Regulations Compliance Report

	ber 2020 at 14:54:3		a FSAP 2012 program, Vers	sion: 1.0.5.9	
Project Informatio	n:				
Assessed By:	Zahid Ashraf (STR	O001082)	Building Type:	Flat	
Dwelling Details:					
NEW DWELLING	DESIGN STAGE		Total Floor Area: 73	8.82m ²	
Site Reference :	Hermitage Lane		Plot Reference:	Plot 22	
Address :	-				
Client Details:					
Name: Address :					
-	s items included wi te report of regulati	thin the SAP calculations. ons compliance.			
1a TER and DER					
	ing system: Mains ga	as (c)			
Fuel factor: 1.00 (n	nains gas (c))	. ,			
Target Carbon Dio	xide Emission Rate	(TER)	15.91 kg/m²		
	ioxide Emission Rat	e (DER)	9.53 kg/m²		ОК
1b TFEE and DF					
-	gy Efficiency (TFEE		39.2 kWh/m ²		
Dwelling Fabric En	ergy Efficiency (DFE	E)	32.2 kWh/m ²		
					ОК
2 Fabric U-value	S				
Element		Average	Highest		
External v	vall	0.15 (max. 0.30)	0.15 (max. 0.70)		OK
Floor		(no floor)			
Roof		(no roof)			
Openings	1	1.40 (max. 2.00)	1.40 (max. 3.30)		ОК
2a Thermal bridg					
Thermal b	oridging calculated fr	om linear thermal transmittanc	es for each junction		
Thermal b 3 Air permeabilit	bridging calculated fr	om linear thermal transmittanc			
Thermal b 3 Air permeabilit Air permeab	oridging calculated fr	om linear thermal transmittanc	3.00 (design valu	e)	
Thermal b 3 Air permeabilit	bridging calculated fr	om linear thermal transmittanc		e)	ок
Thermal b 3 Air permeabilit Air permeab	pridging calculated fr ty pility at 50 pascals	om linear thermal transmittanc	3.00 (design valu	e)	ок
Thermal b 3 Air permeabilit Air permeab Maximum	pridging calculated fr ty pility at 50 pascals ncy	om linear thermal transmittand Community heating scheme	3.00 (design valu 10.0	e)	ок
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficie	pridging calculated fr ty pility at 50 pascals ncy		3.00 (design valu 10.0	e)	ок
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficie	pridging calculated fr ty pility at 50 pascals ncy		3.00 (design valu 10.0	e)	ок
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficie Main Heatin	pridging calculated fr ty pility at 50 pascals ncy		3.00 (design valu 10.0	e)	ОК
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficien Main Heatin Secondary h	bridging calculated fr by bility at 50 pascals ncy ng system: heating system:	Community heating schemes	3.00 (design valu 10.0	e)	ок
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficien Main Heatin Secondary H 5 Cylinder insula	bridging calculated fr ty bility at 50 pascals ncy ng system: heating system: ation	Community heating schemes	3.00 (design valu 10.0	e)	ОК
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficient Main Heatin Secondary H 5 Cylinder insula Hot water S	bridging calculated fr ty bility at 50 pascals ncy ng system: heating system: ation	Community heating schemes	3.00 (design valu 10.0	e)	ОК
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficien Main Heatin Secondary H 5 Cylinder insula	bridging calculated fr ty bility at 50 pascals ncy ng system: heating system: ation	Community heating schemes	3.00 (design valu 10.0	e)	OK
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficient Main Heatin Secondary H 5 Cylinder insula Hot water S 6 Controls	bridging calculated fr by bility at 50 pascals ncy ng system: heating system: ation torage:	Community heating schemes None No cylinder	3.00 (design valu 10.0 s - mains gas	e)	OK
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficient Main Heatin Secondary H 5 Cylinder insula Hot water S	bridging calculated fr by bility at 50 pascals ncy ng system: heating system: ation torage:	Community heating schemes None No cylinder Charging system linked to us	3.00 (design valu 10.0 s - mains gas se of community heating,	e)	
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficien Main Heatin Secondary H 5 Cylinder insula Hot water S 6 Controls Space heatin	bridging calculated fr bridging calculated fr bridging to pascals ncy ag system: heating system: heating system: ation torage: ing controls	Community heating schemes None No cylinder Charging system linked to us programmer and at least two	3.00 (design valu 10.0 s - mains gas se of community heating,	e)	ок
Thermal b 3 Air permeabilit Air permeab Maximum 4 Heating efficient Main Heatin Secondary H 5 Cylinder insula Hot water S 6 Controls	bridging calculated fr bridging calculated fr bridging to pascals ncy ag system: heating system: heating system: ation torage: ing controls	Community heating schemes None No cylinder Charging system linked to us	3.00 (design valu 10.0 s - mains gas se of community heating,	e)	

Regulations Compliance Report

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	1.02	
Maximum	1.5	OK
MVHR efficiency:	93%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: South West	11.2m ²	
Windows facing: North West	2.03m ²	
Ventilation rate:	6.00	
10 Key features		
Air permeablility	3.0 m³/m²h	

Community heating, heat from boilers – mains gas Photovoltaic array

			User D	etails:						
Assessor Name:	Zahid Ashraf			Stroma	a Num	ber:		STRO	001082	
Software Name:	Stroma FSAP 20	12		Softwa	are Ver	sion:		Versio	n: 1.0.5.9	
		Pr	operty A	Address:	Plot 22					
Address :										
1. Overall dwelling dimen	sions:									
•			Area			Av. Hei	ght(m)		Volume(m ³)	-
Ground floor			7:	3.82	(1a) x	2	.5	(2a) =	184.54	(3a)
Total floor area TFA = (1a))+(1b)+(1c)+(1d)+(1	e)+(1n)) 7:	3.82	(4)					
Dwelling volume					(3a)+(3b)	+(3c)+(3d)+(3e)+	.(3n) =	184.54	(5)
2. Ventilation rate:										
	main s heating l	econdary heating	/	other		total			m ³ per hour	,
Number of chimneys		0	+ [0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 +	0] + [0] = [0	x2	20 =	0	(6b)
Number of intermittent fan	s				- L	0	x ^	10 =	0	(7a)
Number of passive vents					Γ	0	x ^	10 =	0	(7b)
Number of flueless gas fire	es					0	x 4	40 =	0	(7c)
								Air ch	anges per ho	
				7-)						_
Infiltration due to chimneys If a pressurisation test has be					ontinue fro	0 0 (9) to (÷ (5) =	0	(8)
Number of storeys in the						(-) (0	(9)
Additional infiltration	2						[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: 0.2	25 for steel or timber	frame or	0.35 for	masonr	y constr	uction			0	(11)
if both types of wall are pre		sponding to	the greate	er wall area	a (after					_
deducting areas of opening If suspended wooden flo		led) or 0.1	1 (seale	d). else	enter 0				0	(12)
If no draught lobby, ente		,	(- , ,					0	(13)
Percentage of windows		tripped							0	(14)
Window infiltration				0.25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate				(8) + (10) -	+ (11) + (1	2) + (13) +	- (15) =		0	(16)
Air permeability value, q	50, expressed in cul	bic metres	s per ho	ur per so	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabilit	y value, then (18) = [(17) ÷ 20]+(8)), otherwis	se (18) = (16)				0.15	(18)
Air permeability value applies		is been done	e or a deg	ree air per	meability i	is being us	sed			-
Number of sides sheltered Shelter factor				(20) = 1 - [0.075 x (1	9)] =			2	(19)
Infiltration rate incorporatir	na shelter factor			(21) = (18)		-/1			0.85	(20) (21)
Infiltration rate modified fo	-	d		() ()					0.13	(21)
i i i	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	· · · ·	. I		~					I	
· · · · · · · · · · · · · · · · · · ·	.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
									I	
Wind Factor $(22a)m = (22)$ (22a)m = 1.27 1.25 1.	0m ÷ 4 23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
	1.1 1.00	0.95	0.90	0.92	'	1.00	1.12	1.10	l	

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	peed) =	(21a) x	(22a)m					
.	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
		<i>ctive air</i> al ventila	•	rate for t	he appli	cable ca	se						0.5	(23a)
				endix N (2	(23a) = (23a	a) x Fmv (e	equation (I	N5)) , othe	rwise (23h) = (23a)			0.5	
								n Table 4h) = (200)			0.5	(23b)
			-	-	-			HR) (24a		2b)m ± ('	23h) v [[,]	1 _ (23c)	79.05 · 1001	(23c)
(24a)m=	r	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.23	0.24	0.25	0.25	÷ 100j	(24a)
								MV) (24b				0120		
(24b)m=	r			0	0				0		0	0		(24b)
								on from c						
,					•	•		c) = (22t		.5 × (23b)			
(24c)m=	= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) lf	natural	ventilati	on or wh	ole hous	e positiv	ve input	ventilatio	n from l	oft					
	if (22b)r	n = 1, th	en (24d)	m = (22l	o)m othe	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]			L	
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in boy	(25)					
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.23	0.24	0.25	0.25		(25)
3. He	at losse	s and he	eat loss	paramete	er:									
ELEN	/IENT	Gros		Openin	-	Net Ar		U-valu		AXU		k-value		Xk
-		area	(m²)	r	1 ²	A ,r	m²	W/m2	:К	(W/I	<)	kJ/m²∙l	K K.	J/K
Doors	_					2	x	1.4	= [2.8				(26)
	ws Type					11.20	-	/[1/(1.4)+		14.86				(27)
Windo	ws Type	∋2 				2.025	5 x1	/[1/(1.4)+	0.04] =	2.68				(27)
Walls	Type1	45.	5	13.2	3	32.27	7 X	0.15	=	4.84				(29)
Walls	Type2	23.9	98	2		21.98	3 X	0.14	=	3.11				(29)
Total a	area of e	elements	, m²			69.48	3							(31)
			ows, use e sides of ir				ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	is given in	paragraph	n 3.2	
Fabric	heat los	ss, W/K	= S (A x	U)				(26)(30)	+ (32) =				28.29	(33)
Heat c	apacity	Cm = S	(A x k)						((28)	.(30) + (32	2) + (32a).	(32e) =	759.54	(34)
Therm	al mass	parame	eter (TMF	P = Cm -	: TFA) ir	n kJ/m²K			Indica	tive Value:	Low		100	(35)
	•		ere the de tailed calc		construct	ion are not	t known pr	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Therm	al bridg	es : S (L	x Y) cal	culated	using Ap	pendix ł	<						8.56	(36)
if details	s of therma	al bridging	are not kn	own (36) =	= 0.05 x (3	1)								
Total f	abric he	at loss							(33) +	(36) =			36.85	(37)
Ventila	ation hea	at loss ca	alculated	monthl				i	(38)m	= 0.33 × (25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	16.28	16.08	15.89	14.92	14.73	13.76	13.76	13.56	14.14	14.73	15.11	15.5		(38)
Heat t	ransfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m		L	
(39)m=	53.13	52.93	52.74	51.77	51.57	50.6	50.6	50.41	50.99	51.57	51.96	52.35		
										Average =	Sum(39)1	12 /12=	51.72	(39)

Heat lo	oss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.72	0.72	0.71	0.7	0.7	0.69	0.69	0.68	0.69	0.7	0.7	0.71		
Numbr	or of dou		nth (Tab			<u> </u>			,	Average =	Sum(40)1.	12 /12=	0.7	(40)
Numbe	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)
(41)	01	20		00	01	00	01		00	01	00	01		()
4. Wa	iter heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				: [1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		34		(42)
Reduce	the annua	al average	hot water		5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.38		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
		1	,	ach month I	r	r		r			1		I	
(44)m=	103.82	100.04	96.26	92.49	88.71	84.94	84.94	88.71	92.49	96.26	100.04	103.82	1400.50	
Energy o	content of	hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	m x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1132.53	(44)
(45)m=	153.95	134.65	138.95	121.14	116.23	100.3	92.94	106.65	107.93	125.78	137.3	149.1		
lf instan	taneous w	/ater heati	na at point	t of use (no	o hot water	^r storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1484.92	(45)
(46)m=	23.09	20.2	20.84	18.17	17.44	15.05	13.94	16	16.19	18.87	20.59	22.36		(46)
· · ·	storage			_										
Storag	e volum	e (litres)) includir	ng any se	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
	•	-		ank in dw	-			. ,		or (0) in ((47)			
	storage		not wate	er (uns n	iciudes i	nstantai	ieous cu	ombi boil	ers) erne		(47)			
	-		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature f	actor fro	m Table	2b								0		(49)
			-	e, kWh/ye				(48) x (49)) =		1	10		(50)
				cylinder l rom Tabl								00		(51)
		-	ee secti			n/ntre/ue	a y)				0.	02		(31)
		from Ta									1.	03		(52)
Tempe	erature f	actor fro	m Table	2b							0	.6		(53)
			-	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
	. ,	(54) in (5									1.	03		(55)
Water	storage	loss cal	culated t	for each	month			((56)m = (55) × (41)	m			L	
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98 H11) is fro	32.01		(56)
-				- · ·	r			r	· · ·	· · · · ·	r			
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
				om Table		F0)						0		(58)
							. ,	65 × (41) ng and a		r thermo	ostat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
1			I	I				I	I		1		l	

Combi	loss ca	lculated	for eacl	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 h	neat req	uired for	water h	eating c	alculated	l foi	r eacl	h month	(62)m	= 0.85 ×	(45)m -	- (46)m +	(57)m +	(59)m + (61)m	
(62)m=	209.23	184.58	194.22	174.63	171.51	15	53.79	148.22	161.93	3 161.42	181.06	190.79	204.37]	(62)
Solar DI	-IW input	calculated	using Ap	pendix G o	r Appendix	: H (I	negati	ve quantity	/) (enter	'0' if no sola	ar contrib	ution to wate	er heating)	-	
(add a	dditiona	al lines if	FGHRS	and/or	WWHRS	ар	plies	, see Ap	pendix	G)				_	
(63)m=	0	0	0	0	0		0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	iter												
(64)m=	209.23	184.58	194.22	174.63	171.51	15	53.79	148.22	161.93	3 161.42	181.06	190.79	204.37]	
		•	•						0	utput from w	ater heat	er (annual)	112	2135.76	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	5´	[0.85	× (45)m	+ (61)	m] + 0.8 :	x [(46)n	n + (57)m	+ (59)m	n]	
(65)m=	95.41	84.71	90.42	83.07	82.87	76	6.15	75.13	79.68	78.68	86.04	88.45	93.8]	(65)
inclu	de (57)	m in calo	culation	of (65)m	only if c	ylin	der is	s in the c	dwellin	g or hot w	, vater is	from com	Imunity ł	neating	
5. Int	ternal g	ains (see	e Table :	5 and 5a):	-				-				-	
		ns (Table			,										
motab	Jan	Feb	Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	116.75	116.75	116.75	116.75	116.75	11	6.75	116.75	116.7		116.75	116.75	116.75		(66)
Lightin	g gains	(calcula	ted in A	ppendix	L, equat	ion	L9 o	r L9a), a	lso see	e Table 5				1	
(67)m=	18.77	16.67	13.56	10.27	7.67	-	.48	7	9.1	12.21	15.51	18.1	19.3	1	(67)
Applia	nces da	ins (calc	ulated i	n Appen	u dix L. ea	uati	ion L	13 or L1	i 3a), ali	so see Ta	uble 5	1	<u> </u>	1	
(68)m=	206.03	208.17	202.79	191.32	176.84	r –	3.23	154.14	152	157.39	168.86	183.34	196.94	1	(68)
										see Table			ļ	1	
(69)m=	34.68	34.68	34.68	34.68	34.68		4.68	34.68	34.68		34.68	34.68	34.68	1	(69)
		ı ns gains	I (Table	1 52)							I			J	
(70)m=				0	0		0	0	0	0	0	0	0	1	(70)
				tive valu				Ů	Ĵ	, , , , , , , , , , , , , , , , , , ,	Ů		Ů]	
(71)m=	-93.4	-93.4	-93.4	-93.4	-93.4	r –) 93.4	-93.4	-93.4	-93.4	-93.4	-93.4	-93.4	1	(71)
				-55.4	-00.4				-55.4			-55.4	-55.4	1	()
(72)m=	128.24	gains (T 126.06	121.53	115.38	111.38	10	5.76	100.97	107.1	109.28	115.65	122.84	126.07	1	(72)
				113.30	111.50					n + (69)m +]	(12)
(73)m=	411.08	gains =	395.91	374.99	353.92	22	(00)	320.14	326.2		358.04		400.34	1	(73)
. ,	lar gain		395.91	574.99	303.92	33	55.49	320.14	320.2	5 550.91	356.04	302.3	400.34]	(13)
			using sol:	ar flux from	Table 6a	and	associ	iated equa	tions to	convert to th	ne applica	able orienta	tion.		
		Access F	•	Area			Flu			g_	ie applie	FF		Gains	
onona		Table 6d		m²				ole 6a		Table 6b		Table 6c		(W)	
Southw	/est <mark>0.9x</mark>	0.77	×	11	2	×「	3	6.79		0.63	×	0.7		126	(79)
	/est _{0.9x}	0.77				~ L × [2.67		0.63		0.7		214.62](79)
	/est _{0.9x}	0.77				× [5.75		0.63		0.7		293.65	(79)
	/est _{0.9x}	0.77				× [06.25		0.63		0.7		363.85	(79)
	/est _{0.9x}	0.77				× [19.01		0.63		0.7		407.54	(79)
	0.0/1	0.11			.2	<u> </u>		15.01		0.00	^	0.7		407.34	()

Southwest _{0.9x}	0.77	x	11	.2	x	1	18.15			0.63	x	0.7		=	404.59	(79)
Southwest _{0.9x}	0.77	x	11	.2	×	1	13.91	İ		0.63	x	0.7		=	390.07	(79)
Southwest _{0.9x}	0.77	x	11	.2	×	1(04.39			0.63	x	0.7		=	357.47	(79)
Southwest _{0.9x}	0.77	x	11	.2	x	9	92.85			0.63	×	0.7		=	317.96	(79)
Southwest _{0.9x}	0.77	x	11	.2	×	6	9.27			0.63	x	0.7		=	237.2	(79)
Southwest _{0.9x}	0.77	x	11	.2	x	4	4.07			0.63	x	0.7		=	150.91	(79)
Southwest0.9x	0.77	x	11	.2	×	3	31.49			0.63	x	0.7		=	107.83	(79)
Northwest 0.9x	0.77	x	2.	03	x	1	1.28	x		0.63	x	0.7		=	6.98	(81)
Northwest 0.9x	0.77	x	2.	03	x	2	2.97	x		0.63	x	0.7		=	14.21	(81)
Northwest 0.9x	0.77	x	2.	03	×	4	1.38	x		0.63	x	0.7		=	25.61	(81)
Northwest 0.9x	0.77	x	2.	03	×	6	67.96	x		0.63	×	0.7		=	42.06	(81)
Northwest 0.9x	0.77	x	2.	03	x	9	1.35	x		0.63	x	0.7		=	56.53	(81)
Northwest 0.9x	0.77	x	2.	03	×	9	97.38	x		0.63	×	0.7		=	60.27	(81)
Northwest 0.9x	0.77	x	2.	03	×	ę	91.1	x		0.63	x	0.7		=	56.38	(81)
Northwest 0.9x	0.77	x	2.	03	x	7	2.63	x		0.63	x	0.7		=	44.95	(81)
Northwest 0.9x	0.77	x	2.	03	×	5	50.42	x		0.63	×	0.7		=	31.2	(81)
Northwest 0.9x	0.77	x	2.	03	×	2	28.07	x		0.63	×	0.7		=	17.37	(81)
Northwest 0.9x	0.77	x	2.	03	×		14.2	x		0.63	×	0.7		=	8.79	(81)
Northwest 0.9x	0.77	x	2.	03	×	ę	9.21	x		0.63	x	0.7		=	5.7	(81)
Solar <u>g</u> ains in	watts, ca	lculated	for eac	h montl	<u>۱</u>			(83)m	1 = Su	m(74)m	.(82)m			-		
(83)m= 132.98	228.83	319.26	405.9	464.07		64.86	446.45	402	.42	349.17	254.5	7 159.7	113	.53		(83)

Tatala														
i otal g	jains – ir	nternal a	nd solar	⁻ (84)m =	= (73)m -	⊦ (83)m	, watts							
(84)m=	544.05	637.77	715.16	780.89	817.99	798.35	766.59	728.65	686.07	612.61	542.01	513.86		(84)
7. Me	an inter	nal temp	erature	(heating	season)								
Temp	erature	during h	eating p	eriods ir	n the livir	ng area f	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilisa	ation fac	tor for g	ains for l	iving are	ea, h1,m	(see Ta	ble 9a)	-						-
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.92	0.88	0.81	0.69	0.55	0.4	0.29	0.32	0.49	0.73	0.88	0.93		(86)
Mean	internal	temper	ature in	living are	ea T1 (fo	llow ste	ps 3 to 7	in Tabl	e 9c)					
(87)m=	19.91	20.17	20.47	20.75	20.91	20.98	21	20.99	20.96	20.74	20.3	19.86		(87)
Temp	erature	during h	eating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	h2 (°C)					
(88)m=	20.32	20.33	20.33	20.34	20.34	20.35	20.35	20.36	20.35	20.34	20.34	20.33		(88)
Utilisa	ation fac	tor for g	ains for I	rest of d	welling, l	n2,m (se	e Table	9a)						
(89)m=	0.92	0.87	0.79	0.67	0.52	0.36	0.25	0.27	0.45	0.7	0.87	0.93		(89)

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	18.85	19.23	19.64	20.04	20.24	20.33	20.35	20.35	20.31	20.04	19.42	18.79		(90)
									1	iLA = Livin	g area ÷ (4	4) =	0.34	(91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

													_
(92)m=	19.21	19.55	19.92	20.28	20.47	20.55	20.57	20.57	20.53	20.28	19.72	19.16	(92)
													•

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

							·			·	i		l	()
(93)m=	19.21	19.55	19.92	20.28	20.47	20.55	20.57	20.57	20.53	20.28	19.72	19.16		(93)
			uirement		e obtoir					• T: (70)			
				nperatur using Ta		ied at ste	ерттог	Table 9	o, so tha	t 11,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	0.9	0.85	0.78	0.66	0.52	0.37	0.26	0.29	0.46	0.7	0.85	0.91		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (84	4)m	i	i	1	ſ	r	1	i	I	
(95)m=	489.82	542.71	556.54	518.01	427.49	296.15	199.82	208.69	316.04	427.85	461.69	468.8		(95)
	<u> </u>	<u> </u>	r	perature		r					1		l	(00)
(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)
	10SS rate 792.21	775.27	an intern 707.85	al tempe 589.07	452.32	Lm , VV = 301.29	=[(39)m 200.87	x [(93)m 210.17	- (96)m 327.68	499.07	655.76	782.94	l	(97)
(97)m=								210.17 24 x [(97]				702.94		(37)
(98)m=	224.98	156.28	112.58	51.17	18.48		0 = 0.02		0	52.99	139.73	233.72		
(00)				•		Ů	ů	-	-		r) = Sum(9		989.91	(98)
Space	o hootin	a roquir	omont in	k\//b/m2	woor			1014	i por your	(i) – Cu iii(0	C /15,812 —		
		• •		kWh/m ²									13.41	(99)
						scheme								
•		•				-		ting prov (Table 1 ⁻	-		unity sch	neme.	0	(301)
						-	-	(., •					(302)
Fraction of space heat from community system $1 - (301) =$ The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat source												1	(302)	
	-							allows for See Appel		up to four	other heat	sources; ti	he latter	
			-	ity boiler									1	(303a)
Fractic	on of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and o	charging	method	(Table	4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distrib	ution los	s factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m					1.05	(306)
Space	heating	9											kWh/yea	ar
Annua	l space	heating	requirem	nent									989.91	
Space	heat fro	m Comr	munity b	oilers					(98) x (30	04a) x (30	5) x (306)	=	1039.41	(307a)
Efficie	ncy of se	econdar	y/supple	mentary	heating	system	in % (fro	om Table	e 4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/su	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water	heating													
			equirem	ent									2135.76	
			ty schen nunity bo						(64) x (30	03a) x (30	5) x (306) :	=	2242.55	(310a)
Electri	city used	d for hea	at distribu	ution				0.01	× [(307a)	(307e) +	- (310a)((310e)] =	32.82	(313)
Coolin	g Syster	n Energ	y Efficie	ncy Rati	0								0	(314)
Space	cooling	(if there	is a fixe	d cooling	g systen	n, if not e	enter 0)		= (107) ÷	· (314) =			0	(315)
Electri	city for p	oumps a	nd fans v	within dv	velling (1	Table 4f)	:							_
macha		ntilation	- halanc	ed extra	act or po	sitive in	put from	outside					287.05	(330a)
mecha	nical ve	nulation	- Dalanc											(0000)

warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330l	o) + (330g) =		287.05	(331)
Energy for lighting (calculated in Appendix L)				331.54	(332)
Electricity generated by PVs (Appendix M) (negative	ve quantity)			-749.25	(333)
Electricity generated by wind turbine (Appendix M)	(negative quantity)			0	(334)
12b. CO2 Emissions – Community heating scheme	9				
	Energy kWh/year	Emission fact kg CO2/kWh		nissions CO2/year	
CO2 from other sources of space and water heatin Efficiency of heat source 1 (%)	ng (not CHP) here is CHP using two fuels repeat (363) to	(366) for the second	fuel	94	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	= [754.15	(367)
Electrical energy for heat distribution	[(313) x	0.52	= [17.03	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372)	= [771.19	(373)
CO2 associated with space heating (secondary)	(309) x	0	= [0	(374)
CO2 associated with water from immersion heater	or instantaneous heater (312) x	0.22	= [0	(375)
Total CO2 associated with space and water heatin	q (373) + (374) + (375) =]	771.19	(376)

(332))) x

CO2 associated with electricity for pumps and fans within dwelling (331)) x

sum of (376)...(382) =

(383) ÷ (4) =

Energy saving/generation technologies (333) to (334) as applicable

CO2 associated with electricity for lighting

Dwelling CO2 Emission Rate

Item 1

Total CO2, kg/year

El rating (section 14)

(378)

(379)

(380)

(383)

(384)

(385)

148.98

172.07

-388.86

703.38

9.53

92.07

=

=

x 0.01 =

0.52

0.52

0.52

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 28 October 2020

Property Details: Plot 22

Dwelling type: Located in: Region: Cross ventilation pos Number of storeys: Front of dwelling face Overshading: Overhangs: Thermal mass param Night ventilation: Blinds, curtains, shut Ventilation rate durin Overheating Details:	es: eter: tters: g hot we		<i>.</i>	Yes 1 North Averag None Indicat False	es valley East ge or unknown tive Value Low ndows fully open)			(P1)
Transmission heat lo	ss coeffi	cient:		36.8				
Summer heat loss co	efficient:			402.24	ŀ			(P2)
Overhangs:								
Orientation:	Ratio:		Z_overhangs:					
South West (SW) North West (NW)	0 0		1 1					
Solar shading:								
Orientation:	Z blind	ls:	Solar access:	C	Overhangs:	Z summer:		
South West (SW)	1		0.9	1		0.9		(P8)
North West (NW)	1		0.9	1		0.9		(P8)
Solar gains:								
Orientation		Area	Flux	g_	FF	Shading	Gains	
South West (SW)	0.9 x	11.2	119.92	0.63	0.7	0.9	479.99	
North West (NW)	0.9 x	2.03	98.85	0.63	0.7	0.9 Total	71.5 551.49	(P3/P4)
Internal gains:						Total	551.49	(F3/F4)
internar gains.								
Internal gains					June 463.63	July 446.58	August 454.76	
Total summer gains					1044.69	998.07	961.03	(P5)
Summer gain/loss ratio)				2.6	2.48	2.39	(P6)
Mean summer externa	l tempera	ture (T	hames valley)		16	17.9	17.8	
Thermal mass tempera	ature incre	ement			1.3	1.3	1.3	
Threshold temperature	;				19.9	21.68	21.49	(P7)
Likelihood of high int		nperatu	re		Not significant	Slight	Slight	
Assessment of likelih	nood of h	igh inte	ernal temperatu	re:	<u>Slight</u>			

Software Name: Stoma FSAP 2012 Software Version: Version: 1.0.5.9 Address: I Deports Address: Pict 22 Address: I Overall dwelling dimensions: Volume(m?) Ground floor 2.5 $(2a)$				User D	etails:							
Aldress : 1. Cverial dwelling dimensions: Area(m ²)Av. Height(m)Volume(m ²)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)T3.82(a)T3.82(b)Output to the formation of the formati	Assessor Name: Software Name:		12									
Area(m ²)Volume(m ³)Ground floorVolume(m ³)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)T3.82(1a)X2.5(2a)=184.54(3a)Develope of the secondary heating(3a)+(3b)+(3c)+(3d)+(3e)+(3a)=184.54(5a)Number of chimneysSecondary heatingother totalm ³ per hourNumber of chimneysSecondary heatingother totalm ³ per hourNumber of chimneys0+0+0(a)Number of passive ventsaaaNumber of flueless gas fires0Air changes per hourInfiltration due to chimneys, flues and fans = (6a)+(6b)+(7b)+(7b) =aa(a)Number of storeys in the dwelling (ns)Air changes per hourIf a passurisation test has been carried out or is intended, proceed to (77), otherwise continue from (9) to (76)Number of storeys in the dwelling (ns)(9)Air changes per hourIf a passurisation test has been carried out or is intended, proceed to (77), otherwise continue from (9) to (76)Number of storeys in the dwelling (ns)(9) <td cols<="" th=""><th></th><th></th><th>Pr</th><th>operty A</th><th>ddress:</th><th>Plot 22</th><th></th><th></th><th></th><th></th><th></th></td>	<th></th> <th></th> <th>Pr</th> <th>operty A</th> <th>ddress:</th> <th>Plot 22</th> <th></th> <th></th> <th></th> <th></th> <th></th>			Pr	operty A	ddress:	Plot 22					
Area(m ²)Av. Height(m)Volume(m ³)Ground flor73.82(1a) x2.5(2a) a184.54(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)73.82(4)184.54(5a)Dwellor volume(3a)+(3b)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c)+(3c	Address :											
Ground floor73.82(1a)X2.5(2a)184.54(3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)73.82(4)Dwelling volume(3a)+(3b)+(3c)+(3d)+(3c)+(3n)184.54(5)2. Ventilation rate:main heating 0+0=0x40(6a)Number of chimneys0+0=0x40(6a)Number of open flues0+0=0x40(6a)Number of open flues0+0=0x10(6a)Number of passive vents0x100x10(6b)Number of flueless gas fires0x100x10(7a)Number of flueless gas fires00x100(7a)Number of storeys in the dwelling (ns) Additional infiltration(1b)+(7a)+(7a)+(7a)+(7a)+(7a)30+ (5)0.16If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue fram (07b (7d))0(1b)(1b)(1b)(1b)Number of storeys in the dwelling (ns) 	1. Overall dwelling dime	nsions:			(a)							
Duelling volume $(3a)+(3b)+(3a)+(3a)+(3a)+(3a)+(,(3n)) = 184.54 (5)$ 2. Ventilation rate:main heating 0secondary heating 0othertotalm³ per hourNumber of chimneys0+0=0×0 =0(6a)Number of open flues0+0=0×0 =0(6b)Number of intermittent fans3×1 0 =30(7a)Number of passive vents0×4 0 =0(7b)Number of tideless gas fires0×4 0 =0(7c)Number of tideless gas fires0×4 0 =0(7c)Number of tideless gas fires0×4 0 =0(7c)Number of storeys in the dwelling (ns) Additional infiltration(9)+(1)+(7c) =30+ (5) =0.16Number of storeys in the dwelling (ns) Additional infiltration:0.25 for steel or timber frame or 0.35 for masony construction If both types of wall are present, use the value corsepanding to the greater wall area (after deducing reases of opening); if equal user 0.35(11)0(12)Percentage of windows and doors draught stripped Nindow infiltration0.25 - (0.2 x (14) + 100) =0(13)Air permeability value, q50, expressed in cubic metres per houre per square metre of envelope area 0(16)(16)Air permeability value, q50, expressed in cubic metres per houre per square metre of envelope area 0(16)(16)Air permeability value, q50, expressed in cubic metres per houre per square metre of envelope area 0(16)(16) <td>Ground floor</td> <td></td> <td></td> <td></td> <td></td> <td>(1a) x</td> <td></td> <td></td> <td>(2a) =</td> <td>. ,</td> <td>-</td>	Ground floor					(1a) x			(2a) =	. ,	-	
2. Ventilation rate:2. Ventilation rate:Number of chimneys 0 0 0 o o f t <td>Total floor area TFA = (1a</td> <td>a)+(1b)+(1c)+(1d)+(1</td> <td>e)+(1n)</td> <td>) 73</td> <td>3.82</td> <td>(4)</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1	e)+(1n)) 73	3.82	(4)						
Number of chimneysmain heatingsecondary heatingothertotalm³ per hourNumber of open flues0+0=0×40 =0(6a)Number of open flues0+0=0×20 =0(6b)Number of intermittent fans3×10 =30(7a)Number of passive vents0×10 =0(7c)Number of flueless gas fires0×40 =0(7c)Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7c) =30+ (6) =0.16I' a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)0(9)Additional infiltration(9)-1]x0.1 =0(9)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 0.3600(12)If no draught lobby, enter 0.05, else enter 00(12)0(14)Percentage of windows and doors draught stripped0(14)(12)0(15)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (3) (10) + (11) + (12) + (13) + (15) =0(15)Air permeability value, apolies if a pressurisation test has been done or a degree air permeability is being used0.31(18)Air permeability value, q50, expressed in cubic metres per hour per square metter of envelope area (3) (10) + (11) + (12) + (13) + (15)	Dwelling volume					(3a)+(3b)	+(3c)+(3d	l)+(3e)+	.(3n) =	184.54	(5)	
Number of chimneysheatingheating 1 0	2. Ventilation rate:											
Number of chimneys 0 $+$ 0 $+$ 0 $=$ 0 $x40$ $=$ 0 $(6a)$ Number of open flues 0 $+$ 0 $+$ 0 $=$ 0 $x20$ 0 $(6b)$ Number of intermittent fans $x10$ 3 $x10$ 3 $(7a)$ 3 $x10$ 3 $(7a)$ Number of passive vents 0 $x10$ 0 $(7c)$ 0 $x40$ 0 $(7c)$ Number of flueless gas fires 0 $x40$ 0 0 $(7c)$ a <td></td> <td></td> <td></td> <td>/ (</td> <td>other</td> <td></td> <td>total</td> <td></td> <td></td> <td>m³ per hour</td> <td>,</td>				/ (other		total			m ³ per hour	,	
Number of intermittent fans Number of intermittent fans Number of passive vents Number of passive vents Number of passive vents Number of stass as fires 1 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 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration at $(6) + (10) + (11) + (12) + (13) + (15) =$ Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3 (17) If based on air permeability value, then $(18) = [(17) + 20) + (8)$, otherwise $(18) = (16)$ Number of sides sheltered Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$ (31) (32) = (32) (33) (34) (35) (35) (35) (35) (35) (36) (36) (36) (37) (36) (37) (37) (38) (37) (39) (39) (39) (39) (31) (31) (32) (32) (33) (31) (32) (32) (33) (33) (32) (34) (35) (35) (35) (35) (35) (36) (36) (36) (37) (37) (38) (37) (39) (39) (39) (39) (39) (39) (31) (31) (32) (32) (31) (32) (32) (33) (33) (32) (34) (35) (35) (35) (35) (35) (36) (36) (36) (36) (36) (36) (36) (36) (36) (36) (36) (36) (36) (37) (38) (37) (39)	Number of chimneys			+ [0] = [0	x 4	40 =	0	(6a)	
Number of passive vents Number of passive vents Number of flueless gas fires 0 x 10 = 0 (7c) Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7c) = 30 + (5) = 0.16 (6) 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 Percentage of windows and doors draught stripped Window infiltration $0.25 \cdot [0.2 \times (14) + 100] =$ 0 (14) Window infiltration rate (B) + (10) + (11) + (12) + (15) = 0 (15) Infiltration rate Number of sides sheltered Number of sides sheltered Number of sides sheltered Number of sides sheltered 1 (20) = 1 - $[0.075 \times (19)] =$ 1 (19) 2 (19) 1 (19) 0.85 (20) Infiltration rate modified for monthly wind speed 1 (20) = 1 - $[0.075 \times (19)] =$ 1 (21) = 1 (21) = 1 (22) = 0.27 (21) Infiltration rate modified for monthly wind speed 1 (20) = 1 - $[0.075 \times (19)] =$ 1 (21) = 1 (21) = 1 (22) = 0.27 (21) Infiltration rate modified for monthly wind speed 1 (21) = 1 (20) = 1 (20) = 1 (20) = 1 (21) = 1 (20) = 1 (21) = 1 (20) = 1 (21) = 1 (20) = 2 (21) 2 (21) 2 (21) (21) (20) = 2 (21) 2 (21) 2 (21) 2 (21) 2 (21) 2 (21) 2 (21) 2 (21) 3 (22) = 3 (22) 3 (23) 3 (24) (24) (25) = 3 (24) 3 (25) 3 (26) 3 (27) 3 (21) 3 (28) 3 (20) 3 (21) 3 (20) 3 (21) 3 (20) 3 (21) 3 (22) 3 (22) 3 (23) 3 (23) 3 (24) 3 (25) (25) 3 (25) 3 (26) 3 (26) 3 (27) 3 (21) 3	Number of open flues	0 +	0	i + 🗖	0] = [0	x 2	20 =	0	_](6b)	
Number of flueless gas fires $ \begin{array}{ccccccccccccccccccccccccccccccccccc$	Number of intermittent far	าร				, L L	3	x 1	0 =	30	_](7a)	
Air changes per hourInfiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =30+ (5) =0.16(8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)(9)(10)(9)Additional infiltration(9)-1]x0.1 =0(10)Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction0(11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.350(12)If no draught lobby, enter 0.05, else enter 00(12)(13)Percentage of windows and doors draught stripped0(13)Window infiltration0.25 - [0.2 x (14) + 100] =0Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =0Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16)0.31Air permeability value, applies if a pressurisation test has been done or a degree air permeability is being used0Number of sides sheltered2(19)Shelter factor(20) = 1 - [0.075 x (19)] =0.35Infiltration rate incorporating shelter factor(21) = (18) x (20) =0.27Infiltration rate incorporating shelter factor(21) = (18) x (20) =0.27Infiltration rate incorporating shelter factor(21) = (18) x (20) =0.27Infiltration rate incorporating shelter factor(Number of passive vents					L L	0	x 1	0 =	0	_](7b)	
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)=$ 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 (9)-1x0.1 = 0 (10) 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 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) + 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)] = Infiltration rate incorporating shelter factor (21) = (18) x (20) = 2 (19) Shelter factor Monthly average wind speed from Table 7 (22)m <u>5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7</u>	Number of flueless gas fir	res					0	x 4	40 =	0	_](7c)	
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)=$ 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 (9)-1x0.1 = 0 (10) 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 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) + 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)] = Infiltration rate incorporating shelter factor (21) = (18) x (20) = 2 (19) Shelter factor Monthly average wind speed from Table 7 (22)m <u>5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7</u>									ا Air ch	anges per bo	_ ur	
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 (9) -1 x0.1 = 0 (10) 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 $0.25 \cdot [0.2 \times (14) \pm 100] =$ 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 $(18) = [(17) \pm 20] + (8)$, 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 $(21) = (18) \times (20) =$ 0.27 (21) Infiltration rate modified for monthly wind speed Infiltration rate modified for monthly wind speed Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)me 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7	Lefthere de la constance de la constance de		(C-) · (Ch) · (7-			_					-	
Number of storeys in the dwelling (ns)0Additional infiltration $((\theta)-1)x0.1 =$ Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction0if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.350If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 00Percentage of windows and doors draught stripped0Window infiltration0.25 - [0.2 x (14) + 100] =Infiltration rate(B) + (10) + (11) + (12) + (13) + (15) =Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3Air permeability value, applies if a pressurisation test has been done or a degree air permeability is being used2Number of sides sheltered2Shelter factor(20) = 1 - [0.075 x (19)] =Infiltration rate modified for monthly wind speed2Infiltration rate modified for monthly wind speed0.27Infiltration rate modified for monthly wind speedInfiltration rate modified for monthly wind speedInfiltration rate modified for monthly wind speedInfiltration rate for the factorInfiltration rate modified for monthly wind speedInfiltration rate for table 7(22)me5.154.94.44.33.83.744.34.54.54.54.54.54.54.54.4<	•					ontinue fra			÷ (5) =	0.16	(8)	
Additional infiltration $(9)-1$ x0.1 =0(10)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 0.350(11)If 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 infiltration0.25 - [0.2 x (14) + 100] =0Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =0Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16)0.31Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used2Number of sides sheltered2(20)Shelter factor(21) = (18) x (20) =0.27Infiltration rate incorporating shelter factor(21) = (18) x (20) =0.27Infiltration rate modified for monthly wind speed0(12)JanFebMarAprMayJanFebMarAprMayJan54.94.44.33.83.744.34.5(22)me5.154.94.44.33.83.744.34.54.7			<i>aoa, procooa</i>				, (0) 10 (10)	[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 $0.25 \cdot [0.2 \times (14) \pm 100] =$ 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) $\pm 20]+(8)$, 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 Infiltration rate incorporating shelter factor Infiltration rate modified for monthly wind speed Infiltration rate modified for monthly wind speed Monthly average wind speed from Table 7 (22)m= <u>5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7</u>	Additional infiltration							[(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 00If no draught lobby, enter 0.05, else enter 00Percentage of windows and doors draught stripped0Window infiltration $0.25 \cdot [0.2 \times (14) \div 100] =$ Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.31Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used0Number of sides sheltered2Shelter factor(20) = 1 - [0.075 x (19]] =Infiltration rate modified for monthly wind speed0.21) = (18) x (20) =Infiltration rate modified for monthly wind speed0.22) = 1 - [0.075 N (19]] =Monthly average wind speed from Table 70.22) = 1 - [0.21 Nov Dec(22) me5.154.94.44.33.83.744.34.54.7	Structural infiltration: 0.	25 for steel or timbe	r frame or (0.35 for	masonr	y constru	uction			0	(11)	
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 00If no draught lobby, enter 0.05, else enter 00Percentage of windows and doors draught stripped0Window infiltration $0.25 \cdot [0.2 \times (14) \div 100] =$ Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope areaIf 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 usedNumber of sides shelteredShelter factorInfiltration rate modified for monthly wind speedInfiltration rate modified for monthly wind speedInfiltration rate wind speed from Table 7(22)me5.154.94.44.33.83.744.34.34.34.34.34.35.154.94.44.33.83.744.34.34.34.34.34.34.34.34.34.34.34.34.34.34.34.34.34.44.34.44.34.44.54.7 <td></td> <td></td> <td>esponding to</td> <td>the greate</td> <td>er wall area</td> <td>a (after</td> <td></td> <td></td> <td></td> <td></td> <td></td>			esponding to	the greate	er wall area	a (after						
If no draught lobby, enter 0.05, else enter 00Percentage of windows and doors draught stripped0Window infiltration $0.25 \cdot [0.2 \times (14) \div 100] =$ Infiltration rate(8) + (10) + (11) + (12) + (13) + (15) =Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.31Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used2Number of sides sheltered2Shelter factor(20) = 1 - [0.075 x (19)] =Infiltration rate modified for monthly wind speed0.21 = (18) x (20) =Monthly average wind speed from Table 7(22) m=5.154.94.44.33.83.744.34.34.54.7	•	• / ·	aled) or 0.1	l (seale	d). else	enter 0			[0] (12)	
Percentage of windows and doors draught stripped0Window infiltration $0.25 \cdot [0.2 \times (14) \div 100] =$ 0Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) =$ 0Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area3If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.31Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used0Number of sides sheltered2Shelter factor $(20) = 1 \cdot [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speedMonthly average wind speed from Table 7(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7	•		,	(-,,						=	
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 area3(17)If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.31(18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used0(16)Number of sides sheltered2(19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 0.85(20)Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.27(21)Infiltration rate modified for monthly wind speed 0.27 (21)Monthly average wind speed from Table 7(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7	Percentage of windows	and doors draught	stripped							0	(14)	
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 3 (17)If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.31 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used 0.31 (18)Number of sides sheltered 2 (19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speed 0.27 (21)Monthly average wind speed from Table 7 $(22)m =$ $(22)m =$ 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7	Window infiltration			(0.25 - [0.2	x (14) ÷ 1	= [00		İ	0	(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 usedNumber of sides sheltered2Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ Infiltration rate modified for monthly wind speed0.27JanFebMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7(22)m=5.154.94.44.33.83.744.34.34.54.7	Infiltration rate			((8) + (10) -	+ (11) + (1	2) + (13) -	+ (15) =		0	(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 <u>Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec</u> Monthly average wind speed from Table 7 (22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7	Air permeability value,	q50, expressed in cu	ubic metres	s per ho	ur per so	quare me	etre of e	nvelope	area	3	(17)	
Number of sides sheltered $(20) = 1 - [0.075 \times (19)] =$ 2 (19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 0.85 (20)Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.27 (21)Infiltration rate modified for monthly wind speed 0.27 (21) 0.27 (21)Mar Apr May Jun Jul Aug Sep Oct Nov DecMonthly average wind speed from Table 7(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7	•									0.31	(18)	
Infiltration rate incorporating shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.85 (20) Infiltration rate modified for monthly wind speed 0.27 (21) Infiltration rate modified for monthly wind speedJanFebMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7 $(22)m=$ 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7			as been done	e or a deg	ree air per	meability i	s being u	sed	ſ			
Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0.27 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7		u		((20) = 1 - [0.075 x (1	9)] =				- · ·	
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7		ing shelter factor		((21) = (18)	x (20) =			l		4	
JanFebMarAprMayJunJulAugSepOctNovDecMonthly average wind speed from Table 7(22)m=5.154.94.44.33.83.83.744.34.54.7		-	ed						I	0.2.		
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7	r		1 1	Jul	Aug	Sep	Oct	Nov	Dec			
	Monthly average wind spe	eed from Table 7										
Wind Factor (22a)m = (22)m \div 4	(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7			
	Wind Factor (22a)m = (22	2)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	(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			

Adjust	ed infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m	-				
~	0.34	0.33	0.33	0.29	0.29	0.25	0.25	0.25	0.27	0.29	0.3	0.31		
		c <i>tive air</i> al ventila	-	rate for t	he appli	cable ca	se						0	(23a)
				endix N (2	(23a) = (23a	a) x Fmv (e	equation (I	N5)) , othe	rwise (23h) = (23a)			0	
			• • •		, ,	, ,	• •	n Table 4h) = (20u)			0	(23b)
			-	-	-			HR) (24a		2h)m ⊥ ('	23h) v [1	l _ (23c)	0 ÷ 1001	(23c)
(24a)m=					0	0				0		0		(24a)
			l anical ve	I		heat rec		MV) (24b	1 = (22)		23h)	-		
(24b)m=				0	0	0			0	0	0	0		(24b)
			I tract ver	L	L Dr. Dositiv		l ventilatio	n from c	L utside					
,					•	-		c) = (22k		5 × (23b))			
(24c)m=	= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) lf	natural	ventilatio	on or wh	ole hous	e positiv	/e input	ventilatio	on from l	oft					
	if (22b)n	n = 1, th	en (24d)	m = (22l	o)m othe	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]			L	
(24d)m=	0.56	0.56	0.55	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.54	0.55		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in boy	(25)					
(25)m=	0.56	0.56	0.55	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.54	0.55		(25)
3. He	at losse	s and he	eat loss	paramet	er:									
ELEN	IENT	Gros area		Openin		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²·ł		X k J/K
Doors			()			2	 x	1.4	= [2.8				(26)
Windo	ws Type	e 1				11.20	5 x1	/[1/(1.4)+	١	14.86				(27)
	ws Type					2.025	<u> </u>	- /[1/(1.4)+		2.68	=			(27)
Walls		45.	5	13.2	3	32.27		0.15		4.84	Ξ r			(29)
Walls		23.9		2	<u> </u>	21.98		0.13		3.11				(29)
		elements		2		69.48		0.14	[5.11	L			(31)
			-	effective wi	ndow U-va			g formula 1	/[(1/U-valu	ie)+0.041 a	as aiven in	paragraph	132	(01)
				nternal wal				,				p = : : : : : : : : : : : : : : : : : :		
Fabric	heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				28.29	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	759.54	(34)
Therm	al mass	parame	ter (TM	- = Cm -	: TFA) ir	n kJ/m²K			Indica	tive Value	: Low		100	(35)
	-				construct	ion are not	t known pr	recisely the	e indicative	values of	TMP in Ta	able 1f		
			tailed calc	culated	usina Ar	nondiv k							0.50	(26)
	-	•	,	own (36) =	• •		`						8.56	(36)
	abric he			(00)	0100 / 10	.,			(33) +	(36) =			36.85	(37)
Ventila	ation hea	at loss ca	alculated	d monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	33.94	33.81	33.67	33.05	32.93	32.39	32.39	32.29	32.6	32.93	33.17	33.42		(38)
Heat ti	ransfer o	coefficie	nt, W/K	-	-	-	-	-	(39)m	= (37) + (3	- 38)m		•	
(39)m=	70.79	70.65	70.52	69.9	69.78	69.24	69.24	69.13	69.44	69.78	70.02	70.26		
	L								,	Average =	Sum(39)1.	12 /12=	69.9	(39)

Heat lo	oss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.96	0.96	0.96	0.95	0.95	0.94	0.94	0.94	0.94	0.95	0.95	0.95		
Numbe	er of day	s in mo	nth (Tab	le 1a)	•		•		,	Average =	Sum(40)1.	12 /12=	0.95	(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)
				1										
4. Wa	ater heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				: [1 - exp	(-0.0003	849 x (TF	FA -13.9	9)2)] + 0.0	0013 x (⁻	TFA -13.		34		(42)
Reduce	the annua	al average	hot water	usage by		lwelling is	designed	(25 x N) to achieve		se target o		.38		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres pei	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	103.82	100.04	96.26	92.49	88.71	84.94	84.94	88.71	92.49	96.26	100.04	103.82		
Enarm	oontont of	botwator	used as	la vlatad m	anthly 1	100 v Vd v		DTm / 2600			m(44) ₁₁₂ =		1132.53	(44)
				. <u> </u>		i		DTm / 3600	i	·				
(45)m=	153.95	134.65	138.95	121.14	116.23	100.3	92.94	106.65	107.93	125.78	137.3 m(45) ₁₁₂ =	149.1	1484.92	(45)
lf instant	taneous w	ater heati	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46		10tal = Su	III(43) ₁₁₂ =		1404.92	
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage										·			
-		. ,		• •			-	within sa	ame ves	sel		0		(47)
	•	-			/elling, e			ı (47) ombi boil	ore) onto	ər '()' in <i>(</i>	(17)			
	storage		not wate	51 (1113 11	iciuues i	nstantai			ers) erit					
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature f	actor fro	m Table	2b								0		(49)
			-	e, kWh/ye				(48) x (49)) =			0		(50)
				•	loss fact le 2 (kWl							-		(54)
		•	ee secti			n/nue/ua	iy)					0		(51)
		from Ta										0		(52)
Tempe	erature f	actor fro	m Table	2b								0		(53)
Energy	/ lost fro	m water	· storage	e, 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	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	50), 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	nnual) fro	om Table	e 3							0		(58)
	•					,	. ,	65 × (41)						
		1	· · · · · ·	I	I	1	· · · · · ·	ng and a	· ·	· · · · · ·	, 	<u> </u>	l	(50)
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)

Combi	loss ca	alculated	for eac	h month	(61)m =	(60	D) ÷ 36	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	neating	calculated	d fo	or eac	h month	(62)r	n =	0.85 × ((45)m +	· (46)m +	(57)m +	- (59)m + (61)m	
(62)m=	130.86	114.45	118.1	102.97	98.8	8	35.26	79	90.6	66	91.74	106.91	116.7	126.73]	(62)
Solar DH	HW input	calculated	using Ap	pendix G	or Appendix	кН	(negati	ve quantity	/) (ente	er '0'	if no sola	r contribu	ition to wat	er heating)	
(add a	dditiona	al lines if	FGHRS	S and/or	WWHRS	6 ap	oplies	, see Ap	pend	ix G	S)				_	
(63)m=	0	0	0	0	0		0	0	0		0	0	0	0		(63)
Output	from w	ater hea	iter													
(64)m=	130.86	114.45	118.1	102.97	98.8	8	35.26	79	90.6	66	91.74	106.91	116.7	126.73		_
										Outp	out from w	ater heat	er (annual)	112	1262.19	(64)
Heat g	ains fro	m water	heating	g, kWh/r	nonth 0.2	5 ´	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	k [(46)n	n + (57)m	ı + (59)n	ן ר	
(65)m=	32.72	28.61	29.53	25.74	24.7	2	21.31	19.75	22.6	66	22.93	26.73	29.18	31.68]	(65)
inclu	de (57)	m in cal	culation	of (65)	n only if c	yliı	nder i	s in the o	dwelli	ing	or hot w	ater is	from com	nmunity	heating	
5. Int	ernal g	ains (see	e Table	5 and 5	a):											
Metabo	olic gaiı	ns (Table	e 5), Wa	itts												
	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	Jg	Sep	Oct	Nov	Dec]	
(66)m=	116.75	116.75	116.75	116.75	116.75	1	16.75	116.75	116.	75	116.75	116.75	116.75	116.75		(66)
Lightin	g gains	(calcula	ted in A	ppendi	L, equat	ion	1 L9 o	r L9a), a	lso s	ee ⁻	Table 5				-	
(67)m=	18.77	16.67	13.56	10.27	7.67		6.48	7	9.1		12.21	15.51	18.1	19.3]	(67)
Applia	nces ga	ains (calc	ulated i	n Appe	ndix L, eq	uat	tion L	13 or L1	3a), a	also	see Ta	ble 5			-	
(68)m=	206.03	208.17	202.79	191.32	176.84	1	63.23	154.14	15	2	157.39	168.86	183.34	196.94	1	(68)
Cookir	ig gains	s (calcula	ted in A	Appendi	x L, equa	tior	n L15	or L15a)), also	o se	e Table	5			_	
(69)m=	34.68	34.68	34.68	34.68	34.68	-	34.68	34.68	34.6		34.68	34.68	34.68	34.68	1	(69)
Pumps	and fa	ins gains	(Table	5a)											_	
(70)m=	0	0	0	0	0	Γ	0	0	0		0	0	0	0	1	(70)
Losses	se.a. e	vaporatio	n (nea	ative va	ues) (Tat	ble	5)	ļ						I	1	
(71)m=	-93.4	-93.4	-93.4	-93.4	-93.4	1	-93.4	-93.4	-93	.4	-93.4	-93.4	-93.4	-93.4	1	(71)
	heating	ı gains (1	rable 5)		-	I								Į	1	
(72)m=	43.97	42.58	39.69	35.75	33.2		29.6	26.55	30.4	46	31.85	35.92	40.52	42.58	1	(72)
	nterna	l gains =	I		1	1	(66)	l m + (67)m	I 1 + (68)m +	- (69)m + I	l (70)m + (71)m + (72)m	1	
(73)m=	326.81	325.45	314.06	295.36	275.74	2	57.34	245.71	249.	·	259.48	278.32	· ·	316.85	1	(73)
6. So	lar gain	s:		1	1	<u> </u>			1				1			
			using sol	ar flux fro	m Table 6a	and	lassoc	iated equa	itions t	о со	nvert to th	ne applica	ble orienta	tion.		
Orienta	ation:	Access F	actor	Are	а		Flu	х			g_		FF		Gains	
		Table 6d		m	2		Tal	ole 6a		Т	able 6b	-	Table 6c		(W)	
Southw	est <mark>0.9x</mark>	0.77)	(1	1.2	x	3	6.79] [0.63	×	0.7	=	126	(79)
Southw	est <mark>0.9</mark> x	0.77)	(1	1.2	x	6	2.67] [0.63	x	0.7	=	214.62	(79)
Southw	est <mark>0.9x</mark>	0.77	,	(1	1.2	x	8	5.75] [0.63	×	0.7	=	293.65	(79)
Southw	est <mark>0.9x</mark>	0.77)	< 1	1.2	x	1	06.25] [0.63	× [0.7	=	363.85	(79)
Southw	est <mark>0.9x</mark>	0.77)	(1	1.2	x	1	19.01	i (0.63	x	0.7	=	407.54	(79)

Southwest0.9x	0.77	x	11.:	2	x	1	18.15]	0.63	}	x	0.7	=	Ē	404.59	(79)
Southwest _{0.9x}	0.77	x	11.	2	x	1	13.91		0.63	3] × [0.7	=	Ē	390.07	(79)
Southwest _{0.9x}	0.77	x	11.	2	x	1	04.39		0.63	3) × [0.7	=		357.47	(79)
Southwest0.9x	0.77	x	11.	2	x	g	92.85		0.63	3) × [0.7	=		317.96	(79)
Southwest0.9x	0.77	x	11.	2	x	6	9.27		0.63	}] × [0.7	=		237.2	(79)
Southwest _{0.9x}	0.77	x	11.	2	x	4	4.07		0.63	3	x	0.7	=		150.91	(79)
Southwest0.9x	0.77	x	11.	2	x	3	31.49]	0.63	3] × [0.7	=		107.83	(79)
Northwest 0.9x	0.77	x	2.03	3	x	1	1.28	x	0.63	}) × [0.7	=		6.98	(81)
Northwest 0.9x	0.77	x	2.0	3	x	2	2.97	x	0.63	3	x	0.7	=		14.21	(81)
Northwest 0.9x	0.77	x	2.0	3	x	4	1.38	×	0.63	3] × [0.7	=		25.61	(81)
Northwest 0.9x	0.77	x	2.0	3	x	6	67.96	x	0.63	3) × [0.7	=		42.06	(81)
Northwest 0.9x	0.77	x	2.0	3	x	g	1.35	x	0.63	3	x	0.7	=		56.53	(81)
Northwest 0.9x	0.77	x	2.0	3	x	g	97.38	x	0.63	3] × [0.7	=		60.27	(81)
Northwest 0.9x	0.77	x	2.0	3	x		91.1	x	0.63	3) × [0.7	=		56.38	(81)
Northwest 0.9x	0.77	x	2.0	3	x	7	2.63	x	0.63	3	x	0.7	=		44.95	(81)
Northwest 0.9x	0.77	x	2.0	3	x	5	50.42	x	0.63	3] × [0.7	=		31.2	(81)
Northwest 0.9x	0.77	x	2.0	3	x	2	28.07	x	0.63	3) × [0.7	=	- [17.37	(81)
Northwest 0.9x	0.77	x	2.0	3	x		14.2	x	0.63	}) × [0.7	=	Ē	8.79	(81)
Northwest 0.9x	0.77	x	2.0	3	x		9.21	x	0.63	}] × [0.7	=	Ē	5.7	(81)
_								-								_
Solar <u>gains in</u>	watts, calcu	ulated	for each	n month	<u>1</u>			(83)m	i = Sum(74	l)m	(82)m					
(83)m= 132.98	228.83 3 [,]	19.26	405.9	464.07	4	64.86	446.45	402	.42 349.	.17	254.57	159.7	113.53	3		(83)
Total gains – i	nternal and	solar	(84)m =	(73)m	+ (8	83)m	, watts									
(84)m= 459.79	554.28 63	33.32	701.26	739.81	7	22.2	692.16	652	.01 608.	.65	532.89	459.69	430.38	3		(84)

7	Moon internel	temperature	booting	
	ivicali interna	i temperature i	nearing	(Season)

Temp	erature	during h	eating p	eriods ir	n the livir	ng area t	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilisa	tion fac	tor for g	ains for l	iving are	ea, h1,m	(see Ta	ble 9a)							-
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.96	0.93	0.89	0.81	0.7	0.55	0.42	0.46	0.65	0.85	0.94	0.97		(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Table	e 9c)					

(87)m=	19.08	19.39	19.81	20.28	20.65	20.88	20.96	20.95	20.79	20.29	19.59	19.01	(87))
Temp	erature	during h	eating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	n2 (°C)					
(88)m=	20.12	20.12	20.12	20.13	20.13	20.14	20.14	20.14	20.13	20.13	20.13	20.12	(88))
Utilisa	ation fac	tor for g	ains for I	rest of d	welling, l	n2,m (se	e Table	9a)						
(89)m=	0.96	0.93	0.88	0.79	0.66	0.49	0.34	0.38	0.6	0.82	0.93	0.96	(89))

Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)

(90)m=	18.35	18.66	19.07	19.52	19.86	20.06	20.12	20.11	19.99	19.54	18.87	18.29		(90)
									f	iLA = Livin	g area ÷ (4	4) =	0.34	(91)

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$

													_
(92)m=	18.6	18.91	19.32	19.78	20.13	20.34	20.4	20.39	20.26	19.79	19.11	18.54	(92)
			-										•

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	18.6	18.91	19.32	19.78	20.13	20.34	20.4	20.39	20.26	19.79	19.11	18.54		(93)
8. Spa	ace hea	ting requ	uirement	t										
				mperatui using Ta		ned at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	tion fac	tor for g	ains, hm	1 <u>.</u> 1:				<u> </u>	·					
(94)m=	0.94	0.91	0.86	0.78	0.66	0.5	0.37	0.4	0.61	0.81	0.92	0.95		(94)
Usefu	l gains,	hmGm	W = (94	4)m x (84	4)m	•					•			
(95)m=	433.79	504.74	544.9	544.64	485.74	363.89	253.9	263.41	368.5	432.73	421.12	409.52		(95)
Month	nly avera	age exte	rnal tem	perature	e 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	e for mea	an interr	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m=	1012.37	989.81	904.05	760.51	588.29	397.18	263.31	276.16	427.73	641.57	841.04	1007.41		(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=	430.46	325.96	267.2	155.43	76.29	0	0	0	0	155.38	302.35	444.83		
								Tota	l per year	(kWh/yeai	r) = Sum(9	8)15,912 =	2157.9	(98)
Space	e heatin	g require	ement in	kWh/m²	?/year								29.23	(99)
8c. Sp	bace co	oling rec	luiremer	nt										
Calcu	lated fo	r June, J	July and	August.	See Tal	ble 10b	-							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	oss rate	e Lm (ca	lculated	using 2	5°C inter	rnal tem	perature	and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	650.81	512.34	525.42	0	0	0	0		(100)
Utilisa	tion fac	tor for lo	ss hm			•								
(101)m=	0	0	0	0	0	0.86	0.91	0.89	0	0	0	0		(101)
Usefu	l loss, h	mLm (V	/atts) = ((100)m x	(101)m	•								
(102)m=	0	0	0	0	0	561.81	465.45	469.01	0	0	0	0		(102)
Gains	(solar (gains ca	culated	for appli	cable w	eather re	-	i	10)				L	
(103)m=	0	0	0	0	0	930.82	893.98	848.49	0	0	0	0		(103)
				r month, < 3 × (98		dwelling,	continue	ous (kW	/h) = 0.0	24 x [(10	03)m – (102)m]:	x (41)m	
(104)m=	0	0	0	0	0	265.68	318.82	282.33	0	0	0	0		
			_						Total	= Sum(104)	=	866.84	(104)
Cooled	fraction	٦							f C =	cooled	area ÷ (4	4) =	1	(105)
		actor (Ta		í									l	_
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
~					(10.1)		(100)		Total	l = Sum((104)	=	0	(106)
•		· · ·		month =	r`	<u> </u>	<u>` </u>	1					I	
(107)m=	0	0	0	0	0	66.42	79.71	70.58	0 Total	0 = Sum(0	0	040 74	(107)
0											100 <i>1</i>)	=	216.71	4
•	-	· ·		‹Wh/m²/y					, ,) ÷ (4) =			2.94	(108)
				alculated	Fonly un	ider spec	cial cond	litions, s						_
Fabrio	Energ	y Efficier	су						(99) -	+ (108) =	=		32.17	(109)

SAP Input

Property Details: Pl	ot 22						
Address: Located in: Region: UPRN: Date of assessm Date of certifica Assessment type Transaction type Tenure type: Related party di Thermal Mass Pa Water use <= 12 PCDF Version:	te: e: e: sclosure: arameter:	New dw New dw Unknow No relat Indicati	valley 2020 ber 2020 relling design stag relling	ge			
Property description	ו:						
Dwelling type: Detachment:		Flat					
Year Completed:		2020					
Floor Location:		Floor a	area:				
Floor 0		73.816	m2		Storey height 2.5 m	:	
Living area:			m ² (fraction 0.3	4)	2.5 11		
Front of dwelling f	aces:	North E	ast				
Opening types:							
Name: NE	Source: Manufacturer	Ту So	pe:	Glazing:		Argon:	Frame:
SW	Manufacturer		ndows	double-glaze		Yes	
NW	Manufacturer	Wi	ndows	double-glaze	ed	Yes	
Name:	Gap:		Frame Facto	or: g-value:	U-value:	Area:	No. of Openings:
NE SW	mm 16mm or	moro	0 0.7	0 0.63	1.4 1.4	2 11.205	1
NW	16mm or		0.7	0.63	1.4	2.025	1
Name:	Type-Name	· Ic	cation:	Orient:		Width:	Height:
NE	rype Nume	Со	rridor Wall	North East		0	0
SW NW			ternal Wall ternal Wall	South West North West		0 0	0 0
		LX		North West		0	0
Overshading:		Average	e or unknown				
Opaque Elements:							
Type: External Elements	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain	wall: Kappa:
External Wall	45.503	13.23	32.27	0.15	0	False	N/A
Corridor Wall Internal Elements	23.98	2	21.98	0.15	0.4	False	N/A
Party Elements							
Thormal bridges							<u></u>
Thermal bridges:		Llear da	fined (individual	PSI-values) Y-Valu	10 - 0 1221		
Thermal bridges:		Length	n Psi-valu	e			
		7.73	0.293	E2 Other	r lintels (including	other steel lintel	s)

SAP Input

	26.7	0.049	E4	Jamb
	47.735	0.065	E7	Party floor between dwellings (in blocks of flats)
	10.9	0.078	E16	Corner (normal)
[Approved]	2.725	-0.09	E17	Corner (inverted internal area greater than external area
	2.725	0.096	E25	Staggered party wall between dwellings
[Approved]	2.725	0.06	E18	Party wall between dwellings
	6.426	0.087	E21	Exposed floor (inverted)
	3.263	0.089	E24	Eaves (insulation at ceiling level - inverted)
	17.211	0	P3	Intermediate floor between dwellings (in blocks of flats)

Ventilation:	
Pressure test:	Yes (As designed)
Ventilation:	Balanced with heat recovery
	Number of wet rooms: Kitchen + 2
	Ductwork: Insulation, rigid
	Approved Installation Scheme: True
Number of chimneys:	0
Number of open flues:	0
Number of fans: Number of passive stacks:	0 0
Number of sides sheltered:	2
Pressure test:	3
Main heating system:	
Main heating system:	Community heating schemes
	Heat source: Community boilers
	heat from boilers – mains gas, heat fraction 1, efficiency 94
	Piping>=1991, pre-insulated, low temp, variable flow
	Central heating pump : 2013 or later
	Design flow temperature: Unknown
Main booting Control	Boiler interlock: Yes
Main heating Control:	
Main heating Control:	Charging system linked to use of community heating, programmer and at least two room thermostats
	Control code: 2312
Secondary heating system:	
Secondary heating system:	None
Water heating:	
Water heating:	From main heating system
3	Water code: 901
	Fuel :mains gas
	No hot water cylinder
Others:	Solar panel: False
	Standard Tariff
Electricity tariff: In Smoke Control Area:	Standard Tariff Unknown
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: 0.91
	Tilt of collector: 30°
	Overshading: None or very little Collector Orientation: South West

SAP Input

Assess Zero Carbon Home: No

User Details: Ssessor Name: Zahid Ashraf Stroma Number: STRO001082													
	Zahid Ashraf Stroma FSAP 2012	2	Stroma Softwa					001082 n: 1.0.5.9					
		Prope	erty Address:	Plot 22									
Address :													
1. Overall dwelling dimens	ions:					• • • •							
Ground floor			Area(m²) 73.82	(1a) x	Av. Hei	ght(m) .5	(2a) =	Volume(m ³) 184.54	(3a)				
Total floor area TFA = (1a)+	-(1b)+(1c)+(1d)+(1e)	+(1n)	73.82	(4)									
Dwelling volume		L		(3a)+(3b)	+(3c)+(3d))+(3e)+	.(3n) =	184.54	(5)				
2. Ventilation rate:													
Number of chimneys		condary eating	other	1 = [total	x 4	40 =	m ³ per hour	(6a)				
Number of open flues	0 +	0	+ 0	」	0	x 2	20 =	0	(6b)				
Number of intermittent fans				- <u> </u>	3	x 1	10 =	30	(7a)				
Number of passive vents					0	x 1	10 =	0	_ (7b)				
Number of flueless gas fires													
							Air ch	anges per hou	ur				
Infiltration due to chimneys,	flues and fans = $(6a)$)+(6b)+(7a)+(⁻	7b)+(7c) =	Г	30	<u> </u>	÷ (5) =	0.16	(8)				
If a pressurisation test has beer				ontinue fro				0.10					
Number of storeys in the	dwelling (ns)							0	(9)				
Additional infiltration						[(9)-	1]x0.1 =	0	(10)				
Structural infiltration: 0.25 if both types of wall are prese deducting areas of openings,	ent, use the value corresp			•	uction		l	0	(11)				
If suspended wooden floo	or, enter 0.2 (unseale	ed) or 0.1 (s	sealed), else	enter 0				0	(12)				
If no draught lobby, enter	0.05, else enter 0							0	(13)				
Percentage of windows a	nd doors draught stri	ipped						0	(14)				
Window infiltration			0.25 - [0.2			(4.5)		0	(15)				
Infiltration rate	0		(8) + (10) -					0	(16)				
Air permeability value, q5 If based on air permeability	· · ·	•	•	•	etre of e	nvelope	area	5	(17)				
Air permeability value applies if					s beina us	ed	l	0.41	(18)				
Number of sides sheltered				, .				2	(19)				
Shelter factor			(20) = 1 - [0.075 x (1	9)] =			0.85	(20)				
Infiltration rate incorporating	shelter factor		(21) = (18)	x (20) =				0.35	(21)				
Infiltration rate modified for	monthly wind speed												
Jan Feb Ma	ar Apr May	Jun J	lul Aug	Sep	Oct	Nov	Dec						
Monthly average wind spee	d from Table 7												
(22)m= 5.1 5 4.9	4.4 4.3	3.8 3	.8 3.7	4	4.3	4.5	4.7						
Wind Factor $(22a)m = (22)n$	n ÷ 4												
(22a)m= 1.27 1.25 1.2	3 1.1 1.08	0.95 0.	.95 0.92	1	1.08	1.12	1.18						

Adjust	ed infiltr	ation rat	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	0.32	0.35	0.38	0.39	0.41		
		c <i>tive air</i> al ventila	-	rate for t	he appli	cable ca	se							
				andix N (2	3h) - (23a	a) x Emv (e	equation (N5)) , othe	rwise (23h) – (23a)			0	(23a)
								n Table 4h) = (200)			0	(23b)
			-	-	-			HR) (24a		2 b)m i (f	22b) v [·	1 (22a)	0	(23c)
(24a)m=									$\frac{1}{0} = \frac{1}{2}$	20)11 + (. 0	23D) X [0	- 100]]	(24a)
	_	-		-		-		-	-	-		0		(210)
(24b)m=								MV) (24b	0) = (22)	0	230)	0	1	(24b)
	_									0	0	0	J	(210)
					-	-		on from c c) = (22b		5 × (23b)			
(24c)m=	r ,	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) lf	natural	ventilatio	n or wh	ole hous	e positiv	/e input	ventilati	n from l	oft			<u>.</u>	1	
,	if (22b)n	n = 1, th	en (24d)	m = (22	o)m othe	erwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]				
(24d)m=	0.6	0.6	0.59	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.58		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in boy	k (25)					
(25)m=	0.6	0.6	0.59	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.58		(25)
3. He	at losse	s and he	eat loss i	paramete	er:									
	/IENT	Gros		Openin		Net Ar	ea	U-valı	ue	AXU		k-value	9	AXk
		area	(m²)	. m		A ,r	m²	W/m2	2K	(W/I	<)	kJ/m²∙ł	K	kJ/K
Doors						2	x	1	=	2				(26)
Windo	ws Type	e 1				11.20	5 <mark>x</mark> 1	/[1/(1.4)+	0.04] =	14.86				(27)
Windo	ws Type	e 2				2.025	5 x1	/[1/(1.4)+	0.04] =	2.68				(27)
Walls ⁻	Type1	45.	5	13.2	3	32.27	7 X	0.18	=	5.81				(29)
Walls ⁻	Type2	23.9	98	2		21.98	3 X	0.18	= [3.96	ן ר		\neg	(29)
Total a	area of e	elements	, m²			69.48	3							(31)
							ated using	g formula 1	/[(1/U-valu	e)+0.04] a	s given in	paragraph	1 3.2	
				nternal wal	ls and pari	titions		(20) (20)	(22)				r	
		ss, W/K :		0)				(26)(30)		(0.0) (0.0	· · · · · · · · · · · · · · · · · · ·	(22.)	29.31	(33)
		Cm = S(. ,							.(30) + (32		(32e) =	759.54	(34)
		•	``	² = Cm ÷	,					tive Value:		- 1.1 - 41	250	(35)
	-	ad of a de			construct	ion are not	t known pi	recisely the	e indicative	values of	TMP IN T	adie 11		
Therm	al bridg	es : S (L	x Y) cal	culated u	using Ap	pendix l	K						8.97	(36)
if details	of therma	al bridging	are not kn	own (36) =	= 0.05 x (3	1)								
Total f	abric he	at loss							(33) +	(36) =			38.27	(37)
Ventila	ation hea	at loss ca	alculated	monthly	/	i			(38)m	= 0.33 × (25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	36.54	36.3	36.07	34.98	34.78	33.83	33.83	33.65	34.19	34.78	35.19	35.62		(38)
Heat ti	ransfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	74.81	74.57	74.34	73.25	73.05	72.1	72.1	71.92	72.46	73.05	73.46	73.89		
									/	Average =	Sum(39)1	12 /12=	73.25	(39)

Heat lo	oss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	(4)			
(40)m=	1.01	1.01	1.01	0.99	0.99	0.98	0.98	0.97	0.98	0.99	1	1		
Numbe	er of day	/s in mo	nth (Tab	le 1a)				•	/	Average =	Sum(40)1.	12 /12=	0.99	(40)
- turnov	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	ater heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF if TF	A > 13.9 A £ 13.9	9, N = 1	+ 1.76 ×					9)2)] + 0.0		TFA -13.		34		(42)
Reduce	the annua	al average	hot water		5% if the a	welling is	designed	(25 x N) to achieve		se target o		.66		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage i	n litres per	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	98.62	95.04	91.45	87.87	84.28	80.69	80.69	84.28	87.87	91.45	95.04	98.62		
_											m(44) ₁₁₂ =		1075.9	(44)
					· ·			DTm / 3600		-				
(45)m=	146.26	127.92	132	115.08	110.42	95.29	88.3	101.32	102.53	119.49	130.43	141.64		
lf instan	taneous w	vater heati	ng at poin	t of use (no	o hot water	^r storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	-	1410.68	(45)
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
Water	storage	loss:			ļ		ļ			ļ				
Storag	e volum	e (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
	•	-		ank in dw	-			. ,	`		(-)			
	vise it no storage		hot wate	er (this ir	icludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	-		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
,		actor fro				,	,					0		(49)
				e, kWh/ye	ear			(48) x (49)) =			0		(50)
,				cylinder								-		
		-		rom Tabl	le 2 (kW	h/litre/da	ay)					0		(51)
	•	eating s from Ta		011 4.5								0		(52)
		actor fro		2b								0		(53)
Energy	/ lost fro	m water	storage	e, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
		(54) in (5	-								<u> </u>	0		(55)
Water	storage	loss cal	culated	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 cylinde	er contains	s dedicate	d solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	50), 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	nnual) fro	om Table	e 3							0		(58)
	-	•	,			59)m = ((58) ÷ 30	65 × (41)	m		·			
(mo	dified by	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 eac	:h ma	onth (61)m =	(60) ÷ 36	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	heati	ing ca	lculated	l foi	r eacl	n month	(62)m	= 0.85 ×	(45)m +	- (46)m +	(57)m +	· (59)m + (61)m	
(62)m=	124.32	108.73	112.2	9	7.82	93.86	8	0.99	75.05	86.12	87.15	101.57	110.87	120.4]	(62)
Solar DH	-IW input	calculated	using Ap	pendi	ix G or	Appendix	Н (negativ	ve quantity) (enter '	0' if no sola	r contribu	ution to wate	er heating)	•	
(add a	dditiona	al lines if	FGHR	S and	d/or V	VWHRS	ар	plies	, see Ap	pendix	G)					
(63)m=	0	0	0		0	0		0	0	0	0	0	0	0]	(63)
Output	from w	ater hea	ter													
(64)m=	124.32	108.73	112.2	9	7.82	93.86	8	0.99	75.05	86.12	87.15	101.57	110.87	120.4]	
										Ou	tput from w	ater heat	er (annual)	12	1199.08	(64)
Heat g	ains fro	m water	heating	g, kV	Vh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (61)	m] + 0.8 x	x [(46)n	n + (57)m	+ (59)m	1]	
(65)m=	31.08	27.18	28.05	24	4.45	23.46	2	0.25	18.76	21.53	21.79	25.39	27.72	30.1]	(65)
inclu	de (57)	m in calo	ulatior	n of ((65)m	only if c	ylin	der is	s in the c	dwelling	or hot w	vater is	from com	munity h	neating	
5. Int	ernal a	ains (see	e Table	5 an	nd 5a)):	-			-				-	-	
	Ŭ	ns (Table)											
metab	Jan	Feb	Mar		Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
(66)m=	116.75	116.75	116.75	_	6.75	116.75		6.75	116.75	116.75	116.75	116.75		116.75		(66)
Liahtin	n dains	i (calcula	L ted in A		ndix l	equat	ion	19.0	19a) a	lso see	Table 5		_		1	
(67)m=	18.77	16.67	13.56	<u> </u>	0.27	7.67		6.48	7	9.1	12.21	15.51	18.1	19.3	1	(67)
		1									u o see Ta	Į			1	
(68)m=	206.03	208.17	202.79	<u> </u>	91.32	176.84		3.23	154.14	152	157.39	168.86	183.34	196.94	1	(68)
				_									100.04	100.04]	(00)
(69)m=	34.68	34.68	34.68	<u></u>	4.68	L, equal 34.68		L15 4.68	34.68	, also s 34.68	ee Table	34.68	34.68	34.68	1	(69)
					4.00	34.00	,	4.00	34.00	54.00	34.00	34.00	34.00	54.00]	(00)
-		ins gains	r i i i i i i i i i i i i i i i i i i i	5a)		0									1	(70)
(70)m=	0	0	0		0	0		0	0	0	0	0	0	0	J	(70)
		vaporatic	<u> </u>	_		, ,									1	(= .)
(71)m=	-93.4	-93.4	-93.4	-9	93.4	-93.4	-6	93.4	-93.4	-93.4	-93.4	-93.4	-93.4	-93.4]	(71)
Water		gains (T	· · · · ·												1	
(72)m=	41.77	40.45	37.7	33	3.96	31.54	2	8.12	25.22	28.94	30.26	34.13	38.5	40.46]	(72)
Total i	nterna	l gains =	:	-				(66)	m + (67)m	+ (68)m	+ (69)m +	(70)m + ((71)m + (72))m	-	
(73)m=	324.61	323.32	312.07	29	93.57	274.08	25	5.86	244.38	248.07	257.89	276.52	297.96	314.72		(73)
	lar gain															
-			•			Table 6a a	and			tions to c		ne applica	able orientat	tion.		
Orienta		Access F Table 6d			Area m ²			Flu	x ble 6a		g_ Table 6b	-	FF Table 6c		Gains (W)	
• •				_			r	Ta		. –		r			· · ·	-
Southw	1	0.77		×	11.	2	×	3	6.79		0.63	× [0.7	=	126	(79)
Southw	1	0.77		×∟	11.	2	×	6	2.67	ĹĹ	0.63	×	0.7	=	214.62	(79)
Southw		0.77		×	11.	2	×	8	5.75		0.63	×	0.7	=	293.65	(79)
Southw		0.77		×	11.	2	×	1(06.25		0.63	×	0.7	=	363.85	(79)
Southw	est <mark>0.9x</mark>	0.77		×	11.	2	x	1	19.01		0.63	x	0.7	=	407.54	(79)

Southwest0.9x	0.77	×	11.2	x	118.15]	0.63	x	0.7	=	404.59	(79)
Southwest _{0.9x}	0.77	×	11.2	x	113.91	İ	0.63	x	0.7	=	390.07	(79)
Southwest _{0.9x}	0.77	x	11.2	x	104.39		0.63	x	0.7	=	357.47	(79)
Southwest _{0.9x}	0.77	×	11.2	x	92.85		0.63	x	0.7	=	317.96	(79)
Southwest _{0.9x}	0.77	x	11.2	x	69.27		0.63	x	0.7	=	237.2	(79)
Southwest _{0.9x}	0.77	x	11.2	x	44.07		0.63	x	0.7	=	150.91	(79)
Southwest0.9x	0.77	x	11.2	x	31.49		0.63	x	0.7	=	107.83	(79)
Northwest 0.9x	0.77	x	2.03	x	11.28	x	0.63	x	0.7	=	6.98	(81)
Northwest 0.9x	0.77	x	2.03	x	22.97	x	0.63	x	0.7	=	14.21	(81)
Northwest 0.9x	0.77	x	2.03	x	41.38	x	0.63	x	0.7	=	25.61	(81)
Northwest 0.9x	0.77	x	2.03	x	67.96	x	0.63	x	0.7	=	42.06	(81)
Northwest 0.9x	0.77	x	2.03	x	91.35	x	0.63	x	0.7	=	56.53	(81)
Northwest 0.9x	0.77	x	2.03	x	97.38	x	0.63	x	0.7	=	60.27	(81)
Northwest 0.9x	0.77	x	2.03	x	91.1	x	0.63	x	0.7	=	56.38	(81)
Northwest 0.9x	0.77	x	2.03	x	72.63	x	0.63	x	0.7	=	44.95	(81)
Northwest 0.9x	0.77	x	2.03	x	50.42	x	0.63	x	0.7	=	31.2	(81)
Northwest 0.9x	0.77	x	2.03	x	28.07	x	0.63	x	0.7	=	17.37	(81)
Northwest 0.9x	0.77	x	2.03	x	14.2	x	0.63	x	0.7	=	8.79	(81)
Northwest 0.9x	0.77	x	2.03	x	9.21	x	0.63	x	0.7	=	5.7	(81)
Solar gains in	Solar gains in watts, calculated for each month $(83)m = Sum(74)m \dots (82)m$											

								、	· · ·	× /				
(83)m=	132.98	228.83	319.26	405.9	464.07	464.86	446.45	402.42	349.17	254.57	159.7	113.53		(83)
Total g	ains – ir	nternal a	ind solar	(84)m =	= (73)m -	+ (83)m	, watts							
(84)m=	457.59	552.16	631.33	699.48	738.15	720.72	690.83	650.49	607.05	531.09	457.66	428.25		(84)
7. Me	an inter	nal temp	erature	(heating	season)								
Temp	erature	during h	leating p	eriods ir	n the livir	ng area f	rom Tab	ole 9, Th	1 (°C)				21	(85)
Utilisa	ation fac	tor for g	ains for l	iving are	ea, h1,m	(see Ta	ble 9a)							
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.98	0.93	0.81	0.62	0.46	0.5	0.76	0.96	0.99	1		(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Table	e 9c)					
(87)m=	19.97	20.15	20.4	20.69	20.9	20.98	21	21	20.95	20.67	20.26	19.94		(87)
Temp	erature	during h	eating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	h2 (°C)					
(88)m=	20.07	20.07	20.08	20.09	20.09	20.1	20.1	20.1	20.1	20.09	20.09	20.08		(88)
Utilisa	ation fac	tor for g	ains for I	rest of d	welling, I	h2,m (se	e Table	9a)						
(89)m=	1	0.99	0.97	0.91	0.76	0.54	0.36	0.41	0.68	0.94	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (fo	ollow ste	eps 3 to 7	7 in Tabl	e 9c)				
(90)m=	19.13	19.31	19.56	19.85	20.03	20.1	20.1	20.1	20.07	19.84	19.43	19.11		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.34	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	_A × T1	+ (1 – fL	.A) × T2					
			,						· ·					

			,			0,							_
(92)m=	19.41	19.6	19.85	20.14	20.32	20.4	20.41	20.41	20.37	20.12	19.71	19.39	(92)
													-

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

(93)m=	19.41	19.6	19.85	20.14	20.32	20.4	20.41	20.41	20.37	20.12	19.71	19.39		(93)
8. Spa	ace hea	ting requ	uiremen	t										
				mperatu using Ta		ned 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		
Utilisa	ation fac	tor for g	ains, hm	<u>ו י</u> ו:										
(94)m=	1	0.99	0.97	0.91	0.78	0.57	0.4	0.44	0.71	0.94	0.99	1		(94)
u Usefu	l gains.	hmGm	. W = (9	4)m x (84	4)m	Į	1							
(95)m=	455.81	546.12	612.06	636.33	, 572.35	410.04	273.62	286.7	428.88	498.56	453.32	427.07		(95)
Month	nlv aver	i age exte	rnal tem	nperature	i e from Ta	ı 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)
`´´	loss rate	i e for mea	ı an interr	nal tempe	erature.		I =[(39)m :	ı x [(93)m	– (96)m	1				
(97)m=	1130.54		992.08	822.98	629.76	417.94	274.45	288.19	454.32	695.39	926.57	1122.27		(97)
· · ·				or each n										
(98)m=	501.99	369.45	282.74	134.39	42.71		0			146.45	340.74	517.23		
(00)	001.00	000.10	202.11	10 1100	12.71	Ů	Ŭ	-	l per year				2335.69	(98)
_								Tota	i per year	(кипиуса	i) = 3un(9	0)15,912 =	2335.09	
Space	e heatin	g require	ement in	n kWh/m²	²/year								31.64	(99)
8c. Sp	bace co	oling rec	luiremer	nt										
Calcu	lated fo	r June, J	July and	August.	See Tal	ble 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat I	loss rate	e Lm (ca	lculated	using 2	5°C inter	nal temp	Derature	and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	677.73	533.53	546.62	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm											
(101)m=	0	0	0	0	0	0.95	0.98	0.97	0	0	0	0		(101)
u Usefu	l loss. r	i mLm (V	/atts) =	1 (100)m x	(101)m	!	1					<u> </u>		
(102)m=	0	0	0	0	0	643.72	521.99	530.14	0	0	0	0		(102)
	(solar)	i nains ca	ı İculated	for appli	i cable w	i eather re	aion se	e Table	10)					
(103)m=	0		0		0	929.34	892.65	846.96	0	0	0	0		(103)
	e coolin		ement fo	r month	whole a			L DUS (kM	(h) = 0.0	24 x [(1($\frac{1}{23}m - ($	لــــــــــــــــــــــــــــــــــــ	c (41)m	
•				< 3 × (98		, woning,	oonina		11) = 0.0.		(102)111])		
(104)m=	0	0	0	0	0	205.64	275.77	235.71	0	0	0	0		
I									Total	= Sum(104)	=	717.13	(104)
Cooled	I fractio	n							f C =	cooled	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		
									Tota	= Sum((104)	=	0	(106)
Space	cooling	requirer	nent for	month =	: (104)m	× (105)	× (106)r	n				I		
(107)m=	0	0	0	0	0	51.41	68.94	58.93	0	0	0	0		
									Total	= Sum(107)	=	179.28	(107)
Space	cooling	requirer	ment in l	kWh/m²/y	/ear				(107)	÷ (4) =			2.43	(108)
8f. F <u>ab</u>	ric <u>Ene</u>	rgy <u>Effic</u> i	ien <u>cy (c</u> a	alculated	l o <u>nly un</u>	der spec	cial <u>con</u> d	litio <u>ns, s</u>	ee <u>sectic</u>	on 11)				_
		y Efficier								+ (108) =	=		34.07	(109)
Targe	et Fabri	c Energ	y Efficie	ency (TF	EE)								39.18	(109)

			User D	etails:						
Assessor Name: Software Name:	Zahid Ashr Stroma FS	-		Strom Softwa					001082 n: 1.0.5.9	
			Property	Address	Plot 22					
Address :										
1. Overall dwelling dime	ensions:									
Ground floor				a(m²) 73.82	(1a) x	Av. He	ight(m) 2.5	(2a) =	Volume(m ³) 184.54	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n) 7	3.82	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3d)+(3e)+	.(3n) =	184.54	(5)
2. Ventilation rate:			-							
Number of chimneys	main heating	second heatin		other 0] = [total 0		40 =	m ³ per hour	r (6a)
Number of open flues	0	+ 0	+	0	=	0	x 2	20 =	0	(6b)
Number of intermittent fa	ans					0	x ′	10 =	0	(7a)
Number of passive vents	3				Γ	0	x ′	10 =	0	(7b)
Number of flueless gas f	ires				Ē	0	x 4	40 =	0	(7c)
								Air ch	anges per ho	ur
Infiltration due to chimne						0		÷ (5) =	0	(8)
If a pressurisation test has k			ceed to (17),	otherwise o	continue fro	om (9) to ((16)			
Number of storeys in t Additional infiltration	ne aweiling (ns	<i>)</i>					[(0).	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0) 25 for steel or	timber frame	or 0.35 fo	r masonr	v constr	uction	[(0)	1,0.1 -	0	(10)
if both types of wall are p deducting areas of openi	present, use the val ings); if equal user	lue correspondin 0.35	g to the great	ter wall are	a (after				0	
If suspended wooden	floor, enter 0.2	(unsealed) o	r 0.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en									0	(13)
Percentage of window	s and doors dr	aught strippe	b	0.05 10.0	(1)	0.01			0	(14)
Window infiltration				0.25 - [0.2			(45)		0	(15)
Infiltration rate		al :		(8) + (10)					0	(16)
Air permeability value, If based on air permeabi						etre of e	nvelope	area	3	(17)
Air permeability value applie	•					is beina us	sed		0.15	(18)
Number of sides sheltere				gree an pe		io sonig at	, o u		2	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorpora	ting shelter fac	tor		(21) = (18)) x (20) =				0.13	(21)
Infiltration rate modified	for monthly win	d speed						I		_
Jan Feb	Mar Apr	May Ju	n Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	beed from Tabl	e 7		_	_	_	_	_		
(22)m= 5.1 5	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)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		

Adjust	ed infiltr	ation rat	e (allowi	ng for sł	nelter an	d wind s	speed) =	(21a) x	(22a)m					
	0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
		<i>ctive air</i> al ventila	•	rate for t	he appli	cable ca	se						0.5	
				andix N (2	3h) - (23a) v Emv (e	auation (1	N5)) , othei	rwise (23h) – (23a)			0.5	(23a)
								n Table 4h)) – (200)			0.5	(23b)
			-	-	-) b) m i ('	00h) [4	(22.0)	79.05	(23c)
a) II (24a)m=		0.26	0.26	0.25	0.24	0.23		HR) (24a 0.22	0.23	20)m + (. 0.24	23D) × [0.25	- (23C) 0.25	÷ 100]	(24a)
												0.25		(244)
			1	· · · · · ·			<u> </u>	MV) (24b	í i	, ,	,	0	l	(24b)
(24b)m=		0	0	0	0	0	0	0	0	0	0	0		(240)
					•	•		on from c c) = (22b		5 × (23b)		_	
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
,								on from l 0.5 + [(2		0.5]				
(24d)m=	<u>, </u>	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in boy	(25)					
(25)m=	0.27	0.26	0.26	0.25	0.24	0.23	0.23	0.22	0.23	0.24	0.25	0.25		(25)
0.11							1	•						_
		s and he				Not An								
ELEN	IENT	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/ł	<)	k-value kJ/m²·ł		λXk ⟨J/Κ
Doors						2	x	1.4		2.8				(26)
Windo	ws Type	e 1				11.20	5 x1	/[1/(1.4)+	0.04] =	14.86				(27)
Windo	ws Type	e 2				2.025	5 x1	/[1/(1.4)+	0.04] =	2.68				(27)
Walls		45.	5	13.2	3	32.27		0.15		4.84				(29)
Walls		23.9		2		21.98		0.14		3.11			\exists	(29)
		elements				69.48		0.14	[0.11	L			(31)
				effective wi	ndow U-va			g formula 1,	/[(1/U-valu	e)+0.041 a	s aiven in	paragraph	3.2	(0.)
		as on both					Ū			, -	Ū			
Fabric	heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				28.29	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	759.54	(34)
Therm	al mass	parame	ter (TMF	- = Cm -	- TFA) in	∩ kJ/m²K			Indica	tive Value:	Low		100	(35)
	-	sments wh ad of a de			constructi	ion are not	t known pr	recisely the	e indicative	values of	TMP in Ta	able 1f		
Therm	al bridg	es : S (L	x Y) cal	culated	using Ap	pendix ł	<						8.56	(36)
if details	s of therma	al bridging	are not kn	own (36) =	= 0.05 x (3	1)								
Total f	abric he	at loss							(33) +	(36) =			36.85	(37)
Ventila	ation hea	at loss ca	alculated	monthl	۷ 				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	16.28	16.08	15.89	14.92	14.73	13.76	13.76	13.56	14.14	14.73	15.11	15.5		(38)
Heat t	ransfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	53.13	52.93	52.74	51.77	51.57	50.6	50.6	50.41	50.99	51.57	51.96	52.35		
									/	Average =	Sum(39)1.		51.72	(39)

Heat lo	oss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m=	0.72	0.72	0.71	0.7	0.7	0.69	0.69	0.68	0.69	0.7	0.7	0.71		
Numbe	er of day	s in mo	nth (Tab	le 1a)	I			!		Average =	Sum(40)1.	.12 /12=	0.7	(40)
Numbe	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)
							I	I		I				
4. Wa	ater heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				: [1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13		34		(42)
Reduce	the annua	al average	hot water		5% if the a	welling is	designed	(25 x N) to achieve		se target o		.38		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ii	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	103.82	100.04	96.26	92.49	88.71	84.94	84.94	88.71	92.49	96.26	100.04	103.82		-
Energy	content of	hot water	used - cal	culated me	onthly $= 4$.	190 x Vd,r	m x nm x L	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1132.53	(44)
(45)m=	153.95	134.65	138.95	121.14	116.23	100.3	92.94	106.65	107.93	125.78	137.3	149.1		
lf instan	tanoous u	ator hoati	na at point	t of uso (no	hot water	storago)	ontor 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1484.92	(45)
			· ·			,		1	i	10.07	20.50	22.26		(46)
(46)m= Water	23.09 storage	20.2 IOSS:	20.84	18.17	17.44	15.05	13.94	16	16.19	18.87	20.59	22.36		(40)
	-) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
	•	•		ank in dw	•			· · ·		(0) : ((47)			
	vise if no storage		not wate	er (this ir	iciudes i	nstantar	ieous co	ombi boil	ers) ente	er 'O' in (47)			
	•		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature f	actor fro	m Table	2b)		(49)
			-	e, kWh/ye				(48) x (49)) =		1	10		(50)
,				cylinder l										(54)
		-	ee secti	rom Tabl on 4.3	e z (kvvi	n/iitie/ua	iy)				0.	02		(51)
	-	from Ta									1.	03		(52)
Tempe	erature f	actor fro	m Table	2b							0	.6		(53)
Energy	/ lost fro	m water	⁻ storage	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter	(50) or ((54) in (5	55)								1.	03		(55)
Water	storage	loss cal	culated	for each	month		-	((56)m = (55) × (41)	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er contains	s dedicate	d solar sto	orage, (57)i	m = (56)m	x [(50) – (H11)] ÷ (5	i0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
	-	•		om Table)		(58)
	-				•		. ,	65 × (41)		r tharma	vetat)			
(moo (59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	ng and a 23.26	22.51	23.26	22.51	23.26		(59)
(00)11=	20.20	21.01	20.20	22.01	20.20	22.01	20.20	20.20	22.01	20.20	22.01	20.20		(00)

Combi	loss ca	alculated	for eac	ch	month ((61)m =	(60)) ÷ 36	65 × (41))m						
(61)m=	0	0	0		0	0		0	0	0	0	0	0	0		(61)
Total h	eat rec	uired for	water	he	ating ca	alculated	l fo	r eacl	n month	(62)m	= 0.85 ×	(45)m +	(46)m +	(57)m +	- (59)m + (61)m	
(62)m=	209.23	184.58	194.22	2	174.63	171.51	1:	53.79	148.22	161.93	161.42	181.06	190.79	204.37]	(62)
Solar DI	HW input	calculated	using A	ope	ndix G or	Appendix	:Н(negati	ve quantity	/) (enter	0' if no sola	r contribu	ition to wate	er heating))	
(add a	dditiona	al lines if	FGHR	Sa	and/or V	WWHRS	ap	plies	, see Ap	pendix	G)				_	
(63)m=	0	0	0		0	0		0	0	0	0	0	0	0		(63)
Output	from v	vater hea	ter													
(64)m=	209.23	184.58	194.22	2	174.63	171.51	1:	53.79	148.22	161.93	161.42	181.06	190.79	204.37		
			-			-				Ou	tput from w	ater heat	er (annual)₁	112	2135.76	(64)
Heat g	ains fro	om water	heatin	g, I	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (61)	m] + 0.8 x	x [(46)m	n + (57)m	+ (59)m	ן ו	
(65)m=	95.41	84.71	90.42		83.07	82.87	7	6.15	75.13	79.68	78.68	86.04	88.45	93.8]	(65)
inclu	ide (57)m in calo	culation	ר ח ר	f (65)m	only if c	ylir	nder i	s in the c	dwelling	g or hot w	ater is	from com	munity I	- neating	
5. Int	ternal g	ains (see	e Table	5	and 5a):										
Metab	olic aai	ns (Table	e 5). W	atts	S											
	Jan	Feb	Mai		Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	140.11	140.11	140.1 ⁻	1	140.11	140.11	14	40.11	140.11	140.11	140.11	140.11	140.11	140.11	1	(66)
Lightin	g gains	(calcula	ted in <i>i</i>	Ap	pendix	L, equat	ion	L9 oi	r L9a), a	lso see	Table 5				-	
(67)m=	46.93	41.69	33.9	T	25.67	19.19	·	16.2	17.5	22.75	30.53	38.77	45.25	48.24]	(67)
Applia	nces ga	ains (calc	ulated	in	Append	dix L, eq	uat	ion L	13 or L1	3a), als	o see Ta	ble 5		I	3	
(68)m=	307.51	310.71	302.60	_	285.55	263.94	r –	43.63	230.06	226.87	234.91	252.03	273.64	293.95]	(68)
Cookir	ng gains	s (calcula	ted in	Ap	pendix	L, equat	tior	n L15	or L15a)	, also s	ee Table	• 5			_	
(69)m=	51.35	51.35	51.35	-i-	51.35	51.35	-	1.35	, 51.35	, 51.35	51.35	51.35	51.35	51.35]	(69)
Pumps	and fa	Ins gains	(Table		a)										1	
(70)m=	0	0	0	Τ	0	0		0	0	0	0	0	0	0	1	(70)
Losses	se.a. e	vaporatic	n (nec	ati	ve valu	ı es) (Tab	le	5)			1		1		1	
(71)m=	<u> </u>	-93.4	-93.4	_	-93.4	-93.4	—	93.4	-93.4	-93.4	-93.4	-93.4	-93.4	-93.4	1	(71)
		ı gains (T	I Table 5)			I								1	
(72)m=	128.24	126.06	121.5	ŕ	115.38	111.38	10	05.76	100.97	107.1	109.28	115.65	122.84	126.07	1	(72)
	nterna	I gains =	I					(66)	m + (67)m	L 1 + (68)m	+ (69)m +	I (70)m + (71)m + (72)]	
(73)m=	580.74	- <u>-</u>	556.1	5	524.64	492.55	46	63.63	446.58	454.76		504.49	1	566.3	1	(73)
. ,	lar gain	I	<u> </u>	-			I							<u> </u>	<u>]</u>	
			using so	lar	flux from	Table 6a	and	associ	ated equa	tions to a	onvert to th	ne applica	ble orientat	tion.		
Orienta	ation:	Access F	actor		Area			Flu	х		g_		FF		Gains	
		Table 6d			m²			Tal	ole 6a		Table 6b	٦	Table 6c		(W)	
Southw	vest <mark>0.9x</mark>	0.77		x	11	.2	x	3	6.79		0.63	x	0.7	=	126	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	11	.2	x	6	2.67		0.63	× [0.7	=	214.62	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	11	.2	x	8	5.75		0.63	× [0.7	=	293.65	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	11	.2	x	1	06.25	ΙĒ	0.63	× [0.7	=	363.85	(79)
Southw	vest <mark>0.9x</mark>	0.77		x	11	.2	x	1	19.01	ΙĒ	0.63	× [0.7	=	407.54	(79)

Southwest _{0.9x}	0.77	x	11	.2	x	1	18.15			0.63	×	0.7		=	404.59	(79)
Southwest _{0.9x}	0.77	x	11	.2	x	1	13.91			0.63	×	0.7		=	390.07	(79)
Southwest _{0.9x}	0.77	x	11	.2	x	1	04.39			0.63	x	0.7		=	357.47	(79)
Southwest _{0.9x}	0.77	x	11	.2	x	g	92.85			0.63	x	0.7		=	317.96	(79)
Southwest _{0.9x}	0.77	x	11	.2	x	6	9.27			0.63	x	0.7		=	237.2	(79)
Southwest _{0.9x}	0.77	x	11	.2	x	4	4.07			0.63	x	0.7		=	150.91	(79)
Southwest0.9x	0.77	x	11	.2	x	3	31.49			0.63	x	0.7		=	107.83	(79)
Northwest 0.9x	0.77	x	2.	03	x	1	1.28	x		0.63	x	0.7		=	6.98	(81)
Northwest 0.9x	0.77	x	2.	03	x	2	2.97	x		0.63	x	0.7		=	14.21	(81)
Northwest 0.9x	0.77	x	2.	03	x	4	1.38	x		0.63	x	0.7		=	25.61	(81)
Northwest 0.9x	0.77	x	2.	03	x	6	67.96	x		0.63	×	0.7		=	42.06	(81)
Northwest 0.9x	0.77	x	2.	03	x	g	91.35	x		0.63	x	0.7		=	56.53	(81)
Northwest 0.9x	0.77	x	2.	03	x	g	97.38	x		0.63	×	0.7		=	60.27	(81)
Northwest 0.9x	0.77	x	2.	03	x		91.1	x		0.63	x	0.7		=	56.38	(81)
Northwest 0.9x	0.77	x	2.	03	x	7	2.63	x		0.63	x	0.7		=	44.95	(81)
Northwest 0.9x	0.77	x	2.	03	x	5	50.42	x		0.63	x	0.7		=	31.2	(81)
Northwest 0.9x	0.77	x	2.	03	x	2	28.07	x		0.63	×	0.7		=	17.37	(81)
Northwest 0.9x	0.77	x	2.	03	x		14.2	x		0.63	x	0.7		=	8.79	(81)
Northwest 0.9x	0.77	x	2.	03	x		9.21	x		0.63	x	0.7		=	5.7	(81)
Solar <u>g</u> ains in	watts, ca	lculated	for eac	h mont	<u>ו</u>			(83)m	= Sur	m(74)m .	.(82)m					
(83)m= 132.98	228.83	319.26	405.9	464.07	4	64.86	446.45	402	.42	349.17	254.5	7 159.7	113.	53		(83)

													1	
Total g	ains – ir	nternal a	nd solar	r (84)m =	= (73)m ·	+ (83)m	, watts							
(84)m=	713.72	805.33	875.41	930.54	956.62	928.49	893.03	857.18	821.93	759.06	699.48	679.83		(84)
7. Me	an inter	nal temp	perature	(heating	season)								
				` Ŭ	n the livii	,	from Tab	ole 9, Th	1 (°C)				21	(85)
•		0	0.		ea, h1,m	0			()					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=														
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)														
(87)m=	20.22	20.42	20.63	20.83	20.94	20.99	21	21	20.97	20.84	20.53	20.18		(87)
Temp	erature	durina h	eating p	eriods ir	n rest of	dwellina	from Ta	ble 9 Ti	n2 (°C)					
(88)m=	20.32	20.33	20.33	20.34	20.34	20.35	20.35	20.36	20.35	20.34	20.34	20.33		(88)
l Itiliea	tion fac	tor for a	ains for	rest of d	welling,	h2 m (sc	L Do Tablo	() ()						
(89)m=	0.84	0.79	0.71	0.59	0.45	0.31	0.21	0.23	0.38	0.6	0.78	0.86		(89)
											0.10	0.00		()
Mean	interna	temper	ature in	the rest	of dwelli	ng T2 (fe	ollow ste	eps 3 to 7	7 in Tabl	e 9c)		1	1	
(90)m=	19.29	19.56	19.86	20.14	20.28	20.34	20.35	20.35	20.32	20.16	19.73	19.24		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.34	(91)
Mean	internal	ltomnor	ature (fo	r tha wh	ole dwe	llina) – fl	Δ 🗸 Τ1	ㅗ (1 _ fl	Δ) ~ T2			I		
mean	mema	remper	aiure (10			y) – II		- (i — i L						

Incan	interna	riemper	aluie (iu			iiiiig) – ii		+ (I – IL					_
(92)m=	19.6	19.85	20.13	20.38	20.5	20.56	20.57	20.57	20.54	20.39	20	19.56	(92)
													•

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

						i	i						I	
(93)m=	19.6	19.85	20.13	20.38	20.5	20.56	20.57	20.57	20.54	20.39	20	19.56		(93)
		ting requ			e obtoin		om 11 of			4 T: (70)	d *** ***	ulate.	
				using Ta		ieu al sie	эрттог	Table 90), so ina	u 11,m=(70)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:										
(94)m=	0.83	0.77	0.7	0.59	0.46	0.32	0.22	0.24	0.39	0.61	0.77	0.84		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (84	4)m	r	r	r		i	1	i	I	
(95)m=	591.78	624.11	612.3	546.21	437.85	298.48	200.32	209.43	321.77	459.97	536.6	573.51		(95)
	<u> </u>	<u> </u>	i	nperature									I	(22)
(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)
	813.03	i	an intern 718.56	al tempe 594.12	454.06	ì	=[(39)m : 200.95	x [(93)m· 210.29	· ,	504.87	670.47	804.15		(97)
(97)m=		791.52				301.67			328.62			604.15		(97)
(98)m=	164.61	112.5	79.06	or each n 34.49	12.06	0	11 = 0.02	4 X [(97)	0	33.4	96.38	171.59		
(50)11-	104.01	112.0	10.00	04.40	12.00	0	Ū	÷	_		r) = Sum(9		704.11	(98)
0								TOTA	i per year	(KVIII/yea	r) – Sum(3	0)15,912 -	9.54	
Space	Space heating requirement in kWh/m²/year 9b. Energy requirements – Community heating scheme													(99)
This part is used for space heating, space cooling or water heating provided by a community scheme Fraction of space heat from secondary/supplementary heating (Table 11) '0' if none														(301)
	on of spa		0	(302)										
				-	•	•		allows for	CUD and	un to four	other heat	oourooo: t		(002)
	-			mal and wa							olinei neal	sources; ti		
Fractio	on of hea	at from C	Commun	ity boile	S								1	(303a)
Fractio	on of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	1	(304a)
Factor	for cont	trol and o	charging	g method	(Table 4	4c(3)) fo	r commu	unity hea	ting sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	12c) for a	commun	ity heatir	ng syste	m					1.05	(306)
Space	heating	g											kWh/ye	ar
Annua	l space	heating	requiren	nent									704.11	
Space	heat fro	om Comr	munity b	oilers					(98) x (30	04a) x (30	5) x (306)	=	739.31	(307a)
Efficier	ncy of se	econdary	y/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/sup	oplemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =		0	(309)
Water	heating	r												
	-	neating r	equirem	nent									2135.76	
		ommunit m Comn							(64) x (30	03a) x (30	5) x (306) :	=	2242.55	(310a)
Electric	city used	d for hea	t distrib	ution				0.01	× [(307a).	(307e) +	- (310a)((310e)] =	29.82	(313)
Cooling	g Systei	m Energ	y Efficie	ncy Rati	0								0	(314)
Space	cooling	(if there	is a fixe	ed coolin	g systen	n, if not e	enter 0)		= (107) ÷	- (314) =			0	(315)
Electric	city for p	oumps a	nd fans	within dv	velling (1	Table 4f)	:							
				ced, extra				outside					287.05	(330a)

warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/	year	=(330a) + (330b) + (330g) =	287.05	(331)
Energy for lighting (calculated in Ap	ppendix L)		331.54	(332)
Electricity generated by PVs (Apper	ndix M) (negative quantity)		-749.25	(333)
Electricity generated by wind turbing	e (Appendix M) (negative quantity)		0	(334)
10b. Fuel costs – Community heat	ing scheme			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 × 0	.01 = 31.35	(340a)
Water heating from CHP	(310a) x	4.24 × 0	.01 = 95.08	(342a)
		Fuel Price		_
Pumps and fans	(331)	13.19 × 0	.01 = 37.86	(349)
Energy for lighting	(332)	13.19 × 0	.01 = 43.73	(350)
Additional standing charges (Table	12)		120	(351)
Energy saving/generation technolog Total energy cost	= (340a)(342e) + (345)(354) =		328.02	(355)
11b. SAP rating - Community heat	ing scheme			
Energy cost deflator (Table 12)			0.42	(356)
Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0] =		1.16	(357)
SAP rating (section12)			83.82	(358)
12b. CO2 Emissions – Community		nergy Emission fa	ctor Emissions	
		Wh/year kg CO2/kWh		
CO2 from other sources of space a Efficiency of heat source 1 (%)	3 ()	els repeat (363) to (366) for the seco	nd fuel 94	(367a)
CO2 associated with heat source 1	[(307b)+(310b)]	x 100 ÷ (367b) x 0.22	= 685.19	(367)
Electrical energy for heat distributio	n [(313) x	0.52	= 15.48	(372)
Total CO2 associated with commun	nity systems (363)	(366) + (368)(372)	= 700.67	(373)
CO2 associated with space heating	(secondary) (309) x	0	= 0	(374)
CO2 associated with water from imi	mersion heater or instantaneous h	eater (312) x 0.22	= 0	(375)
Total CO2 associated with space an	nd water heating (373) +	(374) + (375) =	700.67	(376)
CO2 associated with electricity for p	oumps and fans within dwelling (3	31)) x 0.52	= 148.98	(378)
CO2 associated with electricity for l	ighting (332))):	x 0.52	= 172.07	(379)
Energy saving/generation technolog	gies (333) to (334) as applicable	0.52 × 0	.01 =388.86	(380)
Total CO2, kg/year	sum of (376)(382) =	-	632.86	(383)

Dwelling CO2 Emission Rate (383) ÷ (4) =				8.57	(384)
El rating (section 14)				92.86	(385)
13b. Primary Energy – Community heating scheme					
	Energy kWh/year	Primary factor		Energy Nh/year	
Energy from other sources of space and water heating (Efficiency of heat source 1 (%)	not CHP) CHP using two fuels repeat (363) to	(366) for the second f	uel	94	(367a)
Energy associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	1.22	=	3870.08	(367)
Electrical energy for heat distribution	[(313) x		=	91.54	(372)
Total Energy associated with community systems	(363)(366) + (368)(372	2)	=	3961.62	(373)
if it is negative set (373) to zero (unless specified othe	erwise, see C7 in Appendix C	;)		3961.62	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or	instantaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			3961.62	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps and fans with	ithin dwelling (331)) x	3.07	=	881.25	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1017.84	(379)
Energy saving/generation technologies Item 1		3.07 × 0.01	=	-2300.19	(380)
Total Primary Energy, kWh/year sum	of (376)(382) =			3560.52	(383)

			User D	etails:						
Assessor Name:	Zahid Ashr	af		Strom	a Num	ber:		STRO	001082	
Software Name:	Stroma FS	AP 2012		Softwa	are Ver	sion:		Versic	on: 1.0.5.9	
		Р	roperty <i>i</i>	Address:	Plot 22					
Address :										
1. Overall dwelling dimer	nsions:			()						
Ground floor			_	a(m²) 3.82	(1a) x		ight(m) 2.5	(2a) =	Volume(m ³) 184.54) (3a)
Total floor area TFA = (1a	ı)+(1b)+(1c)+((1d)+(1e)+(1r	ו) 7	3.82	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	184.54	(5)
2. Ventilation rate:	-	-							<u> </u>	
	main heating	secondar heating	У	other		total			m ³ 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	IS				- Ē	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)
C C					L	-				
								Air ch	anges per ho	ur
Infiltration due to chimney	s, flues and fa	ans = (6a)+(6b)+(7	′a)+(7b)+(7c) =		30		÷ (5) =	0.16	(8)
If a pressurisation test has be			d to (17), d	otherwise o	continue fr	om (9) to ((16)			- -
Number of storeys in th Additional infiltration	e dwelling (ns	5)					[(0)]	-1]x0.1 =	0	(9) (10)
Structural infiltration: 0.	25 for steel or	timber frame or	0.35 for	masonr	v constr	uction	[(9)	-1]x0.1 =	0	_(10) _(11)
if both types of wall are pro deducting areas of openin	esent, use the va	lue corresponding to							0	
If suspended wooden fl		,	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent									0	(13)
Percentage of windows	and doors dr	aught stripped		0.25 - [0.2	$\mathbf{v}(1\mathbf{A}) \cdot 1$	001 -			0	(14)
Window infiltration Infiltration rate				(8) + (10)		-	+ (15) -		0	(15)
Air permeability value, o	150 expresse	d in cubic metre						area	0	(16) (17)
If based on air permeabili			•	•	•		melope	urcu	0.41	(18)
Air permeability value applies	-					is being u	sed		0.11	
Number of sides sheltered	b								2	(19)
Shelter factor				(20) = 1 -		9)] =			0.85	(20)
Infiltration rate incorporati	-			(21) = (18)) x (20) =				0.35	(21)
Infiltration rate modified fo							<u> </u>	-	1	
	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe									1	
(22)m= 5.1 5	4.9 4.4	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		

Adjust	ed infiltr	ation rat	e (allowi	ing 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	0.32	0.35	0.38	0.39	0.41		
	ate ette echanica		-	rate for t	he appli	cable ca	se							(23a)
				endix N (2	3b) = (23a	a) x Fmv (e	equation (N5)) , othe	rwise (23h) = (23a)			0	
								n Table 4h) = (200)			0	(23b)
			-	-	-			HR) (24a		2b)m + ('	23h) v [[,]	1 _ (23c)	0 1001	(23c)
(24a)m=					0					0	0	0	÷ 100]	(24a)
		-	_			-		MV) (24b	-	-	-	-		
(24b)m=				0	0	0				0	0	0		(24b)
· · ·								on from c						. ,
					-	-		c) = (22t		5 × (23b)			
(24c)m=	= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	on or wh	ole hous	e positiv	/e input	ventilati	on from l	oft					
	if (22b)n	n = 1, th	en (24d)	m = (22l	o)m othe	erwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]			I	
(24d)m=	0.6	0.6	0.59	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.58		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t	o) or (24	c) or (24	d) in boy	k (25)					
(25)m=	0.6	0.6	0.59	0.57	0.57	0.56	0.56	0.55	0.56	0.57	0.58	0.58		(25)
3. He	at losse	s and he	eat loss	paramet	er:									
	IENT	Gros area	SS	Openin	gs	Net Ar A ,r		U-valı W/m2		A X U (W/I		k-value kJ/m²·ł		A X k kJ/K
Doors		arca	(11)		I	2	x	1	= [2	\neg	N0/111 -1	`	(26)
	ws Type	<u>•</u> 1				11.20	=	/[1/(1.4)+	י	14.86	=			(27)
	ws Type						<u> </u>	/[1/(1.4)+						(27)
Walls				40.0		2.025			i	2.68	\dashv ,			
		45.		13.2	3	32.27		0.18		5.81	╡╏			(29)
Walls		23.9		2		21.98		0.18	=	3.96				(29)
	area of e			footivowi	ndowilly	69.48		n formula 1	1.1.1.1.	$(a) \cdot 0.041$	a airean in	norogrank		(31)
				nternal wal			aled using	g formula 1	/[(1/0-vaiu	e)+0.04j a	is given in	paragraph	3.2	
Fabric	heat los	s, W/K :	= S (A x	U)				(26)(30)) + (32) =				29.31	(33)
Heat c	apacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	759.54	(34)
Therm	al mass	parame	ter (TM	- = Cm -	- TFA) ir	n kJ/m²K			Indica	tive Value:	Medium		250	(35)
	-		ere the de tailed calc		construct	ion are noi	t known pi	recisely the	e indicative	values of	TMP in Ta	able 1f		
				culated	using Ap	pendix l	K						8.97	(36)
	•		,	10wn (36) =	• •	•								`
Total f	abric he	at loss							(33) +	(36) =			38.27	(37)
Ventila	ation hea	at 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=	36.54	36.3	36.07	34.98	34.78	33.83	33.83	33.65	34.19	34.78	35.19	35.62		(38)
Heat ti	ransfer o	coefficie	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	74.81	74.57	74.34	73.25	73.05	72.1	72.1	71.92	72.46	73.05	73.46	73.89		
										Average =	Sum(39)1	12 /12=	73.25	(39)

Heat lo	oss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m=	1.01	1.01	1.01	0.99	0.99	0.98	0.98	0.97	0.98	0.99	1	1		
Numb	or of day	rs in mo	nth (Tab							Average =	Sum(40)1.	12 /12=	0.99	(40)
Numbe	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	ater heat	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				([1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	TFA -13.		34		(42)
Reduce	the annua	al average	hot water	ge in litre usage by r day (all w	5% if the c	welling is	designed			se target o		.66		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ii	n litres pei	r day for e	ach month	Vd,m = fa	ctor from	Table 1c x	(43)	-	-				
(44)m=	98.62	95.04	91.45	87.87	84.28	80.69	80.69	84.28	87.87	91.45	95.04	98.62		_
Energy	content of	hot water	used - ca	lculated me	onthly $= 4$.	190 x Vd,r	m x nm x [OTm / 3600			m <mark>(44)</mark> 112 = ables 1b, 1		1075.9	(44)
(45)m=	146.26	127.92	132	115.08	110.42	95.29	88.3	101.32	102.53	119.49	130.43	141.64		
			1	1	1	1	1	1		Total = Su	m(45) ₁₁₂ =	-	1410.68	(45)
lf instan	taneous w	ater heati	ng at point	t of use (no	o hot wate	r storage),	enter 0 in	boxes (46) to (61)					
(46)m=	21.94 storage	19.19	19.8	17.26	16.56	14.29	13.24	15.2	15.38	17.92	19.57	21.25		(46)
	-) includir	ng any se	olar or W	WHRS	storage	within sa	ame ves	sel		150		(47)
Otherv Water	vise if no storage	o stored loss:	hot wate	ank in dw er (this ir loss facto	ncludes i	nstantar	neous co	. ,	ers) ente	er '0' in (39		(48)
Tempe	erature f	actor fro	m Table	e 2b								54		(49)
			-	e, kWh/ye				(48) x (49)) =		0.	75		(50)
Hot wa	ater stora	age loss		cylinder l rom Tabl on 4.3								0		(51)
		from Ta										0		(52)
Tempe	erature f	actor fro	m Table	e 2b								0		(53)
			•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
	. ,	(54) in (5									0.	75		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)	m			l	
(56)m=	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(56)
-				orage, (57)	· · ·			· · ·			-			()
(57)m=	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(57)
Primar	y circuit	loss cal	lculated	om Table for each	month (. ,	, ,				0		(58)
			1	le H5 if t	r	1		-	-	1	· · · · · · · · · · · · · · · · · · ·	00.0-		
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)

Combi	loss ca	lculated	for eac	ch	month ((61)m =	(60)) ÷ 36	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	he	ating ca	alculated	l fo	r eacl	n month	(62)m	= 0.85	× (4	45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	192.85	170	178.59	э	160.17	157.02	14	40.38	134.89	147.9	2 147.6	52	166.09	175.53	188.24		(62)
Solar DH	-IW input	calculated	using A	ppe	ndix G or	Appendix	н ((negativ	/e quantity) (enter	'0' if no s	olar	contribut	ion to wate	er heating)	-	
(add a	dditiona	al lines if	FGHR	Sa	and/or V	WWHRS	ap	plies,	see Ap	pendix	(G)						
(63)m=	0	0	0		0	0		0	0	0	0		0	0	0		(63)
Output	from w	ater hea	ter														
(64)m=	192.85	170	178.59	э	160.17	157.02	14	40.38	134.89	147.9	2 147.6	52	166.09	175.53	188.24]	
			•							0	utput from	n wa	iter heate	r (annual)₁	12	1959.29	(64)
Heat g	ains fro	m water	heatin	g, I	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (61	m] + 0.8	8 x	[(46)m	+ (57)m	+ (59)m]	
(65)m=	85.91	76.2	81.17		74.34	73.99	6	67.76	66.63	70.97	70.1	7	77.01	79.44	84.37]	(65)
inclu	de (57)	m in calo	culation	יי ח ס	f (65)m	only if c	ylir	nder is	s in the c	dwellin	g or hot	t wa	ater is fi	rom com	munity h	heating	
	. ,	ains (see			. ,	-					0					Ū	
		ns (Table															
Melab	Jan	Feb	Mai		Apr	May		Jun	Jul	Aug	g Se	n	Oct	Nov	Dec]	
(66)m=	116.75	116.75	116.7	-	116.75	116.75		16.75	116.75	116.7			116.75	116.75	116.75		(66)
		(calcula														J	. ,
(67)m=	18.77	16.67	13.56	<u> </u>	10.27	7.67	i —	6.48	230), a	9.1	12.2	- 1	15.51	18.1	19.3	1	(67)
				_										10.1	10.0	J	()
		ins (calc	r —	-	Append 191.32	176.84	r –	63.23		5a), ai 152				102.24	100.04	1	(68)
(68)m=	206.03	208.17	202.79	_					154.14		157.3		168.86	183.34	196.94	J	(00)
	<u> </u>	s (calcula		-i-			<u> </u>					-				1	(00)
(69)m=	34.68	34.68	34.68		34.68	34.68	3	4.68	34.68	34.68	34.68	8	34.68	34.68	34.68	J	(69)
-		ns gains	r i	÷ 5a	-						-1				i	1	()
(70)m=	3	3	3		3	3		3	3	3	3		3	3	3	J	(70)
Losses	s e.g. ev	/aporatic	on (neg	jati	ve valu	es) (Tab	le	5)							1	•	
(71)m=	-93.4	-93.4	-93.4		-93.4	-93.4	-	93.4	-93.4	-93.4	-93.4	4	-93.4	-93.4	-93.4	J	(71)
Water	heating	gains (T	able 5)												-	
(72)m=	115.47	113.39	109.09	Э	103.25	99.45	9	4.11	89.56	95.38	97.4	5	103.5	110.34	113.4		(72)
Total i	nterna	gains =	•				_	(66)	m + (67)m	+ (68)r	n + (69)m	+ (7	70)m + (7	'1)m + (72)	m	_	
(73)m=	401.3	399.27	386.47	7	365.85	344.99	32	24.84	311.73	317.5	1 328.0)8	348.9	372.8	390.67		(73)
6. So	lar gain	s:															
Solar g	ains are	calculated	using sc	olar	flux from	Table 6a	and	associ	ated equa	tions to	convert to	o the	e applicat	ole orientat	ion.		
Orienta		Access F			Area			Flu			g_	N L-	-	FF		Gains	
	_	Table 6d			m²			Tac	ole 6a		Table 6	DD		able 6c		(W)	_
Southw	est <mark>0.9x</mark>	0.77		x	11	.2	x	3	6.79		0.63		x	0.7	=	126	(79)
Southw	est <mark>0.9x</mark>	0.77		x	11	.2	x	6	2.67		0.63		x	0.7	=	214.62	(79)
Southw	est <mark>0.9x</mark>	0.77		x	11	.2	x	8	5.75		0.63		×	0.7	=	293.65	(79)
Southw	est <mark>0.9x</mark>	0.77		x	11	.2	x	10	06.25		0.63		x	0.7	=	363.85	(79)
Southw	est <mark>0.9x</mark>	0.77		x	11	.2	x	1	19.01		0.63		x	0.7	=	407.54	(79)

Southwest _{0.9x}	0.77	x	11.	2	× [118.15]	0.63	x	0.7	=	404.59	(79)
Southwest _{0.9x}	0.77	x	11.	2	×	113.91]	0.63	x	0.7	=	390.07	(79)
Southwest _{0.9x}	0.77	x	11.	2	×	104.39]	0.63	x	0.7	=	357.47	(79)
Southwest _{0.9x}	0.77	x	11.	2	×	92.85]	0.63	x	0.7	=	317.96	(79)
Southwest _{0.9x}	0.77	x	11.	2	× [69.27]	0.63	x	0.7	=	237.2	(79)
Southwest _{0.9x}	0.77	x	11.	2	×	44.07]	0.63	x	0.7	=	150.91	(79)
Southwest0.9x	0.77	x	11.	2	×	31.49]	0.63	x	0.7	=	107.83	(79)
Northwest 0.9x	0.77	x	2.0	3	×	11.28	x	0.63	x	0.7	=	6.98	(81)
Northwest 0.9x	0.77	x	2.0	3	×	22.97	x	0.63	x	0.7	=	14.21	(81)
Northwest 0.9x	0.77	×	2.0	3	×	41.38	x	0.63	x	0.7	=	25.61	(81)
Northwest 0.9x	0.77	x	2.0	3	×	67.96	x	0.63	x	0.7	=	42.06	(81)
Northwest 0.9x	0.77	x	2.0	3	×	91.35	x	0.63	x	0.7	=	56.53	(81)
Northwest 0.9x	0.77	x	2.0	3	×	97.38	x	0.63	x	0.7	=	60.27	(81)
Northwest 0.9x	0.77	x	2.0	3	×	91.1	x	0.63	x	0.7	=	56.38	(81)
Northwest 0.9x	0.77	×	2.0	3	×	72.63	x	0.63	x	0.7	=	44.95	(81)
Northwest 0.9x	0.77	x	2.0	3	×	50.42	x	0.63	x	0.7	=	31.2	(81)
Northwest 0.9x	0.77	x	2.0	3	×	28.07	x	0.63	x	0.7	=	17.37	(81)
Northwest 0.9x	0.77	x	2.0	3	×	14.2	x	0.63	x	0.7	=	8.79	(81)
Northwest 0.9x	0.77	x	2.0	3	×	9.21	x	0.63	x	0.7	=	5.7	(81)
Solar gains in	watts, calo	culated	for eac	n month	۱		(83)m	n = Sum(74)m	(82)m		-	-	
(83)m= 132.98		319.26	405.9	464.07		4.86 446.45	402	.42 349.17	254.5	7 159.7	113.53		(83)
Total gains – i	nternal and	d solar	(84)m =	: (73)m	+ (8	3)m, watts						_	

i otai g				(0+)	- (70)	· (00)///	, wano							
(84)m=	534.28	628.1	705.72	771.76	809.06	789.7	758.18	719.93	677.24	603.46	532.5	504.2		(84)
7 Me	an inter	nal temr	perature	(heating	season)								
				, o		ng area f	from Tab	ole 9, Th	1 (°C)				21	(85)
Utilisation factor for gains for living area, h1,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.97	0.9	0.77	0.57	0.42	0.46	0.7	0.93	0.99	1		(86)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)													1	
(87)m=	20.06	20.24	20.48	20.75	20.92	20.99	21	21	20.97	20.74	20.35	20.03		(87)
Temp	erature	during h	eating p	eriods ir	n rest of	dwelling	from Ta	ble 9, Tl	h2 (°C)				1	
(88)m=	20.07	20.07	20.08	20.09	20.09	20.1	20.1	20.1	20.1	20.09	20.09	20.08		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling,	h2,m (se	e Table	9a)					I	
(89)m=	0.99	0.98	0.96	0.87	0.71	0.5	0.33	0.37	0.62	0.9	0.98	1		(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)												1		
(90)m=	18.83	19.09	19 44	19.81	20.02	20.1	20.1	20.1	20.07	19.81	19.26	18.8	l	(90)

(90)m=	18.83	19.09	19.44	19.81	20.02	20.1	20.1	20.1	20.07	19.81	19.26	18.8		(90)
									1	LA = Livin	g area ÷ (4	4) =	0.34	(91)
Mean	interna	l temper	ature (fo	or the wh	ole dwe	lling) = fl	_A × T1	+ (1 – fL	.A) × T2					

						0,							_
(92)m=	19.25	19.48	19.79	20.13	20.33	20.4	20.41	20.41	20.38	20.12	19.63	19.22	(92)
			-		-								•

Apply adjustment to the mean internal temperature from Table 4e, where appropriate

	<u> </u>												(00)
(93)m= 19.25	19.48	19.79	20.13	20.33	20.4	20.41	20.41	20.38	20.12	19.63	19.22		(93)
8. Space hea				ro obtoir	ad at at	on 11 of	Toble O	o oo tha	+ Ti m_(76)m.on	d ro colo	ulata	
	Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa	ctor for g	ains, hm):										
(94)m= 0.99	0.98	0.95	0.88	0.73	0.52	0.36	0.4	0.65	0.9	0.98	0.99		(94)
Useful gains	, hmGm	, W = (94	4)m x (8	4)m	• •		•						
(95)m= 529.68	615.37	671.33	675.85	588.7	412.92	273.96	287.34	438.36	545.28	522.06	500.92		(95)
Monthly ave	rage exte	ernal tem	perature	e 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	te for me	an intern	al tempe	i	Lm , W =	=[(39)m :	x [(93)m	– (96)m]	·			
(97)m= 1118.4			822.68	630.28	418.1	274.48	288.24	454.84	695.67	920.63	1109.56		(97)
Space heatir	<u> </u>	1	1	i	Wh/mont	th = 0.02	24 x [(97)m – (95	<u> </u>	ŕ			
(98)m= 438.01	317.24	235.67	105.72	30.94	0	0	0	0	111.89	286.97	452.83		_
							Tota	l per year	(kWh/yeai	r) = Sum(9	8)15,912 =	1979.26	(98)
Space heatir	ng requir	ement in	kWh/m²	/year								26.81	(99)
9a. Energy re	quiremer	nts – Indi	ividual h	eating s	vstems i	ncluding	micro-C	CHP)					
Space heati				<u> </u>									
Fraction of s	•	at from se	econdar	y/supple	mentary	system						0	(201)
Fraction of space heat from main system(s) $(202) = 1 - (201) =$											1	(202)	
Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] =$											1	(204)	
											93.5	(206)	
Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, %													
		iry/suppi t			g systen r			r				0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space heatin	1 	• ``	i	1	í								
438.01	317.24	235.67	105.72	30.94	0	0	0	0	111.89	286.97	452.83		
(211)m = {[(98	í È	1	r Ò)6)	1	r							(211)
468.46	339.29	252.05	113.07	33.09	0	0	0	0	119.67	306.92	484.31		_
							Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	_	2116.86	(211)
Space heatir	-		• •	month									
= {[(98)m x (2	1	1	r -					· · · · ·					
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		-
							Tota	l (kWh/yea	ar) =Sum(2	215) _{15,10} 12	7	0	(215)
Water heatin	-												
Output from w					440.00	404.00	4 47 00	4.47.00	400.00	475 50	400.04		
192.85		178.59	160.17	157.02	140.38	134.89	147.92	147.62	166.09	175.53	188.24		
Efficiency of v	1	-										79.8	(216)
(217)m= 86.94	86.46	85.55	83.74	81.38	79.8	79.8	79.8	79.8	83.79	86.12	87.07		(217)
Fuel for water (219)m = (64													
(219)m= 221.83		208.75	191.28	192.93	175.91	169.04	185.36	184.99	198.22	203.82	216.19		
	1		L					I = Sum(2				2344.96	(219)
Annual totals	5							```		Wh/year		kWh/yea	
Space heating		ed, main	system	1					ĸ	ycai		2116.86	
	-		-										

Water heating fuel used				2344.96	
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				331.54	(232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	Energy kWh/year	ctor	Emissions kg CO2/yea		
Space heating (main system 1)	(211) x	0.216	=	457.24	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	506.51	(264)
Space and water heating	(261) + (262) + (263) + (264) =			963.75	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	172.07	(268)
Total CO2, kg/year	su	m of (265)(271) =		1174.75	(272)

TER =

(273)

15.91