pace heat pace heat total heat in main space seconda	nts – Indi	econdary nain systemain systemain systemain systematory	eating sy y/supple em(s) stem 1 em 1 y heating	mentary	system	(202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan	quirement ng: pace heat pace heat otal heat main space seconda	nts – Indi at from so at from m ng from a ace heati ry/supplo	vidual hecondary nain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1	CHP) - (201) =		Nov	Dec	30.34 0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require	nts - Indi	econdary nain systemain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system n, % Jul	(202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =	Nov	Dec	0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from set from many from mace heating ry/supplement (co. 283.28	econdary nain systemain systematar Apr alculatee	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system	(202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from so at from m ace heati ry/supple Mar ement (c 283.28	econdary nain systemain systemater Apr alculater 127.76 00 ÷ (20	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2	CHP) - (201) = 02) × [1 -	(203)] = Oct	Nov 345.38	Dec 541.5	0 1 1 89.9	(99) (201) (202) (204) (206) (208)
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from set from many from mace heating ry/supplement (co. 283.28	econdary nain systemain systematar Apr nalculatee	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system n, % Jul	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heat Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01	quirement ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62	at from so at from m ace heati ry/supple Mar ement (c 283.28	econdary nain systemain systemater Apr alculater 127.76 00 ÷ (20	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54]	quirement ng: pace heat pa	at from set from many from many from many from many from many from many from many from many from ment (company from ment (company from ment (company from ment from me	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug	CHP) - (201) = 02) × [1 -	(203)] = Oct 139.7	Nov 345.38 384.18	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Jan Space heati 521.01 (211)m = {[(9) 579.54} Space heati = {[(98)m x (2)	quiremer ng: pace hea pace hea patal heatil main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1	nts - Indicate from some set from many from the set of	econdary nain systemain systematar Apr nalculater 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0	(203)] = Oct 139.7 155.4 ar) =Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54]	quirement ng: pace heat pa	at from set from many from many from many from many from many from many from many from many from ment (company from ment (company from ment (company from ment from me	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54} Space heati = {[(98)m x (2) (215)m= 0	quiremer ng: pace hea pace hea patal heatil main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1	nts - Indicate from some set from many from the set of	econdary nain systemain systematar Apr nalculater 127.76 00 ÷ (20 142.12	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of s Fraction of to Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54 Space heati = {[(98)m x (2) (215)m=0	quirement ng: pace heat pa	t from set from many from	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/8) 0	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 month	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy re Space heati Fraction of s Fraction of s Fraction of te Efficiency of Efficiency of Space heati 521.01 (211)m = {[(9) 579.54 Space heati = {[(98)m x (2) (215)m= 0 Water heating	quiremer ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1 0 g vater hea	trom so that from many from the many from th	econdary nain systemain systematra Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/ 8) 0	eating sylvy/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 emonth 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012} 0 215) _{15,1012}	Dec 541.5	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear
9a. Energy respectively space heating fraction of some services of the energy of the e	quiremer ng: pace hea pace hea patal heatin main spa seconda Feb ng require 381.62 3)m x (20 424.49 ng fuel (s 01)] } x 1 0 g vater hea 142.61	ter (calce	econdary nain systemain systemain systementar Apr alculated 127.76 00 ÷ (20 142.12 y), kWh/8) 0	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 38.69 06) 43.04 month	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 · (204) = (2 Aug 0 Tota	CHP) - (201) = 02) × [1 - Sep 0 I (kWh/yea	(203)] = Oct 139.7 155.4 ar) = Sum(2	Nov 345.38 384.18 211) _{15,1012}	Dec 541.5 602.34 =	0 1 1 89.9 0 kWh/ye	(99) (201) (202) (204) (206) (208) ear

(217)m= 89.27 89.18 88.99 88.57 87.9	87.3 87.3	87.3 8	7.3 88.6	89.11	89.3		(217)
Fuel for water heating, kWh/month							
(219) m = (64) m x $100 \div (217)$ m (219)m = 182.2 159.92 166.33 147.07 143.22	125.96 118.21	133.51 13	4.47 152.58	163.85	176.83	1	
	<u> </u>	Total = S	um(219a) ₁₁₂ =	<u>-</u> !	<u>!</u>	1804.16	(219)
Annual totals			ı	(Wh/yea	r	kWh/year	⊿ -
Space heating fuel used, main system 1						2646.21	
Water heating fuel used						1804.16	
Electricity for pumps, fans and electric keep-hot							
central heating pump:					30		(230c)
boiler with a fan-assisted flue					45]	(230e)
Total electricity for the above, kWh/year		sum of (2	230a)(230g)	=		75	(231)
Electricity for lighting						342.26	(232)
Electricity generated by PVs						-1162.06	(233)
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b) =				3792.88	(338)
10a. Fuel costs - individual heating systems:							
	Fuel		Fuel	Price		Fuel Cost	
	kWh/year		(Table			£/year	
Space heating - main system 1	(211) x		3	48	x 0.01 =	92.09	(240)
Space heating - main system 2	(213) x			0	x 0.01 =	0	(241)
Space heating - secondary	(215) x		13	3.19	x 0.01 =	0	(242)
Water heating cost (other fuel)	(219)		3.	.48	x 0.01 =	62.78	(247)
Pumps, fans and electric keep-hot	(231)		13	3.19	x 0.01 =	9.89	(249)
(if off-peak tariff, list each of (230a) to (230g) sep Energy for lighting	arately as app	licable and a			rding to x 0.01 =	Table 12a 45.14	(250)
Additional standing charges (Table 12)						120	(251)
	one of (233) to	o (235) x)	13	3.19	x 0.01 =	-153.28	」 【(252)
Appendix Q items: repeat lines (253) and (254) a		, , ,	10	5.19		-133.26	
	3 (166666) 37) + (250)(254)	=				176.63	(255)
11a. SAP rating - individual heating systems							
Energy cost deflator (Table 12)						0.42	(256)
, ,	(56)] ÷ [(4) + 45.0]	=				0.6	(257)
SAP rating (Section 12)						91.61	(258)
12a. CO2 emissions – Individual heating system	ns includina mi	cro-CHP				31.01	
			- !	-la (-	40	Fuelester	
	Energy kWh/year			sion fac 02/kWh	tor	Emissions kg CO2/yea	
Space heating (main system 1)	(211) x			216	=	571.58	(261)
	. ,		0	-10		371.00	_(_01)

Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	389.7	(264)
Space and water heating	(261) + (262) + (263) + (264) =			961.28	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	177.63	(268)
Energy saving/generation technologies Item 1		0.519	=	-603.11	(269)
Total CO2, kg/year	sum	of (265)(271) =		574.73	(272)
CO2 emissions per m²	(272	2) ÷ (4) =		7.33	(273)
El rating (section 14)				94	(274)

13a. Primary Energy

	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	3228.38 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22	2201.08 (264)
Space and water heating	(261) + (262) + (263) + (264) =		5429.46 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	1050.75 (268)
Energy saving/generation technologies			
Item 1		3.07	-3567.53 (269)
'Total Primary Energy	sum	of (265)(271) =	3142.93 (272)
Primary energy kWh/m²/year	(272	2) ÷ (4) =	40.09 (273)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU				
Address :	Woodwell Cottage P2, Woo	odwell Road, BRISTOL,	BS11 9XU			
1. Overall dwelling dime	ensions:					
Ground floor		Area(m²) 39.2 (1a) x	Av. Height(n	n) (2a) = [Volume(m³)) (3a)
First floor						
	-	39.2 (1b) x	2.56	(2b) =	100.35	(3b)
·	a)+(1b)+(1c)+(1d)+(1e)+(1	,,		_		_
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:	main accorde	adh an	total			_
	main seconda heating heating	ry other	total	_	m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
					_	_
				Air ch	anges per ho	ur —
•	ys, flues and fans = $(6a)+(6b)+(6b)+(6a)$		30	÷ (5) =	0.15	(8)
Number of storeys in the	een carried out or is intended, proced ne dwelling (ns)	ea to (17), otherwise continue	rrom (9) to (16)	Г	0	(9)
Additional infiltration	ic aweiling (115)		ſ	(9)-1]x0.1 =	0	(10)
	.25 for steel or timber frame o	or 0.35 for masonry cons		[0	(11)
	resent, use the value corresponding t	•		L	<u> </u>	」 ` ′
	loor, enter 0.2 (unsealed) or 0	0.1 (sealed), else enter	0		0	(12)
If no draught lobby, en	ter 0.05, else enter 0				0	(13)
Percentage of windows	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14) -	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) +	(12) + (13) + (15) =	•	0	(16)
Air permeability value,	q50, expressed in cubic metr	es per hour per square	metre of envelo	pe area	5	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] +$	(8), otherwise $(18) = (16)$			0.4	(18)
Air permeability value applie	s if a pressurisation test has been do	one or a degree air permeabili	ty is being used	_		_
Number of sides sheltere	ed	(00) 4 50 075	(40)3	-	1	(19)
Shelter factor		$(20) = 1 - [0.075 \times$			0.92	(20)
Infiltration rate incorporat		$(21) = (18) \times (20)$	=		0.37	(21)
Infiltration rate modified f	or monthly wind speed	, , , , , , , , , , , , , , , , , , , 	, , , , , , , , , , , , , , , , , , , 			
Jan Feb	Mar Apr May Jun	Jul Aug Ser	Oct No	v Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infilt	tration rat	e (allowi	ng for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		•	rate for t	he appli	cable ca	se	!					· 	(00-)
If exhaust air			andiv N (2	23h) - (23a	a) v Emy (6	aguation (N	NSN othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balance		-	-	_					2h\m + (23h) v [1 _ (23c)	0 ± 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)		l	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	/e input v	ventilatio	n from (outside	l			ı	
if (22b)	m < 0.5 >	< (23b), t	hen (24	c) = (23k	o); other	wise (24	c) = (22l	b) m + 0.	5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura				•	•				0.51				
(24d)m= 0.61	m = 1, th 0.61	en (24a) 0.6	m = (22)	0.58	0.56	4a)m = 0.56	0.5 + [(2)]	0.57	0.5]	0.59	0.59	Ī	(24d)
Effective ai		ļ			ļ	<u> </u>			0.36	0.59	0.59		(244)
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(25)
` ′					l	l							
0 1141													
3. Heat loss		·			Not Ar	00	Hyal		A V I I		le volue		A V I ₂
3. Heat loss ELEMENT	es and he Gros area	SS	oaramet Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
	Gros	SS	Openin	ıgs									
ELEMENT	Gros area	SS	Openin	ıgs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area oe 1	SS	Openin	ıgs	A ,r	m ² x x x 1.	W/m2	2K = [- 0.04] = [(W/ 2.07				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area oe 1 oe 2	SS	Openin	ıgs	A ,r 2.07	m² x x1. x1.	W/m2 1 /[1/(1.4)+		2.07 2.15				kJ/K (26) (27)
Doors Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ & 0.04] = [\\ & 0.04] = [\\ & 0.04] = [\\ \end{array} $	2.07 2.15 3.43				kJ/K (26) (27) (27)
Doors Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{c} 2K \\ \hline \\ -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $ $ \begin{array}{c} -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $	2.07 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3	SS	Openin	ıgs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{c} 2K \\ \hline \\ -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $ $ \begin{array}{c} -0.04] = \begin{bmatrix} \\ -0.04] = \\ \end{bmatrix} $	2.07 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area oe 1 oe 2 oe 3	ss (m²)	Openin	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{ccc} 2K & = & \\ -0.04] & = & \\ -0.04] & = & \\ -0.04] & = & \\ -0.04] & = & \\ 0.04] & = & \\ \end{array} $	2.07 2.15 3.43 1.14 2.84 2.261				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area oe 1 oe 2 oe 3 oe 4	ss (m²)	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096				kJ/K (26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 80.8 2.1 57.	ss (m²) 33 2	Openin m	ngs n²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18	EK = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [-	2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1 57. elements	33 2 4 5, m ²	10.9 0 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	EK = [- 0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1 57. elements	33 2 4 5, m ² lows, use e	10.9 10.9 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	2K = [- 0.04] = [2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1 57. elements od roof wind eas on both oss, W/K	33 2 4 5, m ² dows, use e sides of in = S (A x	10.9 10.9 2.66	ngs n ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	$ \begin{array}{cccc} 2K & = & \\ & -0.04 $	(W/ 2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	k)	kJ/m²-l	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	(26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows and ** include the are Fabric heat lo	Gros area De 1 De 2 De 3 De 4	33 2 4 5, m² lows, use end sides of interest and interest	10.9 0 2.66	indow U-valls and par	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x10 x10 x10 x10 x10 x10 x10 x10 x10 x10	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+ 0.13 0.18 0.13	$ \begin{array}{cccc} 2K & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & 0.04 & = & \\ & = & \\$	(W/ 2.07 2.15 3.43 1.14 2.84 2.261 5.096 12.59 0.38 7.12	K)	kJ/m²-l	3.2	(26) (27) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

				ulation.										
	ŭ	`	,		using Ap	•	K						10.55	(36
	of therma abric hea		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			52.74	(37
			alculated	l monthly	V						25)m x (5)		53.74	(0,
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(3
eat tr	ansfer c	coefficier	nt W/K	<u> </u>	<u> </u>	<u> </u>	!	<u> </u>	(39)m	= (37) + (37)		ļ	l	
9)m=	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		
oot lo	oo poro	motor (b	JI D) \\\	/m²l/	I	I	l			Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	92.59	(3
)m=	1.21	1.2	HLP), W/	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		
5)111-	1.21	1.2	1.2	1.10	1.10	1.10	1.10	1.10			Sum(40) ₁ .		1.18	(4
umbe	er of day	s in mor	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
eum	ad occu	ipancy, I	NI									40	1	(4
				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		43		(
f TF	A £ 13.9	9, N = 1											-	
nnual	OVOROR													
								(25 x N) to achieve		se taraet o		.96		(-
duce	the annua	al average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target o		.96		(4
duce	the annua	al average	hot water	usage by a day (all w	5% if the a	lwelling is	designed	to achieve	a water us	se target o		.96 Dec]	(-
duce t more	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the d ater use, l	lwelling is hot and co Jun	designed (Aug		_	,·	1		(
duce t more t t wate	the annua that 125 Jan	al average litres per p Feb	hot water person per Mar	usage by day (all w	5% if the divater use, I	lwelling is hot and co Jun	designed (Aug	a water us	_	,·	1		(
duce t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in 101.15	Feb 197.47	Mar day for ea	Apr ach month 90.12	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$	Jun ctor from 3	designed and desig	Aug (43)	Sep	Oct 93.79 Fotal = Su	97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	
t more t wate	the annual that 125 Jan er usage in	Feb 197.47	Mar day for ea	usage by a day (all was Apr ach month	5% if the or vater use, I May Vd,m = fa 86.44	Jun ctor from 3	designed and desig	Aug (43) 86.44	90.12 90.12 90.12 90.12	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(₍
educe It more It wate It wate It may come to the company come to the company come to the company compa	Jan er usage ir 101.15	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1	Dec 101.15 = c, 1d) 145.27	1103.46	(₍
t water ergy comparisons instant	the annual that 125 Jan ar usage in 101.15 content of 150 taneous w	Feb 11 Per per per per per per per per per per p	Mar day for ea 93.79 used - cale 135.38	Apr ach month 90.12 culated mo 118.03	May Vd,m = fa 86.44 201113.25 20 hot water	Jun ctor from 82.76 190 x Vd,r 97.73	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/more 105.16	Oct 93.79 Total = Su 122.55 Total = Su	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		(
ergy constant	Jan er usage ir 101.15	Feb litres per per per per per per per per per per	Mar day for ea 93.79 used - cale	Apr ach month 90.12 culated mo	5% if the orater use, I May $Vd,m = fa$ 86.44 $onthly = 4$.	Jun ctor from 1 82.76	Jul Table 1c x 82.76 m x nm x E 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 0 kWh/more	93.79 Fotal = Su 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		
duce the more t	Jan 101.15 content of 150 aneous w 0 storage	Feb 11 per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage),	designed and desig	Aug (43) 86.44 DTm / 3600 103.92 boxes (46)	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27		
duce t more t water t water t water t water t water t water t water t water t water t water t water t water	the annual that 125 Jan ar usage in 101.15 content of 150 faneous w 0 storage e volum	Feb 1/2 Feb 1/	Mar day for ea 93.79 used - call 135.38 ng at point 0	Apr ach month 90.12 culated mo 118.03 of use (no	5% if the orater use, I May $Vd,m = fa$ 86.44 0 113.25 0 hot water 0	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mor 105.16 0 to (61)	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t water dust i)m= dust in me ater i corage common herw	the annual that 125 Jan ar usage in 101.15 content of 150 storage e volum munity herise if no	Feb 1 litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 0 includinated no talcated and no talcated and a calcated and a calcated and a calcated and and and a calcated and and a calcated and and a calcated and a ca	Apr ach month 90.12 culated mo 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 97.73 storage), 0	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage	Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 0 within sa	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ =	Dec 101.15 = c, 1d) 145.27 = 0		
duce t more t water t water t water t si)m= mstant oragg commherw ater:	the annual that 125 Jan ar usage in 101.15 content of 150 staneous w 0 storage e volum munity helise if no storage	Feb 11tres per properties per proper	Mar 93.79 used - call 135.38 ng at point o includinate hot water	Apr ach month 90.12 culated mo 118.03 of use (no unk in dw er (this in	May Vd,m = fa 86.44 201113.25 20 hot water 0 colar or Welling, encludes i	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(((
duce t more	Jan 101.15 150 201.15 2	Feb 11 prints per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point o includinate hot water	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x D 90.56 enter 0 in 0 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mon 105.16 0 to (61) 0	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		
duce t more literative water ergy of mostant mostant orage commister: in the mostant in the most	Jan 101.15 101.1	Feb 1 litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de	Mar 93.79 used - calc 135.38 ng at point and no tal hot water eclared le m Table	Apr ach month 90.12 culated me 118.03 of use (no	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 colar or Water 20 colar or Water 21 colar or Water 22 colar or Water 23 colar or Water 24 colar or Water 35 colar or Water 36 colar or Water 47 colar or Water 48 colar or Water 59 colar or Water 60 colar or Water 60 colar or Water 61 colar or Water 62 colar or Water 63 colar or Water 64 colar or Water 65 colar or Water 66 colar or Water 67 colar or Water 67 colar or Water 68 colar or Water 69 colar or Water 69 colar or Water 60 colar or Water	Jun ctor from 7 82.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 0 storage 0 litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4)
duce to more that water that wate	the annual that 125 Jan 101.15 content of 150 storage e volum munity helise if no storage eranufact erature far	Feb n litres per p 97.47 hot water 131.19 loss: e (litres) eating a o stored loss: urer's de actor fro m water	Mar day for ea 93.79 used - cale 135.38 ng at point nd no tale hot water eclared le m Table storage	Apr ach month 90.12 culated mo 118.03 of use (no ng any so nk in dw er (this in oss facto 2b	5% if the orater use, I May $Vd,m = fa$ 86.44 0 0 0 0 0 0 0	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47)	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 c, 1d) 145.27 0 0		(4)
duce t more	the annual that 125 Jan 101.15 content of 150 storage e volum munity he vise if no storage anufact that it is anufact to anufact that is an unique to the content of the content	Feb plitres per per per per per per per per per per	Mar day for ea 93.79 used - call 135.38 ng at point nd no tal hot water m Table storage eclared to	Apr ach month 90.12 culated mo 118.03 of use (no ank in dw er (this ir oss facto 2b cylinder l	May Vd,m = fa 86.44 201113.25 20 hot water 0 20 colar or Water 20 colar or Water 21 colar or Water 22 colar or Water 23 colar or Water 24 colar or Water 35 colar or Water 36 colar or Water 47 colar or Water 48 colar or Water 59 colar or Water 60 colar or Water 60 colar or Water 61 colar or Water 62 colar or Water 63 colar or Water 64 colar or Water 65 colar or Water 66 colar or Water 67 colar or Water 67 colar or Water 68 colar or Water 69 colar or Water 69 colar or Water 60 colar or Water	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at wate 4)m= anergy of anstant b)m= atternation att	the annual that 125 Jan 101.15 content of 150 anneous w o storage e volum munity h vise if no storage anufact rature fa to lost fro anufact ter stora	Feb n litres per p 97.47 hot water 131.19 rater heatin 0 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de	Mar day for ea 93.79 used - call 135.38 ng at point nd no tal hot water m Table storage eclared to	Apr ach month 90.12 culated mo 118.03 of use (no ng any so ank in dw er (this ir oss facto 2b cylinder l com Table	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4 (4 (4 (4 (4
educe at more at more at more at more at more at more at more at wate at more	the annual the annual that 125 Jan 101.15 content of 150 storage in the annual that 125 content of 150 storage in the annual that it is a content of the annual that it is a content of the annual that it is a content of the annual that it is a content of the annual that is a con	Feb 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2	Mar day for ea 93.79 used - calc 135.38 ng at point on includir and no talc hot water eclared left m Table storage eclared of factor free sections	Apr ach month 90.12 culated mo 118.03 for use (no ng any so ank in dw er (this ir oss facto 2b cylinder I com Tabl on 4.3	May Vd,m = fa 86.44 113.25 hot water 0 clar or W velling, e ncludes i or is kno ear loss fact	Jun ctor from 182.76 190 x Vd,r 97.73 r storage), 0 /WHRS enter 110 nstantar wn (kWh	designed and desig	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 0 within sa (47) ombi boil	90.12 90.12 0 kWh/mort 105.16 0 ame vessers) enter	Oct 93.79 Total = Su th (see Ta 122.55 Total = Su 0 sel	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 0	Dec 101.15 = c, 1d) 145.27 = 0		(4) (4) (4) (4) (5) (5) (5) (5)

Energy	/ lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)	x (52) x ((53) =		0] ((54)
Enter	(50) or	(54) in (5	55)									0	((55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			•	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((56)
If cylinde	er contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	J lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((57)
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0] ((58)
Primar	y circuit	loss cal	culated	for each	month (59)m =	(58) ÷ 36	65 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is s	solar wa	ter heati	ng and a	cylinde	r thermo	stat)		•	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	((59)
Combi	loss ca	lculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0] ((61)
Total h	eat req	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48	((62)
Solar Di	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	-	
(add a	dditiona	I lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)	_			_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	((63)
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	((63) (G2)
Output	from w	ater hea	ter										_	
(64)m=	127.5	111.52	115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48		
								Outp	out from w	ater heate	r (annual)	12	1229.79	(64)
Heat g	ains fro	m water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8	x [(46)m	+ (57)m	+ (59)m]	
(65)m=	31.88	27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87	((65)
inclu	ıde (57)	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Int	ternal ga	ains (see	Table 5	and 5a):									
Metab	olic gair	s (Table	5), Wat	ts									_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	((66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m=	20.26	18	14.64	11.08	8.28	6.99	7.56	9.82	13.18	16.74	19.54	20.83	((67)
Applia	nces ga	ins (calc	ulated ir	Append	dix L, eq	uation L	13 or L1	3a), also	see Ta	ble 5			_	
(68)m=	216.06	218.31	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	((68)
Cookir	ng gains	(calcula	ited in A	ppendix	L, equa	tion L15	or L15a), also se	ee Table	5				
(69)m=	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	((69)
Pumps	and fa	ns gains	(Table	5a)	-	-	-	-			-	-		
(70)m=	0	0	0	0	0	0	0	0	0	0	0	0	((70)
Losses	e.g. ev	aporatic	n (nega	tive valu	es) (Tab	ole 5)							-	
(71)m=	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27		(71)
Water	heating	gains (T	able 5)										-	
(72)m=	42.84	41.49	38.67	34.83	32.35	28.84	25.87	29.68	31.04	35	39.48	41.49	((72)
Total i	nternal	gains =	;			(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72))m	-	
(73)m=	338.65	337.27	325.44	306.02	285.55	266.49	254.54	258.38	268.75	288.3	310.76	328.33] ((73)
		•	•	•	•	•	•	•		•		•	•	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	tion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	х	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	X	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	X	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.7	=	15.55	(76)
East	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.7	=	5.16	(76)
East	0.9x	0.77	x	2.59	x	38.42	x	0.63	x	0.7	=	30.41	(76)
East	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.7	=	10.1	(76)
East	0.9x	0.77	x	2.59	x	63.27	x	0.63	x	0.7	=	50.08	(76)
East	0.9x	0.77	x	0.86	x	63.27	x	0.63	x	0.7	=	16.63	(76)
East	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.7	=	73.04	(76)
East	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.7	=	89.52	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	x	0.7	=	29.72	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.7	=	91.64	(76)
East	0.9x	0.77	X	0.86	x	115.77	x	0.63	X	0.7	=	30.43	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.7	=	87.24	(76)
East	0.9x	0.77	X	0.86	x	110.22	x	0.63	X	0.7	=	28.97	(76)
East	0.9x	0.77	X	2.59	x	94.68	x	0.63	X	0.7	=	74.94	(76)
East	0.9x	0.77	X	0.86	X	94.68	X	0.63	X	0.7	=	24.88	(76)
East	0.9x	0.77	X	2.59	X	73.59	x	0.63	X	0.7	=	58.25	(76)
East	0.9x	0.77	X	0.86	x	73.59	X	0.63	x	0.7	=	19.34	(76)
East	0.9x	0.77	X	2.59	X	45.59	x	0.63	X	0.7	=	36.09	(76)
East	0.9x	0.77	X	0.86	x	45.59	x	0.63	x	0.7	=	11.98	(76)
East	0.9x	0.77	X	2.59	x	24.49	x	0.63	x	0.7	=	19.38	(76)
East	0.9x	0.77	X	0.86	x	24.49	x	0.63	x	0.7	=	6.44	(76)
East	0.9x	0.77	X	2.59	x	16.15	x	0.63	x	0.7	=	12.78	(76)
East	0.9x	0.77	X	0.86	X	16.15	X	0.63	X	0.7	=	4.24	(76)

	_									_						_		_
South 0).9x	0.77		X	2.1	4	X	4	6.75	X	0.	63	x	0.7		= [30.58	(78)
South 0).9x	0.77		X	2.1	4	X	7	6.57	X	0.	63	X	0.7		= [50.08	(78)
South 0).9x	0.77		X	2.1	4	X	9	7.53	X	0.	63	x	0.7		= [63.79	(78)
South 0).9x	0.77		X	2.1	4	X	1	10.23	X	0.	63	x	0.7		= [72.09	(78)
South 0).9x	0.77		X	2.1	4	x	1	14.87	X	0.	63	x	0.7		= [75.13	(78)
South 0).9x	0.77		X	2.1	4	x	1	10.55	X	0.	63	x	0.7		= [72.3	(78)
South 0).9x	0.77		X	2.1	4	x	10	08.01	X	0.	63	x	0.7		= [70.64	(78)
South 0).9x	0.77		X	2.1	4	x	10	04.89	X	0.	63	x	0.7		= [68.6	(78)
South 0).9x	0.77		X	2.1	4	x	10	01.89	X	0.	63	x	0.7		= [66.63	(78)
South 0).9x	0.77		X	2.1	4	x	8	2.59	X	0.	63	x	0.7		= [54.01	(78)
South 0).9x	0.77		X	2.1	4	x	5	5.42	X	0.	63	x	0.7		= [36.24	(78)
South 0).9x	0.77		X	2.1	4	x	4	40.4	X	0.	63	x	0.7		= [26.42	(78)
Rooflights 0).9x	1		X	1.3	3	x	4	7.01	X	0.	63	x	0.7		= [49.63	(82)
Rooflights o).9x	1		X	1.3	3	x	8	33.9	X	0.	63	x	0.7		= [88.58	(82)
Rooflights o).9x	1		X	1.3	3	x	1:	22.73	X	0.	63	x	0.7		= [129.57	(82)
Rooflights 0).9x	1		X	1.3	3	x	10	61.74	X	0.	63	x	0.7		= [170.76	(82)
Rooflights o).9x	1		X	1.3	3	X	18	87.38	X	0.	63	x	0.7		= [197.83	(82)
Rooflights o).9x	1		X	1.3	3	x	18	88.06	X	0.	63	x	0.7		= [198.54	(82)
Rooflights 0).9x	1		X	1.3	3	x	18	80.51	X	0.	63	x	0.7		= [190.58	(82)
Rooflights 0).9x	1		X	1.3	3	X	10	61.54	X	0.	63	x	0.7		= [170.54	(82)
Rooflights o).9x	1		X	1.3	3	x	1	36.5	X	0.	63	x	0.7		= [144.11	(82)
Rooflights 0).9x	1		X	1.3	3	x	9	5.08	X	0.	63	x	0.7		= [100.38	(82)
Rooflights o).9x	1		X	1.3	3	X	5	7.06	X	0.	63	x	0.7		= [60.24	(82)
Rooflights o).9x	1		X	1.3	3	x	3	9.72	X	0.	63	x	0.7		= [41.93	(82)
Solar gain											n = Sum							
					395.07			72.11		397	7.63 32	29.45	226.41	135.29	94.1	6		(83)
Total gains				_	` 	` '				1 050		20.40		140.05	400			(0.4)
(84)m= 45	0.1	536.55	619	./	701.09	751.7	3 1	738.6	705.91	656	5.01 5	98.19	514.71	446.05	422.4	49		(84)
7. Mean i				,	Ŭ											_		_
Tempera		•		• .			•			ble 9	, Th1 (°C)					21	(85)
Utilisation	n fact	 _	ains f	or li	ving are	a, h1,	m (s	ee Ta	ble 9a)			-						
	an	Feb	Ma	\rightarrow	Apr	Ma	—	Jun	Jul	_	_	Sep	Oct	Nov	De	C		
(86)m=	1	1	0.9	9	0.96	0.88		0.72	0.55	0.6	61 (0.85	0.98	1	1			(86)
Mean inte	ernal	tempera	ature	in li	ving are	a T1	(follo	w ste	ps 3 to 7	7 in T	able 9	c)						
(87)m= 19	.66	19.83	20.1	1	20.47	20.77	2	20.94	20.99	20.	98 2	0.86	20.46	19.99	19.6	4		(87)
Tempera	ture o	during h	eatin	g pe	eriods in	rest o	of dw	elling/	from Ta	able 9	9, Th2	(°C)						
(88)m= 19	.92	19.92	19.9	2	19.94	19.94	. 1	19.95	19.95	19.	95 1	9.94	19.94	19.93	19.9	3		(88)
Utilisation	n fact	or for ga	ains f	or re	est of dv	velling	, h2	,m (se	e Table	9a)								
	1	0.99	0.9	-	0.94	0.84		0.63	0.43	0.4	49 (0.78	0.97	0.99	1			(89)
Mean inte	ernal	tempera	ature	in t	he rest o	of dwe	ellina	T2 (fc	ollow ste	eps 3	to 7 ir	Table	9c)	-				
		1		-		•	. 9	ν		,			- /					

(90)m=	18.7	18.87	19.15	19.51	19.78	19.92	19.95	19.95	19.86	19.5	19.04	18.68		(90)
(30)111=	10.7	10.07	19.10	19.51	19.70	19.92	19.90	19.90			g area ÷ (4		0.23	(91)
						\ 4					9 (, l	0.20	(01)
	interna 18.92	- _	ature (fo	r	1	· · ·				10.72	10.26	10.01		(02)
(92)m=		19.1	19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(92)
(93)m=	18.92	19.1	he mean 19.37	19.73	20.01	20.16	20.19	20.19	20.1	19.73	19.26	18.91		(93)
			uirement		20.01	20.10	20.10	20.10	20.1	10.70	10.20	10.01		()
•			ernal ter		re obtain	ned at ste	ep 11 of	Table 9	o, so tha	t Ti.m=(76)m an	d re-calc	ulate	
			or gains	•				1 4510 01	, 00 ii a		, o,,,,, a,,,	u 10 0010	diato	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:										
(94)m=	1	0.99	0.98	0.94	0.84	0.65	0.46	0.52	0.8	0.96	0.99	1		(94)
	<u> </u>		W = (94)	ŕ	·									
(95)m=		532.72	607.76	659.91	631.38	479.8	323.54	337.91	475.61	496.09	443.22	421.57		(95)
	<u> </u>		rnal tem	i 										(0.0)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			an intern		1		<u> </u>		<u> </u>		1100.10	4070.00		(07)
		1337.36		1002.99	767.52	507.12	327.41	344.65	549.56	842.77	1129.49	1373.09		(97)
Space (98)m=	694.08	g require 540.72	ement fo 447.32	247.02	101.29	/vn/mon	$\ln = 0.02$	4 X [(97))m – (95 0)mj x (4° 257.93	494.11	707.93		
(90)111=	094.00	340.72	447.32	247.02	101.29	U	U						3490.42	(98)
_					- /			TUla	l per year	(KVVII/yeai) = Sum(9	O)15,912 =	3490.42	╡``
Space	e heatin	g require	ement in	kWh/m²	²/vear								44.52	(99)
					, , ca.								44.52	(33)
8c. S	pace co	oling rec	quiremen		,,,								44.02	(00)
	lated fo	r June, c	July and	t August.	See Tal					_			44.JZ	(00)
Calcu	lated fo Jan	r June, c Feb	July and Mar	August. Apr	See Tal	Jun	Jul	Aug	Sep	Oct	Nov	Dec	77.02	(00)
Calcu Heat	lated fo Jan loss rate	r June, c Feb e Lm (ca	July and Mar Iculated	August. Apr using 2	See Tal May 5°C inter	Jun nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)	77.02	
Calcu Heat (100)m=	Jan Jan loss rate	r June, c Feb e Lm (ca	July and Mar Iculated	August. Apr	See Tal	Jun							77.02	(100)
Heat (100)m=	Jan Jan loss rate 0 ation fac	r June, C Feb E Lm (ca 0	July and Mar Iculated 0 oss hm	August. Apr using 25	See Tal May 5°C inter	Jun nal temp 857.31	oerature 674.9	and exte	ernal ten	nperatur 0	e from T	able 10) 0	77.02	(100)
Calcu Heat (100)m= Utilisa (101)m=	Jan Jan loss rate 0 ation fac	r June, C Feb E Lm (ca 0 tor for lo	July and Mar Ilculated 0 oss hm 0	August. Apr using 25	See Tal May 5°C inter 0	Jun rnal temp 857.31	perature	and exte	ernal ten	nperatur	e from T	able 10)	77.02	
Heat (100)m= Utilisa (101)m= Usefu	Jan loss rate 0 ation fac	r June, C Feb Lm (ca 0 tor for lc 0	July and Mar Ilculated 0 pss hm 0 Vatts) = (August. Apr using 29 0 100)m x	See Tal May 5°C inter 0	Jun rnal temp 857.31	0.92	and exte 691.53	ernal ten 0	o 0	e from T 0	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m=	Jan Jan Joss rate 0 ation fac 0 I loss, h	r June, C Feb E Lm (ca 0 stor for lo mLm (W	July and Mar Ilculated 0 oss hm 0 Vatts) = (August. Apr using 25 0 0 (100)m x	See Tal May 5°C inter 0 0 (101)m	Jun nal temp 857.31 0.86	0.92 622.55	and exte 691.53 0.9	ernal ten 0 0	nperatur 0	e from T	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g	r June, C Feb E Lm (ca 0 stor for lo mLm (W	July and Mar Ilculated 0 pss hm 0 Vatts) = (August. Apr using 25 0 0 (100)m x	See Tal May 5°C inter 0 0 (101)m	Jun nal temp 857.31 0.86	0.92 622.55	and exte 691.53 0.9	ernal ten 0 0	o 0	e from T 0	able 10) 0	77.02	(100)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar o	r June, c Feb e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca	July and Mar Ilculated 0 oss hm 0 Vatts) = (0 Iculated 0	August. Apr using 25 0 (100)m x for appli	See Tal May 5°C inter 0 (101)m 0 cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation fact I loss, h 0 s (solar g	r June, c Feb Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0	July and Mar Iculated 0 pss hm 0 Vatts) = (0	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar q 0 e cooling 04)m to	r June, c Feb Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0	July and Mar Journal of the second of the se	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we	Jun rnal temp 857.31 0.86 738.17 eather re 920.76	0.92 622.55 egion, se	and exte 691.53 0.9 621.41 e Table 828.78	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar o e cooling 04)m to	r June, c Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month,	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>		(100) (101) (102)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fact outliness, he cooling 04)m to d fraction	r June, c Feb Lm (ca 0 stor for lo 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1	able 10) 0 0 0 102)m]>	c (41)m	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 cooling 04)m to	r June, C Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Ilculated 0 pss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m < 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun nal temp 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07 continuo	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	c (41)m 478.84	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 cooling 04)m to	r June, c Feb Lm (ca 0 stor for lo 0 mLm (W 0 gains ca 0 g require zero if (July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo (104)m <	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 (cable we 0 , whole c	Jun 857.31 0.86 738.17 eather re 920.76 dwelling,	0.92 622.55 egion, se 882.07	and exto 691.53 0.9 621.41 ee Table 828.78 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<i>((41)m</i> 478.84 1	(100) (101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of 0 e cooling 04)m to d fraction ittency fi	r June, C Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar July	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47	0.92 622.55 egion, se 882.07 continuo 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (1 0 1,0,4) area ÷ (4	able 10) 0 0 0 102)m] >	c (41)m 478.84	(100) (101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermi (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of the cooling of the coolin	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta 0	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 ment for	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<i>((41)m</i> 478.84 1	(100) (101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m=	lated fo Jan loss rate 0 ation face 0 Il loss, h 0 s (solar of the cooling of the coolin	r June, C Feb Lm (ca 0 ttor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar July	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47	0.92 622.55 egion, se 882.07 continuo 193.09	and exte 691.53 0.9 621.41 ee Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(100) (101) (102) (103) (104) (105)
Calcument (100)m= Utilisa (101)m= Useful (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermit (106)m= Space (107)m=	lated fo Jan loss rate 0 ation face 0 I loss, h 0 s (solar g 0 e cooling 04)m to d fraction ttency fo cooling 0	r June, c Feb E Lm (ca 0 Intor for lo 0 Intor for l	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0 (104)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	((41)m 478.84 1	(100) (101) (102) (103) (104) (105) (106)
Calcul Heat (100)m= Utilisa (101)m= Useful (102)m= Gains (103)m= Space set (1) (104)m= Cooled Intermit (106)m= Space (107)m=	lated fo Jan loss rate 0 ation face 0 I loss, h 0 s (solar g 0 e cooling 04)m to d fraction ttency fo cooling 0	r June, c Feb E Lm (ca 0 Intor for lo 0 Intor for l	July and Mar Iculated 0 oss hm 0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 ment for	August. Apr using 29 0 (100)m x 0 for appli 0 r month, 3 x (98 0	See Tal May 5°C inter 0 (101)m 0 cable we 0 whole c)m 0 (104)m 0	Jun rnal temp 857.31 0.86 738.17 eather re 920.76 dwelling, 131.47 0.25 × (105)	0.92 622.55 egion, se 882.07 continuo 193.09 0.25 × (106)r	and exto 691.53 0.9 621.41 e Table 828.78 ous (kW 154.28	0 0 10) 0 Total f C = 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	478.84 1	(100) (101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under sp	pecial conditions, see section 11)		
Fabric Energy Efficiency	(99) + (108) =	46.05	(109)
Target Fabric Energy Efficiency (TFEE)		52.95	(109)

				\ - (- 'l						
			User D	etails:						
Assessor Name:	Jemma Mclau	•			a Num				030065	
Software Name:	Stroma FSAP				are Ve			Versio	n: 1.0.5.25	
	W 1 11 0 11					E E - FIN				
Address:	Woodwell Cotta	ge P2, Wood	lwell Ro	oad, BRI	STOL, E	8S11 9XI	J			
Overall dwelling dimer	ISIONS.		Aros	a(m²)		Av. He	iaht/m\		Volume(m³)	`
Ground floor					(1a) x		2.6	(2a) =	101.92) (3a)
First floor			;	39.2	(1b) x	2	.56	(2b) =	100.35	(3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)-	+(1e)+(1n)	78.4	(4)			-		
Dwelling volume					(3a)+(3b)+(3c)+(3d	l)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:										
	main heating	secondary heating	y	other		total			m³ per houi	r
Number of chimneys		+ 0] + [0	=	0	X	40 =	0	(6a)
Number of open flues	0	0	+ [0	= [0	X	20 =	0	(6b)
Number of intermittent far	ns					3	X	10 =	30	(7a)
Number of passive vents						0	X	10 =	0	(7b)
Number of flueless gas fir	es					0	X	40 =	0	(7c)
								Air ch	anges per ho	ur
Infiltration due to chimney	s, flues and fans	= (6a)+(6b)+(7	a)+(7b)+(7c) =	Γ	30		÷ (5) =	0.15	(8)
If a pressurisation test has be	en carried out or is in	tended, proceed	l to (17), d	otherwise (continue fr	om (9) to ((16)			
Number of storeys in th	e dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.2					•	ruction			0	(11)
if both types of wall are pre deducting areas of opening			the great	ter wall are	ea (atter					
If suspended wooden fl			1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ento	er 0.05, else ente	r 0							0	(13)
Percentage of windows	and doors draug	ht stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13) +	+ (15) =		0	(16)
Air permeability value, o	q50, expressed in	cubic metre	s per ho	our per s	quare m	etre of e	nvelope	area	4	(17)
If based on air permeabilit	ty value, then (18)	$= [(17) \div 20] + (8)$), otherwi	ise (18) =	(16)				0.35	(18)
Air permeability value applies		st has been don	e or a deg	gree air pe	rmeability	is being us	sed			_
Number of sides sheltered	t			(20) 1	[0.07E v./	10)]			1	(19)
Shelter factor					[0.075 x (*	19)] =			0.92	(20)
Infiltration rate incorporati	_			(21) = (18) x (20) =				0.32	(21)
Infiltration rate modified for					<u> </u>	<u> </u>		_	1	
Jan Feb I	Mar Apr M	1ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe		iay Gaii	- Oui	l /lug	Госр	1 00.				

4.9

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

Wind Factor (22a)m = (22)m ÷ 4	
(22a)m= 1.27 1.25 1.23 1.1 1.08 0.95 0.95 0.92 1 1.08 1.12 1.18]
A divisted infiltration rate (allowing for abolton and wind an add). (O4a) v (O0a) v	•
Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m 0.41	1
Calculate effective air change rate for the applicable case	J
If mechanical ventilation:	0 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)	0 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0 (23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c)	- 1
(24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0	(24a)
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)	1 (245)
(24b)m= 0 0 0 0 0 0 0 0 0 0 0 0	(24b)
c) If whole house extract ventilation or positive input ventilation from outside if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b)m + 0.5 \times (23b)$	
(24c)m= 0 0 0 0 0 0 0 0 0 0 0 0	(24c)
d) If natural ventilation or whole house positive input ventilation from loft	4
if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [(22b)m^2 \times 0.5]$	-
(24d)m= 0.58	(24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)	7
(25)m= 0.58 0.58 0.58 0.56 0.56 0.55 0.55 0.54 0.55 0.56 0.57 0.57	(25)
3. Heat losses and heat loss parameter:	
ELEMENT Gross Openings Net Area U-value A X U k-value	
Doors $\frac{\text{ELEMENT}}{\text{area (m}^2)}$ $\frac{\text{Gloss}}{\text{m}^2}$ $\frac{\text{Openings}}{\text{A ,m}^2}$ $\frac{\text{Net Area}}{\text{W/m2K}}$ $\frac{\text{O-Value}}{\text{W/m2K}}$ $\frac{\text{K-Value}}{\text{W/M2K}}$ $\frac{\text{W/K}}{\text{W/K}}$	
Doors m^2 A , m^2 W/m2K (W/K) kJ/m ² · m^2 Doors m^2 A , m^2 W/m2K m^2 m^2 m^2 A , m^2 W/m2K m^2	K kJ/K (26)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m²- Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 $x1/[1/(1.4)+0.04]$ = 2.15	K kJ/K (26) (27)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m²- Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4)+0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43	K kJ/K (26) (27) (27)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m². Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4)+ 0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4)+ 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+ 0.04] = 1.14	K kJ/K (26) (27) (27)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m². Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4)+ 0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4)+ 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4)+ 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4)+ 0.04] = 2.84	K kJ/K (26) (27) (27) (27)
area (m²) $m²$ A ,m² W/m2K (W/K) kJ/m². Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4) + 0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4) + 0.04] = 3.43 Windows Type 3 0.86 x1/[1/(1.4) + 0.04] = 1.14 Windows Type 4 2.14 x1/[1/(1.4) + 0.04] = 2.84 Rooflights 1.33 x1/[1/(1.3) + 0.04] = 1.729	K kJ/K (26) (27) (27) (27) (27) (27b)
	K kJ/K (26) (27) (27) (27) (27) (27b)
Doors 2.07 \times 1.4 $=$ 2.898 Windows Type 1 1.62 $\times 1/[1/(1.4) + 0.04] =$ 2.15 Windows Type 2 2.59 $\times 1/[1/(1.4) + 0.04] =$ 3.43 Windows Type 3 0.86 $\times 1/[1/(1.4) + 0.04] =$ 1.14 Windows Type 4 2.14 $\times 1/[1/(1.4) + 0.04] =$ 2.84 Rooflights 1.33 $\times 1/[1/(1.3) + 0.04] =$ 1.729 Floor $3.9.2$ \times 0.17 $=$ 6.664	K kJ/K (26) (27) (27) (27) (27) (27b)
	K kJ/K (26) (27) (27) (27) (27b) (28) (29)
area (m²) m² A ,m² W/m2K (W/K) kJ/m²- Doors	K kJ/K (26) (27) (27) (27) (27b) (28) (29)
area (m²) m² A ,m² W/m2K (W/K) kJ/m². Doors 2.07 x 1.4 = 2.898 Windows Type 1 1.62 x1/[1/(1.4)+0.04] = 2.15 Windows Type 2 2.59 x1/[1/(1.4)+0.04] = 3.43 Windows Type 3 Windows Type 4 Rooflights 1.33 x1/[1/(1.4)+0.04] = 1.729 Floor Walls Type 1 80.83 10.9 69.93 x 0.2 = 13.99 Walls Type 2 2.12 0 2.12 x 0.2 = 0.42 Roof 57.4 2.66 54.74 x 0.14 = 7.66 Total area of elements, m²	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31)
A , m² W/m2K (W/K) kJ/m²-Doors 2.07 x 1.4 = 2.898	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32)
A ,m² W/m2K (W/K) kJ/m²-	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32)
A ,m² W/m2K (W/K) kJ/m²-	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32) h 3.2
A ,m² W/m2K (W/K) kJ/m²-	K kJ/K (26) (27) (27) (27) (27) (27b) (28) (29) (29) (30) (31) (32)

can he u	sed inste	ad of a de	tailed calcı	ulation										
					using Ap	pendix I	K						10.48	(36)
	•	,	•		= 0.05 x (3	•								(==)
Total fa	bric hea	at loss							(33) +	(36) =			57.1	(37)
Ventilat	tion hea	it loss ca	alculated	monthl	y				(38)m	= 0.33 × (25)m x (5)			
[Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m=	96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Heat lo	ss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	94.67	(39)
(40)m=	1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		
Numbe	r of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.21	(40)
ſ	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
_	-			-	-	-		-		-	-	-	•	
4. Wat	ter heat	ing ener	gy requi	irement:								kWh/ye	ear:	
Accum	od occu	nanov I	NI.									10	Ī	(40)
if TF				[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.	.9)	.43		(42)
Annual	averag	e hot wa						(25 x N)				.96		(43)
		_			5% if the d ater use, l	_	_	to achieve	a water us	se target o	f			
Г	-				<u> </u>		•	Ι	0		N			
Hot wate	Jan r usage in	Feb	Mar day for ea	Apr ach month	May Vd,m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	101.15	97.47	93.79	90.12	86.44	82.76	82.76	86.44	90.12	93.79	97.47	101.15		
(44)111-	101.10	37.47	33.73	30.12	00.44	02.70	02.70	00.44		Total = Su			1103.46	(44)
Energy c	ontent of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			(,		1.000	` ′
(45)m=	150	131.19	135.38	118.03	113.25	97.73	90.56	103.92	105.16	122.55	133.77	145.27		
_							!			Total = Su	m(45) ₁₁₂ =	=	1446.81	(45)
If instanta	aneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46) to (61)	,	,	,	•	
(46)m=	0 storage	0	0	0	0	0	0	0	0	0	0	0		(46)
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	me ves	sel		0		(47)
_		,		•	velling, e		_			00.		0		()
	-	_			_			ombi boil	ers) ente	er '0' in (47)			
Water s	storage	loss:												
a) If ma	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature fa	actor fro	m Table	2b								0		(49)
•			storage	-		:4		(48) x (49)	=			0		(50)
•				-	loss fact le 2 (kW							0		(51)
		•	ee secti		(1.00)	, 0, 00	-1/					<u> </u>	1	(01)
	-	from Ta										0		(52)
Tempe	rature fa	actor fro	m Table	2b								0		(53)

Energy lost from wat	•	e, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0	(54)
Enter (50) or (54) in	, ,									0	(55)
Water storage loss o	alculated	for each	month			((56)m = (55) × (41)	m 	_		
(56)m= 0 0	0	0	0	0	0	0	0	0	0	0	(56)
If cylinder contains dedica	ted solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H
(57)m= 0 0	0	0	0	0	0	0	0	0	0	0	(57)
Primary circuit loss (annual) fr	om Table	3							0	(58)
Primary circuit loss of					` '	, ,					
(modified by factor	1	1	·	i	1			 			1
(59)m= 0 0	0	0	0	0	0	0	0	0	0	0	(59)
Combi loss calculate	d for each	n month ((61)m =	(60) ÷ 36	65 × (41))m					
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0	(61)
Total heat required f	or water h	eating ca	alculated	for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m
(62)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48	(62)
Solar DHW input calculate	ed using App	pendix G o	· Appendix	ι Η (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	
(add additional lines	if FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)				1
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0	(63)
FHRS 0 0	0	0	0	0	0	0	0	0	0	0	(63) (G2)
Output from water he	eater										
(64)m= 127.5 111.5	2 115.07	100.32	96.26	83.07	76.97	88.33	89.38	104.17	113.71	123.48	
						Outp	out from wa	ater heate	r (annual) ₁	12	1229.79 (64)
Heat gains from water	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8 >	([(46)m	+ (57)m	+ (59)m]
(65)m= 31.88 27.88	28.77	25.08	24.07	20.77	19.24	22.08	22.35	26.04	28.43	30.87	(65)
include (57)m in c	alculation	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating
5. Internal gains (s	ee Table :	5 and 5a):								
Metabolic gains (Tab	le 5), Wa	tts									
Jan Feb		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m= 121.59 121.5	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	(66)
Lighting gains (calcu	lated in A	ppendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				•
(67)m= 19.76 17.55	14.27	10.8	8.08		i e						
Appliances gains (ca		1 10.0	0.00	6.82	7.37	9.58	12.85	16.32	19.05	20.31	(67)
Appliances gains (ec	Iculated in	ļ							19.05	20.31	(67)
(68)m= 216.06 218.3	-	ļ							19.05 192.26	20.31	(67)
(68)m= 216.06 218.3	1 212.66	n Append 200.63	dix L, eq 185.44	uation L	13 or L1 161.64	3a), also	see Ta	ble 5 177.08			1
· · · · · · · · · · · · · · · · · · ·	1 212.66 lated in A	n Append 200.63	dix L, eq 185.44	uation L	13 or L1 161.64	3a), also	see Ta	ble 5 177.08			1
(68)m= 216.06 218.3 Cooking gains (calcumate) (69)m= 35.16 35.16	1 212.66 lated in A 35.16	200.63 appendix 35.16	dix L, eq 185.44 L, equa	uation L 171.17 tion L15	13 or L1 161.64 or L15a)	3a), also 159.4), also se	see Ta 165.05 ee Table	ble 5 177.08	192.26	206.53	(68)
(68)m= 216.06 218.3 Cooking gains (calcu	1 212.66 lated in A 35.16	200.63 appendix 35.16	dix L, eq 185.44 L, equa	uation L 171.17 tion L15	13 or L1 161.64 or L15a)	3a), also 159.4), also se	see Ta 165.05 ee Table	ble 5 177.08	192.26	206.53	(68)
(68)m= 216.06 218.3 Cooking gains (calcumate (69)m= 35.16 35.16 Pumps and fans gain	212.66 Ilated in A 35.16 as (Table	200.63 appendix 35.16 5a)	dix L, eq 185.44 L, equat 35.16	uation L 171.17 tion L15 35.16	13 or L1 161.64 or L15a) 35.16	3a), also 159.4), also se 35.16	see Ta 165.05 ee Table 35.16	ble 5 177.08 5 35.16	192.26 35.16	206.53 35.16	(68)
(68)m= 216.06 218.3 Cooking gains (calculated) 35.16 35.16 Pumps and fans gain 0 0	212.66 llated in A	200.63 appendix 35.16 5a)	dix L, eq 185.44 L, equat 35.16	uation L 171.17 tion L15 35.16	13 or L1 161.64 or L15a) 35.16	3a), also 159.4), also se 35.16	see Ta 165.05 ee Table 35.16	ble 5 177.08 5 35.16	192.26 35.16	206.53 35.16	(68)
(68)m= 216.06 218.3 Cooking gains (calculated) (69)m= 35.16 35.16 Pumps and fans gain (70)m= 0 0 Losses e.g. evapora	212.66 llated in A 35.16 ns (Table 0 cion (nega	200.63 appendix 35.16 5a) 0 ative valu	dix L, eq 185.44 L, equat 35.16 0 es) (Tab	uation L 171.17 tion L15 35.16 0 ole 5)	13 or L1 161.64 or L15a) 35.16	3a), also 159.4), also se 35.16	see Ta 165.05 ee Table 35.16	ble 5 177.08 5 35.16	192.26 35.16	206.53 35.16	(68)
(68)m= 216.06 218.3 Cooking gains (calculated) (69)m= 35.16 35.16 Pumps and fans gain (70)m= 0 0 Losses e.g. evapora (71)m= -97.27 -97.2	212.66 llated in A 35.16 is (Table 0 cion (nega 7	200.63 appendix 35.16 5a) 0 ative valu	dix L, eq 185.44 L, equat 35.16 0 es) (Tab	uation L 171.17 tion L15 35.16 0 ole 5)	13 or L1 161.64 or L15a) 35.16	3a), also 159.4), also se 35.16	see Ta 165.05 ee Table 35.16	ble 5 177.08 5 35.16	192.26 35.16	206.53 35.16	(68)
(68)m= 216.06 218.3 Cooking gains (calculated) (69)m= 35.16 35.16 Pumps and fans gain (70)m= 0 0 Losses e.g. evapora (71)m= -97.27 -97.2 Water heating gains (72)m= 42.84 41.49	212.66 llated in A 35.16 s (Table 0 cion (nega 7 -97.27 (Table 5) 38.67	200.63 appendix 35.16 5a) 0 utive valu	dix L, eq 185.44 L, equat 35.16 0 es) (Tab -97.27	uation L 171.17 tion L15 35.16 0 ole 5) -97.27	13 or L1 161.64 or L15a) 35.16 0 -97.27	3a), also 159.4), also se 35.16 0	see Ta 165.05 ee Table 35.16 0 -97.27	ble 5 177.08 5 35.16 0 -97.27	192.26 35.16 0 -97.27	206.53 35.16 0 -97.27	(68) (69) (70) (71)
(68)m= 216.06 218.3 Cooking gains (calculate) (69)m= 35.16 35.16 Pumps and fans gain (70)m= 0 0 Losses e.g. evapora (71)m= -97.27 -97.2 Water heating gains	212.66 lated in A 35.16 ns (Table 0 cion (nega 7 -97.27 (Table 5) 38.67	200.63 appendix 35.16 5a) 0 utive valu	dix L, eq 185.44 L, equat 35.16 0 es) (Tab -97.27	uation L 171.17 tion L15 35.16 0 ole 5) -97.27	13 or L1 161.64 or L15a) 35.16 0 -97.27	3a), also 159.4), also se 35.16 0 -97.27	see Ta 165.05 ee Table 35.16 0 -97.27	ble 5 177.08 5 35.16 0 -97.27	192.26 35.16 0 -97.27	206.53 35.16 0 -97.27	(68) (69) (70) (71)

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta		Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	X	1.62	x	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	x	41.52	X	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	X	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	x	1.62	x	13.12	X	0.63	X	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	x	8.86	X	0.63	X	0.8	=	10.03	(74)
East	0.9x	0.77	x	2.59	x	19.64	X	0.63	x	0.8	=	17.77	(76)
East	0.9x	0.77	X	0.86	x	19.64	X	0.63	X	0.8	=	5.9	(76)
East	0.9x	0.77	x	2.59	x	38.42	X	0.63	X	0.8	=	34.76	(76)
East	0.9x	0.77	x	0.86	x	38.42	X	0.63	x	0.8	=	11.54	(76)
East	0.9x	0.77	X	2.59	x	63.27	X	0.63	X	0.8	=	57.24	(76)
East	0.9x	0.77	x	0.86	x	63.27	X	0.63	x	0.8	=	19.01	(76)
East	0.9x	0.77	x	2.59	x	92.28	X	0.63	x	0.8	=	83.48	(76)
East	0.9x	0.77	x	0.86	x	92.28	X	0.63	X	0.8	=	27.72	(76)
East	0.9x	0.77	x	2.59	x	113.09	X	0.63	x	0.8	=	102.31	(76)
East	0.9x	0.77	x	0.86	x	113.09	X	0.63	X	0.8	=	33.97	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.8	=	104.73	(76)
East	0.9x	0.77	x	0.86	x	115.77	x	0.63	x	0.8	=	34.77	(76)
East	0.9x	0.77	X	2.59	X	110.22	x	0.63	X	0.8	=	99.71	(76)
East	0.9x	0.77	x	0.86	X	110.22	x	0.63	x	0.8	=	33.11	(76)
East	0.9x	0.77	x	2.59	X	94.68	X	0.63	x	0.8	=	85.65	(76)
East	0.9x	0.77	x	0.86	X	94.68	X	0.63	X	0.8	=	28.44	(76)
East	0.9x	0.77	x	2.59	X	73.59	X	0.63	x	0.8	=	66.57	(76)
East	0.9x	0.77	x	0.86	X	73.59	X	0.63	X	0.8	=	22.1	(76)
East	0.9x	0.77	x	2.59	X	45.59	X	0.63	X	0.8	=	41.24	(76)
East	0.9x	0.77	x	0.86	X	45.59	X	0.63	x	0.8	=	13.69	(76)
East	0.9x	0.77	x	2.59	x	24.49	x	0.63	x	0.8	=	22.15	(76)
East	0.9x	0.77	x	0.86	x	24.49	x	0.63	x	0.8	=	7.36	(76)
East	0.9x	0.77	x	2.59	x	16.15	x	0.63	x	0.8	=	14.61	(76)
East	0.9x	0.77	x	0.86	x	16.15	x	0.63	x	0.8	=	4.85	(76)

South 0.9x	0.77	x	2.1	1	x		6.75	1 x	0.63		x	0.8	一 .	34.94	(78)
South 0.9x	0.77	- x	2.1		X	_	6.57] ^] x	0.63		x	0.8	┥.		
South 0.9x	0.77	= x	2.1		X	_	7.53] ^] x	0.63		x	0.8	╣.		(78)
South 0.9x	0.77	X	2.1		X		10.23]	0.63		x	0.8	╡.		 :::
South 0.9x	0.77	X	2.1		X	_	14.87]	0.63		x	0.8	╡.		
South 0.9x	0.77	X	2.1		X	_	10.55] x	0.63		X	0.8	= =		 :::
South 0.9x	0.77	x	2.1		x		08.01]]	0.63		X	0.8	= =		
South 0.9x	0.77	x	2.1		x		04.89]]	0.63		X	0.8	╡.		(78)
South 0.9x	0.77	×	2.1		x	_	01.89]] x	0.63		X	0.8	╡.		 :::
South 0.9x	0.77	x	2.1		x		2.59) x	0.63		X	0.8	_ =		
South 0.9x	0.77	x	2.1		X		5.42	X	0.63		X	0.8	= =		
South _{0.9x}	0.77	x	2.1	4	x		10.4	x	0.63		X	0.8	= =	30.2	(78)
Rooflights 0.9x	1	X	1.3	3	x	4	7.01	j×	0.63		X	0.8	_ =	56.72	(82)
Rooflights 0.9x	1	x	1.3	3	x	8	33.9	x	0.63		x	0.8		101.23	3 (82)
Rooflights 0.9x	1	X	1.3	3	x	12	22.73	x	0.63		x	0.8		148.08	8 (82)
Rooflights 0.9x	1	X	1.3	3	x	16	61.74	x	0.63		x	0.8		195.1	5 (82)
Rooflights 0.9x	1	X	1.3	3	X	18	37.38	x	0.63		X	0.8		226.09	9 (82)
Rooflights 0.9x	1	X	1.3	3	X	18	38.06	X	0.63		X	0.8	=	226.9	1 (82)
Rooflights _{0.9x}	1	x	1.3	3	x	18	30.51	X	0.63		X	0.8	=	217.8	(82)
Rooflights 0.9x	1	X	1.3	3	X	16	61.54	X	0.63		X	0.8	=	194.9	1 (82)
Rooflights _{0.9x}	1	X	1.3	3	X	1	36.5	X	0.63		X	0.8	=	164.7	(82)
Rooflights _{0.9x}	1	X	1.3	3	X	9	5.08	X	0.63		X	0.8	=	114.72	2 (82)
Rooflights _{0.9x}	1	X	1.3	3	X	5	7.06	X	0.63		X	0.8	=	68.85	(82)
Rooflights 0.9x	1	X	1.3	3	X	3	9.72	X	0.63		X	0.8	=	47.92	(82)
Solar gains in		I				00.55	545.00	i i	n = Sum(74)			154.00	407.04	\neg	(02)
(83)m= 127.37 Total gains – i		336.3 d solar	451.51	532.77		39.55 83\m	515.86	454	.44 376.5	01 25	58.76	154.62	107.61	_	(83)
(84)m= 465.51		661.37	757.25	818.12	<u> </u>	05.87	770.21	712	.57 644.9	3 54	16.63	3 464.89	435.42	,	(84)
` ′	ļ ļ	!				00.07	770.21	L ' '-	.07		10.00	, 104.00	400.42		(0.1)
7. Mean inter								-l- 0	Th4 (9C)						(05)
Temperature Utilisation fac	·	٠.			•			ole 9	, IIII (C))				21	(85)
Jan	Feb	Mar	Apr	May	Ť	Jun	Jul	ΙΔ	ug Se	n I	Oct	Nov	Dec	ī	
(86)m= 1	0.99	0.98	0.95	0.86	-	0.69	0.52	0.5	-).97	1	1	\exists	(86)
	ļ ļ	!							i	!					
Mean interna (87)m= 19.65		20.13	20.49	20.79	$\overline{}$	20.95	20.99	20.		7 2	0.47	19.99	19.62	٦	(87)
` ′	ļ <u> </u>									!	0.11	10.00	10.02		(= /
Temperature (88)m= 19.9	19.9	ating p	erioas ir 19.91	19.92	_	/eiiing 19.92	19.92	19.			9.92	19.91	19.91	¬	(88)
	ļ <u> </u>								19.9	<u>- </u>	J.JZ	19.91	18.81	_	(00)
Utilisation fac	 -				\neg	<u> </u>		T	10 1 2	. _		0.00		7	(00)
(89)m= 1	0.99	0.98	0.93	0.81		0.59	0.4	0.4	<u>i</u>	!).96	0.99	1	╛	(89)
Mean interna	al temperat	ture in t	the rest	of dwe	lling	T2 (fo	ollow ste	eps 3	to 7 in Ta	able 9	(c)				

()														
(90)m=	18.68	18.86	19.15	19.51	19.78	19.9	19.92	19.92	19.85	19.49	19.02	18.65		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.23	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llina) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m=	18.9	19.09	19.38	19.74	20.01	20.15	20.17	20.17	20.09	19.72	19.25	18.88		(92)
Apply	adjustn	nent to t	he mean	internal	l tempera	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	18.9	19.09	19.38	19.74	20.01	20.15	20.17	20.17	20.09	19.72	19.25	18.88		(93)
8. Sp	ace hea	tina reau	uirement											
					re obtain	ed at ste	ep 11 of	Table 9l	o. so tha	t Ti.m=(76)m an	d re-calc	ulate	
			or gains	•					o, oo	, (. 0,	u . o oao		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	1	0.99	0.98	0.93	0.81	0.62	0.43	0.49	0.77	0.96	0.99	1		(94)
Usefu	ıl gains,	hmGm ,	W = (94	4)m x (84	4)m									
(95)m=	463.91	559.64	645.43	702.3	663.96	495.8	331.09	346.46	495.49	522.92	461.4	434.32		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	1				
(97)m=	1403.7	1360.91	1232.49	1026.55	785.58	519.2	334.35	352.26	562.54	861.83	1152.19	1398.25		(97)
Space	e heating	g require	ement fo	r each n	nonth, k\	Nh/mont	h = 0.02	24 x [(97)m – (95)m] x (4 ²	1)m			
(98)m=	699.2	538.46	436.77	233.46	90.48	0	0	0	0	252.16	497.37	717.16		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3465.06	(98)
Space	o bootin	a roquir	omant in	k\A/b/m²	2/voor					`	,	, , [44.0	(00)
•	· ·	•	ement in	KVVII/III	7уваі								44.2	(99)
8c. S	pace co	alina roc										_		
		oling rec	luiremen	nt										
Calcu	lated fo	r June, J	luly and	August.										
	lated fo	r June, c Feb	luly and Mar	August. Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	Jan Jan loss rate	r June, c Feb e Lm (ca	luly and Mar Iculated	August. Apr using 2	May 5°C inter	Jun nal temp	perature	and ext	ernal ten	nperatur	e from T	able 10)		(400)
Heat (100)m=	Jan Jan loss rate	r June, c Feb Lm (ca	luly and Mar Iculated	August. Apr	May	Jun								(100)
Heat (100)m=	Jan Jan loss rate 0 ation fac	r June, c Feb e Lm (ca o tor for lo	Mar Mar Iculated 0	August. Apr using 25	May 5°C inter	Jun nal temp 879.9	692.69	and ext	ernal ten	nperatur 0	e from T	able 10)		,
Heat (100)m= Utilisa (101)m=	Jan Jan loss rate 0 ation fac	r June, c Feb E Lm (ca 0 tor for lo	Mar Iculated 0 oss hm	August. Apr using 25	May 5°C inter 0	Jun nal temp 879.9	perature	and ext	ernal ten	nperatur	e from T	able 10)		(100)
Heat (100)m= Utilisa (101)m= Usefu	Jan loss rate 0 ation fac	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W	luly and Mar lculated 0 ess hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9	692.69 0.93	and extended and e	ernal ten 0	o 0	e from T 0	able 10) 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m=	Jan Jan Joss rate 0 ation fac 0 I loss, h	r June, c Feb e Lm (ca 0 tor for lo 0 mLm (W	July and Mar Iculated 0 oss hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9 0.88 771.09	0.93 645.44	and exter 710.17 0.91	ernal ten 0 0	nperatur 0	e from T	able 10)		,
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains	Jan loss rate 0 ation fac 0 Il loss, h 0 (solar o	r June, c Feb e Lm (ca 0 tor for lo 0 mLm (W	luly and Mar lculated 0 ess hm 0 /atts) = (August. Apr using 25 0 0 100)m x	May 5°C inter 0 0 (101)m	Jun rnal temp 879.9 0.88 771.09 eather re	0.93 0.93 645.44 egion, se	and external	ernal ten 0 0	o 0	e from T 0 0	able 10) 0 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	Jan Jan Joss rate 0 ation fac I loss, h 0 s (solar o	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca	July and Mar Journal of the second of the se	August. Apr using 25 0 100)m x 0 for appli	May 5°C inter 0 (101)m 0 cable we	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and external and e	0 0 0 10)	0 0 0	0 0 0	able 10) 0 0 0		(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space	lated for Jan loss rate 0 ation facult loss, he cooling e cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole c	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and external and e	0 0 0 10)	0 0 0	0 0 0	able 10) 0 0	c (41)m	(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1	Jan loss rate 0 ation fac 0 ul loss, h 0 s (solar c 0 e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 grequire zero if (luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	August. Apr using 25 0 100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continuo	and external and e	0 0 10) 0 (h) = 0.0	0 0 0 0 24 x [(10	0 0 0 0 0 0 0	able 10) 0 0 0 102)m]	c (41)m	(101)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space	Jan loss rate 0 ation fac 0 ul loss, h 0 s (solar c 0 e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement fo	August. Apr using 25 0 (100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole c	Jun rnal temp 879.9 0.88 771.09 eather re 994.37	0.93 645.44 egion, se	and external and e	0 0 10) 0 0/h) = 0.00	0 0 0 0 24 x [(10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>		(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar of 0 c) e cooling 04)m to	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m <	August. Apr using 25 0 100)m x 0 for appli 0 r month,	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continuo	and external and e	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar g 0 d fraction d	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continuo	and external and e	0 0 10) 0 7h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]>		(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar c 0 0 d) m to 0 d fractior fattency fa	r June, c Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (0	luly and Mar lculated 0 ess hm 0 /atts) = (0 lculated 0 ement for 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 0.93 645.44 egion, se 952.37 continuo	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar c 0 0 d) m to 0 d fractior fattency fa	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (luly and Mar lculated 0 ss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98	May 5°C inter 0 (101)m 0 cable we 0 whole comes	Jun nal temp 879.9 0.88 771.09 eather re 994.37 dwelling,	0.93 0.93 645.44 egion, se 952.37 continuo	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39 1	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermit (106)m=	lated for Jan loss rate 0 ation fac 0 ll loss, h 0 s (solar c 0 04)m to 0 d fractior ittency fac 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Iculated 0 Pss hm 0 Jatts) = (0 Iculated 0 Pement fo 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 0.93 645.44 egion, se 952.37 continuo 228.36	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Intermi (106)m=	lated for Jan loss rate 0 ation face 0 loss, he cooling cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0 month =	May 5°C inter 0 (101)m 0 cable we 0 whole co)m 0 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m]> 0 = 4) =	571.39 1	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermit (106)m=	lated for Jan loss rate 0 ation face 0 loss, he cooling cooling	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0	July and Mar Iculated 0 Pss hm 0 Jatts) = (0 Iculated 0 Pement fo 104)m < 0	August. Apr using 25 0 100)m x 0 for appli 0 r month, 3 x (98 0	May 5°C inter 0 (101)m 0 cable we whole co)m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76	0.93 0.93 645.44 egion, se 952.37 continuo 228.36	and external and e	0 0 10) 0 Total f C =	0 0 0 0 24 x [(10 0 = Sum(cooled a	e from T 0 0 0 0 0 03)m - (1 0 1,04) area ÷ (4 0 1,04)	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103) (104) (105)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermi (106)m= Space (107)m=	lated for Jan loss rate 0 ation fac 0 loss, h 0 s (solar g 0 0 d) fraction for ittency fac 0 cooling 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require correquirer 0	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for 0	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	May 5°C inter 0 (101)m 0 cable we 0 whole co m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25	and external and e	0 0 10) 0 Total f C = 0 Total	0 0 0 0 24 x [(10 0 = Sum(cooled a	e from T 0 0 0 0 0 03)m - (1 0 1,04) area ÷ (4 0 1,04)	able 10) 0 0 0 102)m]> 0 = 4) =	571.39 1 0	(101) (102) (103) (104) (105) (106)
Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolect Intermit (106)m= Space (107)m=	lated for Jan loss rate 0 ation fac 0 loss, h 0 s (solar g 0 0 d) fraction for ittency fac 0 cooling 0	r June, c Feb Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require correquirer 0	luly and Mar lculated 0 sss hm 0 /atts) = (0 lculated 0 ement fo 104)m < 0 able 10b 0 ment for	August. Apr using 25 0 (100)m x 0 for appli 0 r month, 3 x (98 0) 0	May 5°C inter 0 (101)m 0 cable we 0 whole co m 0	Jun rnal temp 879.9 0.88 771.09 eather re 994.37 dwelling, 160.76 0.25 x (105)	0.93 645.44 egion, se 952.37 continue 228.36 0.25	and external and e	0 0 10) 0 Total f C = 0 Total	0 0 0 0 24 x [(10 0 = Sum(cooled a	e from T 0 0 0 0 0 03)m - (1 0 1,04) area ÷ (4 0 1,04)	able 10) 0 0 0 102)m] >	571.39	(101) (102) (103) (104) (105)

8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11)

Fabric Energy Efficiency

(99) + (108) =

46.02

(109)

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software V	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOU				
Address :	Woodwell Cottage P2, Woo	odwell Road, BRISTOL	, BS11 9XU			
Overall dwelling dime	ensions:	A (a)	A 11 1 14	,	V 1 (2)	
Ground floor		Area(m²) 39.2 (1a) x	Av. Height(n	n) (2a) = [Volume(m³)	(3a)
First floor				$(2b) = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1$](3b)
	0) ((1 b) ((1 c) ((1 d) ((1 c)) ((1 c)		2.56	(20) =	100.35	(30)
·	a)+(1b)+(1c)+(1d)+(1e)+(1	,,		_		_
Dwelling volume		(3a)+((3b)+(3c)+(3d)+(3e)+	(3n) =	202.27	(5)
2. Ventilation rate:		and a state of	4-4-1			_
	main seconda heating heating	ary other	total	_	m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	x 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ns		3	x 10 =	30	(7a)
Number of passive vents			0	x 10 =	0	(7b)
Number of flueless gas fi	res		0	x 40 =	0	(7c)
				_		_
				Air ch	anges per ho	ur _
•	ys, flues and fans = $(6a)+(6b)+$		30	÷ (5) =	0.15	(8)
Number of storeys in the	een carried out or is intended, proce ne dwelling (ns)	ea to (17), otnerwise continue	e from (9) to (16)	Г	0	(9)
Additional infiltration	io awoming (no)		ı	(9)-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 for masonry con		`	0	(11)
	resent, use the value corresponding	to the greater wall area (after		L		_
deducting areas of openii	ngs);	0.1 (sealed), else enter	0	Г	0	(12)
If no draught lobby, en	,	o. ((coa. ca), c. co c. n.c.			0	(13)
• •	s and doors draught stripped				0	(14)
Window infiltration		0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11) +	+ (12) + (13) + (15) =	. <u>[</u>	0	(16)
Air permeability value,	q50, expressed in cubic metr	es per hour per square	metre of envelo	pe area 「	4	(17)
	ity value, then $(18) = [(17) \div 20] +$				0.35	(18)
Air permeability value applie	s if a pressurisation test has been do	one or a degree air permeabil	ity is being used	L		
Number of sides sheltere	ed				1	(19)
Shelter factor		(20) = 1 - [0.075]	x (19)] =		0.92	(20)
Infiltration rate incorporat	ing shelter factor	$(21) = (18) \times (20)$	=		0.32	(21)
Infiltration rate modified f	or monthly wind speed					
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct No	v Dec		
Monthly average wind sp	eed from Table 7					

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor ((22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.41	0.4	0.39	0.35	0.35	0.31	0.31	0.3	0.32	0.35	0.36	0.38]	
Calculate effe		-	rate for t	he appli	cable ca	se	!	!	!	!	!	,	(00.)
If mechanic			andiv N (2	3h) - (23s	a) v Emy (4	aguation (N	V5)) othe	rwisa (23h) <i>- (</i> 23a)			0	(23a)
If balanced wi) = (25a)			0	(23b)
a) If balance		,	,			`		,	2h\m + (23h) v [1 – (23c)	0 - 1001	(23c)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balanc	ed mech	anical ve	ntilation	without	heat red	covery (N	л ЛV) (24k	(22)	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from	outside	l			J	
if (22b)	m < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22	b) m + 0.	5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natura									0.51				
	m = 1, th 0.58	en (24d) _{0.58}	m = (221)	0.56	0.55	(4d)m = 0.55	$0.5 + [(2)]_{0.54}$	(2b)m² x 0.55		0.57	0.57	1	(24d)
` ′	<u>.</u> !	<u> </u>		<u> </u>	l				0.56	0.57	0.57	J	(240)
Effective ai (25)m= 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.57	0.57	1	(25)
(),	1	1	1 3133					1]	. ,
3. Heat loss		•							A 37.11				A 3/ I
3. Heat loss	es and he Gros area	SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
	Gros	SS	Openin	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area e 1	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [- 0.04] = [(W/ 2.898				kJ/K (26)
ELEMENT Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r 2.07	m ² x x10 x10	W/m2 1.4 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.898 2.15				kJ/K (26) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59	x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.898 2.15 3.43				kJ/K (26) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86	x1. x1. x1. x1.	W/m2 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14				kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3	SS	Openin	gs	A ,r 2.07 1.62 2.59 0.86 2.14	x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Rooflights	Gros area ne 1 ne 2 ne 3	ss (m²)	Openin	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁ ²	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664				kJ/K (26) (27) (27) (27) (27) (27b)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1	Gros area ne 1 ne 2 ne 3 ne 4	ss (m²)	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99				(26) (27) (27) (27) (27) (27b) (28)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof	Gros area one 1 one 2 one 3 one 4 one 57.	33 2	Openin m	gs ₁₂	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42				kJ/K (26) (27) (27) (27) (27b) (28) (29) (30)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements	33 2 4 , m ²	Openin m 10.9 0 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [- 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof winder eas on both	33 2 4 , m ² ows, use e	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m ² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.14	2K = [- 0.04] = [(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66	K)	kJ/m²-	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the area	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K:	33 2 4 , m ² ows, use e sides of in = S (A x	10.9 10.9 2.66	gs p indow U-ve	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calcul	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66 0	K)	kJ/m²•	K	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Roof Total area of Party wall * for windows an ** include the are Fabric heat lo	Gros area oe 1 oe 2 oe 3 oe 4 80.8 2.1: 57. elements d roof windle eas on both oss, W/K: y Cm = S(33 2 4 , m ² ows, use e sides of in = S (A x	10.9 0 2.66	gs 1 ² Indow U-va Is and pan	A ,r 2.07 1.62 2.59 0.86 2.14 1.33 39.2 69.93 2.12 54.74 179.5 29.73 alue calculatitions	x1. x1. x1. x1. x1. x1. x1. x1. x1. x1.	W/m² 1.4 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.3)+ 0.17 0.2 0.2 0.14	2K	(W/ 2.898 2.15 3.43 1.14 2.84 1.729 6.664 13.99 0.42 7.66 0	K)	kJ/m²•	n 3.2	kJ/K (26) (27) (27) (27) (27b) (28) (29) (30) (31) (32)

		laneu calci	ulation.										
Thermal bridg	jes : S (L	x Y) cal	culated (using Ap	pendix I	K						10.48	(36)
f details of therm	0 0	are not kn	own (36) =	= 0.05 x (3	1)			(00)	(0.0)				<u> </u>
Total fabric h								` '	(36) =			57.1	(37
entilation he			·	<u> </u>					= 0.33 × (· · · · · ·	<u> </u>	1	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m= 39.01	38.79	38.57	37.57	37.38	36.5	36.5	36.34	36.84	37.38	37.76	38.16		(38
Heat transfer	coefficie	nt, W/K	•		•			(39)m	= (37) + (3	38)m		1	
39)m= 96.11	95.89	95.68	94.67	94.48	93.61	93.61	93.44	93.94	94.48	94.86	95.26		
Heat loss par	ameter (H	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	94.67	(39
40)m= 1.23	1.22	1.22	1.21	1.21	1.19	1.19	1.19	1.2	1.21	1.21	1.22		_
Number of da	ys in mo	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.21	(40
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41
												-	
4. Water hea	atina ene	rav reaui	irement:								kWh/y	ear:	
	<u> </u>									1			
ssumed occ. if TFA > 13 if TFA £ 13	.9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		43		(4
	,	ater usac	ge in litre	es per da	av Vd,av	erage =	(25 x N)	+ 36		91	.96	1	(43
Annual avera Reduce the annu	ge hot wa lal average	hot water	usage by	5% if the a	lwelling is	designed			se target o		.96]	(43
Annual avera Reduce the annu	ge hot wa lal average	hot water	usage by	5% if the a	lwelling is	designed		a water us	se target o]	(43
Annual avera Reduce the annual not more that 12	ge hot wa lal average 5 litres per p	hot water person per Mar	usage by day (all w	5% if the d vater use, I May	lwelling is not and co Jun	designed ld) Jul	to achieve Aug		se target o		.96]	(43
Annual avera Reduce the annu not more that 12	ge hot wa lal average 5 litres per l Feb in litres per	hot water person per Mar day for ea	usage by aday (all was Aprach month	5% if the divater use, I May Vd,m = fa	welling is not and co Jun ctor from	designed Id) Jul Table 1c x	Aug (43)	a water us Sep	Oct	Nov	Dec]	(43
Annual avera Reduce the annual not more that 12	ge hot wa lal average 5 litres per l Feb in litres per	hot water person per Mar	usage by day (all w	5% if the d vater use, I May	lwelling is not and co Jun	designed ld) Jul	to achieve Aug	Sep	Oct 93.79	Nov 97.47	Dec 101.15]	
Annual avera Reduce the annual not more that 12: Jan Hot water usage	ge hot wa nal average 5 litres per p Feb in litres per 97.47	hot water person per Mar day for ea	usage by a day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 86.44	Jun ctor from 7	designed ld) Jul Table 1c x	Aug (43) 86.44	Sep	93.79 Total = Su	Nov 97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	`
Annual avera Reduce the annual not more that 12. Jan Hot water usage 44)m= 101.15	ge hot wa nal average 5 litres per p Feb in litres per 97.47	hot water person per Mar day for ea	usage by a day (all was Apr ach month	5% if the divater use, I May Vd,m = fa 86.44	Jun ctor from 7	designed ld) Jul Table 1c x	Aug (43) 86.44	Sep	93.79 Total = Su	Nov 97.47 m(44) ₁₁₂ =	Dec 101.15	1103.46	`
Annual avera Reduce the annual rot more that 12. Jan Hot water usage 101.15 Energy content of	ge hot wa nal average litres per litres per gen gen gen gen gen gen gen gen gen gen	Mar day for ea	usage by a day (all was Apr ach month 90.12	5% if the orater use, I May Vd,m = fa 86.44 conthly = 4.	Jun ctor from 1 82.76	designed ld) Jul Table 1c x 82.76	Aug (43) 86.44 PTm / 3600	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27	1103.46	(44
Annual avera Reduce the annual reduce the annual reduce the annual reduced that 12: Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150	ge hot wa yel average 5 litres per yel yel yel yel yel yel yel yel yel yel	Mar day for ea 93.79 used - calc	Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44 onthly = 4.	Jun Jun ctor from 1 82.76 190 x Vd,r 97.73	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su th (see Ta 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(44
Jan dot water usage 44)m= 101.15 Energy content of 15)m= 150 instantaneous 46)m= 22.5	ge hot wa yal average 5 litres per yer yer yer yer yer yer yer yer yer y	Mar day for ea 93.79 used - calc	Apr ach month 90.12	5% if the or vater use, I May Vd,m = fa 86.44 onthly = 4.	Jun Jun ctor from 1 82.76 190 x Vd,r 97.73	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56	Aug (43) 86.44 07m / 3600 103.92	90.12 90.12 90.12 90.12 105.16	93.79 Total = Su th (see Ta 122.55	97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	Dec 101.15 = c, 1d) 145.27		(44
Annual avera Reduce the annual	ge hot water heatile 19.68	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31	Apr ach month 90.12 culated mo 118.03	5% if the director use, I May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage),	designed Id) Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tall 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
Annual avera Reduce the annual reduce the annual	ge hot wa yal average 5 litres per yer yer yer yer yer yer yer yer yer y	Mar day for ea 93.79 used - calc 135.38 ng at point 20.31	Apr ach month 90.12 culated mo 118.03 for use (no	5% if the orater use, I May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W	Jun ctor from 1 82.76 190 x Vd,r 97.73 storage), 14.66	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tall 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27		(4:
Annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 f instantaneous 46)m= 22.5 Vater storage Storage volur f community	ge hot water leading and average for litres per leading and litres per leading and litres per leading and litres per leading and litres per leading and litres leadin	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31 includin	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 Diar or Water Velling, e	Jun storage), 14.66 /WHRS not and co	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage Ulitres in	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
Annual avera Reduce the annual reduce the annual reduce the annual reduce the annual reduce that 12: Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 Finstantaneous 46)m= 22.5 Vater storage Storage volurificommunity Otherwise if reduce the annual r	ge hot wa value average 5 litres per 5 litres per 97.47 If hot water 131.19 water heating 19.68 e loss: ne (litres) heating a so stored	Mar day for ea 93.79 used - cale 135.38 ng at point 20.31 includin	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 Diar or Water Velling, e	Jun storage), 14.66 /WHRS not and co	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage Ulitres in	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame ves	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(4:
Annual avera Reduce the annual reduce the annual	ge hot way and average to litres per per per per per per per per per per	Mar Gay for ea 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water	Apr ach month 90.12 culated mo 118.03 for use (no	May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame ves	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(44 (46 (47
Annual avera Reduce the annual reduce the annual	ge hot water sper per per per per per per per per per	Mar Gay for each 135.38 135.38 10 including and no tale hot water	Apr ach month 90.12 culated mo 118.03 r of use (no 17.7 ang any so ank in dw er (this in	May Vd,m = fa 86.44 onthly = 4. 113.25 o hot water 16.99 olar or W velling, e	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame ves	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(45) (45) (46) (47)
Annual avera Reduce the annual avera Reduce the annual avera Reduce the annual avera I Jan Hot water usage 44)m= 101.15 Energy content of 45)m= 150 If instantaneous A6)m= 22.5 Vater storage Storage volur If community Otherwise if r Vater storage a) If manuface Temperature	ge hot water sper per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared lem Table	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in oss facto 2b	May Vd,m = fa 86.44 201113.25 20 hot water 16.99 20 lar or Water Welling, each or is known is know	Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage 0 litres in neous co	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47)	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0		(45) (46) (47) (48) (49)
Annual avera Reduce the annual reduce the annual	ge hot wa value average to litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared left marger.	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 ag any so ank in dw er (this in oss facto 2b	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or Water $velling, e$	Jun ctor from 7 82.76 82.76 97.73 14.66 WHRS nter 110 nstantar wn (kWł	designed des	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79		(444 (45) (46) (47) (48) (49)
Annual avera Reduce the annual reduce the annual	ge hot wa yal average 5 litres per l Feb in litres per 97.47 f hot water 131.19 water heatil 19.68 e loss: ne (litres) heating a no stored e loss: sturer's de factor fro om water sturer's de rage loss	Mar day for ea 93.79 used - calc 135.38 ng at point 20.31 includin and no ta hot water eclared le storage eclared of factor fr	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in coss facto 2b cylinder l com Table	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0		(44 (45 (46 (47 (48 (49 (50
Annual avera Reduce the annual reduce the annual	ge hot water sper per per per per per per per per per	Mar 93.79 used - calc 135.38 ng at point 20.31 including and no talchot water eclared left actor fractor fractor fractor fractor fractor security and no talchot water eclared contactor fr	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 and any so ank in dw er (this in coss facto 2b cylinder l com Table	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(44 (45 (46 (47 (48 (49 (50 (51
Annual avera Reduce the annual reduce the annual	ge hot way and average to litres per per per per per per per per per per	Mar 93.79 used - calc 135.38 135.38 including and no talchot water eclared left m Table storage eclared of factor from the section of the	Apr ach month 90.12 culated mo 118.03 for use (no 17.7 ang any so ank in dw er (this in coss facto 2b cylinder I com Tabl con 4.3	5% if the orater use, I May $Vd,m = fa$ 86.44 $0nthly = 4$. 113.25 0 hot water 16.99 colar or W yelling, each or is known as fact	Jun ctor from 182.76 190 x Vd,r 97.73 14.66 /WHRS nter 110 nstantar wn (kWh	Jul Table 1c x 82.76 m x nm x L 90.56 enter 0 in 13.58 storage litres in neous con/day):	Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	90.12 90.12 0 kWh/mor 105.16 15.77 ame vest	93.79 Total = Sunth (see Tail 122.55 Total = Sunth 18.38	Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	Dec 101.15 = c, 1d) 145.27 = 21.79 0 0 0 0 0		(43 (44 (46 (47 (48 (49 (50 (51 (52 (53

Energy lost fr	om wateı	r storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0]	(54)
Enter (50) or	(54) in (5	55)									0]	(55)
Water storage	e loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(56)
If cylinder contain	ns dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primary circu	it loss (ar	nnual) fro	om Table	e 3							0]	(58)
Primary circu	•	,			(59)m = ((58) ÷ 36	65 × (41)	m				-	
(modified b	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heati	ng and a	cylinde	r thermo	stat)		_	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m= 12.64	11.42	12.64	12.23	12.64	12.23	12.64	12.64	12.23	12.64	12.23	12.64]	(61)
Total heat red	quired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	(62)
Solar DHW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	y) (enter '0	if no sola	r contribut	ion to wate	er heating)	4	
(add addition	al lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
FHRS 0	0	0	0	0	0	0	0	0	0	0	0	-	(63) (G2)
Output from v	vater hea	iter											
(64)m= 162.64	142.61	148.02	130.26	125.89	109.96	103.2	116.56	117.39	135.19	146.01	157.91]	
	•					!	Outp	out from w	ater heate	r (annual)	12	1595.65	(64)
Heat gains fro	om water	heating	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	ı + (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m	·]	_
(65)m= 53.04	46.48	48.17	42.3	40.82	35.55	33.27	37.71	38.02	43.91	47.54	51.46]	(65)
include (57)m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal of	ains (see	e Table 5	and 5a):									
Metabolic gai				,									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m= 121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	121.59	1	(66)
Lighting gains	s (calcula	ted in A	ppendix	L. equat	ion L9 o	r L9a). a	lso see	Lable 5	!	<u>I</u>	!	J	
(67)m= 19.76	17.55	14.27	10.8	8.08	6.82	7.37	9.58	12.85	16.32	19.05	20.31	1	(67)
Appliances ga	ains (calc	ulated ir	. Append	dix L. ea	uation L	13 or L1	3a), also	see Ta	ble 5		<u>!</u>	J	
(68)m= 216.06	- ` 	212.66	200.63	185.44	171.17	161.64	159.4	165.05	177.08	192.26	206.53	1	(68)
Cooking gain	s (calcula	ted in A	nnendix	I equat	tion I 15	or I 15a) also se	ee Table	1			J	
(69)m= 35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16	35.16]	(69)
Pumps and fa			<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>		<u> </u>	J	
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3]	(70)
Losses e.g. e	vaporatio	n (nega	tive valu	es) (Tab	le 5)					<u> </u>	<u> </u>	J	
(71)m= -97.27		-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27	-97.27]	(71)
Water heating			I	I						l	1	J	
(72)m= 71.29	69.16	64.75	58.75	54.86	49.38	44.72	50.69	52.81	59.02	66.03	69.17]	(72)
Total interna				L	ļ	<u> </u>	<u> </u>		(70)m + (7		ļ	J	-
(73)m= 369.58	-	354.15	332.66	310.86	289.85	276.2	282.14	293.19	314.89	339.81	358.48]	(73)
(2/	1	1	1	1	1 ======	I =: •:=	I ===···		1	1	1	J	•

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orienta	tion:	Access Facto Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.62	x	10.63	x	0.63	x	0.8	=	12.03	(74)
North	0.9x	0.77	X	1.62	X	20.32	x	0.63	x	0.8	=	23	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	x	0.8	=	39.08	(74)
North	0.9x	0.77	x	1.62	x	55.46	x	0.63	x	0.8	=	62.77	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	x	0.8	=	84.55	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.8	=	90.51	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	x	0.8	=	84.51	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.8	=	67.05	(74)
North	0.9x	0.77	x	1.62	X	41.52	X	0.63	X	0.8	=	46.98	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.8	=	27.37	(74)
North	0.9x	0.77	X	1.62	X	13.12	X	0.63	X	0.8	=	14.84	(74)
North	0.9x	0.77	x	1.62	X	8.86	X	0.63	X	0.8	=	10.03	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.8	=	17.77	(76)
East	0.9x	0.77	x	0.86	X	19.64	X	0.63	X	0.8	=	5.9	(76)
East	0.9x	0.77	x	2.59	X	38.42	X	0.63	X	0.8	=	34.76	(76)
East	0.9x	0.77	x	0.86	X	38.42	x	0.63	x	0.8	=	11.54	(76)
East	0.9x	0.77	X	2.59	X	63.27	X	0.63	X	0.8	=	57.24	(76)
East	0.9x	0.77	x	0.86	X	63.27	X	0.63	X	0.8	=	19.01	(76)
East	0.9x	0.77	x	2.59	X	92.28	x	0.63	x	0.8	=	83.48	(76)
East	0.9x	0.77	x	0.86	X	92.28	X	0.63	X	0.8	=	27.72	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.8	=	102.31	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	X	0.8	=	33.97	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.8	=	104.73	(76)
East	0.9x	0.77	x	0.86	x	115.77	x	0.63	x	0.8	=	34.77	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.8	=	99.71	(76)
East	0.9x	0.77	x	0.86	x	110.22	x	0.63	x	0.8	=	33.11	(76)
East	0.9x	0.77	x	2.59	X	94.68	x	0.63	x	0.8	=	85.65	(76)
East	0.9x	0.77	x	0.86	x	94.68	x	0.63	X	0.8	=	28.44	(76)
East	0.9x	0.77	x	2.59	X	73.59	x	0.63	x	0.8	=	66.57	(76)
East	0.9x	0.77	x	0.86	X	73.59	x	0.63	X	0.8	=	22.1	(76)
East	0.9x	0.77	x	2.59	x	45.59	x	0.63	X	0.8	=	41.24	(76)
East	0.9x	0.77	x	0.86	X	45.59	x	0.63	x	0.8	=	13.69	(76)
East	0.9x	0.77	x	2.59	x	24.49	x	0.63	x	0.8	=	22.15	(76)
East	0.9x	0.77	x	0.86	x	24.49	x	0.63	x	0.8	=	7.36	(76)
East	0.9x	0.77	x	2.59	x	16.15	x	0.63	x	0.8	=	14.61	(76)
East	0.9x	0.77	x	0.86	X	16.15	x	0.63	x	0.8	=	4.85	(76)

South	0.9x	0.77		X	2.1	4	x	4	6.75	X	0.	63	x	0.8		= [34.94	(78)
South	0.9x	0.77		x	2.1	4	x	7	6.57	X	0.	63	x	0.8		= [57.23	(78)
South	0.9x	0.77		x	2.1	4	x	9	7.53	X	0.	63	x	0.8		= [72.9	(78)
South	0.9x	0.77		x	2.1	4	x	1	10.23	X	0.	63	x	0.8		= [82.39	(78)
South	0.9x	0.77		x	2.1	4	х	1	14.87	X	0.	63	х	0.8		= [85.86	(78)
South	0.9x	0.77		x	2.1	4	x	1	10.55	X	0.	63	X	0.8		= [82.63	(78)
South	0.9x	0.77		x	2.1	4	х	10	08.01	X	0.	63	X	0.8		= [80.73	(78)
South	0.9x	0.77		x	2.1	4	х	10	04.89	X	0.	63	х	0.8		= [78.4	(78)
South	0.9x	0.77		x	2.1	4	x	10	01.89	X	0.	63	x	0.8		= [76.15	(78)
South	0.9x	0.77		x	2.1	4	x	8	2.59	X	0.	63	x	0.8		= [61.73	(78)
South	0.9x	0.77		x	2.1	4	x	5	5.42	X	0.	63	x	0.8		= [41.42	(78)
South	0.9x	0.77		x	2.1	4	x	4	40.4	X	0.	63	x	0.8		= [30.2	(78)
Rooflights	0.9x	1		x	1.3	3	x	4	7.01	X	0.	63	x	0.8		= [56.72	(82)
Rooflights	0.9x	1		x	1.3	3	x	8	33.9	X	0.	63	x	0.8		= [101.23	(82)
Rooflights	0.9x	1		x	1.3	3	x	1:	22.73	X	0.	63	x	0.8		= [148.08	(82)
Rooflights	0.9x	1		x	1.3	3	x	10	61.74	X	0.	63	x	0.8		= [195.15	(82)
Rooflights	0.9x	1		x	1.3	3	x	18	87.38	X	0.	63	X	0.8		= [226.09	(82)
Rooflights	0.9x	1		x	1.3	3	x	18	88.06	X	0.	63	X	0.8		= [226.91	(82)
Rooflights	0.9x	1		x	1.3	3	x	18	80.51	X	0.	63	x	0.8		= [217.8	(82)
Rooflights	0.9x	1		x	1.3	3	x	10	61.54	X	0.	63	X	0.8		= [194.91	(82)
Rooflights	0.9x	1		x	1.3	3	x	1	36.5	X	0.	63	X	0.8		= [164.7	(82)
Rooflights	0.9x	1		x	1.3	3	x	9	5.08	X	0.	63	x	0.8		= [114.72	(82)
Rooflights	0.9x	1		x	1.3	3	x	5	7.06	X	0.	63	X	0.8		= [68.85	(82)
Rooflights	0.9x	1		x	1.3	3	x	3	9.72	X	0.	63	X	0.8		= [47.92	(82)
Solar gair										_	n = Sum			_		_		
(83)m= 12										454	.44 3	76.51	258.70	154.62	107.6	61		(83)
Total gair		1			<u> </u>	· ,			1									(0.4)
(84)m= 49	96.95	595.24	690.	.45	784.17	843.63	3 8	329.4	792.06	736	.58 6	69.7	573.6	494.43	466.	1		(84)
7. Mean					Ĭ													
Tempera		•		•			•			ble 9	, Th1 (°C)					21	(85)
Utilisatio	n fac	tor for g	ains	for li	ving are		Ť	ee Ta	ble 9a)		-				i	_		
_	Jan	Feb	M	$\overline{}$	Apr	Ma	+	Jun	Jul	_		Sep	Oct	_	De	С		4
(86)m=	1	0.99	0.9	8	0.94	0.85		0.67	0.51	0.5	57 (0.82	0.97	0.99	1			(86)
Mean in	terna	l temper	ature	in li	ving are	ea T1	(follo	w ste	ps 3 to 7	7 in T	able 9	c)						
(87)m= 1	9.69	19.87	20.	16	20.52	20.8	2	20.95	20.99	20.	98 2	0.88	20.49	20.02	19.66	6		(87)
Tempera	ature	during h	eatir	ng pe	eriods ir	rest o	of dw	elling/	from Ta	able 9	9, Th2	(°C)						
(88)m=	19.9	19.9	19.	.9	19.91	19.92	1	9.92	19.92	19.	93 1	9.92	19.92	19.91	19.9°	1		(88)
Utilisatio	on fac	tor for g	ains	for re	est of d	welling	, h2	,m (se	e Table	9a)	<u> </u>	· · ·						
(89)m=	1	0.99	0.9	-	0.92	0.79	$\overline{}$	0.58	0.39	0.4	14 (0.74	0.95	0.99	1			(89)
Mean in	terna	l temper	ature	in t	he rest	of dwe	llina	T2 (fc	ollow ste	eps 3	to 7 ir	n Table	9c)	•				
		L					.9	ν		,			- /					

	1				1	l							(00)
(90)m= 18.16	18.43	18.85	19.36	19.73	19.89	19.92	19.92	19.83	19.34	18.65	18.12		(90)
								ı	LA = LIVIN	g area ÷ (4	+) =	0.23	(91)
Mean interna	ıl temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m= 18.52	18.77	19.16	19.63	19.98	20.14	20.17	20.17	20.07	19.61	18.97	18.48		(92)
Apply adjustr	ment to t	he mean	interna	temper	ature fro	m Table	4e, whe	re appro	priate				
(93)m= 18.37	18.62	19.01	19.48	19.83	19.99	20.02	20.02	19.92	19.46	18.82	18.33		(93)
8. Space hea	iting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	L		•			J 311	1 119						
(94)m= 0.99	0.99	0.97	0.91	0.79	0.59	0.4	0.45	0.74	0.94	0.99	1		(94)
Useful gains,	hmGm	, W = (9 ⁴	4)m x (84	4)m	ı								
(95)m= 494.31	587.84	668.62	715.59	664.63	486.21	317.96	334.07	493.16	541.06	488.89	464.24		(95)
Monthly aver	age exte	ernal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat	e for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(<mark>97)</mark> m= 1352.22	1315.64	1196.57	1001.74	768.2	504.73	320.28	338.19	547.11	836.81	1112.17	1345.98		(97)
Space heating	g require	ement fo	r each n	nonth, k\	Nh/mon	th = 0.02	24 x [(97)	m – (95)m] x (4	1)m			
(98)m= 638.29	489.08	392.79	206.03	77.05	0	0	0	0	220.04	448.76	656.02		
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3128.06	(98)
Space heating	ig require	ement in	kWh/m²	²/year								39.9	(99)
·	• •				vstems i	ncludina	micro-C	HP)				39.9	(99)
9a. Energy re	quiremer				ystems i	ncluding	micro-C	HP)				39.9	(99)
·	quiremer	nts – Indi	vidual h	eating s		_	micro-C	CHP)				39.9	
9a. Energy red Space heati	quiremer ng: pace hea	nts – Indi	vidual h	eating s		system	micro-C (202) = 1 -						(20
Space heating Fraction of space heating Fraction of space heating Fraction of space heating fraction of space heating fraction of space heating fraction fraction of space heating fraction frac	quiremerng: pace head	nts – Indi at from se at from m	vidual h econdary	eating sy y/supple em(s)		system		- (201) =	(203)] =			0	(20)
9a. Energy reconstruction of space heating fraction of space fraction of to	quirements ng: pace head pace head pace head patal heati	nts — Indi at from se at from m ng from i	ividual h econdary nain syst main sys	eating sy/supple em(s) stem 1		system	(202) = 1 -	- (201) =	(203)] =			0 1 1	(202
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of	quirement ng: pace hea pace hea patal heati main spa	nts – Indi at from se at from m ng from l ace heati	vidual hecondary nain systemain syst	eating sy/supple em(s) stem 1	mentary	system	(202) = 1 -	- (201) =	(203)] =			0 1 1 89.9	(20 ²) (20 ²) (20 ⁴) (20 ⁶)
9a. Energy red Space heati Fraction of space fraction of to Efficiency of	quirement ng: pace hea pace hea patal heati main spa seconda	nts – Indi	econdary nain systemain systemain systemain systematory	eating syysupple em(s) stem 1 em 1	mentary g system	system	(202) = 1 - (204) = (2	- (201) = 02) × [1 –				0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of Efficiency of Jan	quirement ng: pace hea pace hea patal heati main spa seconda	nts – Indi at from se at from m ng from a ace heati ary/supple Mar	vidual hecondary nain systemain systementar Apr	eating sy/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 -	- (201) =	(203)] =	Nov	Dec	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recomplete Space heating Fraction of space fraction of to Efficiency of Efficiency of Space heating	quirement ng: pace heat to tal heat it main sparseconda Feb	nts – Indi at from se at from m ng from n ace heati ary/supple Mar ement (c	econdary nain systemain systemain systementar Apr	eating syysupple em(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 -	Oct			0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recompany space heating Fraction of space fraction of the Efficiency of Efficiency of Jan	quirement ng: pace hea pace hea patal heati main spa seconda	nts – Indi at from se at from m ng from a ace heati ary/supple Mar	vidual hecondary nain systemain systementar Apr	eating sy/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1 - (204) = (2	- (201) = 02) × [1 –		Nov 448.76	Dec 656.02	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Efficiency of Space heating 638.29	quirement of the property of t	at from seat from mace heating/supplement (compared)	econdary nain systemain systementar Apr alculatee	eating syy/supplem(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 -	Oct		656.02	0 1 1 89.9	(20 ²) (20 ²) (20 ⁶) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Efficiency of Space heating 638.29	quirement ng: pace heat pace heat pace heat patal heat it main spates secondar rebuire require 489.08	at from seat from mace heating/supplement (compared)	econdary nain systemain systementar Apr alculatee	eating syy/supplem(s) stem 1 em 1 y heating May d above	mentary g system Jun	system 1, % Jul	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76 499.18	656.02 729.72	0 1 1 89.9	(20 ²) (20 ²) (20 ⁸) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211) m = {[(98)]	quirement of the property of t	at from so at from m at from m ace heati ary/supple Mar ement (c 392.79	econdary nain systemain systementar Apr alculated 206.03 00 ÷ (20	eating sy/supple em(s) stem 1 em 1 May dabove 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76	656.02 729.72	0 1 1 89.9	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(986) 710]	quirement of the property of t	at from seat from mace heating/supplement (compared as 192.79) 1436.92	econdary nain systemain systematrar Apr alculated 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 y heating May d above 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76	448.76 499.18	656.02 729.72	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) m x (20) modes]	quirement ng: pace heat pa	at from so at from m ng from m ace heati ary/supplo Mar ement (c 392.79 04)] } x 1 436.92	econdary nain systemain systematar Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2	- (201) = 02) × [1 - Sep 0	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	729.72 =	0 1 1 89.9 0 kWh/ye	(20 ²) (20 ²) (20 ⁸) (20 ⁸) ar
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) m x (20) modes]	quirement of the property of t	at from seat from mace heating/supplement (compared as 192.79) 1436.92	econdary nain systemain systematrar Apr alculated 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 y heating May d above 77.05	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space fraction of the Efficiency of Ef	quirement ng: pace heat pa	at from so at from m ng from m ace heati ary/supplo Mar ement (c 392.79 04)] } x 1 436.92	econdary nain systemain systematar Apr alculater 206.03 00 ÷ (20 229.17	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98)	quirement pace heat pace h	at from seat from mace heating/supplement (c 392.79 04)] } x 1 436.92 econdary 00 ÷ (20 0	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating syy/supple em(s) stem 1 em 1 y heating dabove 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(20°) (20°) (20°) (20°) (20°) (20°) (21°)
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Efficiency of Space heating (211)m = {[(98) m x (215)m= 0]} Water heating Output from we	quirement ng: pace heat pa	at from so at from mace heating mar lement (c 392.79 lecondary 00 ÷ (20 lecondary on the following states of the following sta	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating sy/supple em(s) stem 1 em 1 y heating May d above 77.05 06) 85.71 fmonth 0	g system Jun 0	system n, % Jul 0	(202) = 1 · (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 = 0	0 1 1 89.9 0 kWh/ye	(201) (202) (204) (206) (208) ar
9a. Energy recomplete Space heating Fraction of space heating fraction of to Efficiency of Efficiency of Efficiency of Space heating 638.29 (211)m = {[(98) 710} Space heating {[(98) m x (20) 215)m=0} Water heating	quirement ng: pace heat pa	at from so at from mace heating/supplement (c 392.79) 436.92 econdary 00 ÷ (20 0)	econdary nain systemain systemain systementar Apr alculated 206.03 00 ÷ (20 229.17 y), kWh/8) 0	eating syy/supple em(s) stem 1 em 1 y heating dabove 77.05 06) 85.71	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	- (201) = 02) × [1 - Sep 0 I (kWh/yea	Oct 220.04 244.76 ar) =Sum(2	448.76 499.18 211) _{15,1012}	656.02 729.72 =	0 1 1 89.9 0 kWh/ye	(99) (201 (202 (204 (208 (208 ar (211)

(217)m= 89.36 89.3 8	39.17 88.87	88.27	87.3	87.3	87.3	87.3	88.89	89.25	89.38		(217)
Fuel for water heating, kV											
(219) m = (64) m x $100 \div$ (219)m= 182.01 159.7 160	(217)m 65.99 146.57	142.62	125.96	118.21	133.51	134.47	152.09	163.6	176.67		
(1)						I = Sum(2	19a) ₁₁₂ =		<u> </u>	1801.39	(219)
Annual totals							k۱	Nh/year		kWh/year	J` ′
Space heating fuel used,	main system	1								3479.49	
Water heating fuel used										1801.39	
Electricity for pumps, fans	s and electric l	keep-ho	t						,		_
central heating pump:									30		(230c)
boiler with a fan-assisted	d flue								45		(230e)
Total electricity for the abo	ove, kWh/yea	r			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting										348.92	(232)
Electricity generated by P	PVs									-1162.06	(233)
Total delivered energy for	r all uses (211)(221)	+ (231)	+ (232).	(237b)	=				4630.04	(338)
12a. CO2 emissions – Ir	ndividual heati	ng syste	ems inclu	uding mi	cro-CHF						
				ergy /h/year			Emiss kg CO2	ion fac 2/kWh	tor	Emissions kg CO2/yea	ır
Space heating (main syst	tem 1)		(211	I) x			0.2	16	=	751.57	(261)
Space heating (secondary	y)		(215	5) x			0.5	19	=	0	(263)
Water heating			(219	9) x			0.2	16	=	389.1	(264)
Space and water heating			(261	1) + (262)	+ (263) + (264) =				1140.67	(265)
Electricity for pumps, fans	s and electric l	keep-ho	t (231	I) x			0.5	19	=	38.93	(267)
Electricity for lighting			(232	2) x			0.5	19	=	181.09	(268)
Energy saving/generation	n technologies										

Item 1

Total CO2, kg/year

El rating (section 14)

Dwelling CO2 Emission Rate

(269)

(272)

(273)

(274)

-603.11

757.57

9.66

92

0.519

sum of (265)...(271) =

 $(272) \div (4) =$

		User Details:				
Assessor Name:	Jemma Mclaughlan	Stroma Nu	mber:	STRO	030065	
Software Name:	Stroma FSAP 2012	Software \	ersion:	Versio	n: 1.0.5.25	
		Property Address: HOL	JSE E - FINAL			
Address :	Woodwell Cottage P2, Wo	odwell Road, BRISTOL	, BS11 9XU			
1. Overall dwelling dime	ensions:					
Ground floor		Area(m²) 39.2 (1a)	Av. Height(m) (2a) =	Volume(m³) (3a)
				-	101.92	Ⅎ``
First floor		39.2 (1b)	2.56	(2b) =	100.35	(3b)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n) 78.4 (4)				
Dwelling volume		(3a)+	(3b)+(3c)+(3d)+(3e)+.	(3n) =	202.27	(5)
2. Ventilation rate:						
	main second heating heating		total		m³ per hou	r
Number of chimneys	0 + 0	+ 0 =	0	× 40 =	0	(6a)
Number of open flues	0 + 0	+ 0 =	0	x 20 =	0	(6b)
Number of intermittent fa	ins		3)	x 10 =	30	(7a)
Number of passive vents	,		0 ,	x 10 =	0	(7b)
Number of flueless gas f	ires		0 >	× 40 =	0	(7c)
				Air ch	anges per ho	ur
	ys, flues and fans = $(6a)+(6b)$ -		30	÷ (5) =	0.15	(8)
	peen carried out or is intended, proc	eed to (17), otherwise continu	e from (9) to (16)			7.00
Number of storeys in t Additional infiltration	ne dweiling (ns)		1/9	9)-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame	or 0.35 for masonry cor		5) 1]XO.1 =	0	(11)
if both types of wall are p	resent, use the value corresponding					
deducting areas of openi	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or	0.1 (spaled) also enter	0		0	(12)
If no draught lobby, en	,	o. i (sealed), else elitei	O .		0	(13)
• • • • • • • • • • • • • • • • • • • •	s and doors draught stripped				0	(14)
Window infiltration	0	0.25 - [0.2 x (14)	÷ 100] =		0	(15)
Infiltration rate		(8) + (10) + (11)	+ (12) + (13) + (15) =		0	(16)
• •	q50, expressed in cubic met		metre of envelop	e area	5	(17)
	lity value, then $(18) = [(17) \div 20]$				0.4	(18)
Air permeability value applie Number of sides sheltere	es if a pressurisation test has been o	lone or a degree air permeabl	lity is being used		1	(19)
Shelter factor	,u	(20) = 1 - [0.075	x (19)] =		0.92	(20)
Infiltration rate incorpora	ting shelter factor	$(21) = (18) \times (20)$	=		0.37	(21)
Infiltration rate modified f	or monthly wind speed					_
Jan Feb	Mar Apr May Jun	Jul Aug Se	p Oct Nov	Dec		

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

(22)m=

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.41	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		-	rate for t	he appli	cable ca	se	-	-	-	-	-		(23a)
If exhaust air h			endix N. (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) . othe	rwise (23b) = (23a)			0	(23a)
If balanced wit									, (,			0	(23c)
a) If balance	ed mecha	anical ve	ntilation	with he	at recov	· erv (MVI	HR) (24a	a)m = (22	2b)m + (23b) x [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	иV) (24t	m = (22)	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	house ex	tract ver	tilation o	or positiv	e input	ventilatio	n from o	outside		•	•	•	
if (22b)	m < 0.5 ×	(23b), t	hen (24)	c) = (23b); other	wise (24	c) = (22k	o) m + 0.	5 × (23b) 		1	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural	ventilation								0.51				
(24d)m = 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.51	0.59	0.59	1	(24d)
Effective air					l	l			0.00	1 0.00	0.00	J	,
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(25)
3. Heat losse	oc and he	nat loce r	paramete	or:									
ELEMENT	Gros		Openin		Net Ar	ea	U-val	ue	AXU		k-value	<u>.</u>	ΑΧk
	area	_	m	-	A ,r		W/m2		(W/I	K)	kJ/m²-l		kJ/K
Doors					2.07	Х	1	=	2.07				(26)
Windows Typ	e 1				1.62	x1,	/[1/(1.4)+	0.04] =	2.15				(27)
Windows Typ	e 2				2.59	x1,	/[1/(1.4)+	0.04] =	3.43				(27)
Windows Typ	e 3				0.86	x1,	/[1/(1.4)+	0.04] =	1.14				(27)
Windows Typ	e 4				2.14	x1,	/[1/(1.4)+	0.04] =	2.84				(27)
Rooflights					1.33	x1,	/[1/(1.7) +	0.04] =	2.261				(27b)
Floor					39.2	X	0.13	= [5.096				(28)
Walls Type1	80.8	33	10.9		69.93	3 x	0.18	= [12.59				(29)
Walls Type2	2.12	2	0		2.12	х	0.18	= [0.38				(29)
Daaf		4	2.66	;	54.74	, x	0.13	= [7.12				(30)
Roof	57.4	T											
Total area of					179.5	5							(31)
					179.5 29.73	=	0	= [0				(31)
Total area of o	elements	, m² ows, use e	ffective wi		29.73	x	L			as given in	paragraph	3.2	``
Total area of o	elements d roof winder eas on both	, m² ows, use e sides of ir	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu		as given in	paragraph		(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	L	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)
Total area of o	elements d roof winder eas on both ess, W/K: Cm = S(ows, use e sides of ir = S (A x (A x k)	iffective wi ternal wali U)	ls and par	29.73 alue calcul titions	X ated using	formula 1	/[(1/U-valu) + (32) = ((28)	ie)+0.04] a	2) + (32a).			(32)
Total area of of Party wall * for windows and ** include the are Fabric heat lo	elements d roof winder eas on both	ows, use e sides of ir = S (A x	ffective wi		29.73	x ated using	formula 1	 /[(1/U-valu) + (32) =	ie)+0.04] a			43.19	(32)

an be use	ea instea						,							(26)
Thermal	bridge	s : S (L	x Y) cal	culated i	using Ap	pendix I	1						10.55	(36)
		0 0	are not kn	own (36) =	= 0.05 x (3	1)			(0.0)	(2.5)				_
Total fab									` '	(36) =			53.74	(37
entilatio/			alculated				<u> </u>				25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(0.0
38)m=	40.74	40.45	40.17	38.86	38.61	37.46	37.46	37.25	37.91	38.61	39.11	39.63		(38
Heat tran	nsfer c	oefficier	nt, W/K			T		1	(39)m	= (37) + (3	38)m	ı	1	
39)m= 9	94.48	94.19	93.91	92.6	92.35	91.2	91.2	90.99	91.64	92.35	92.85	93.37		— ,
leat loss	s parar	meter (H	ILP), W/	m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	92.59	(39
40)m=	1.21	1.2	1.2	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		_
Number	of day:	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.18	(40
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
													-	
4. Wate	er heati	ing ener	gy requi	rement:								kWh/y	ear:	
			k I											
if TFA if TFA	> 13.9 £ 13.9), N = 1), N = 1	+ 1.76 x)2)] + 0.(ΓFA -13.	.9)	43	1	
if TFA if TFA annual a Reduce the	> 13.9 £ 13.9 average e annual), N = 1), N = 1 e hot wa l average	+ 1.76 x ater usag	ge in litre usage by	es per da	ay Vd,av Iwelling is	erage = designed)2)] + 0.0 (25 x N) to achieve	+ 36		91	.96]	•
if TFA if TFA innual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		91]	·
if TFA if TFA Annual a Reduce the of more th	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96]	·
if TFA if TFA Annual a Reduce the ot more the	> 13.9 £ 13.9 average e annual hat 125 l	o, N = 1 o, N = 1 e hot wa l average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, f	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 91	.96		•
if TFA if TFA Annual a Reduce the not more the dot water to	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43)	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the not more th dot water the 44)m= 1	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l	N = 1 N = 1 e hot was l average litres per p Feb litres per 97.47	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 90.12	es per da 5% if the d vater use, I May Vd,m = fac 86.44	ay Vd,av lwelling is not and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 82.76	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12	Oct 93.79 Total = Su	9) 91 Nov 97.47 m(44) ₁₁₂ =	.96 Dec 101.15	1103.46	(43
if TFA if TFA Annual a Reduce the lot more the Hot water the 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) Nov 97.47 m(44)12 = ables 1b, 1	.96 Dec 101.15 c, 1d) 145.27	1103.46	(4:
if TFA if TFA Annual a Reduce the not more the Hot water to 44)m= 1 Energy cor 45)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(43
if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= instantan 46)m=	> 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 ntent of l 150 neous wa	P, N = 1 P, N = 1 Pe hot was I average litres per p Peb Politres per 97.47 hot water 131.19 ater heatin 19.68	+ 1.76 x ater usag hot water person per Mar day for ea 93.79 used - calc 135.38	ge in litre usage by day (all w Apr ach month 90.12 culated me	es per da 5% if the da 5% is the da 5% if the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% if the da 5% is the da 5% in the da 5% is the da 5% in the da 5% in the da 5% in the da 5% in the da 5% is the da 5% in th	ay Vd,av lwelling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92	+ 36 a water us Sep 90.12 0 kWh/mor 105.16	Oct 93.79 Total = Su 122.55	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77	.96 Dec 101.15 c, 1d) 145.27		(44
if TFA if TFA if TFA annual a Reduce the ot more th lot water th the standard stan	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa	P, N = 1 P, N = 1 P hot was a verage litres per p Peb litres per p 97.47 Phot water 131.19 Pater heatin 19.68	+ 1.76 x ater usage hot water person per Mar day for ear 93.79 used - calce 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no	es per da 5% if the da sater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99	ay Vd,av lwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA Annual a Reduce the bot more the dot water the 44)m= 1 Energy cor 45)m= finstantan 46)m= Vater sto	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 l Jan usage in 101.15 150 150 meous wa 22.5 orage volume	Post N = 1 Post N = 1	ter usaghot water berson per Mar day for ea 93.79 used - calcate 135.38 and at point 20.31	ge in litre usage by day (all w Apr ach month 90.12 culated me 118.03 of use (no	es per da 5% if the da 5% if th	ay Vd,av Iwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 storage),	erage = designed and ld) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 0 to (61) 15.77	Oct 93.79 Total = Su 122.55 Total = Su 18.38	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27		(44)
if TFA if TFA if TFA Annual a Reduce the lot more th dot water the start and the start and the finstantan 46)m= Vater start Storage of the start and the finstantan 46)m= Vater start f community	> 13.9 £ 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 Intent of li 150 Ineous wa 22.5 Iorage volume unity he	P, N = 1 P,	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(4:
if TFA if TFA if TFA Annual a Reduce the ot more if dot water i 44)m= 1 Energy cor 45)m= Vater sto Storage value Communication	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the control	+ 1.76 x ater usage hot water person per Mar day for ea 93.79 used - calc 135.38 ag at point 20.31 includin nd no ta	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 82.76 190 x Vd,r 97.73 r storage), 14.66 IWHRS	erage = designed (d) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(44)
if TFA if TFA if TFA Annual a Reduce the not more the Hot water the 44)m= 1 Energy cor 45)m= Vater sto Storage of Communication Otherwis Vater sto	> 13.9 £	P, N = 1 P, N = 1 P hot was I average litres per p P hot water 131.19 P hot water 131.19 P hot water 19.68 P litres P cating a stored P stored P stored P stored P stored	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so nk in dw er (this in	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS nter 110	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45)
if TFA if TFA if TFA Annual a Reduce the not more if that water if 44)m= 1 Energy cor 45)m= Vater sta Storage if from to the rwis Vater sta a) If mar	> 13.9 £ 13.9 £ 13.9 average e annual hat 125 li usage in 101.15 150 150 150 150 150 150 150 150 150 1	Power of the state	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 including the market water the m	Apr Apr Ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in	es per da 5% if the d vater use, f May Vd,m = fac 86.44 2011 13.25 20 hot water 16.99 Color or W velling, e	ay Vd,av Iwelling is not and co Jun ctor from 82.76 190 x Vd,r 97.73 r storage), 14.66 /WHRS nter 110	erage = designed (d) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vesi	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79		(45) (45) (46) (47)
if TFA Annual a Reduce the not more the state of the stat	> 13.9 £	Power of the sector from water	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared lem Table storage	Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the d rater use, t May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Dolar or W relling, e acludes in or is known	ay Vd,av welling is not and co Jun ctor from 7 82.76 190 x Vd,r 97.73 storage), 14.66 /WHRS nter 110 nstantar	erage = designed and ld) Jul Table 1c x 82.76 90.56 enter 0 in 13.58 storage litres in neous con/day):	(25 x N) to achieve Aug (43) 86.44 DTm / 3600 103.92 boxes (46) 15.59 within sa (47)	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(48)
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second of t	ter usage hot water overson per Mar day for ear 93.79 used - calce 135.38 ing at point 20.31 including and no talce the water storage eclared of factor fr	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, h May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Collar or W velling, e acludes in por is knowear	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(44 (45 (46 (47 (48 (49 (50
if TFA if TFA if TFA Annual a Reduce the not more tf Hot water t 44)m= 1 Energy cor 45)m= Water sto Storage s Formula Otherwis Water sto a) If mar Energy lo b) If mar Hot water	> 13.9 £	Polynomials of the second sector from water sectors of the sectors	ter usage hot water person per Mar day for ear 93.79 used - calc 135.38 ag at point 20.31 includin nd no talc hot water eclared less torage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 90.12 culated mo 118.03 of use (no 17.7 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, f May Vd,m = fac 86.44 201113.25 20 hot water 16.99 Colar or W relling, e reludes in or is known ear coss factor	ay Vd,av welling is not and co	erage = designed id) Jul Table 1c x 82.76 m x nm x E 90.56 enter 0 in 13.58 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 86.44 07m / 3600 103.92 boxes (46) 15.59 within sa (47) ombi boil	+ 36 a water us Sep 90.12 0 kWh/mor 105.16 15.77 ame vess ers) ente	Oct 93.79 Total = Su 122.55 Total = Su 18.38 sel	9) 91 Nov 97.47 m(44) ₁₁₂ = ables 1b, 1 133.77 m(45) ₁₁₂ = 20.07	.96 Dec 101.15 c, 1d) 145.27 21.79 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

	/ lost fro	m water	storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0	(54))
•		(54) in (5	_	,								0	(55)	
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0	(56))
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0	(57))
Primar	y circuit	loss (ar	nual) fro	om Table	e 3							0	(58))
Primar	y circuit	loss cal	culated	for each	month (59)m = 0	(58) ÷ 36	55 × (41)	m					
(mod	dified by	factor f	rom Tab	le H5 if t	here is	solar wat	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0	(59))
Combi	loss ca	lculated	for each	month	(61)m =	(60) ÷ 30	65 × (41))m						
(61)m=	50.96	44.86	47.8	44.44	44.05	40.81	42.17	44.05	44.44	47.8	48.07	50.96	(61))
Total h	eat requ	uired for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23	(62))
Solar DH	-IW input	calculated	using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	on to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0	(63))
FHRS	0	0	0	0	0	0	0	0	0	0	0	0	(63)	(G2)
Output	from w	ater hea	ter											
(64)m=	200.96	176.06	183.18	162.47	157.3	138.54	132.73	147.96	149.6	170.35	181.84	196.23		
'		•	•	•	•	•	•	Outp	out from w	ater heate	r (annual) ₁	12	1997.22 (64))
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m]	
(65)m=	62.62	54.84	56.96	50.35	48.67	42.7	40.65	45.56	46.08	52.7	56.5	61.04	(65)	١
inclu							ı			_			(00)	'
	ıde (57)ı	m in cal	culation	of (65)m	only if c	ylinder i	s in the	dwelling		ater is fr	om com		·	
				of (65)m and 5a	•	ylinder i	s in the	dwelling			om com		·	
5. Int	ernal ga		e Table 5	and 5a	•	eylinder i	s in the o	dwelling			om com		·	
5. Int	ernal ga	ains (see	e Table 5	and 5a	•	ylinder i	s in the o	dwelling Aug			om com		·	
5. Int	ernal ga	ains (see	Table 5	and 5a):				or hot w	rater is fr		munity h	·	
5. Int Metabo (66)m=	olic gain Jan 121.59	rins (see	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m=	olic gain Jan 121.59	rins (see res (Table Feb 121.59	2 Table 5 2 5), Wat Mar 121.59	and 5a ets Apr 121.59): May	Jun 121.59	Jul 121.59	Aug 121.59	or hot w Sep 121.59	rater is fr	Nov	munity h	neating	
5. Int Metabo (66)m= Lightin (67)m=	ernal gan Dlic gain Jan 121.59 g gains	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m=	ernal gain Jan 121.59 g gains 20.26	rains (see as (Table Feb 121.59 (calcula	E Table 5 e 5), Wat Mar 121.59 ted in Ap	5 and 5a tts Apr 121.59 opendix 11.08	May 121.59 L, equat 8.28	Jun 121.59 ion L9 o	Jul 121.59 r L9a), a 7.56	Aug 121.59 Iso see	Sep 121.59 Table 5	Oct 121.59	Nov 121.59	Dec	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m=	ernal gain Jan 121.59 g gains 20.26 nces ga	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31	Mar 121.59 ted in Ap 14.64 ulated ir 212.66	Apr 121.59 ppendix 11.08 Appendix 200.63	May 121.59 L, equat 8.28 dix L, eq 185.44	Jun 121.59 ion L9 o 6.99 uation L	Jul 121.59 r L9a), a 7.56 13 or L1	Aug 121.59 Iso see 9.82 3a), also	Sep 121.59 Table 5 13.18 see Ta	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54	Dec 121.59	neating (66)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reins (see Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 16 calcula 17 calcula 18	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m=	ernal garante polic gains Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16	reb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A	tts Apr 121.59 ppendix 11.08 Append 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a	Aug 121.59 Iso see 9.82 3a), also 159.4	Sep 121.59 Table 5 13.18 see Ta 165.05	Oct 121.59 16.74 ble 5 177.08	Nov 121.59 19.54 192.26	Dec 121.59 20.83	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	Apr 121.59 pendix 11.08 Appendix 200.63 ppendix 35.16	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	ernal gardic gain Jan 121.59 g gains 20.26 nces ga 216.06 ng gains 35.16 s and fai	res (Table Feb 121.59 (calcula 18 ins (calcula 218.31 (calcula 35.16 ins gains 3	Mar 121.59 ted in Ap 14.64 ulated ir 212.66 ated in A 35.16 (Table \$	and 5a tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53	(66) (67) (68)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal garanteernal	raporatic	ted in Apulated in	and 5a tts Apr 121.59 Dependix 11.08 Appendix 200.63 Dependix 35.16 5a) 3 tive value	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ole 5)	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16	Oct 121.59 16.74 ble 5 177.08 2 5 35.16	Nov 121.59 19.54 192.26 35.16	Dec 121.59 20.83 206.53 35.16	(66) (67) (68) (69)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatic	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 35.16	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	
5. Int Metabo (66)m= Lightin (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garanteernal	raporatice gains (see less (Table Feb 121.59) (calcula 18 ins (calcula 35.16) as gains 3 aporatice 197.27 gains (Table Feb 121.59) gains (Table Feb 121.59) (calcula 35.16 ins gains 3	E Table 5 E 5), Wat Mar 121.59 ted in Ap 14.64 ullated in 212.66 ted in A 35.16 (Table 5 3 on (nega -97.27 Table 5) 76.56	tts Apr 121.59 ppendix 11.08 Appendix 200.63 ppendix 35.16 5a) 3 tive valu -97.27	May 121.59 L, equat 8.28 dix L, eq 185.44 L, equat 35.16 3 es) (Tab	Jun 121.59 ion L9 o 6.99 uation L 171.17 tion L15 35.16 3 ble 5) -97.27	Jul 121.59 r L9a), a 7.56 13 or L1 161.64 or L15a 35.16	Aug 121.59 Iso see 9.82 3a), also 159.4 , also se 35.16 3	Sep 121.59 Table 5 13.18 see Ta 165.05 ee Table 35.16 3 -97.27	Oct 121.59 16.74 ble 5 177.08 3 -97.27	Nov 121.59 19.54 192.26 35.16 3 -97.27	Dec 121.59 20.83 206.53 35.16 3	(66) (67) (68) (70)	

6. Solar gains:

Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.

Orientat	ion:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	1.62	x	10.63	x	0.63	x	0.7	=	10.53	(74)
North	0.9x	0.77	x	1.62	х	20.32	x	0.63	x	0.7	=	20.12	(74)
North	0.9x	0.77	x	1.62	x	34.53	x	0.63	X	0.7	=	34.19	(74)
North	0.9x	0.77	x	1.62	х	55.46	x	0.63	x	0.7	=	54.92	(74)
North	0.9x	0.77	x	1.62	x	74.72	x	0.63	X	0.7	=	73.98	(74)
North	0.9x	0.77	x	1.62	x	79.99	x	0.63	x	0.7	=	79.2	(74)
North	0.9x	0.77	x	1.62	x	74.68	x	0.63	X	0.7	=	73.94	(74)
North	0.9x	0.77	x	1.62	x	59.25	x	0.63	x	0.7	=	58.66	(74)
North	0.9x	0.77	x	1.62	x	41.52	x	0.63	x	0.7	=	41.11	(74)
North	0.9x	0.77	x	1.62	x	24.19	x	0.63	x	0.7	=	23.95	(74)
North	0.9x	0.77	x	1.62	x	13.12	x	0.63	x	0.7	=	12.99	(74)
North	0.9x	0.77	x	1.62	x	8.86	x	0.63	x	0.7	=	8.78	(74)
East	0.9x	0.77	x	2.59	x	19.64	x	0.63	x	0.7	=	15.55	(76)
East	0.9x	0.77	x	0.86	x	19.64	x	0.63	x	0.7	=	5.16	(76)
East	0.9x	0.77	x	2.59	x	38.42	x	0.63	x	0.7	=	30.41	(76)
East	0.9x	0.77	x	0.86	x	38.42	x	0.63	x	0.7	=	10.1	(76)
East	0.9x	0.77	x	2.59	x	63.27	x	0.63	x	0.7	=	50.08	(76)
East	0.9x	0.77	x	0.86	x	63.27	x	0.63	x	0.7	=	16.63	(76)
East	0.9x	0.77	x	2.59	x	92.28	x	0.63	x	0.7	=	73.04	(76)
East	0.9x	0.77	x	0.86	X	92.28	x	0.63	x	0.7	=	24.25	(76)
East	0.9x	0.77	x	2.59	X	113.09	X	0.63	x	0.7	=	89.52	(76)
East	0.9x	0.77	x	0.86	X	113.09	x	0.63	x	0.7	=	29.72	(76)
East	0.9x	0.77	X	2.59	X	115.77	X	0.63	X	0.7	=	91.64	(76)
East	0.9x	0.77	X	0.86	x	115.77	x	0.63	X	0.7	=	30.43	(76)
East	0.9x	0.77	X	2.59	X	110.22	X	0.63	X	0.7	=	87.24	(76)
East	0.9x	0.77	X	0.86	x	110.22	x	0.63	X	0.7	=	28.97	(76)
East	0.9x	0.77	X	2.59	x	94.68	x	0.63	X	0.7	=	74.94	(76)
East	0.9x	0.77	X	0.86	X	94.68	X	0.63	X	0.7	=	24.88	(76)
East	0.9x	0.77	X	2.59	X	73.59	x	0.63	X	0.7	=	58.25	(76)
East	0.9x	0.77	X	0.86	x	73.59	X	0.63	x	0.7	=	19.34	(76)
East	0.9x	0.77	X	2.59	X	45.59	x	0.63	X	0.7	=	36.09	(76)
East	0.9x	0.77	X	0.86	x	45.59	x	0.63	x	0.7	=	11.98	(76)
East	0.9x	0.77	X	2.59	x	24.49	x	0.63	x	0.7	=	19.38	(76)
East	0.9x	0.77	X	0.86	x	24.49	x	0.63	x	0.7	=	6.44	(76)
East	0.9x	0.77	X	2.59	x	16.15	x	0.63	x	0.7	=	12.78	(76)
East	0.9x	0.77	X	0.86	X	16.15	X	0.63	X	0.7	=	4.24	(76)

South 0.9x	0.77	x	2.14	x	46	6.75	1 x	0.63	×	0.7		30.58	(78)
South 0.9x	0.77	$=$ $\begin{bmatrix} x \\ x \end{bmatrix}$	2.14	^ x		6.57] ^] _x	0.63	X	0.7		50.08	(78)
South 0.9x	0.77		2.14	^ x		7.53] ^] _x	0.63	X	0.7		63.79	(78)
South 0.9x	0.77	X	2.14	= ^		0.23] ^] _X	0.63	^_ x	0.7	= =	72.09	(78)
South 0.9x	0.77		2.14	^ x		4.87] ^] _X	0.63	X	0.7	= =	75.13	(78)
South 0.9x	0.77	×	2.14	×	-	0.55] x	0.63	X	0.7	= =	72.3	(78)
South 0.9x	0.77	×	2.14	ا ×		8.01]] _X	0.63	ا ×	0.7	= =	70.64	(78)
South 0.9x	0.77	×	2.14	ا ×		4.89]]	0.63	ا ×	0.7	= =	68.6	(78)
South 0.9x	0.77	×	2.14	= x		1.89) x	0.63	= x	0.7	= =	66.63	(78)
South 0.9x	0.77	x	2.14	×		2.59	X	0.63	×	0.7	=	54.01	(78)
South _{0.9x}	0.77	x	2.14	×	_	5.42	X	0.63	×	0.7	=	36.24	(78)
South _{0.9x}	0.77	x	2.14	×	4	0.4	x	0.63	×	0.7	= =	26.42	(78)
Rooflights _{0.9x}	1	x	1.33	×	47	7.01	x	0.63	×	0.7	_ =	49.63	(82)
Rooflights 0.9x	1	x	1.33	×	8:	3.9	х	0.63	×	0.7	=	88.58	(82)
Rooflights 0.9x	1	x	1.33	x	12	2.73	x	0.63	×	0.7	=	129.57	(82)
Rooflights 0.9x	1	x	1.33	x	16	1.74	x	0.63	×	0.7	=	170.76	(82)
Rooflights 0.9x	1	X	1.33	x	18	7.38	x	0.63	x	0.7	=	197.83	(82)
Rooflights 0.9x	1	X	1.33	x	18	8.06	x	0.63	X	0.7	=	198.54	(82)
Rooflights _{0.9x}	1	X	1.33	x	18	0.51	x	0.63	x	0.7	=	190.58	(82)
Rooflights 0.9x	1	X	1.33	X	16	1.54	X	0.63	X	0.7	=	170.54	(82)
Rooflights _{0.9x}	1	X	1.33	X	13	36.5	X	0.63	X	0.7	=	144.11	(82)
Rooflights _{0.9x}	1	X	1.33	X	95	5.08	X	0.63	X	0.7	=	100.38	(82)
Rooflights _{0.9x}	1	X	1.33	X	57	7.06	X	0.63	X	0.7	=	60.24	(82)
Rooflights _{0.9x}	1	X	1.33	X	39).72	X	0.63	X	0.7	=	41.93	(82)
Solar gains in					T		<u> </u>	s = Sum(74)m.				1	(00)
(83)m= 111.45 Total gains – i		294.26 d solar			72.11 83\m	451.37	397	.63 329.45	226.4	1 135.29	94.16		(83)
(84)m= 494.41		660.59	739.19 78		72.06	737.69	690	.57 634.15	553.5	3 488.04	466.04	l	(84)
(4)					72.00	707.00	1 000	.07 004.10	000.0	3 400.04	400.04		(0.1)
7. Mean inter		`				T.I	. 1 - 0	TI 4 (00)					7(05)
Temperature	•	٠.		·			oie 9	ini (°C)				21	(85)
Utilisation fac	 -	-		```			Ι	Can	0.4	Nev	Daa]	
(86)m= 1	Feb 0.99	Mar 0.98		lay ₃₇	Jun 0.7	Jul 0.53	0.5	ug Sep i9 0.83	Oct 0.97	. Nov 0.99	Dec 1		(86)
									0.57	0.55	'		(00)
Mean interna				$\overline{}$					20.5	20.04	10.60	1	(87)
(87)m= 19.71		20.16	20.5 20		20.95	20.99	20.	!	20.5	20.04	19.69		(07)
Temperature	 -				Ť							1	(00)
(88)m= 19.92	19.92	19.92	19.94 19	94	19.95	19.95	19.	95 19.94	19.94	19.93	19.93		(88)
Utilisation fac	 -				$\overline{}$		_					1	
(89)m= 1	0.99	0.98	0.93 0.	32	0.61	0.41	0.4	6 0.76	0.96	0.99	1		(89)
Mean interna	ıl temperat	ure in t	he rest of d	welling	T2 (fo	llow ste	eps 3	to 7 in Tabl	e 9c)				

(90)m= 18.21	18.46	18.85	19.36	19.73	19.92	19.95	19.94	19.85	19.36	18.7	18.18		(90)
10.21	10.10	10.00	10.00	10.70	10.02	10.00	10.01			g area ÷ (4		0.23	(91)
										g aroa . (., –	0.23	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	A) × T2					
(92)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(92)
Apply adjustr	nent to the	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.56	18.79	19.16	19.63	19.98	20.16	20.19	20.19	20.09	19.62	19.01	18.53		(93)
8. Space hea	ıting requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:				•				•		
(94)m= 1	0.99	0.97	0.93	0.82	0.63	0.44	0.49	0.77	0.95	0.99	1		(94)
Useful gains,	hmGm ,	W = (94	l)m x (84	4)m									
(95)m= 491.97	573.41	643.2	685.66	644.99	483.53	324.19	339.18	486.26	526.41	483.09	464.29		(95)
Monthly aver	age exte	rnal tem	perature	from Ta	able 8		•						
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1347.38	1308.62	1188.81	993.13	764.64	506.81	327.4	344.65	548.62	833.3	1106.17	1338.22		(97)
Space heating	g require	ement fo	r each n	nonth, k\	/Vh/mont	h = 0.02	24 x [(97)m – (95)m] x (4 ⁻	1)m			
98)m= 636.43	494.06	405.93	221.38	89.01	0	0	0	0	228.33	448.62	650.21		
											L		_
	!						Tota	l per year	(kWh/year) = Sum(9)	8) _{15,912} =	3173.97	(98)
Snace heatin	a require	ement in	k\\/h/m²	!/vear			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Space heatin	• ,			•					(kWh/year) = Sum(9	8)15,912 =	3173.97 40.48	(98)
9a. Energy red	quiremer			•	ystems i	ncluding			(kWh/year) = Sum(9	8) _{15,912} =		╡ .
Pa. Energy red Space heating	quiremer ng:	nts – Indi	vidual h	eating sy					(kWh/year) = Sum(9	8) _{15,912} =	40.48	(99)
Space heating Fraction of sp	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system	micro-C	CHP)	(kWh/year) = Sum(9	8)15.912 =		(99)
Pa. Energy red Space heating	quiremer ng: pace hea	nts – Indi nt from se	vidual h	eating sy		system		CHP)	(kWh/year) = Sum(9	8)15,912 =	40.48	(99)
Space heating Fraction of sp	quiremenng: Dace head	nts – Indi nt from se nt from m	vidual h econdar ain syst	eating sy y/supple em(s)		system	(202) = 1	CHP)) = Sum(9	8)15.912 =	40.48	(201
Space heating Fraction of space Fraction Fraction Of space Fraction Fractio	quiremen ng: pace hea pace hea pace heatin	nts - Indi at from se at from m	vidual h econdary ain syst	eating sy y/supple em(s) stem 1		system	(202) = 1	CHP) - (201) =) = Sum(9	8)15,912	0	(99) (201 (202 (204
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Space heating Fraction of space Fraction of to Efficiency of Jan	quirement ng: pace heat pace heat tal heatin main spa seconda	nts – Indi at from se at from m ng from i ace heati ry/supple Mar	vidual h econdary ain syst main sys ng syste ementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	mentary g system Jun	system	(202) = 1	CHP) - (201) =) = Sum(9	8) _{15,912} =	0 1 1 93.4	(99) (201 (202 (204 (206 (208
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Space heating Fraction of space Fraction of to Efficiency of Efficiency of Space heating G36.43	quirements pace heat pace	nts – Indi	econdary ain systemain systemain systementar Apralculated	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system	micro-C (202) = 1 (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 93.4	(99) (201 (202 (204 (206 (208
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				1	i		1	(a.a.)
` '	80.3 80.3	80.3	80.3	85.79	87.24	87.84		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m								
` '	72.53 165.29	184.27	186.3	198.57	208.45	223.4		
	•	Tota	I = Sum(2	19a) ₁₁₂ =			2356.83	(219)
Annual totals				k'	Wh/year	•	kWh/year	_
Space heating fuel used, main system 1							3398.26	
Water heating fuel used							2356.83	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a)	(230g) =	:		75	(231)
Electricity for lighting							357.88	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)	(237b)	=				6268.27	(338)
12a. CO2 emissions – Individual heating systems	s including mi	icro-CHP)					_
	Energy			Emiss	ion fac	tor	Emissions	
	kWh/year			kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1)	(211) x			0.2	16	=	734.02	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	509.08	(264)
Space and water heating	(261) + (262)	+ (263) + (264) =				1243.1	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	185.74	(268)
				((005)				_
Total CO2, kg/year			sum c	of (265)(271) =		1467.76	(272)

TER =

(273)

18.72

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 25 February 2021

Property Details: HOUSE E - FINAL

Dwelling type:Semi-detached House

Located in: England

Region: South East England

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation: False

Blinds, curtains, shutters: Dark-coloured curtain or roller blind

Ventilation rate during hot weather (ach): 8 (Windows fully open)

Overheating Details:

Summer ventilation heat loss coefficient: 534 (P1)

Transmission heat loss coefficient: 57.1

Summer heat loss coefficient: 591.1 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
North (W1-2 FRONT N)	0	1
East (W3 - SIDE E)	0	1
East (W4 - SIDE E)	0	1
South (W5 - REAR S)	0	1
South (RW1-2 REAR S)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North (W1-2 FRONT N)	0.98	1	1	0.98	(P8)
East (W3 - SIDE E)	0.98	1	1	0.98	(P8)
East (W4 - SIDE E)	0.98	1	1	0.98	(P8)
South (W5 - REAR S)	0.98	1	1	0.98	(P8)
South (RW1-2 REAR S)	0.98	1	1	0.98	(P8)

Solar gains:

Orientation		Area	Flux	g _	FF	Shading	Gains
North (W1-2 FRONT N)	1 x	3.24	86.66	0.63	0.8	0.98	125.45
East (W3 - SIDE E)	1 x	2.59	124.8	0.63	0.8	0.98	144.42
East (W4 - SIDE E)	1 x	0.86	124.8	0.63	0.8	0.98	47.95
South (W5 - REAR S)	1 x	2.14	118.4	0.63	0.8	0.98	113.21
	1 x	2.66	202.31	0.63	0.8	0.98	240.45
						Total	671.47 (P3/P4)

Internal gains:

	June	July	August
Internal gains	422.24	404.7	412.74
Total summer gains	1133.38	1076.17	1007.8 (P5)
Summer gain/loss ratio	1.92	1.82	1.7 (P6)
Mean summer external temperature (South East England)	15.4	17.4	17.5

SAP 2012 Overheating Assessment

Thermal mass temperature increment 0.25 0.25

Threshold temperature 17.57 19.47 19.45 (P7)

Likelihood of high internal temperature Not significant Not significant

Assessment of likelihood of high internal temperature: Not significant

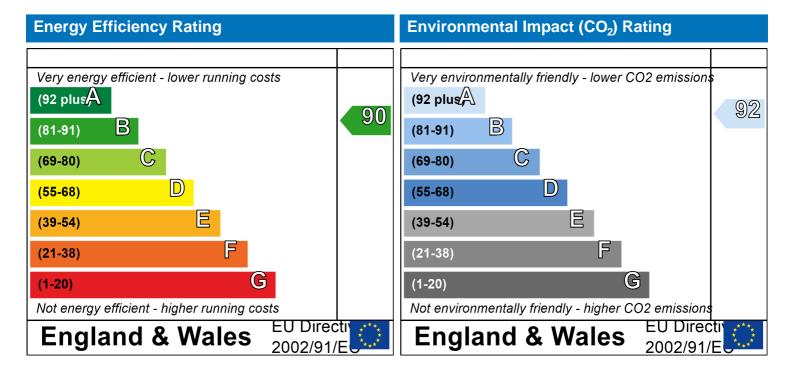
Predicted Energy Assessment



Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type: Date of assessment: Produced by: Total floor area: Detached House 24 February 2021 Jemma Mclaughlan

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Predicted Energy Assessment

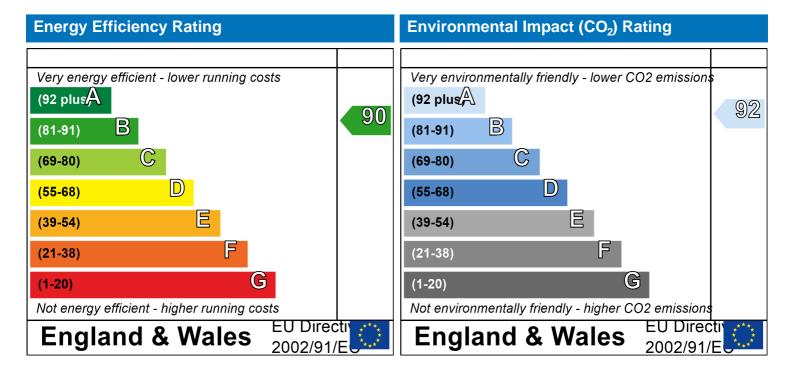


Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type: Date of assessment: Produced by: Total floor area: Semi-detached House 24 February 2021 Jemma Mclaughlan

otal floor area: 78.4 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

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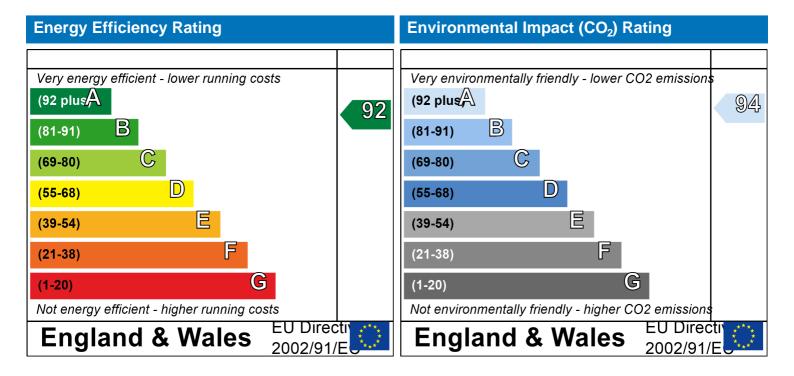
Predicted Energy Assessment



Woodwell Cottage P2 Woodwell Road BRISTOL BS11 9XU Dwelling type: Date of assessment: Produced by: Total floor area: Semi-detached House 24 February 2021 Jemma Mclaughlan 78.4 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

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SITE WIDE ENERGY DEMAND, CO2 & COST ANALYSIS - WOODWELL P2								
OPTION 2 - ASHP	HOUSE C	HOUSE D	HOUSE E	SITE TOTAL	CURRENT CARBON I	FACTORS - SAP 2012	PREDICTED CARBON	N FACTORS - SAP 10
Stage 1 - BASELINE Energy Demand	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1825.6	1800.4	1800.4	5426.3	0.216	1172.1	0.210	1139.5
Space Heating (211)	4195.5	3892.0	3892.0	11979.4	0.216	2587.6	0.210	2515.7
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	75.0	75.0	75.0	225.0	0.519	116.8	0.233	52.4
Lighting (232)	385.4	383.8	383.8	1153.0	0.519	598.4	0.233	268.7
TOTAL	6481.5	6151.2	6151.2	18783.8		4474.8		3976.3
Stage 2 - IMPROVED Energy Demand Following Energy Efficiency Measures	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1827.2	1801.4	1801.4	5430.0	0.216	1172.9	0.210	1140.3
Space Heating (211)	3574.5	3479.5	3479.5	10533.5	0.216	2275.2	0.210	2212.0
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	75.0	75.0	75.0	225.0	0.519	116.8	0.233	52.4
Lighting (232)	350.4	348.9	348.9	1048.2	0.519	544.0	0.233	244.2
TOTAL	5827.1	5704.8	5704.8	17236.7		4108.9		3649.0
Stage 3 - FINAL Energy Demand following Renewable or LZC Technologies	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1354.1	1339.9	1339.9	4033.8	0.519	2093.6	0.233	939.9
Space Heating (211)	1287.1	1233.2	1233.2	3753.5	0.519	1948.1	0.233	874.6
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Lighting (232)	350.4	348.9	348.9	1048.2	0.519	544.0	0.233	244.2
PV	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
TOTAL	2991.5	2922.0	2922.0	8835.5		4585.6		2058.7

CO² REDUCTION SUMMARY - SAP2012

Summary of CO2 Emission Reductions	Total CO2 emissions (kgCO2/year)
Baseline emissions	4474.8
Improved emissions after application of energy efficiency measures.	4108.9
CO2 Reduction from application of energy efficiency measures.	365.9
Improved emissions after incorporation of efficient energy supply	4108.9
CO2 Reduction from efficient Energy Supply.	0.0
Final emissions after incorporation of renewable energy	4585.6
CO2 Reduction from incorporation of renewable energy	-476.7
CO2 displaced in total	-110.8
Summary of CO2 Emission Reductions	Total reduction (%)
% CO2 displaced by energy efficiency measures	8.2%
% CO2 displaced by efficient supply of energy	0.00%
% CO2 displaced by renewable energy	-11.6%
% CO2 displaced in total	-2.5%

CO² REDUCTION SUMMARY - SAP10

Summary of CO2 Emission Reductions	Total CO2 emissions (kgCO2/year)
Baseline emissions	3976.3
Improved emissions after application of energy efficiency measures.	3649.0
CO2 Reduction from application of energy efficiency measures.	327.3
Improved emissions after incorporation of efficient energy supply	3649.0
CO2 Reduction from efficient Energy Supply.	0.0
Final emissions after incorporation of renewable energy	2058.7
CO2 Reduction from incorporation of renewable energy	1590.3
CO2 displaced in total	1917.6
Summary of CO2 Emission Reductions	Total reduction (%)
% CO2 displaced by energy efficiency measures	8.2%
% CO2 displaced by efficient supply of energy	0.00%
% CO2 displaced by renewable energy	43.6%
% CO2 displaced in total	48.2%

ENERGY REDUCTION SUMMARY - SAP2012

Summary of Energy Reduction:	Total Regulated Energy Use (kWh/yr):
Baseline Energy Demand.	18783.8
Improved Energy Demand after application of energy efficiency measures.	17236.7
Energy Saved from application of Energy Efficiency Measures.	1547.1
Improved Energy Demand after incorporation of efficient energy supply.	17236.7
Energy Saved from incorporation of efficient energy supply.	0.0
Improved Energy Demand after incorporation of renewable energy technology.	8835.5
Energy Saved from incorporation of renewable energy technology.	8401.2
Energy Demand reduction in total	9948.3
Summary of Energy Reduction:	Total Energy Reduction (%):
% Energy Demand reduction from efficiency measures	8.2%
% Energy Demand reduction by efficient supply of energy	0.00%
% Energy Demand reduction by renewable energy	48.7%
% Energy Demand reduction in total	53.0%

ENERGY REDUCTION SUMMARY - SAP10

Summary of Energy Reduction:	Total Regulated Energy Use (kWh/yr):
Baseline Energy Demand.	18783.8
Improved Energy Demand after application of energy efficiency measures.	17236.7
Energy Saved from application of Energy Efficiency Measures.	1547.1
Improved Energy Demand after incorporation of efficient energy supply.	17236.7
Energy Saved from incorporation of efficient energy supply.	0.0
Improved Energy Demand after incorporation of renewable energy technology.	8835.5
Energy Saved from incorporation of renewable energy technology.	8401.2
Energy Demand reduction in total	9948.3
Summary of Energy Reduction:	Total Energy Reduction (%):
% Energy Demand reduction from efficiency measures	8.2%
% Energy Demand reduction by efficient supply of energy	0.00%
% Energy Demand reduction by renewable energy	48.7%
% Energy Demand reduction in total	53.0%

SITE WIDE ENERGY DEMAND, CO2 & COST ANALYSIS - WOODWELL P2								
OPTION 3 - SHW	HOUSE C	HOUSE D	HOUSE E	SITE TOTAL	CURRENT CARBON FACTORS - SAP 2012		PREDICTED CARBON FACTORS - SAP 10	
Stage 1 - BASELINE Energy Demand	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1825.6	1800.4	1800.4	5426.3	0.216	1172.1	0.210	1139.5
Space Heating (211)	4195.5	3892.0	3892.0	11979.4	0.216	2587.6	0.210	2515.7
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	75.0	75.0	75.0	225.0	0.519	116.8	0.233	52.4
Lighting (232)	385.4	383.8	383.8	1153.0	0.519	598.4	0.233	268.7
TOTAL	6481.5	6151.2	6151.2	18783.8		4474.8		3976.3
Stage 2 - IMPROVED Energy Demand Following Energy Efficiency Measures	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Total Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1827.2	1801.4	1801.4	5430.0	0.216	1172.9	0.210	1140.3
Space Heating (211)	3574.5	3479.5	3479.5	10533.5	0.216	2275.2	0.210	2212.0
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	75.0	75.0	75.0	225.0	0.519	116.8	0.233	52.4
Lighting (232)	350.4	348.9	348.9	1048.2	0.519	544.0	0.233	244.2
TOTAL	5827.1	5704.8	5704.8	17236.7		4108.9		3649.0
Stage 3 - FINAL Energy Demand following Renewable or LZC Technologies	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Energy Demand (kWh/yr)	Carbon Emission Factor (SAP 2012)	Total CO2 (kgCO2/yr)	Carbon Emission Factor (SAP10)	Total CO2 (kgCO2/yr)
Hot Water (219)	1194.7	1179.3	1179.3	3553.3	0.216	767.5	0.210	746.2
Space Heating (211)	3485.0	3355.8	3355.8	10196.6	0.216	2202.5	0.210	2141.3
Secondary Heating (215)	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
Pumps & Fans (231)	125.0	125.0	125.0	375.0	0.519	194.6	0.233	87.4
Lighting (232)	350.4	348.9	348.9	1048.2	0.519	544.0	0.233	244.2
PV	0.0	0.0	0.0	0.0	0.519	0.0	0.233	0.0
TOTAL	5155.2	5009.0	5009.0	15173.1		3708.6		3219.1

CO² REDUCTION SUMMARY - SAP2012

Summary of CO2 Emission Reductions	Total CO2 emissions (kgCO2/year)
Baseline emissions	4474.8
Improved emissions after application of energy efficiency measures.	4108.9
CO2 Reduction from application of energy efficiency measures.	365.9
Improved emissions after incorporation of efficient energy supply	4108.9
CO2 Reduction from efficient Energy Supply.	0.0
Final emissions after incorporation of renewable energy	3708.6
CO2 Reduction from incorporation of renewable energy	400.3
CO2 displaced in total	766.2
Summary of CO2 Emission Reductions	Total reduction (%)
% CO2 displaced by energy efficiency measures	8.2%
% CO2 displaced by efficient supply of energy	0.00%
% CO2 displaced by renewable energy	9.7%
% CO2 displaced in total	17.1%

CO² REDUCTION SUMMARY - SAP10

Summary of CO2 Emission Reductions	Total CO2 emissions (kgCO2/year)
Baseline emissions	3976.3
Improved emissions after application of energy efficiency measures.	3649.0
CO2 Reduction from application of energy efficiency measures.	327.3
Improved emissions after incorporation of efficient energy supply	3649.0
CO2 Reduction from efficient Energy Supply.	0.0
Final emissions after incorporation of renewable energy	3219.1
CO2 Reduction from incorporation of renewable energy	429.9
CO2 displaced in total	757.2
Summary of CO2 Emission Reductions	Total reduction (%)
% CO2 displaced by energy efficiency measures	8.2%
% CO2 displaced by efficient supply of energy	0.00%
% CO2 displaced by renewable energy	11.8%
% CO2 displaced in total	19.0%

ENERGY REDUCTION SUMMARY - SAP2012

Summary of Energy Reduction:	Total Regulated Energy Use (kWh/yr):
Baseline Energy Demand.	18783.8
Improved Energy Demand after application of energy efficiency measures.	17236.7
Energy Saved from application of Energy Efficiency Measures.	1547.1
Improved Energy Demand after incorporation of efficient energy supply.	17236.7
Energy Saved from incorporation of efficient energy supply.	0.0
Improved Energy Demand after incorporation of renewable energy technology.	15173.1
Energy Saved from incorporation of renewable energy technology.	2063.6
Energy Demand reduction in total	3610.7
Summary of Energy Reduction:	Total Energy Reduction (%):
% Energy Demand reduction from efficiency measures	8.2%
% Energy Demand reduction by efficient supply of energy	0.00%
% Energy Demand reduction by renewable energy	12.0%
% Energy Demand reduction in total	19.2%

ENERGY REDUCTION SUMMARY - SAP10

Summary of Energy Reduction:	Total Regulated Energy Use (kWh/yr):	
Baseline Energy Demand.	18783.8	
Improved Energy Demand after application of energy efficiency measures.	17236.7	
Energy Saved from application of Energy Efficiency Measures.	1547.1	
Improved Energy Demand after incorporation of efficient energy supply.	17236.7	
Energy Saved from incorporation of efficient energy supply.	0.0	
Improved Energy Demand after incorporation of renewable energy technology.	15173.1	
Energy Saved from incorporation of renewable energy technology.	2063.6	
Energy Demand reduction in total	3610.7	
Summary of Energy Reduction:	Total Energy Reduction (%):	
% Energy Demand reduction from efficiency measures	8.2%	
% Energy Demand reduction by efficient supply of energy	0.00%	
% Energy Demand reduction by renewable energy	12.0%	
% Energy Demand reduction in total	19.2%	