

FULL SAP CALCULATION PRINTOUT

Calculation Type: New Build (As Designed)

Property Reference	01			Issued on Date	12/04/2021
Assessment Reference	Proposed	Prop Type Ref	Ground floor studio		
Property	3-7, Henry Road, Barnet, London, EN4 8BL				
SAP Rating	78 C	DER	32.54	TER	27.28
Environmental	82 B	% DER<TER	-19.29		
CO ₂ Emissions (t/year)	1.03	DFEE	80.75	TFEE	65.31
General Requirements Compliance	Fail	% DFEE<TFEE	-23.66		
Assessor Details	Mr. Malcolm Maclean, SRE Limited, Tel: 01730 710044, malcolm@sre.co.uk			Assessor ID	V497-0002
Client	Daniel Rose Planning, DRPL				

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REGULATIONS COMPLIANCE REPORT - Approved Document L1A, 2013 Edition, England

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DWELLING AS DESIGNED

Ground-floor flat, total floor area 37 m²

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:Mains gas
Fuel factor:1.00 (mains gas)
Target Carbon Dioxide Emission Rate (TER) 27.28 kgCO₂/m²
Dwelling Carbon Dioxide Emission Rate (DER) 32.54 kgCO₂/m²Fail
Excess emissions =5.26 kgCO₂/m² (19.3%)

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)65.3 kWh/m²/yr
Dwelling Fabric Energy Efficiency (DFEE)80.8 kWh/m²/yrFail
Excess energy =15.5 kWh/m²/yr (23.7%)

2 Fabric U-values

Element	Average	Highest	
External wall	0.23 (max. 0.30)	0.27 (max. 0.70)	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	(no roof)		
Openings	1.35 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using default γ -value of 0.15

3 Air permeability

Air permeability at 50 pascals:	5.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas	
Data from database		
Vaillant ecoFIT pure 825 VUW 256/6-3 (H-GB)		
Combi boiler		
Efficiency: 89.6% SEDBUK2009		
Minimum: 88.0%	OK	

Secondary heating system:

None

5 Cylinder insulation

Hot water storage	No cylinder
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6 Controls

Space heating controls:	Programmer, room thermostat and TRVs	OK
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Hot water controls:

No cylinder

Boiler interlock

No

Fail

7 Low energy lights

Percentage of fixed lights with low-energy fittings:100%	
Minimum	75%

OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (Thames Valley):	Slight	OK
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Based on:

Overshading:	Average
Windows facing North:	3.91 m ² , Overhang width less than twice window, ratio 0.06
Windows facing West:	3.44 m ² , Overhang width less than twice window, ratio 0.05
Air change rate:	3.00 ach
Blinds/curtains:	Light-coloured curtain or roller blind, closed 0% of daylight hours

10 Key features

Door U-value	1.10 W/m ² K
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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
 CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	37.1700 (1b)	2.4900 (2b)	92.5533 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.1700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.5533 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m3 per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.2161 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate					0.4661 (18)
Number of sides sheltered					2 (19)
Shelter factor				(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor				(21) = (18) x (20) =	0.3962 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.5051	0.4952	0.4853	0.4358	0.4259	0.3764	0.3764	0.3665	0.3962	0.4259	0.4457	0.4655 (22b)
Effective ac	0.6276	0.6226	0.6178	0.5950	0.5907	0.5708	0.5708	0.5671	0.5785	0.5907	0.5993	0.6083 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (Uw = 1.40)			7.3500	1.3258	9.7443		(27)
Front door			1.4900	1.1000	1.6390		(26)
Heat Loss Floor 1			37.1700	0.1600	5.9472	110.0000	4088.7000 (28a)
External Wall Outside	32.7000	7.3500	25.3500	0.1800	4.5630	150.0000	3802.5000 (29a)
External Wall Sheltered	29.4500	1.4900	27.9600	0.2735	7.6481	124.1000	3469.8360 (29a)
Total net area of external elements Aum(A, m ²)			99.3200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.5416		(33)
Party Ceilings 1			37.1700			30.0000	1115.1000 (32b)
Internal Wall 1			8.6600			9.0000	77.9400 (32c)
Internal Wall 2			4.2100			9.0000	37.8900 (32c)
Internal Wall 3			5.2000			9.0000	46.8000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12638.7660 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							340.0260 (35)
Thermal bridges (Default value 0.150 * total exposed area)							14.8980 (36)
Total fabric heat loss						(33) + (36) =	44.4396 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	19.1678	19.0165	18.8682	18.1716	18.0413	17.4345	17.4345	17.3222	17.6682	18.0413	18.3049	18.5806 (38)
Heat transfer coeff	63.6074	63.4561	63.3078	62.6112	62.4809	61.8742	61.8742	61.7618	62.1079	62.4809	62.7445	63.0202 (39)
Average = Sum(39)m / 12 =												62.6106 (39)
HLP	1.7113	1.7072	1.7032	1.6845	1.6809	1.6646	1.6646	1.6616	1.6709	1.6809	1.6880	1.6955 (40)
HLP (average)												1.6844 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.3333 (42)
Average daily hot water use (litres/day)												65.8663 (43)
Daily hot water use	72.4530	69.8183	67.1837	64.5490	61.9143	59.2797	59.2797	61.9143	64.5490	67.1837	69.8183	72.4530 (44)
Energy conte	107.4456	93.9727	96.9714	84.5420	81.1200	70.0004	64.8657	74.4343	75.3233	87.7821	95.8210	104.0554 (45)
Energy content (annual)										Total = Sum(45)m =		1036.3338 (45)
Distribution loss (46)m = 0.15 x (45)m	16.1168	14.0959	14.5457	12.6813	12.1680	10.5001	9.7299	11.1651	11.2985	13.1673	14.3731	15.6083 (46)

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	36.9212	32.1356	34.2361	31.8324	31.5509	29.2338	30.2083	31.5509	31.8324	34.2361	34.4309	36.9212	(61)
Total heat required for water heating calculated for each month	144.3669	126.1082	131.2074	116.3744	112.6709	99.2343	95.0740	105.9852	107.1557	122.0181	130.2519	140.9766	(62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63)
Output from w/h	144.3669	126.1082	131.2074	116.3744	112.6709	99.2343	95.0740	105.9852	107.1557	122.0181	130.2519	140.9766	(64)
Heat gains from water heating, kWh/month	44.9560	39.2798	40.8020	36.0683	34.8601	30.5836	29.1199	32.6371	33.0031	37.7465	40.4682	43.8287	(65)

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	
(66)m	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	10.2912	9.1405	7.4336	5.6277	4.2068	3.5515	3.8375	4.9882	6.6951	8.5010	9.9219	10.5772	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	114.4875	115.6756	112.6818	106.3084	98.2631	90.7017	85.6502	84.4622	87.4559	93.8293	101.8746	109.4360	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	(71)
Water heating gains (Table 5)	60.4247	58.4521	54.8414	50.0949	46.8550	42.4772	39.1397	43.8671	45.8376	50.7346	56.2058	58.9096	(72)
Total internal gains	231.2032	229.2679	220.9565	208.0307	195.3247	182.7302	174.6272	179.3173	185.9885	199.0648	214.0022	224.9226	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
North	3.9100	10.6334	0.6300	0.7000	0.7700	12.7063 (74)							
West	3.4400	19.6403	0.6300	0.7000	0.7700	20.6480 (80)							
Solar gains	33.3543	64.6743	107.7814	163.2920	208.1767	217.2888	205.1080	170.3298	126.9751	76.8334	41.4205	27.5725	(83)
Total gains	264.5575	293.9422	328.7379	371.3227	403.5013	400.0191	379.7351	349.6470	312.9636	275.8982	255.4227	252.4951	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	55.1943	55.3259	55.4555	56.0725	56.1895	56.7405	56.7405	56.8437	56.5270	56.1895	55.9534	55.7086	
alpha	4.6796	4.6884	4.6970	4.7382	4.7460	4.7827	4.7827	4.7896	4.7685	4.7460	4.7302	4.7139	
util living area	0.9989	0.9979	0.9948	0.9823	0.9383	0.8229	0.6686	0.7320	0.9280	0.9901	0.9979	0.9991	(86)
MIT	19.5462	19.6725	19.9223	20.2818	20.6297	20.8775	20.9663	20.9483	20.7470	20.3111	19.8720	19.5277	(87)
Th 2	19.5328	19.5357	19.5385	19.5520	19.5545	19.5663	19.5663	19.5685	19.5617	19.5545	19.5494	19.5441	(88)
util rest of house	0.9983	0.9969	0.9920	0.9714	0.8960	0.7037	0.4755	0.5438	0.8582	0.9820	0.9966	0.9987	(89)
MIT 2	18.2488	18.3770	18.6279	18.9921	19.3182	19.5190	19.5608	19.5583	19.4324	19.0267	18.5872	18.2391	(90)
Living area fraction	19.3106	19.4372	19.6872	20.0476	20.3915	20.6308	20.7111	20.6959	20.5083	20.0778	19.6387	19.2937	(92)
Temperature adjustment	19.3106	19.4372	19.6872	20.0476	20.3915	20.6308	20.7111	20.6959	20.5083	20.0778	19.6387	19.2937	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9982	0.9968	0.9924	0.9758	0.9233	0.7971	0.6338	0.6977	0.9095	0.9856	0.9967	0.9986	(94)
Ext temp.	264.0859	293.0012	326.2234	362.3459	372.5639	318.8618	240.6623	243.9322	284.6286	271.9215	254.5785	252.1377	(95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Month fracti	954.7868	922.4741	834.8557	697.9644	543.0522	373.1503	254.3701	265.3230	398.0059	592.1842	786.7345	951.2087	(97)
Space heating kWh	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating per m2	513.8814	423.0058	378.4224	241.6453	126.8433	0.0000	0.0000	0.0000	0.0000	238.2755	383.1523	520.1088	(98)
												2825.3349	(98)
												76.0112	(99)

8c. Space cooling requirement

Not applicable

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CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE 09 Jan 2014

9a. Energy requirements - Individual heating systems, including micro-CHP

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													85.5000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													3304.4852 (211)
Space heating requirement	513.8814	423.0058	378.4224	241.6453	126.8433	0.0000	0.0000	0.0000	0.0000	238.2755	383.1523	520.1088	(98)
Space heating efficiency (main heating system 1)	85.5000	85.5000	85.5000	85.5000	85.5000	0.0000	0.0000	0.0000	0.0000	85.5000	85.5000	85.5000	(210)
Space heating fuel (main heating system)	601.0309	494.7436	442.5994	282.6261	148.3547	0.0000	0.0000	0.0000	0.0000	278.6848	448.1313	608.3144	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	144.3669	126.1082	131.2074	116.3744	112.6709	99.2343	95.0740	105.9852	107.1557	122.0181	130.2519	140.9766	(64)
Efficiency of water heater (217)m	88.0735	87.9623	87.6647	86.9496	85.4504	80.4000	80.4000	80.4000	80.4000	86.8069	87.7048	88.1389	(216)
Fuel for water heating, kWh/month	163.9165	143.3662	149.6695	133.8412	131.8554	123.4257	118.2512	131.8224	133.2782	140.5626	148.5117	159.9483	(219)
Water heating fuel used													1678.4490 (219)
Annual totals kWh/year													
Space heating fuel - main system													3304.4852 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													30.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													75.0000 (231)
Electricity for lighting (calculated in Appendix L)													181.7450 (232)
Total delivered energy for all uses													5239.6793 (238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3304.4852	0.2160	713.7688	(261)
Space heating - secondary	0.0000	0.0000	0.0000	(263)
Water heating (other fuel)	1678.4490	0.2160	362.5450	(264)
Space and water heating			1076.3138	(265)
Pumps and fans	75.0000	0.5190	38.9250	(267)
Energy for lighting	181.7450	0.5190	94.3257	(268)
Total CO2, kg/year			1209.5645	(272)
Dwelling Carbon Dioxide Emission Rate (DER)			32.5400	(273)

16 CO2 EMISSIONS ASSOCIATED WITH APPLIANCES AND COOKING AND SITE-WIDE ELECTRICITY GENERATION TECHNOLOGIES

DER			32.5400	ZC1
Total Floor Area		TFA	37.1700	
Assumed number of occupants		N	1.3333	
CO2 emission factor in Table 12 for electricity displaced from grid		EF	0.5190	
CO2 emissions from appliances, equation (L14)			18.2521	ZC2
CO2 emissions from cooking, equation (L16)			4.0624	ZC3
Total CO2 emissions			54.8545	ZC4
Residual CO2 emissions offset from biofuel CHP			0.0000	ZC5
Additional allowable electricity generation, kWh/m ² /year			0.0000	ZC6
Resulting CO2 emissions offset from additional allowable electricity generation			0.0000	ZC7
Net CO2 emissions			54.8545	ZC8

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CALCULATION OF TARGET EMISSIONS 09 Jan 2014

SAP 2012 WORKSHEET FOR New Build (As Designed) (Version 9.92, January 2014)
CALCULATION OF TARGET EMISSIONS 09 Jan 2014

1. Overall dwelling dimensions

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	37.1700 (1b)	2.4900 (2b)	92.5533 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	37.1700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.5533 (5)

2. Ventilation rate

	main heating	secondary heating	other	total	m ³ per hour
Number of chimneys	0	0	0	0 * 40 =	0.0000 (6a)
Number of open flues	0	0	0	0 * 20 =	0.0000 (6b)
Number of intermittent fans				2 * 10 =	20.0000 (7a)
Number of passive vents				0 * 10 =	0.0000 (7b)
Number of flueless gas fires				0 * 40 =	0.0000 (7c)
Air changes per hour					
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =				20.0000 / (5) =	0.2161 (8)
Pressure test				Yes	
Measured/design AP50				5.0000	
Infiltration rate					0.4661 (18)
Number of sides sheltered				2	(19)
Shelter factor			(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor			(21) = (18) x (20) =		0.3962 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.5051	0.4952	0.4853	0.4358	0.4259	0.3764	0.3764	0.3665	0.3962	0.4259	0.4457	0.4655 (22b)
Effective ac	0.6276	0.6226	0.6178	0.5950	0.5907	0.5708	0.5708	0.5671	0.5785	0.5907	0.5993	0.6083 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K					
TER Opaque door			1.4900	1.0000	1.4900		(26)					
TER Opening Type (Uw = 1.40)			7.3500	1.3258	9.7443		(27)					
Heat Loss Floor 1			37.1700	0.1300	4.8321		(28a)					
External Wall Outside	32.7000	7.3500	25.3500	0.1800	4.5630		(29a)					
External Wall Sheltered	29.4500	1.4900	27.9600	0.1800	5.0328		(29a)					
Total net area of external elements Aum(A, m ²)			99.3200				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		25.6622		(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							250.0000 (35)					
Thermal bridges (User defined value 0.050 * total exposed area)							4.9660 (36)					
Total fabric heat loss							(33) + (36) = 30.6282 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	19.1678	19.0165	18.8682	18.1716	18.0413	17.4345	17.4345	17.3222	17.6682	18.0413	18.3049	18.5806 (38)
Average = Sum(39)m / 12 =	49.7960	49.6447	49.4964	48.7998	48.6695	48.0627	48.0627	47.9504	48.2964	48.6695	48.9331	49.2088 (39)
	16.1168	14.0959	14.5457	12.6813	12.1680	10.5001	9.7299	11.1651	11.2985	13.1673	14.3731	15.6083 (46)
HLP	1.3397	1.3356	1.3316	1.3129	1.3094	1.2931	1.2931	1.2900	1.2993	1.3094	1.3165	1.3239 (40)
HLP (average)												1.3129 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31 (41)

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.3333 (42)
Average daily hot water use (litres/day)												65.8663 (43)
Daily hot water use	72.4530	69.8183	67.1837	64.5490	61.9143	59.2797	59.2797	61.9143	64.5490	67.1837	69.8183	72.4530 (44)
Energy conte	107.4456	93.9727	96.9714	84.5420	81.1200	70.0004	64.8657	74.4343	75.3233	87.7821	95.8210	104.0554 (45)
Energy content (annual)												Total = Sum(45)m = 1036.3338 (45)
Distribution loss (46)m = 0.15 x (45)m	16.1168	14.0959	14.5457	12.6813	12.1680	10.5001	9.7299	11.1651	11.2985	13.1673	14.3731	15.6083 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)

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Combi loss	36.9212	32.1356	34.2361	31.8324	31.5509	29.2338	30.2083	31.5509	31.8324	34.2361	34.4309	36.9212 (61)
Total heat required for water heating calculated for each month	144.3669	126.1082	131.2074	116.3744	112.6709	99.2343	95.0740	105.9852	107.1557	122.0181	130.2519	140.9766 (62)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63)
Output from w/h	144.3669	126.1082	131.2074	116.3744	112.6709	99.2343	95.0740	105.9852	107.1557	122.0181	130.2519	140.9766 (64)
Heat gains from water heating, kWh/month	44.9560	39.2798	40.8020	36.0683	34.8601	30.5836	29.1199	32.6371	33.0031	37.7465	40.4682	43.8287 (65)

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
(66)m	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660	66.6660 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	10.2912	9.1405	7.4336	5.6277	4.2068	3.5515	3.8375	4.9882	6.6951	8.5010	9.9219	10.5772 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	114.4875	115.6756	112.6818	106.3084	98.2631	90.7017	85.6502	84.4622	87.4559	93.8293	101.8746	109.4360 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666	29.6666 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328	-53.3328 (71)
Water heating gains (Table 5)	60.4247	58.4521	54.8414	50.0949	46.8550	42.4772	39.1397	43.8671	45.8376	50.7346	56.2058	58.9096 (72)
Total internal gains	231.2032	229.2679	220.9565	208.0307	195.3247	182.7302	174.6272	179.3173	185.9885	199.0648	214.0022	224.9226 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W
North	3.9100	10.6334	0.6300	0.7000	0.7700	12.7063 (74)
West	3.4400	19.6403	0.6300	0.7000	0.7700	20.6480 (80)

Solar gains	33.3543	64.6743	107.7814	163.2920	208.1767	217.2888	205.1080	170.3298	126.9751	76.8334	41.4205	27.5725 (83)
Total gains	264.5575	293.9422	328.7379	371.3227	403.5013	400.0191	379.7351	349.6470	312.9636	275.8982	255.4227	252.4951 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Thl (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil _m (see Table 9a)	0.9958	0.9927	0.9833	0.9507	0.8630	0.6996	0.5393	0.6004	0.8450	0.9699	0.9925	0.9966 (86)
MIT	19.6125	19.7597	20.0353	20.4173	20.7437	20.9317	20.9836	20.9738	20.8308	20.4143	19.9537	19.5916 (87)
Th 2	20.3302	20.3322	20.3342	20.3436	20.3453	20.3535	20.3535	20.3550	20.3503	20.3453	20.3418	20.3381 (88)
util rest of house	0.9951	0.9914	0.9802	0.9410	0.8361	0.6462	0.4667	0.5269	0.8051	0.9623	0.9909	0.9960 (89)
MIT 2	19.0236	19.1720	19.4475	19.8306	20.1405	20.3091	20.3456	20.3416	20.2276	19.8326	19.3734	19.0091 (90)
Living area fraction	fLA = Living area / (4) = 0.8184 (91)											
MIT	19.5055	19.6530	19.9286	20.3108	20.6341	20.8186	20.8677	20.8590	20.7213	20.3086	19.8483	19.4858 (92)
Temperature adjustment	0.6000											
adjusted MIT	20.1055	20.2530	20.5286	20.9108	21.2341	21.4186	21.4677	21.4590	21.3213	20.9086	20.4483	20.0858 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	263.1898	291.3666	322.5457	352.5794	351.6692	292.3126	223.4847	226.6366	269.6590	267.3431	253.1710	251.4320 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	787.0521	762.1942	694.3634	586.1240	464.0220	327.7220	233.9562	242.5802	348.7609	501.7155	653.1746	781.7226 (97)
Month fracti	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000 (97a)
Space heating kWh	389.7536	316.3962	276.6324	168.1521	83.5905	0.0000	0.0000	0.0000	0.0000	174.3730	288.0026	394.5363 (98)
Space heating per m2	(98) / (4) = 56.2668 (99)											

8c. Space cooling requirement

Not applicable

9a. Energy requirements - Individual heating systems, including micro-CHP

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Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													88.4000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement													2365.8786 (211)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	389.7536	316.3962	276.6324	168.1521	83.5905	0.0000	0.0000	0.0000	0.0000	174.3730	288.0026	394.5363	(98)
Space heating efficiency (main heating system 1)	88.4000	88.4000	88.4000	88.4000	88.4000	0.0000	0.0000	0.0000	0.0000	88.4000	88.4000	88.4000	(210)
Space heating fuel (main heating system)	440.8977	357.9143	312.9326	190.2173	94.5594	0.0000	0.0000	0.0000	0.0000	197.2546	325.7948	446.3080	(211)
Water heating requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	144.3669	126.1082	131.2074	116.3744	112.6709	99.2343	95.0740	105.9852	107.1557	122.0181	130.2519	140.9766	(64)
Efficiency of water heater (217)m	87.4278	87.2717	86.8843	85.9769	84.3120	80.3000	80.3000	80.3000	80.3000	85.9495	86.9925	87.5026	(217)
Fuel for water heating, kWh/month	165.1270	144.5006	151.0140	135.3553	133.6356	123.5794	118.3985	131.9865	133.4442	141.9649	149.7277	161.1113	(219)
Water heating fuel used													1689.8451 (219)
Annual totals kWh/year													
Space heating fuel - main system													2365.8786 (211)
Space heating fuel - secondary													0.0000 (215)
Electricity for pumps and fans:													
central heating pump													39.0000 (230c)
main heating flue fan													45.0000 (230e)
Total electricity for the above, kWh/year													84.0000 (231)
Electricity for lighting (calculated in Appendix L)													181.7450 (232)
Total delivered energy for all uses													4321.4687 (238)

----- 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP -----

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2365.8786	0.2160	511.0298 (261)
Space heating - secondary	0.0000	0.0000	0.0000 (263)
Water heating (other fuel)	1689.8451	0.2160	365.0065 (264)
Space and water heating			876.0363 (265)
Pumps and fans	84.0000	0.5190	43.5960 (267)
Energy for lighting	181.7450	0.5190	94.3257 (268)
Total CO2, kg/m2/year			1013.9580 (272)
Emissions per m2 for space and water heating			23.5684 (272a)
Fuel factor (mains gas)			1.0000
Emissions per m2 for lighting			2.5377 (272b)
Emissions per m2 for pumps and fans			1.1729 (272c)
Target Carbon Dioxide Emission Rate (TER) = (23.5684 * 1.00) + 2.5377 + 1.1729, rounded to 2 d.p.			27.2800 (273)