Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:38:18

Project Information:

Assessed By: John Simpson (STRO006273) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 74.4m²

Site Reference: Maitland Park Estate

Plot Reference: AC 004

Address: AC 004, Aspen Court, Maitland Park Estate, London, NW3 2EH

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 24.73 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 6.66 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 45.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 42.5 kWh/m²

OK
2 Fabric U-values

Element Average Highest

 Element
 Average
 Highest

 External wall
 0.12 (max. 0.30)
 0.12 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor 0.12 (max. 0.25) 0.12 (max. 0.70)

Roof (no roof)

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

OK

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:	0.5	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: South	2.69m²	
Windows facing: South	11.21m²	
Windows facing: West	1.8m²	
Windows facing: West	1.8m²	
Windows facing: West	3.24m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
40 16 6 6 6		
10 Key features	0.0 2/ 2h	
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m²K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.12 W/m ² K	
Community heating, heat from electric heat pump		
Photovoltaic array		

			User D)otoilo:						
Assessor Name:	John Simps	·on	USEI L	Strom:	a Nium	bor		QTD/	0006273	
Software Name:	Stroma FSA			Softwa					ion: 1.0.4.26	
Continuito Italiio.			Property A					10.0		
Address :	AC 004, Asp	en Court, Mait					2EH			
Overall dwelling dime		,		,		,				
			Area	a(m²)		Av. He	ight(m)	Volume(m ³	3)
Ground floor			-	74.4	(1a) x	2	2.9	(2a) =	215.76	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1	1d)+(1e)+(1	n) =	74.4	(4)			_		
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	215.76	(5)
2. Ventilation rate:										
	main heating	seconda heating	ry	other		total			m³ per hou	ır
Number of chimneys	0	+ 0	7 + [0] = [0	×	40 =	0	(6a)
Number of open flues	0	+ 0	- + -	0	Ī - [0	×	20 =	0	(6b)
Number of intermittent far	ns					0	×	(10 =	0	(7a)
Number of passive vents					Ī	0	×	(10 =	0	(7b)
Number of flueless gas fir	res				Ī	0	×	40 =	0	(7c)
								Λ:	hanna nar ha	<u> </u>
		(0.) (01.) (- · / · /	- \	_				hanges per ho	_
Infiltration due to chimney					ontinus fr	0	(16)	÷ (5) =	0	(8)
If a pressurisation test has be Number of storeys in th			3 a 10 (17), 0	Julei Wise C	onunue n	om (9) to	(10)		0	(9)
Additional infiltration	io arronning (rio)						[(9	9)-1]x0.1 =		(10)
Structural infiltration: 0.	25 for steel or	timber frame o	r 0.35 fo	r masonr	y constr	ruction		, -	0	(11)
if both types of wall are production group of anoming			to the great	er wall are	a (after					
deducting areas of openin).1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent		` ,	•	,,					0	(13)
Percentage of windows	and doors dra	ught stripped							0	(14)
Window infiltration				0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed	d in cubic metr	es per ho	our per s	quare m	etre of e	envelop	e area	2	(17)
If based on air permeabili	ty value, then	$(18) = [(17) \div 20] +$	(8), otherwi	ise (18) = (16)				0.1	(18)
Air permeability value applies		n test has been do	ne or a deg	gree air pe	rmeability	is being u	sed			_
Number of sides sheltered Shelter factor	d			(20) = 1 -	in n 75 v (1	10)1 –			2	(19)
Infiltration rate incorporati	ing chalter fact	or		(21) = (18)					0.85	(20)
Infiltration rate modified for	•			(-1) - (10)	, , (20) =				0.08	(21)
	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
L 1			I Jui	_L Aug	<u> </u>	1 001	1 1100	1 Dec		
Monthly average wind specific (22)m= 5.1 5	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
(22)111- 0.1 0	T.O T.4	7.0 3.0	1 3.0	J 3.7			1 4.0	4.1		
Wind Factor (22a)m = (22	2)m ÷ 4									

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

djusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	: (21a) x	(22a)m				_	
0.11	0.11	0.1	0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.1	0.1		
<i>alculate effe</i> If mechanica		_	rate for t	he appli	cable ca	se	-	-	-				
If exhaust air h			andiv N (2	3h) - (23s	a) v Emy (e	auation (NS)) other	rwica (23h	n) = (23a)			0.5	(2
									o) = (23a)			0.5	(;
If balanced with		•	-	_								76.5	(
a) If balance	ı —	ı —				- `	- ^ ` 	í `	- 		<u>`</u>	i ÷ 100] i	,
4a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]	(
b) If balance	d mech	anical ve	ntilation	without	heat rec	overy (I	MV) (24b	m = (22)	2b)m + (23b)		1	
lb)m= 0	0	0	0	0	0	0	0	0	0	0	0		
c) If whole h if (22b)r				•	-		on from (-c) = (22b		.5 × (23b	o)			
c)m= 0	0	0	0	0	0	0	0	0	0	0	0		
d) If natural if (22b)r							on from I 0.5 + [(2		0.5]	•		•	
-d)m= 0	0	0	0	0	0	0	0	0	0	0	0		
Effective air	change	rate - er	ter (24a) or (24k	o) or (24	c) or (24	ld) in box	(25)	-	•	-	•	
i)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		
Heathers		()			•				•	•	•	1	
. Heat losse LEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
ndows Type	e 1				2.69	x1	/[1/(1.4)+	0.04] =	3.57				
ndows Type	2				11.21	x1	/[1/(1.4)+	0.04] =	14.86	\equiv			
ndows Type	3				1.8	x1	/[1/(1.4)+	0.04] =	2.39	=			
indows Type	e 4				1.8	<u> </u>	/[1/(1.4)+	0.04] =	2.39	=			
ndows Type					3.24	<u></u>	/[1/(1.4)+	0.041 =	4.3	=			
oor					74.4	x			8.928	╡ ,			
alls	40.5					= "		╣ -				╡	=
	49.5		20.7	4	28.79	=	0.12	=	3.46				
tal area of e	elements	, m²			123.9	3							
irty wall					49.76		0	=	0				
or windows and Include the area						ated usin	g formula 1	/[(1/U-valu	ıe)+0.04] á	as given in	paragraph	1 3.2	
bric heat los				is and pan	uuons		(26)(30)	+ (32) =				39.88	
at capacity		•	0)				, , , ,		(30) + (32	2) + (32a)	(32e) =		=
ermal mass		,	2 – Cm	TEA) ir	n k I/m²k				itive Value	, , ,	(020) =	0	
r design assess	•	•		,			recisely the				able 1f	250	
n be used inste				CONSTRUCT	ion are not	. KITOWIT P	recisely the	maioative	, values of	TIVII III I	abic II		
ermal bridge	es : S (L	x Y) cal	culated (using Ap	pendix ł	<						11.69	
etails of therma	al bridging	are not kn	own (36) =	= 0.05 x (3	11)								
tal fabric he	at loss							(33) +	(36) =			51.57	
ntilation hea	at loss ca	alculated	l monthly	<u>/</u>				(38)m	= 0.33 × ((25)m x (5))	_	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m= 16.08	15.93	15.78	15.02	14.87	14.12	14.12	13.96	14.42	14.87	15.17	15.48		
eat transfer o	coefficier	nt, W/K						(39)m	= (37) + (38)m	-	-	
		.,						· - / · ·	, , ,	· · · · · ·		1	
9)m= 67.65	67.5	67.35	66.59	66.44	65.68	65.68	65.53	65.98	66.44	66.74	67.04		

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.91	0.91	0.91	0.9	0.89	0.88	0.88	0.88	0.89	0.89	0.9	0.9		
		!							Average =	Sum(40) ₁	12 /12=	0.89	(40)
Number of day	<u> </u>	<u> </u>	le 1a)		<u> </u>			1	T	1	i I		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occu if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	ΓFA -13		35		(42)
Annual average Reduce the annual not more that 125	ge hot wa al average	hot water	usage by	5% if the c	lwelling is	designed i			se target o		.97		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i								1 - 22		L			
(44)m= 98.96	95.36	91.77	88.17	84.57	80.97	80.97	84.57	88.17	91.77	95.36	98.96		
` '				l .		l .	<u> </u>		rotal = Su	m(44) ₁₁₂ =	=	1079.59	(44)
Energy content of	f hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 146.76	128.36	132.45	115.47	110.8	95.61	88.6	101.67	102.88	119.9	130.88	142.13		
									Total = Su	m(45) ₁₁₂ =	=	1415.52	(45)
If instantaneous v	vater heati	ng at point	of use (no	not water	r storage),	enter 0 in	boxes (46)	to (61)	1		1		
(46)m= 22.01	19.25	19.87	17.32	16.62	14.34	13.29	15.25	15.43	17.99	19.63	21.32		(46)
Water storage Storage volum) includir	na anv sa	olar or M	/WHRS	storana	within sa	ame ves	امء		0		(47)
If community h	,					•		airio voo	001		0		(47)
Otherwise if no	-			-			, ,	ers) ente	er '0' in ((47)			
Water storage			`					,	`	,			
a) If manufact	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro	om watei	r storage	, kWh/ye	ear			(48) x (49)) =		1	10		(50)
b) If manufact			-										
Hot water stor If community h	-			le 2 (KVV	n/litre/da	ay)				0.	02		(51)
Volume factor	•		011 4.3							1	03		(52)
Temperature f			2b							-	.6		(53)
Energy lost fro				ear			(47) x (51)) x (52) x (53) =		03		(54)
Enter (50) or		_	, ,					, , , ,	,		03		(55)
Water storage	loss cal	culated t	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 cylinder contain												хH	. ,
(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)
	<u> </u>			<u>l</u>		I	I	1	L				, ,
Primary circuit	`	,			50\m = 4	(EQ) + 26	S5 ~ (44)	ım			0		(58)
Primary circuit (modified by				,	•	` '	, ,		r thermo	stat)			
(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)
													` '

Combilees	الم مامان المام	for ooah		(04)	(00) - 0	CF (44)	\						
Combi loss	calculated 0	or each	montn ((61)m =	(60) ÷ 3	05 × (41))m 0	0	0	0	0		(61)
		<u> </u>					<u> </u>	ļ	<u> </u>	ļ		(F0)m + (G1)m	(01)
(62)m= 202.0		187.73	168.97	166.08	149.11	143.88	156.95	156.38	175.18	184.37	197.4	(59)m + (61)m	(62)
Solar DHW inp		LI				<u> </u>							(02)
(add additio									ii contribut	ion to wate	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	water hea	ter						<u> </u>		<u> </u>			
(64)m= 202.0		187.73	168.97	166.08	149.11	143.88	156.95	156.38	175.18	184.37	197.4		
	-1	<u> </u>		ļ		<u>!</u>	Out	put from w	ater heate	r (annual)₁	12	2066.36	(64)
Heat gains f	rom water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)r	n] + 0.8 ;	x [(46)m	+ (57)m	+ (59)m	1	-
(65)m= 93.0		88.26	81.19	81.06	74.59	73.68	78.03	77	84.09	86.31	91.48]	(65)
include (5	7)m in cald	culation o	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is f	rom com	munity h	i neating	
5. Internal	•			•	•						,		
Metabolic ga				,									
Jar		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 117.	4 117.4	117.4	117.4	117.4	117.4	117.4	117.4	117.4	117.4	117.4	117.4		(66)
Lighting gair	ns (calcula	ted in Ap	pendix	L, equati	on L9 o	r L9a), a	lso see	Table 5	•	•	•		
(67)m= 18.4	8 16.42	13.35	10.11	7.56	6.38	6.89	8.96	12.03	15.27	17.82	19		(67)
Appliances	gains (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), als	see Ta	ble 5	•	•	•	
(68)m= 207.3	209.49	204.07	192.53	177.96	164.26	155.12	152.96	158.39	169.93	184.5	198.19		(68)
Cooking gai	ns (calcula	ted in Ap	pendix	L, equat	ion L15	or L15a)	, also s	ee Table	5	•	•	•	
(69)m= 34.7	4 34.74	34.74	34.74	34.74	34.74	34.74	34.74	34.74	34.74	34.74	34.74		(69)
Pumps and	fans gains	(Table 5	ia)					•				•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g.	evaporatio	n (negat	ive valu	es) (Tab	le 5)		=	-	-	-			
(71)m= -93.9	2 -93.92	-93.92	-93.92	-93.92	-93.92	-93.92	-93.92	-93.92	-93.92	-93.92	-93.92		(71)
Water heating	ng gains (T	able 5)		_		-	-				-		
(72)m= 125.0	3 122.95	118.63	112.76	108.96	103.59	99.03	104.87	106.95	113.02	119.88	122.96		(72)
Total intern	al gains =	1			(66))m + (67)m	+ (68)m	+ (69)m +	(70)m + (7	'1)m + (72))m		
(73)m= 409.0	7 407.08	394.27	373.62	352.69	332.46	319.26	325.02	335.58	356.44	380.42	398.37		(73)
6. Solar ga	ins:												
Solar gains a		•	r flux from	Table 6a			tions to c	onvert to th	ne applicat		tion.		
Orientation:	Access F Table 6d		Area m²		Flu	ıx ble 6a	-	g_ able 6b	т	FF able 6c		Gains (W)	
0 1							, <u> </u>	able ob	_ '	able oc		` '	7
South 0.9		X	2.6		X	16.75	X	0.4	x	0.8	=	27.89	(78)
South 0.9		X	11.			16.75	X	0.4	x	8.0	=	116.22	[(78)
South 0.9		X	2.6			76.57	X	0.4		0.8	=	45.68	(78)
South 0.9		X	11.		-	76.57	X	0.4	x	0.8	=	190.34	(78)
South 0.9	× 0.77	X	2.6	69	X S	97.53	X	0.4	X	0.8	=	58.18	(78)

0 11	г		1		1		1		ı		,		_
South	0.9x	0.77	X	11.21	X	97.53	X	0.4	X	0.8	=	242.46	(78)
South	0.9x	0.77	X	2.69	X	110.23	X	0.4	X	0.8	=	65.76	(78)
South	0.9x	0.77	X	11.21	X	110.23	X	0.4	X	0.8	=	274.04	(78)
South	0.9x	0.77	X	2.69	X	114.87	X	0.4	X	0.8	=	68.52	(78)
South	0.9x	0.77	X	11.21	X	114.87	X	0.4	X	0.8	=	285.56	(78)
South	0.9x	0.77	X	2.69	X	110.55	X	0.4	X	0.8	=	65.95	(78)
South	0.9x	0.77	X	11.21	X	110.55	X	0.4	X	0.8	=	274.81	(78)
South	0.9x	0.77	X	2.69	X	108.01	X	0.4	X	0.8	=	64.43	(78)
South	0.9x	0.77	X	11.21	X	108.01	x	0.4	X	0.8	=	268.51	(78)
South	0.9x	0.77	X	2.69	X	104.89	x	0.4	X	0.8	=	62.57	(78)
South	0.9x	0.77	X	11.21	X	104.89	x	0.4	x	0.8	=	260.76	(78)
South	0.9x	0.77	X	2.69	x	101.89	X	0.4	x	0.8	=	60.78	(78)
South	0.9x	0.77	X	11.21	x	101.89	x	0.4	x	0.8	=	253.28	(78)
South	0.9x	0.77	X	2.69	x	82.59	x	0.4	x	0.8	=	49.27	(78)
South	0.9x	0.77	X	11.21	X	82.59	x	0.4	x	0.8	=	205.3	(78)
South	0.9x	0.77	X	2.69	x	55.42	x	0.4	x	0.8	=	33.06	(78)
South	0.9x	0.77	X	11.21	x	55.42	x	0.4	x	0.8	=	137.76	(78)
South	0.9x	0.77	X	2.69	x	40.4	x	0.4	x	0.8	=	24.1	(78)
South	0.9x	0.77	X	11.21	x	40.4	x	0.4	x	0.8	=	100.43	(78)
West	0.9x	0.77	X	1.8	x	19.64	x	0.4	x	0.8	=	7.84	(80)
West	0.9x	0.77	X	1.8	X	19.64	x	0.4	x	0.8	=	7.84	(80)
West	0.9x	0.77	X	3.24	x	19.64	x	0.4	x	0.8	=	14.11	(80)
West	0.9x	0.77	X	1.8	x	38.42	x	0.4	x	0.8	=	15.34	(80)
West	0.9x	0.77	X	1.8	x	38.42	x	0.4	x	0.8	=	15.34	(80)
West	0.9x	0.77	X	3.24	x	38.42	x	0.4	x	0.8	=	27.61	(80)
West	0.9x	0.77	X	1.8	X	63.27	x	0.4	x	0.8	=	25.26	(80)
West	0.9x	0.77	X	1.8	x	63.27	x	0.4	x	0.8	=	25.26	(80)
West	0.9x	0.77	X	3.24	x	63.27	x	0.4	x	0.8	=	45.46	(80)
West	0.9x	0.77	X	1.8	x	92.28	x	0.4	x	0.8	=	36.84	(80)
West	0.9x	0.77	X	1.8	x	92.28	x	0.4	x	0.8	=	36.84	(80)
West	0.9x	0.77	X	3.24	x	92.28	x	0.4	x	0.8	=	66.3	(80)
West	0.9x	0.77	X	1.8	X	113.09	x	0.4	x	0.8	=	45.14	(80)
West	0.9x	0.77	X	1.8	x	113.09	x	0.4	x	0.8	=	45.14	(80)
West	0.9x	0.77	X	3.24	x	113.09	x	0.4	x	0.8	=	81.26	(80)
West	0.9x	0.77	X	1.8	x	115.77	x	0.4	x	0.8	=	46.21	(80)
West	0.9x	0.77	X	1.8	x	115.77	x	0.4	x	0.8	=	46.21	(80)
West	0.9x	0.77	x	3.24	x	115.77	x	0.4	x	0.8	=	83.18	(80)
West	0.9x	0.77	X	1.8	x	110.22	x	0.4	x	0.8	j =	44	(80)
West	0.9x	0.77	x	1.8	x	110.22	x	0.4	x	0.8	=	44	(80)
West	0.9x	0.77	x	3.24	x	110.22	x	0.4	x	0.8	=	79.19	(80)
West	0.9x	0.77	×	1.8	X	94.68	x	0.4	X	0.8	=	37.79	(80)

West	0.9x	0.77	Х	1.	8	x	94	4.68	x		0.4	x	0.8		=	37.79	(80)
West	0.9x	0.77	x	3.2	24	x	94	4.68	х		0.4	x	0.8		=	68.02	(80)
West	0.9x	0.77	X	1.	8	x	73	3.59	x		0.4	X	0.8		=	29.37	(80)
West	0.9x	0.77	X	1.	8	x	73	3.59	x		0.4	x	0.8		=	29.37	(80)
West	0.9x	0.77	X	3.2	24	x	73	3.59	x		0.4	X	0.8		=	52.87	(80)
West	0.9x	0.77	х	1.	8	x	4	5.59	х		0.4	x	0.8		=	18.2	(80)
West	0.9x	0.77	x	1.	8	x [4	5.59	x		0.4	×	0.8		=	18.2	(80)
West	0.9x	0.77	х	3.2	24	x	45	5.59	х		0.4	x	0.8		=	32.76	(80)
West	0.9x	0.77	х	1.	8	x	24	4.49	X		0.4	x	0.8		=	9.78	(80)
West	0.9x	0.77	X	1.	8	x	24	4.49	x		0.4	x	0.8		=	9.78	(80)
West	0.9x	0.77	X	3.2	24	x	24	4.49	x		0.4	X	0.8		=	17.6	(80)
West	0.9x	0.77	X	1.	8	x	16	6.15	x		0.4	x	0.8		=	6.45	(80)
West	0.9x	0.77	Х	1.	8	x	16	6.15	x		0.4	x	0.8		=	6.45	(80)
West	0.9x	0.77	Х	3.2	24	x	16	6.15	х		0.4	x	0.8		=	11.6	(80)
					_				-								
Solar g	ains in	watts, ca	alculated	for eac	h month				(83)m	ı = Su	ım(74)m .	(82)m				_	
(83)m=	173.9	294.3	396.62	479.77	525.63	516	6.36	500.13	466	.94	425.68	323.7	2 207.97	149	9.02		(83)
Total ga	ains – i	nternal a	ınd sola	· (84)m =	= (73)m	+ (83	3)m ,	watts									
(84)m=	582.97	701.37	790.89	853.39	878.32	848	8.82	819.39	791	.96	761.26	680.1	6 588.39	547	7.39		(84)
7. Mea	an inter	nal temp	erature	(heating	seasor)											
Tempe	erature	during h	eating p	eriods ir	n the livi	ng a	rea f	rom Tab	ole 9	Th1	1 (°C)					21	(85)
Utilisa	tion fac	ctor for a	ains for	living are	ea. h1.m	ı (se	e Tal	ble 9a)								•	
Utilisa	tion fac Jan	tor for ga	ains for Mar	living are	ea, h1,m May	T .	e Tal	ble 9a) Jul	A	ug	Sep	Oct	Nov	Τр	ec		
Utilisa (86)m=		Ī		<u> </u>		J	T		A 0.3	ug 88	Sep 0.59	Oct	+	D 0.9			(86)
(86)m=	Jan 0.99	Feb 0.97	Mar 0.93	Apr 0.83	May 0.68	0.4	un 49	Jul 0.35	0.3	88	0.59		+	+-			(86)
(86)m=	Jan 0.99	Feb	Mar 0.93	Apr 0.83	May 0.68	0.4 ollow	un 49	Jul 0.35	0.3	able	0.59		0.98	+-	99		(86)
(86)m= Mean (87)m=	Jan 0.99 interna 20.27	Feb 0.97 lt tempera 20.47	Mar 0.93 ature in 20.68	Apr 0.83 living are 20.88	May 0.68 ea T1 (for 20.97	0.4 ollow	un 49 v ster 21	Jul 0.35 os 3 to 7 21	0.3 7 in T 2	able	0.59 e 9c) 20.99	0.87	0.98	0.9	99		
(86)m= Mean (87)m= Tempe	Jan 0.99 interna 20.27 erature	Feb 0.97 I temper: 20.47 during h	Mar 0.93 ature in 20.68 eating p	Apr 0.83 living are 20.88 periods in	May 0.68 ea T1 (for 20.97) rest of	J 0.4 ollow dwe	un 49 v ster 21	Jul 0.35 os 3 to 7 21 from Ta	7 in T 2 able 9	able 1 9, Th	0.59 e 9c) 20.99	20.87	0.98	20.	.23		(87)
(86)m= Mean (87)m= Tempe (88)m=	Jan 0.99 interna 20.27 erature 20.16	Feb 0.97 Il temper: 20.47 during h	Mar 0.93 ature in 20.68 eating p	Apr 0.83 living ard 20.88 periods in 20.17	May 0.68 ea T1 (for 20.97) n rest of 20.17	J 0.4 ollow dwe 20	un 49 v ster 21 elling	Jul 0.35 os 3 to 7 21 from Ta 20.18	0.37 in T 2 able 9 20.	able 1 9, Th	0.59 e 9c) 20.99	0.87	0.98	0.9	.23		
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa	Jan 0.99 interna 20.27 erature 20.16 tion fac	Feb 0.97 Il tempera 20.47 during h 20.16 ctor for ga	Mar 0.93 ature in 20.68 eating p 20.16 ains for	Apr 0.83 living are 20.88 periods in 20.17 rest of d	May 0.68 ea T1 (for 20.97 rest of 20.17 welling,	J 0.4 ollow dwe 20 h2,m	un 49 v ster elling .18	Jul 0.35 0s 3 to 7 21 from Ta 20.18 e Table	0.37 in T 2 able 9 20.	able 1 9, Th	0.59 e 9c) 20.99 n2 (°C) 20.18	20.87	0.98	20.	.23		(87)
(86)m= Mean (87)m= Tempe (88)m=	Jan 0.99 interna 20.27 erature 20.16	Feb 0.97 Il temper: 20.47 during h	Mar 0.93 ature in 20.68 eating p	Apr 0.83 living ard 20.88 periods in 20.17	May 0.68 ea T1 (for 20.97) n rest of 20.17	J 0.4 ollow dwe 20 h2,m	un 49 v ster 21 elling	Jul 0.35 os 3 to 7 21 from Ta 20.18	0.37 in T 2 able 9 20.	able 1 9, Th	0.59 e 9c) 20.99	20.87	0.98	20.	.23		(87)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99	Feb 0.97 Il tempera 20.47 during h 20.16 ctor for ga	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92	Apr 0.83 living are 20.88 periods in 20.17 rest of d 0.8	May 0.68 ea T1 (for 20.97 no rest of 20.17 welling, 0.63	J 0.4 ollow 20 dwe 20 h2,m	v ster elling .18 n (se	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29	0.37 in T 2 able 9 20. 9a) 0.3	able 1 9, Th	0.59 e 9c) 20.99 n2 (°C) 20.18	0.87 20.87 20.17 0.83	0.98	20.	.23		(87)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99	Feb 0.97 l tempera 20.47 during h 20.16 etor for ga 0.97	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92	Apr 0.83 living are 20.88 periods in 20.17 rest of d 0.8	May 0.68 ea T1 (for 20.97 no rest of 20.17 welling, 0.63	J 0.4 collow dwe 20 h2,m 0.4 ing T	v ster elling .18 n (se	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29	0.37 in T 2 able 9 20. 9a) 0.3	able 7	0.59 20.99 20.99 20.18 0.52 ' in Table 20.17	0.87 20.87 20.17 0.83 e 9c) 20.04	0.98 7 20.53 7 20.17 9 0.97	20.	.17		(87)
(86)m=	Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna	Feb 0.97 Il temper: 20.47 during h 20.16 ctor for gas 0.97 Il temper:	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in	Apr 0.83 living are 20.88 periods in 20.17 rest of d 0.8 the rest	May 0.68 ea T1 (for 20.97) n rest of 20.17 welling, 0.63 of dwell	J 0.4 collow dwe 20 h2,m 0.4 ing T	v ster v ster elling 1.18 n (se 43	Jul 0.35 os 3 to 7 21 from Ta 20.18 e Table 0.29 ollow ste	0.3 7 in T 2 able 9 20. 9a) 0.3 eps 3	able 7	0.59 20.99 20.99 20.18 0.52 ' in Table 20.17	0.87 20.87 20.17 0.83 e 9c) 20.04	0.98 7 20.53 7 20.17 9 0.97	20.	.17	0.37	(87) (88) (89)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2	Feb 0.97 l temper: 20.47 during h 20.16 ctor for ga 0.97 l temper: 19.48	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78	Apr 0.83 living ard 20.88 periods in 20.17 rest of d 0.8 the rest 20.04	May 0.68 ea T1 (for 20.97) rest of 20.17 welling, 0.63 of dwell 20.15	J J 0.4 o.4 o.4 o.4 o.4 o.4 o.4 o.4 o.4 o.4 o	un 49 v ster 21 elling 1.18 m (see 43 T2 (fc	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29 Dllow ste 20.18	0.37 in T 2 2 able 9 20. 9a) 0.3 20.	7 able 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17	0.87 20.87 20.17 0.83 e 9c) 20.04	0.98 7 20.53 7 20.17 9 0.97	20.	.17	0.37	(87) (88) (89) (90)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2	Feb 0.97 Il temper: 20.47 during h 20.16 ctor for gas 0.97 Il temper:	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78	Apr 0.83 living ard 20.88 periods in 20.17 rest of d 0.8 the rest 20.04	May 0.68 ea T1 (for 20.97) n rest of 20.17 welling, 0.63 of dwell 20.15	dwe 20 h2,n 0.4	un 49 v ster 21 elling 1.18 m (see 43 T2 (fc	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29 Dllow ste 20.18	0.37 in T 2 2 able 9 20. 9a) 0.3 20.	Table Ta	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17	0.87 20.87 20.17 0.83 e 9c) 20.04	0.98 7 20.53 7 20.17 9 0.97 1 19.58 ving area ÷ (20.	23 117 999	0.37	(87) (88) (89) (90)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Mean (92)m= [Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2 interna 19.59	Feb 0.97 Il temper: 20.47 during h 20.16 ctor for ga 0.97 Il temper: 19.48 Il temper: 19.84	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78 ature (for	Apr 0.83 living ard 20.88 periods in 20.17 rest of d 0.8 the rest 20.04 or the wh	May	J 0.00 0.0	un 49 v ster 21 elling 1.18 Γ2 (fc 1.18) = fL 1.48	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29 bllow ste 20.18 A × T1 20.48	0.37 in T 2 2 20. 9a) 0.3 20. + (1 20.	Fable 1	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17 f A) × T2 20.47	0.87 20.87 20.17 0.83 e 9c) 20.04 LA = Li	0.98 7 20.53 7 20.17 0.97 1 19.58 ving area ÷ (0.9 20. 20. 0.9 19. (4) =	23 117 999	0.37	(87) (88) (89) (90) (91)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Mean (92)m= [Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2 interna 19.59	Feb 0.97 Il temper: 20.47 during h 20.16 etor for ga 0.97 Il temper: 19.48	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78 ature (for	Apr 0.83 living ard 20.88 periods in 20.17 rest of d 0.8 the rest 20.04 or the wh	May	J 0 0 10 0 10 0 11 12 0 12 13 14 15 15 15 15 15 15 15	un 49 v ster 21 elling 1.18 Γ2 (fc 1.18) = fL 1.48	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29 bllow ste 20.18 A × T1 20.48	0.37 in T 2 2 20. 9a) 0.3 20. + (1 20.	Table Ta	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17 f A) × T2 20.47	0.87 20.87 20.17 0.83 e 9c) 20.04 LA = Li	0.98 7 20.53 7 20.17 0.97 1 19.58 ving area ÷ (0.9 20. 20. 0.9 19. (4) =		0.37	(87) (88) (89) (90) (91)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Mean (92)m= [Apply (93)m= [Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2 interna 19.59 adjustr 19.59	Feb 0.97 Il temper: 20.47 during h 20.16 etor for ga 0.97 Il temper: 19.48 Il temper: 19.84 ment to the	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78 ature (for 20.11 ne mear 20.11	Apr 0.83 living arr 20.88 periods ir 20.17 rest of d 0.8 the rest 20.04 or the wh 20.35 n interna 20.35	May 0.68 ea T1 (for 20.97 no rest of 20.17 welling, 0.63 of dwell 20.15 nole dwell 20.45 I temper	J 0 0 10 0 10 0 11 12 0 12 13 14 15 15 15 15 15 15 15	un 49 v ster 21 elling 1.18 π (ser 43 π2 (for 1.18 e fror	Jul 0.35 ps 3 to 7 21 from Ta 20.18 e Table 0.29 pllow ste 20.18 A × T1 20.48 m Table	0.37 in T 2 20. 20. 20. 20. 20. 20. 20. 20. 20. 2	Table Ta	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17 f A) × T2 20.47 re appro	0.87 20.87 20.17 0.83 e 9c) 20.04 LA = Li	0.98 7 20.53 7 20.17 0.97 1 19.58 ving area ÷ (0.9 20. 20. 19. (4) =		0.37	(87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Tempe (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2 interna 19.59 adjustr 19.59	Feb 0.97 Il temper: 20.47 during h 20.16 ctor for ga 0.97 Il temper: 19.48 Il temper: 19.84 ment to th 19.84 tting requ	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78 ature (for 20.11 he mean 20.11	Apr 0.83 living are 20.88 periods in 20.17 rest of d 0.8 the rest 20.04 or the wh 20.35 n interna 20.35	May 0.68 ea T1 (for 20.97 no rest of 20.17 welling, 0.63 of dwell 20.15 nole dwell 20.45 I temper 20.45	dwe 20 h2,n 0 ing T 20 ature 20 20	v ster 21 elling .18 n (see 43) = fL .48 e from	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29 bllow ste 20.18 A × T1 20.48 m Table 20.48	0.37 in T 2 20. 9a) 0.3 20. + (1 20. 4e, 20.	Fable 1	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17 f A) × T2 20.47 re approximate 20.47	0.87 20.87 20.17 0.83 e 9c) 20.04 LA = Li 20.34	0.98 7 20.53 7 20.17 0.97 1 19.58 ving area ÷ (0.9 20. 20. 19. (4) =	999 23 117 115 54		(87) (88) (89) (90) (91) (92)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Apply (93)m= [8. Spa Set Ti	Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2 interna 19.59 adjustr 19.59 ace hea to the	Feb 0.97 Il temper: 20.47 during h 20.16 ctor for ga 0.97 Il temper: 19.48 Il temper: 19.84 ment to th 19.84 tting requ	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78 ature (for 20.11 he mean 20.11 uirementernal te	Apr 0.83 living are 20.88 periods ir 20.17 rest of d 0.8 the rest 20.04 or the wh 20.35 in interna 20.35	May 0.68 ea T1 (for 20.97) rest of 20.17 welling, 0.63 of dwell 20.15 cole dwe 20.45 I temper 20.45 re obtain	dwe 20 h2,n 0 ing T 20 ature 20 20	v ster 21 elling .18 n (see 43) = fL .48 e from	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29 bllow ste 20.18 A × T1 20.48 m Table 20.48	0.37 in T 2 20. 9a) 0.3 20. + (1 20. 4e, 20.	Fable 1	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17 f A) × T2 20.47 re approximate 20.47	0.87 20.87 20.17 0.83 e 9c) 20.04 LA = Li 20.34	0.98 7 20.53 7 20.17 0.97 1 19.58 ving area ÷ (1 19.93	0.9 20. 20. 19. (4) =	999 23 117 115 54		(87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Tempe (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa Set Ti the uti	Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2 interna 19.59 adjustr 19.59 ace hea to the ilisation Jan	Feb 0.97 I temper: 20.47 during h 20.16 ctor for ga 0.97 I temper: 19.48 I temper: 19.84 ment to th 19.84 ting required factor for ga 19.84 The state of	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78 ature (for 20.11 he mean 20.11 uirement ernal teleor gains Mar	Apr 0.83 living are 20.88 eriods in 20.17 rest of d 0.8 the rest 20.04 or the wh 20.35 interna 20.35 mperaturusing Tal Apr	May 0.68 ea T1 (for 20.97) rest of 20.17 welling, 0.63 of dwell 20.15 cole dwe 20.45 I temper 20.45 re obtain	dwe 20 h2,n 0.4 ing T 20 ature 20 ned a	v ster 21 elling .18 n (see 43) = fL .48 e from	Jul 0.35 DS 3 to 7 21 from Ta 20.18 e Table 0.29 bllow ste 20.18 A × T1 20.48 m Table 20.48	0.37 in T 2 20. 20. 20. 20. 20. 20. 20. 20. 20. 2	Fable 1	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17 f A) × T2 20.47 re approximate 20.47	0.87 20.87 20.17 0.83 e 9c) 20.04 LA = Li 20.34	0.98 20.53 20.17 0.97 19.58 ving area ÷ (19.93 19.93 (76)m ar	0.9 20. 20. 19. (4) =	999 23 117 115 54		(87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Tempe (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa Set Ti the uti	Jan 0.99 interna 20.27 erature 20.16 tion fac 0.99 interna 19.2 interna 19.59 adjustr 19.59 ace hea to the ilisation Jan	Feb 0.97 Il temper: 20.47 during h 20.16 ctor for ga 0.97 Il temper: 19.48 Il temper: 19.84 ment to th 19.84 tting requirement interfactor for	Mar 0.93 ature in 20.68 eating p 20.16 ains for 0.92 ature in 19.78 ature (for 20.11 he mean 20.11 uirement ernal teleor gains Mar	Apr 0.83 living are 20.88 eriods in 20.17 rest of d 0.8 the rest 20.04 or the wh 20.35 interna 20.35 mperaturusing Tal Apr	May 0.68 ea T1 (for 20.97) n rest of 20.17 welling, 0.63 of dwell 20.15 nole dwell 20.45 I temper 20.45 re obtain able 9a	dwe 20 h2,n 0.4 ing T 20 ature 20 ned a	v step 21 21 21 21 21 21 21 31 31 31 31 31 31 31 31 31 31 31 31 31	Jul 0.35 ps 3 to 7 21 from Ta 20.18 e Table 0.29 pllow ste 20.18 A × T1 20.48 m Table 20.48	0.37 in T 2 20. 20. 20. 20. 20. 20. 20. 20. 20. 2	Fable 1	0.59 20.99 20.99 20.18 0.52 7 in Table 20.17 f A) × T2 20.47 re approximate a	0.87 20.87 20.17 0.83 e 9c) 20.04 LA = Li 20.34 priate 20.34	0.98 7 20.53 7 20.17 0.97 1 19.58 1 19.93 1 19.93 1 Nov	0.9 20. 20. 19. (4) =	.23 .17 .999 .15		(87) (88) (89) (90) (91) (92)

USETH dains $nm(4m - VV = 194)m \times 184)m$														
Useful gains, hmGm, W = (94)m x (84)m (95)m= 575.11 676.2 723.24 689.22 565.14 384.63 254.85 267.36 415.69 570.3 568.83 542		(95)												
Monthly average external temperature from Table 8														
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2		(96)												
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m]														
(97)m= 1034.54 1008.6 916.85 762.23 581.28 386.18 254.97 267.56 420.44 647.11 856.46 1028.65		(97)												
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m	I													
(98)m= 341.81 223.38 144.05 52.57 12.01 0 0 0 57.15 207.09 362.07	1,100,10	(98)												
Total per year (kWh/year) = Sum(98) _{15,912} = Space heating requirement in kWh/m²/year	1400.12 18.82	(99)												
9b. Energy requirements – Community heating scheme														
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	0	(301)												
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 sources; the includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.	he latter													
Fraction of heat from Community heat pump	1	(303a)												
Factor for control and charging method (Table 4c(3)) for community heating system	1	(305)												
Distribution loss factor (Table 12c) for community heating system	1.1	(306)												
Space heating	kWh/yea	_												
Annual space heating requirement	1400 12													
Annual space heating requirement 1400.12														
Space heat from Community heat pump (98) x (304a) x (305) x (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)		(307a) (308												
	1540.14	╡`												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	1540.14 0	(308												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) =	1540.14 0	(308												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating	1540.14 0 0	(308												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme:	1540.14 0 0 2066.36	(308												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) =	1540.14 0 0 2066.36 2272.99	(308 (309) (310a)												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] =	1540.14 0 0 2066.36 2272.99 38.13	(308 (309) (310a) (313)												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) × (303a) × (305) × (306) = Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio	1540.14 0 0 2066.36 2272.99 38.13 0	(308 (309) (310a) (313) (314)												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) × (303a) × (305) × (306) = Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	1540.14 0 0 2066.36 2272.99 38.13 0	(308 (309) (310a) (313) (314) (315) (330a)												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans	1540.14 0 0 2066.36 2272.99 38.13 0 0 164.52	(308 (309) (310a) (313) (314) (315) (330a) (330b)												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) × (303a) × (305) × (306) = Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans pump for solar water heating	1540.14 0 0 2066.36 2272.99 38.13 0 0 164.52 0	(308 (309) (310a) (313) (314) (315) (330a) (330b) (330g)												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans pump for solar water heating Total electricity for the above, kWh/year =(330a) + (330b) + (330b) =	1540.14 0 0 2066.36 2272.99 38.13 0 0 164.52 0 0	(308 (309) (310a) (313) (314) (315) (330a) (330b) (330g) (331)												
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) × (303a) × (305) × (306) = Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans pump for solar water heating	1540.14 0 0 2066.36 2272.99 38.13 0 0 164.52 0	(308 (309) (310a) (313) (314) (315) (330a) (330b) (330g)												

(334)Electricity generated by wind turbine (Appendix M) (negative quantity) 12b. CO2 Emissions – Community heating scheme Energy **Emission factor Emissions** kWh/year kg CO2/kWh kg CO2/year CO2 from other sources of space and water heating (not CHP) If there is CHP using two fuels repeat (363) to (366) for the second fuel Efficiency of heat source 1 (%) 319 (367a) CO2 associated with heat source 1 $[(307b)+(310b)] \times 100 \div (367b) \times$ 620.38 (367)0.52 Electrical energy for heat distribution (372)[(313) x]0.52 19.79 Total CO2 associated with community systems (363)...(366) + (368)...(372)(373)640.17 CO2 associated with space heating (secondary) (309) x(374)0 0 CO2 associated with water from immersion heater or instantaneous heater (312) x (375)0.52 0 Total CO2 associated with space and water heating (373) + (374) + (375) =640.17 (376)CO2 associated with electricity for pumps and fans within dwelling (331)) x (378)0.52 85.38 CO2 associated with electricity for lighting (332))) x (379)0.52 169.42 Energy saving/generation technologies (333) to (334) as applicable Item 1 x = 0.01 =(380) 0.52 -399.36 sum of (376)...(382) = Total CO2, kg/year (383)495.62 **Dwelling CO2 Emission Rate** $(383) \div (4) =$ (384)6.66

El rating (section 14)

(385)

94.44

			User D	etaile: -						
Assessor Name:	John Simpson			Strom:	a Num	ber:		STRC	0006273	
Software Name:	Stroma FSAP 20	012		Softwa					on: 1.0.4.26	
		Р	roperty i	Address	AC 004	ļ				
Address :	AC 004, Aspen Co	ourt, Maitla	and Park	c Estate,	London	, NW3 2	EΗ			
1. Overall dwelling dime	ensions:									
			Area	a(m²)		Av. He	ight(m)	_	Volume(m ³	3)
Ground floor			7	74.4	(1a) x	2	2.9	(2a) =	215.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1r	n)	74.4	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	215.76	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	ır
Number of chimneys	0 +	0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	Ī + Ē	0	Ī = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ans				,	3	x -	10 =	30	(7a)
Number of passive vents	S				F	0	x -	10 =	0	(7b)
Number of flueless gas f					L	0	x	40 =	0	(7c)
raniber of nucless gas i	1103				L	0			0	(70)
								Air ch	nanges per ho	our
Infiltration due to chimne	eys, flues and fans =	(6a)+(6b)+(7	'a)+(7b)+(7c) =	Г	30		÷ (5) =	0.14	(8)
If a pressurisation test has l	been carried out or is inter	nded, procee	d to (17), d	otherwise o	ontinue fr	om (9) to ((16)			_
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0					•	uction			0	(11)
if both types of wall are p deducting areas of openi	oresent, use the value corr ings): if equal user 0.35	esponding to	the great	er wall are	a (atter					
If suspended wooden	• / .	aled) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	nter 0.05, else enter 0)							0	(13)
Percentage of window	s and doors draught	stripped							0	(14)
Window infiltration				0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)
Air permeability value,	• •		•	•	•	etre of e	envelope	area	5	(17)
If based on air permeabi	•								0.39	(18)
Air permeability value applie		nas been dor	ne or a deg	gree air pe	meability	is being u	sed			–
Number of sides shelters Shelter factor	ed			(20) = 1 -	0 075 x (1	9)1 =			2	(19)
Infiltration rate incorpora	ting shelter factor			(21) = (18)		O)] —			0.85	(20)
Infiltration rate modified	•	ad		(21) - (10)	X (20) -				0.33	(21)
Jan Feb	Mar Apr May		Jul	Aug	Sep	Oct	Nov	Dec	1	
Monthly average wind sp	··	y Odii	<u> </u>	l //ug	Сор		1 1101		J	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	1	
V =/···	- 1 1		L	I	•	L <u> </u>	L	L]	
Wind Factor (22a)m = (2	22)m ÷ 4		_	1		ı	•		7	
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	

Adjusted infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	= (21a) x	(22a)m				_		
0.42	0.41	0.41	0.36	0.36	0.31	0.31	0.31	0.33	0.36	0.37	0.39			
Calculate effec		•	rate for t	he appli	cable ca	se	-				•			
If mechanica			andiv N (2	3h) - (23a	a) v Emy (e	auation (N5)) othe	rwica (23h) = (232)			0		(2:
If balanced with) = (23a)			0		(2:
		-	•	_					26\m . /	22h) [:	1 (220)	0 . 1001		(2:
a) If balance	o mecha o	o 0	0	o with ries	0		$\frac{\text{RK}}{1}$ (248	$\frac{1}{0} = \frac{2}{2}$	0	230) x [0	- 100j 		(2
· <u> </u>	-											J		(-
b) If balance	0	o 0	0	0	0	overy (0	0	0	0	0	l		(2
·	-											J		(-
c) If whole he					•		lc) = (22b		5 × (23b)	,	•		
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0			(2
d) If natural v if (22b)m				•	•		on from 1 0.5 + [(2		0.5]					
24d)m= 0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58			(2
Effective air	change	rate - er	iter (24a	or (24b	o) or (24d	c) or (24	4d) in box	(25)				_		
25)m= 0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58			(2
3. Heat losses	s and he	eat loss r	paramete	er:										
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,n		U-val		A X U (W/I	K)	k-value kJ/m²-l		A X k	
Vindows Type		(111)	•••		2.41		1/[1/(1.4)+		3.2		10/111			(2
Vindows Type					10.05	=	·		13.32	\dashv				(2
Vindows Type					1.61	=	1/[1/(1.4)+		2.13	=				(2
Vindows Type					1.61	=	1/[1/(1.4)+		2.13	=				(2
Vindows Type					2.91	_	1/[1/(1.4)+		3.86	=				(2
Floor					74.4	_	0.13		9.672	╡╶				(2
Valls	49.5		18.59	$\overline{}$		_				륵 ¦		-		(2
otal area of e	L		10.33	<u></u>	30.94	_	0.18		5.57					
Party wall	icincino	, 111			123.9	=								(3
for windows and	roof wind	owe uso s	effective wi	ndow I I-ve	49.76		0 formula 1	= 	0		naragranh			(3
* include the area						atou usin	g Torrinala T	/[(ic)+0.0+j c	is given in	paragrapi	7 3.2		
abric heat los	s, W/K =	= S (A x	U)				(26)(30)	+ (32) =				39.8	9	(3
Heat capacity	Cm = S(Axk)						((28).	.(30) + (32	2) + (32a).	(32e) =	0		(3
hermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250)	(3
For design assess an be used instea				construct	ion are not	t known p	recisely the	e indicative	values of	TMP in Ta	able 1f			
hermal bridge	es : S (L	x Y) cal	culated ı	using Ap	pendix k	<						8.03	3	(3
details of therma		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			47.9	2	(3
entilation hea	it loss ca	alculated	l monthly	/				(38)m	= 0.33 × (25)m x (5))			•
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
38)m= 41.93	41.68	41.44	40.31	40.1	39.11	39.11	38.93	39.49	40.1	40.53	40.98			(3
ىـــــــا leat transfer c	oefficier	nt, W/K					•	(39)m	= (37) + (37)	38)m	•	1		
		89.36	88.23	88.02	87.04	87.04	86.85	87.42	88.02	88.45	88.9			
39)m= 89.85	89.61	09.50	00.20	00.02	00.									

eat loss para	meter (H	HLP), W	m²K					(40)m	= (39)m ÷	- (4)			
)m= 1.21	1.2	1.2	1.19	1.18	1.17	1.17	1.17	1.17	1.18	1.19	1.19		
ımber of day	e in mo	oth (Tab	lo 1a)					,	Average =	Sum(40) ₁	12 /12=	1.19	(4
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
´ <u> </u>					ļ	<u> </u>	<u> </u>			<u> </u>			
. Water heat	ing enei	rgy requi	rement:								kWh/ye	ar:	
sumed occu if TFA > 13.9 if TFA £ 13.9	N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	ΓFA -13		35		(4
inual average duce the annua t more that 125	l average	hot water	usage by	5% if the c	lwelling is	designed t			se target o		.97		(4
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
t water usage in	litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)			•			
)m= 98.96	95.36	91.77	88.17	84.57	80.97	80.97	84.57	88.17	91.77	95.36	98.96		
ergy content of	hot water	used - cal	culated m	onthly – 1	100 v Vd r	n v nm v F	Tm / 3600			m(44) ₁₁₂ =		1079.59	(
m= 146.76	128.36	132.45	115.47	110.8	95.61	88.6	101.67	102.88	119.9	130.88 m(45) ₁₁₂ =	142.13	1415.52	
stantaneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46		rotar – Su	111(43)112 -	- L	1413.32	
)m= 22.01	19.25	19.87	17.32	16.62	14.34	13.29	15.25	15.43	17.99	19.63	21.32		(
iter storage								•					
rage volum	` ,		•			Ū		ame ves	sei		150		
ommunity herwise if no	•			•			` '	ers) ente	er 'O' in <i>(</i>	(47)			
iter storage		not mate	, (u.i.o ii	.0.4400 .	notanta	.0000		0.0, 0	». • (,			
If manufacti	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		
mperature fa	actor fro	m Table	2b							0.	54		(
ergy lost from		_	-				(48) x (49)) =		0.	75		(
If manufactors t water stora			•								0		
ommunity h	•			- (, 0, 0.0	.,,					<u> </u>		· ·
ume factor	from Ta	ble 2a									0		
mperature fa	actor fro	m Table	2b								0		(
ergy lost from		-	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(
iter (50) or (, ,	•								0.	75		
iter storage		culated f				T	((56)m = (55) × (41)ı	m 	1			
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		(
linder contains/			rage, (57)ı		x [(50) – (· · · · ·		/)m = (56)	m where (H11) IS fro	m Appendix	СĦ	
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		(
				_									(
•	•	•			E0\	(EQ) - QC	SE /44\	-			0		,
mary circuit mary circuit modified by	loss cal	culated t	for each	month (•	. ,	, ,		r thermo		0		

Combil		المعاديما	fo.,	. حاد		(C4)	(00	N - 20	CE (44)	١								
(61)m=	OSS Ca	alculated 0	or ead	on i	montn (61)m =	(bt	0) ÷ 30	05 × (41))m c	1	0	0	0	0			(61)
		<u> </u>	<u> </u>	<u></u>			1 fo							<u> </u>	<u> </u>		(59)m + (61)m	(0.)
	193.35		179.0	_	160.57	157.4	_	40.7	135.19	148	_	147.98	166.5	175.97	188.7		(39)111 + (61)111	(62)
` ' L		calculated	L				<u> </u>		<u> </u>	<u> </u>				1				(02)
		al lines if	_					_					CONTINU	iion to watt	or ricatii	119)		
(63)m=	0	0	0	T	0	0		0	0	C	_	0	0	0	0			(63)
Output f	from v	vater hea	ter				_		<u> </u>				<u> </u>	ļ				
	193.35	1	179.0	5	160.57	157.4	1	40.7	135.19	148	.26	147.98	166.5	175.97	188.7	72		
L							1			!	Outp	out from wa	ater heate	er (annual) ₁	112		1964.13	(64)
Heat ga	ains fro	m water	heatin	g, l	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (6	31)m	1] + 0.8 >	د [(46)m	+ (57)m	+ (59)m]	_
(65)m=	86.07	76.35	81.32	Ī	74.47	74.12	6	67.86	66.74	71.	08	70.28	77.14	79.59	84.53	3		(65)
includ	de (57	m in calc	culation	1 o	f (65)m	only if o	ylir	nder i	s in the o	dwell	ling	or hot w	ater is f	rom com	munity	y h	eating	
5. Inte	ernal g	ains (see	: Table	5	and 5a)):										-		
		ns (Table			·													
	Jan	Feb	Ma	\neg	Apr	May		Jun	Jul	Α	ug	Sep	Oct	Nov	De	c		
(66)m=	117.4	117.4	117.4	1	117.4	117.4	1	17.4	117.4	117	7.4	117.4	117.4	117.4	117.4	4		(66)
Lighting	gains	(calcula	ted in	App	pendix l	L, equat	ion	L9 o	r L9a), a	lso s	ee -	Table 5	•	•	•			
(67)m=	18.48	16.42	13.35	Ī	10.11	7.56		6.38	6.89	8.9	96	12.03	15.27	17.82	19			(67)
Applian	ces ga	ains (calc	ulated	in	Append	dix L, eq	ua	tion L	13 or L1	3a),	also	see Ta	ble 5				l	
(68)m=	207.34	209.49	204.0	7	192.53	177.96	1	64.26	155.12	152	.96	158.39	169.93	184.5	198.1	19		(68)
Cooking	g gain:	s (calcula	ted in	Ap	pendix	L, equa	tior	ո L15	or L15a)	, als	o se	e Table	5	•	•		'	
(69)m=	34.74	34.74	34.74		34.74	34.74	3	34.74	34.74	34.	74	34.74	34.74	34.74	34.74	4		(69)
Pumps	and fa	ıns gains	(Table	5a	a)												!	
(70)m=	3	3	3		3	3		3	3	3	3	3	3	3	3			(70)
Losses	e.g. e	vaporatio	n (neg	ati	ve valu	es) (Tab	ole	5)	-					-	-		•	
(71)m=	-93.92	-93.92	-93.92	2	-93.92	-93.92	-9	93.92	-93.92	-93	.92	-93.92	-93.92	-93.92	-93.9	2		(71)
Water h	neating	gains (T	able 5	5)					-				-	-	-		•	
(72)m=	115.69	113.61	109.3		103.43	99.62	9	94.26	89.7	95.	54	97.61	103.69	110.54	113.6	62		(72)
Total in	nterna	l gains =	:					(66)	m + (67)m	ı + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m			
(73)m=	402.74	400.74	387.9	4	367.29	346.35	3.	26.12	312.93	318	.68	329.25	350.11	374.08	392.0)3		(73)
6. Sola	ar gain	s:																
_		calculated	_	olar		Table 6a	and			tions	to co	nvert to th	e applical		tion.			
Orientat		Access F Table 6d	actor		Area m²			Flu	x ble 6a		т	g_ able 6b	т	FF able 6c			Gains (W)	
0 1										1			, -, -				(۷۷)	,
South	0.9x	0.77		X	2.4	1	X	4	6.75	Х		0.63	x	0.7	_	=	34.43	(78)
South	0.9x	0.77		X	10.0		X		6.75	X		0.63	x	0.7	=	=	143.59	(78)
South	0.9x	0.77		Х	2.4		X		6.57	X	_	0.63	x	0.7	_	=	56.39	(78)
South	0.9x	0.77		X	10.0	05	X	7	6.57	X	<u></u>	0.63	x	0.7		=	235.17	(78)
South	0.9x	0.77		X	2.4	1	X	9	7.53	X		0.63	X	0.7		=	71.84	(78)

0	_		1		,		1		l				٦
South	0.9x	0.77	X	10.05	X	97.53	X	0.63	X	0.7	=	299.57	(78)
South	0.9x	0.77	X	2.41	X	110.23	X	0.63	X	0.7	=	81.19	(78)
South	0.9x	0.77	X	10.05	X	110.23	Х	0.63	X	0.7	=	338.58	(78)
South	0.9x	0.77	X	2.41	X	114.87	X	0.63	X	0.7	=	84.61	(78)
South	0.9x	0.77	X	10.05	X	114.87	X	0.63	X	0.7	=	352.82	(78)
South	0.9x	0.77	X	2.41	X	110.55	X	0.63	X	0.7	=	81.42	(78)
South	0.9x	0.77	X	10.05	X	110.55	X	0.63	X	0.7	=	339.54	(78)
South	0.9x	0.77	X	2.41	X	108.01	X	0.63	X	0.7	=	79.55	(78)
South	0.9x	0.77	X	10.05	X	108.01	X	0.63	X	0.7	=	331.75	(78)
South	0.9x	0.77	X	2.41	X	104.89	X	0.63	X	0.7	=	77.26	(78)
South	0.9x	0.77	X	10.05	x	104.89	x	0.63	X	0.7	=	322.17	(78)
South	0.9x	0.77	X	2.41	X	101.89	X	0.63	X	0.7	=	75.04	(78)
South	0.9x	0.77	X	10.05	x	101.89	X	0.63	x	0.7	=	312.93	(78)
South	0.9x	0.77	X	2.41	X	82.59	X	0.63	X	0.7	=	60.83	(78)
South	0.9x	0.77	X	10.05	x	82.59	X	0.63	x	0.7	=	253.65	(78)
South	0.9x	0.77	X	2.41	x	55.42	x	0.63	x	0.7	=	40.82	(78)
South	0.9x	0.77	X	10.05	x	55.42	X	0.63	x	0.7	=	170.21	(78)
South	0.9x	0.77	X	2.41	x	40.4	X	0.63	x	0.7	=	29.75	(78)
South	0.9x	0.77	X	10.05	x	40.4	x	0.63	x	0.7	=	124.08	(78)
West	0.9x	0.77	X	1.61	x	19.64	x	0.63	x	0.7	=	9.66	(80)
West	0.9x	0.77	X	1.61	x	19.64	x	0.63	x	0.7	=	9.66	(80)
West	0.9x	0.77	x	2.91	x	19.64	x	0.63	x	0.7	=	17.47	(80)
West	0.9x	0.77	X	1.61	x	38.42	X	0.63	X	0.7	=	18.9	(80)
West	0.9x	0.77	X	1.61	x	38.42	x	0.63	x	0.7	=	18.9	(80)
West	0.9x	0.77	X	2.91	x	38.42	x	0.63	x	0.7	=	34.17	(80)
West	0.9x	0.77	X	1.61	x	63.27	x	0.63	x	0.7	=	31.13	(80)
West	0.9x	0.77	X	1.61	x	63.27	X	0.63	x	0.7	=	31.13	(80)
West	0.9x	0.77	X	2.91	x	63.27	x	0.63	x	0.7	=	56.27	(80)
West	0.9x	0.77	X	1.61	x	92.28	x	0.63	x	0.7	=	45.41	(80)
West	0.9x	0.77	X	1.61	x	92.28	x	0.63	x	0.7	=	45.41	(80)
West	0.9x	0.77	x	2.91	x	92.28	x	0.63	x	0.7	=	82.07	(80)
West	0.9x	0.77	x	1.61	x	113.09	x	0.63	x	0.7	=	55.65	(80)
West	0.9x	0.77	X	1.61	x	113.09	x	0.63	x	0.7	=	55.65	(80)
West	0.9x	0.77	X	2.91	x	113.09	X	0.63	x	0.7	=	100.58	(80)
West	0.9x	0.77	X	1.61	x	115.77	X	0.63	X	0.7	=	56.96	(80)
West	0.9x	0.77	x	1.61	x	115.77	x	0.63	x	0.7	=	56.96	(80)
West	0.9x	0.77	x	2.91	x	115.77	x	0.63	x	0.7	j =	102.96	(80)
West	0.9x	0.77	x	1.61	x	110.22	x	0.63	x	0.7	j =	54.23	(80)
West	0.9x	0.77	x	1.61	x	110.22	x	0.63	x	0.7	j =	54.23	(80)
West	0.9x	0.77	x	2.91	x	110.22	x	0.63	x	0.7	j =	98.02	(80)
West	0.9x	0.77	x	1.61	×	94.68	x	0.63	X	0.7	=	46.58	(80)
	_												

West	0.9x	0.77	X	1.6	61	x	9	4.68	X	0.6	3	x	0.7	-	= [46.58	(80)
West	0.9x	0.77	Х	2.9	91	x	9	4.68	X	0.6	3	х	0.7		- [84.2	(80)
West	0.9x	0.77	X	1.6	S1	x [7	3.59	X	0.6	3	x	0.7		= [36.21	(80)
West	0.9x	0.77	X	1.6	61	x [7	3.59	X	0.6	3	x	0.7	:	= [36.21	(80)
West	0.9x	0.77	X	2.9	91	x [7	3.59	X	0.6	3	x	0.7	:	= [65.45	(80)
West	0.9x	0.77	X	1.6	61	x [4	5.59	X	0.6	3	x	0.7		= [22.43	(80)
West	0.9x	0.77	X	1.6	61	x [4	5.59	x	0.6	3	x	0.7	-	- [22.43	(80)
West	0.9x	0.77	X	2.9	91	x [4	5.59	X	0.6	3	x	0.7	:	= [40.54	(80)
West	0.9x	0.77	X	1.6	61	x [2	4.49	X	0.6	3	x	0.7	-	= [12.05	(80)
West	0.9x	0.77	X	1.6	61	x [2	4.49	X	0.6	3	x	0.7		= [12.05	(80)
West	0.9x	0.77	X	2.9	91	x	2	4.49	X	0.6	3	x	0.7		= [21.78	(80)
West	0.9x	0.77	X	1.6	61	x	1	6.15	X	0.6	3	x	0.7		= [7.95	(80)
West	0.9x	0.77	X	1.6	61	x	1	6.15	X	0.6	3	x	0.7	=	= [7.95	(80)
West	0.9x	0.77	X	2.9	91	x	1	6.15	X	0.6	3	x	0.7	:	- [14.36	(80)
Solar		watts, ca	alculated	for eac	h month	1			(83)m	= Sum(7	'4)m	.(82)m			_		
(83)m=	214.82	363.54	489.94	592.64	649.29		37.84	617.79	576	.8 52	5.84	399.89	256.9	184.0	9		(83)
·		nternal a		·	`	`									_		(5.1)
(84)m=	617.56	764.29	877.88	959.93	995.65	96	3.97	930.71	895.	48 85	5.08	749.99	630.99	576.1	2		(84)
7. Me	an inter	nal temp	erature	(heating	seasor	n)											
Temp	erature	during h	eating p	eriods ir	n the livi	ng a	area f	from Tab	ole 9.	Th1 (°	C)				Ī	21	(85)
						•			,	1111 (O)				L		
Utilisa	ation fac	ctor for g	ains for	living are	ea, h1,m	_			,				_		_ L		
Utilisa	ation fac Jan	tor for g	ains for Mar	living are	ea, h1,m May	n (se			I .		Sep	Oct	Nov	Dec	c l		
Utilisa (86)m=		Ť		T .	I	n (se	e Ta	ble 9a)	I .	ıg S	<u> </u>	Oct	Nov 0.98	Dec			(86)
(86)m=	Jan 0.99	Feb	Mar 0.95	Apr 0.87	May 0.74	o (se	ee Ta Jun .56	ble 9a) Jul 0.41	At 0.4	ug S	Sep		+				
(86)m=	Jan 0.99	Feb 0.98	Mar 0.95	Apr 0.87	May 0.74	o (se	ee Ta Jun .56	ble 9a) Jul 0.41	At 0.4	ug S 4 0. able 9c	Sep		+				
(86)m= Mean (87)m=	Jan 0.99 interna 19.89	Feb 0.98 lt temper 20.13	Mar 0.95 ature in 20.42	Apr 0.87 living are 20.71	May 0.74 ea T1 (for 20.9	ollov	Jun 0.56 w ste	ble 9a) Jul 0.41 ps 3 to 7 21	0.4 ' in T	ug S 4 0. able 90	Sep 66 66	0.9	0.98	0.99			(86)
(86)m= Mean (87)m=	Jan 0.99 interna 19.89	Feb 0.98	Mar 0.95 ature in 20.42	Apr 0.87 living are 20.71	May 0.74 ea T1 (for 20.9	ollow	Jun 0.56 w ste	ble 9a) Jul 0.41 ps 3 to 7 21	0.4 ' in T	ug S 4 0. able 90 99 20	Sep 66 66	0.9	0.98	0.99	5		(86)
(86)m= Mean (87)m= Temp (88)m=	Jan 0.99 interna 19.89 perature 19.91	Feb 0.98 1 temper 20.13 during h	Mar 0.95 ature in 20.42 eating p	Apr 0.87 living are 20.71 periods in	May 0.74 ea T1 (for 20.9) n rest of 19.93	ollov dwe	Jun 0.56 w ste 0.98 elling 9.94	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94	0.4 7 in T 20.9 able 9	ug S 4 0. able 90 99 20	Sep 66 66	20.7	0.98	0.99 19.85	5		(86)
(86)m= Mean (87)m= Temp (88)m= Utilisa	Jan 0.99 interna 19.89 perature 19.91 ation fac	Feb 0.98 ltemper 20.13 during h	Mar 0.95 ature in 20.42 eating p	Apr 0.87 living are 20.71 periods in	May 0.74 ea T1 (for 20.9) n rest of 19.93	ollow dwe h2,r	Jun 0.56 w ste 0.98 elling 9.94	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94	0.4 7 in T 20.9 able 9	ug S 4 0. able 9c 99 20 0, Th2 (Sep 66 66	20.7	0.98	0.99 19.85	5 2		(86)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	Jan 0.99 interna 19.89 perature 19.91 ation fac	Feb 0.98 l temper 20.13 during h 19.92 etor for ga 0.97	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84	May 0.74 ea T1 (for 20.9) rest of 19.93 welling, 0.68	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	use Ta Jun 0.56 w ste 0.98 elling 9.94 m (se	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31	Au 0.4 7 in T 20.9 able 9 19.9 9a) 0.3	able 90, Th2 (95 19	Sep 66 6.95 6.95 6.95 6.94 6.94 6.94 6.94 6.95 6.94 6.95 6.94 6.95 6.94 6.95	0.9 20.7 19.93	20.23	0.99 19.85 19.92	5 2		(86) (87) (88)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean	Jan 0.99 interna 19.89 perature 19.91 ation fac 0.99 interna	Feb 0.98 ltemper 20.13 during h 19.92 ctor for gas 0.97 ltemper	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84 the rest	May 0.74 ea T1 (for 20.9) n rest of 19.93 welling, 0.68 of dwell	(see 0 0 0 0 0 0 0 0 0	Jun 0.56 w ste 0.98 elling 9.94 m (se 0.48	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 ollow ste	Au 0.47 in T 20.9 19.9 9a) 0.3	ug S 4 0. able 90 99 20 9, Th2 (95 19 4 0. to 7 in	Sep 66 1.95 1.95 1.94 1.94 1.95 1.94 1.94 1.95 1.94 1.95	0.9 20.7 19.93 0.87 9 9c)	0.98 20.23 19.93 0.97	0.99 19.85 19.92 0.99	2		(86) (87) (88) (89)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	Jan 0.99 interna 19.89 perature 19.91 ation fac	Feb 0.98 l temper 20.13 during h 19.92 etor for ga 0.97	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84	May 0.74 ea T1 (for 20.9) rest of 19.93 welling, 0.68	(see 0 0 0 0 0 0 0 0 0	use Ta Jun 0.56 w ste 0.98 elling 9.94 m (se	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31	Au 0.4 7 in T 20.9 able 9 19.9 9a) 0.3	ug S 4 0. able 90 99 20 9, Th2 (95 19 4 0. to 7 in	Sep 66 1.95 1.95 1.94 1.94 1.94 1.91	0.9 20.7 19.93 0.87 9c) 19.62	0.98 20.23 19.93 0.97	0.99 19.85 19.92 0.99	2	0.27	(86) (87) (88) (89)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean	Jan 0.99 interna 19.89 perature 19.91 ation fac 0.99 interna	Feb 0.98 ltemper 20.13 during h 19.92 ctor for gas 0.97 ltemper	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84 the rest	May 0.74 ea T1 (for 20.9) n rest of 19.93 welling, 0.68 of dwell	(see 0 0 0 0 0 0 0 0 0	Jun 0.56 w ste 0.98 elling 9.94 m (se 0.48	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 ollow ste	Au 0.47 in T 20.9 19.9 9a) 0.3	ug S 4 0. able 90 99 20 9, Th2 (95 19 4 0. to 7 in	Sep 66 1.95 1.95 1.94 1.94 1.94 1.91	0.9 20.7 19.93 0.87 9c) 19.62	0.98 20.23 19.93 0.97	0.99 19.85 19.92 0.99	2	0.37	(86) (87) (88) (89)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	Jan 0.99 interna 19.89 perature 19.91 ation fac 0.99 interna 18.46	Feb 0.98 l temper 20.13 during h 19.92 etor for ga 0.97 l temper 18.81	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in 19.22	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84 the rest 19.62 or the wh	May 0.74 ea T1 (for 20.9 n rest of 19.93 welling, 0.68 of dwell 19.84	dwe h2,r 0 ing 19	ee Ta Jun .56 w ste 0.98 elling 9.94 m (se 1.48 T2 (fo 9.93	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 ollow ste 19.94 A × T1	Au 0.4 7 in T 20.9 able 9 19.9 9a) 0.3 eps 3 19.9	able 90 99 20 9, Th2 (95 19 4 0. to 7 in	Sep 66 1.95 1.95 1.94 1.94 1.91	0.9 20.7 19.93 0.87 e 9c) 19.62 A = Liv	0.98 20.23 19.93 0.97 18.97 ing area ÷ (-	0.99 19.85 19.92 0.99 18.41 4) =	5 2 1	0.37	(86) (87) (88) (89) (90) (91)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	Jan 0.99 interna 19.89 erature 19.91 ation fac 0.99 interna 18.46 interna 18.99	Feb 0.98 I temper 20.13 during h 19.92 ctor for ga 0.97 I temper 18.81	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in 19.22 ature (for	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84 the rest 19.62 or the wh	May 0.74 ea T1 (for 20.9) n rest of 19.93 welling, 0.68 of dwell 19.84 cole dwell 20.23	(se 0 0 0 0 0 0 0 0 0	ee Ta Jun 0.56 w stee 0.98 elling 9.94 m (see 0.48 T2 (fo 9.93	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 ollow ste 19.94 A × T1 20.33	Au 0.4 7 in T 20.9 19.9 9a) 0.3 19.9 + (1 - 20.5	ug S 4 0. able 90 99 20 0, Th2 (195 19 4 0. to 7 in 94 19 - fLA) 3	Sep 66 1.95 1.95 1.94 1.91 1.11	0.9 20.7 19.93 0.87 9 9c) 19.62 A = Liv	0.98 20.23 19.93 0.97 18.97 ing area ÷ (-	0.99 19.85 19.92 0.99	5 2 1	0.37	(86) (87) (88) (89)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply	Jan 0.99 interna 19.89 perature 19.91 ation fac 0.99 interna 18.46 interna 18.99 r adjustr	Feb 0.98 ltemper. 20.13 during h 19.92 etor for ga 0.97 ltemper. 18.81 ltemper. 19.3 ment to th	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in 19.22 ature (for	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84 the rest 19.62 or the wh 20.02 n interna	May 0.74 ea T1 (for 20.9) n rest of 19.93 welling, 0.68 of dwell 19.84 cole dwell 20.23 I temper	dwe 19 19 19 19 19 19 19 19 19 19 19 19 19	ee Ta Jun .56 w ste 0.98 elling 9.94 m (se 1.48 T2 (fo 9.93 g) = fl 0.32 re fro	Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 collow ste 19.94 A × T1 20.33 m Table	Au 0.4 7 in T 20.9 19.9 19.9 19.9 19.9 19.9 4e, 1	able 90 able 90 99 20 9, Th2 (95 19 4 0. to 7 in 94 19 - fLA) >	Sep 66 1.95 1.95 1.94 1.91 1.29	0.9 20.7 19.93 0.87 9 9c) 19.62 A = Liv	0.98 20.23 19.93 0.97 18.97 ing area ÷ (0.99 19.85 19.92 0.99 18.41 4) =	5 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.37	(86) (87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m=	Jan 0.99 interna 19.89 erature 19.91 ation fac 0.99 interna 18.46 interna 18.99 adjustr 18.99	Feb 0.98 I temper 20.13 during h 19.92 ctor for ga 0.97 I temper 18.81 I temper 19.3 ment to th 19.3	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in 19.22 ature (for 19.66 ne mear	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84 the rest 19.62 or the wh 20.02 n interna	May 0.74 ea T1 (for 20.9) n rest of 19.93 welling, 0.68 of dwell 19.84 cole dwell 20.23	dwe 19 19 19 19 19 19 19 19 19 19 19 19 19	ee Ta Jun 0.56 w stee 0.98 elling 9.94 m (see 0.48 T2 (fo 9.93	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 ollow ste 19.94 A × T1 20.33	9a) 0.3 19.9 4 (1 - 20.5	able 90 able 90 99 20 9, Th2 (95 19 4 0. to 7 in 94 19 - fLA) >	Sep 66 1.95 1.95 1.94 1.91 1.11	0.9 20.7 19.93 0.87 9 9c) 19.62 A = Liv	0.98 20.23 19.93 0.97 18.97 ing area ÷ (0.99 19.85 19.92 0.99 18.41 4) =	5 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.37	(86) (87) (88) (89) (90) (91)
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(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Sp Set T	Jan 0.99 interna 19.89 erature 19.91 ation fac 0.99 interna 18.46 interna 18.99 adjustr 18.99 ace head i to the	Feb 0.98 ltemper 20.13 during h 19.92 etor for ga 0.97 ltemper 18.81 ltemper 19.3 ment to th 19.3 sting requ	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in 19.22 ature (for 19.66 ne mear 19.66 uirement	Apr O.87 living are 20.71 periods in 19.93 rest of d O.84 the rest 19.62 or the wh 20.02 minterna 20.02 mperaturusing Ta	May 0.74 ea T1 (for 20.9) n rest of 19.93 welling, 0.68 of dwell 19.84 cole dwell 20.23 I temper 20.23 re obtain able 9a	dwe 19 19 19 19 19 19 19 19 19 19 19 19 19	ee Ta Jun .56 w stel 0.98 elling 9.94 m (se 1.48 T2 (fo 9.93 0.32 re fro 0.32	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 ollow ste 19.94 A × T1 20.33 m Table 20.33	Au 0.4 7 in T 20.9 19.9 19.9 19.9 19.9 19.9 19.9 19.9 1	able 90 99 20 9, Th2 (95 19 4 0. to 7 in 94 19 - fLA) 3 33 20 where a 33 20	Sep 66 66 69 66 69 66 69 66	0.9 20.7 19.93 0.87 9 9c) 19.62 A = Liv 20.02 priate 20.02	0.98 20.23 19.93 0.97 18.97 ing area ÷ (0.99 19.85 19.92 0.99 18.41 18.94 d re-ca	5 2 1 1 4 1 alc		(86) (87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Sp Set T the ut	Jan 0.99 interna 19.89 erature 19.91 ation fac 0.99 interna 18.46 interna 18.99 adjustr 18.99 ace head i to the cilisation Jan	Feb 0.98 l temper. 20.13 during h 19.92 ctor for ga 0.97 l temper. 18.81 l temper. 19.3 ment to th 19.3 ating requires reacting requires factor for gas to the factor fo	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in 19.22 ature (for 19.66 ne mean 19.66 direment ernal teleor gains Mar	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84 the rest 19.62 or the wh 20.02 n interna 20.02 mperaturusing Tal Apr	May 0.74 ea T1 (for 20.9) rest of 19.93 welling, 0.68 of dwell 19.84 cole dwell 20.23 I temper 20.23	dwe 19 19 19 19 19 19 19 19 19 19 19 19 19	ee Ta Jun 0.56 w stel 0.98 elling 9.94 m (se 0.48 T2 (fo 9.93 g) = fl 0.32 re fro 0.32 at ste	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 ollow ste 19.94 A × T1 20.33 m Table 20.33	Au 0.4 7 in T 20.9 19.9 19.9 19.9 4e, 19.9 20.6	able 90 99 20 9, Th2 (95 19 4 0. to 7 in 94 19 - fLA) 3 33 20 where a 33 20	Sep 66 8.0 1.95 1.94 1.94 1.29 1.29 1.29	0.9 20.7 19.93 0.87 9 9c) 19.62 A = Liv 20.02 priate 20.02	0.98 20.23 19.93 0.97 18.97 ing area ÷ (0.99 19.85 19.92 0.99 18.41 4) =	5 2 1 1 4 1 alc		(86) (87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Sp Set T the ut	Jan 0.99 interna 19.89 erature 19.91 ation fac 0.99 interna 18.46 interna 18.99 adjustr 18.99 ace head i to the cilisation Jan	Feb 0.98 I temper 20.13 during h 19.92 ctor for ga 0.97 I temper 18.81 I temper 19.3 ment to th 19.3 sting required factor for for for ga factor for ga 19.4	Mar 0.95 ature in 20.42 eating p 19.92 ains for 0.93 ature in 19.22 ature (for 19.66 ne mean 19.66 direment ernal teleor gains Mar	Apr 0.87 living are 20.71 periods in 19.93 rest of d 0.84 the rest 19.62 or the wh 20.02 n interna 20.02 mperaturusing Tal Apr	May 0.74 ea T1 (for 20.9 n rest of 19.93 welling, 0.68 of dwell 19.84 cole dwell 20.23 I temper 20.23 re obtain able 9a	dwe 19 19 19 19 19 19 19 19 19 19 19 19 19	ee Ta Jun 0.56 w stel 0.98 elling 9.94 m (se 0.48 T2 (fo 9.93 g) = fl 0.32 re fro 0.32 at ste	ble 9a) Jul 0.41 ps 3 to 7 21 from Ta 19.94 ee Table 0.31 ollow ste 19.94 A × T1 20.33 m Table 20.33	Au 0.4 7 in T 20.9 19.9 19.9 19.9 19.9 19.9 19.9 19.9 1	able 90 99 20 9, Th2 (95 19 4 0. to 7 in 94 19 — fLA) 3 33 20 where a 33 20 e 9b, so	Sep 66 66 69 66 69 66 69 66	0.9 20.7 19.93 0.87 9 9c) 19.62 A = Liv 20.02 priate 20.02	0.98 20.23 19.93 0.97 18.97 ing area ÷ (0.99 19.85 19.92 0.99 18.41 18.94 d re-ca	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		(86) (87) (88) (89) (90) (91) (92)

Useful gains, hmGr		4)m x (8	4)m	,	1	1	1					
(95)m= 609.09 738.3		805.89	694.01	488.29	323.47	339.56	519.11	652.13	612	570.19		(95)
Monthly average ex		i 	r	1						i 1		(0.0)
(96)m= 4.3 4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate for m		1										(07)
(97)m= 1319.74 1289.9			750.88	497.54	324.61	341.32	541.33	828.72	1091.18	1310.05		(97)
Space heating requ	1	1	1		I				·			
(98)m= 528.72 370.6	270.59	126.12	42.32	0	0	0	0	131.39	345.01	550.46		7,00
						Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2365.25	(98)
Space heating requ	irement ir	n kWh/m²	²/year								31.79	(99)
9a. Energy requirem	ents – Ind	lividual h	eating s	ystems i	ncluding	micro-C	CHP)					
Space heating:										ı		_
Fraction of space h				mentary	•		(224)				0	(201)
Fraction of space h	eat from n	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of total hea	ting from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficiency of main s	pace heat	ting syste	em 1								93.5	(206)
Efficiency of second	lary/suppl	lementar	y heatin	g systen	າ, %						0	(208)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	– ar
Space heating requ	irement (d	calculate	d above)								
528.72 370.6	270.59	126.12	42.32	0	0	0	0	131.39	345.01	550.46		
(211) m = {[(98)m x (2)]	204)] } x ′	100 ÷ (20	06)									(211)
565.48 396.4	1 289.4	134.89	45.26	0	0	0	0	140.52	368.99	588.72		
•						Tota	l (kWh/yea	ar) =Sum(2	211),,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	=	2529.68	(211)
Space heating fuel	(secondai	ry), kWh/	month							•		_
$= \{[(98)m \times (201)]\} x$	100 ÷ (20	08)										
(215)m= 0 0	0	0	0	0	0	0	0	0	0	0		
						Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	F	0	(215)
Water heating												_
Output from water he										T 1		
193.35 170.4		160.57	157.4	140.7	135.19	148.26	147.98	166.5	175.97	188.72		_
Efficiency of water h											79.8	(216)
(217)m= 87.36 86.83		84.18	81.85	79.8	79.8	79.8	79.8	84.19	86.58	87.5		(217)
Fuel for water heatin $(219)m = (64)m \times 1$	-											
(219)m= 221.32 196.2		190.75	192.3	176.32	169.42	185.79	185.43	197.76	203.25	215.67		
	_!	Į	<u> </u>	!	Į	Tota	I = Sum(2:	19a) ₁₁₂ =			2342.71	(219)
Annual totals								k\	Wh/year	. I	kWh/year	
Space heating fuel u	sed, main	system	1						, , ,		2529.68	
Water heating fuel us												₹
•	sed										2342.71	1
Electricity for pumps		electric	keep-ho	t							2342.71	
Electricity for pumps central heating pum	fans and	electric	keep-ho	t						30	2342.71	(230c)

boiler with a fan-assisted flue		45	(230e)
Total electricity for the above, kWh/year	sum of (230a	a)(230g) =	75 (231)
Electricity for lighting			326.44 (232)
12a. CO2 emissions – Individual heating system	s including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216 =	546.41 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216	506.02 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1052.43 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	169.42 (268)
Total CO2, kg/year	sum	n of (265)(271) =	1260.78 (272)

TER =

(273)

24.73

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:38:28

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 52.2m2 Site Reference: Plot Reference: Maitland Park Estate AC 005

AC 005, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

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

Dwelling Carbon Dioxide Emission Rate (DER) 9.37 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 54.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 51.4 kWh/m²

OK 2 Fabric U-values

Element Highest Average

External wall 0.12 (max. 0.30) 0.12 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK OK

Floor 0.12 (max. 0.25) 0.12 (max. 0.70)

Roof (no roof)

1.40 (max. 3.30)

Openings 1.40 (max. 2.00)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

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:	0.5	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: East	4.91m²	
Windows facing: West	7.06m²	
Windows facing: West	1.8m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m²K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.12 W/m²K	

Community heating, heat from electric heat pump

Photovoltaic array

			l loor [Details:						
	0:		User L					0.700	2222	
Assessor Name:	John Simp				a Num				006273	
Software Name:	Stroma FS	AP 2012	_		are Ve			Versic	n: 1.0.4.26	
			Property							
Address :	•	oen Court, Ma	aitland Par	k Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
			Are	a(m²)	1	Av. He	eight(m)	_	Volume(m ³	<u>-</u>
Ground floor				52.2	(1a) x		2.9	(2a) =	151.38	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+((1d)+(1e)+	(1n)	52.2	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	151.38	(5)
2. Ventilation rate:										
	main heating	secon heatir		other		total			m³ per hou	ır
Number of chimneys	0	+ 0	+	0	_ = _	0	х	40 =	0	(6a)
Number of open flues	0	+ 0	<u> </u>	0	-	0	×	20 =	0	(6b)
Number of intermittent fa	ans					0	x	10 =	0	(7a)
Number of passive vents	3				Ē	0	x	10 =	0	(7b)
Number of flueless gas f	ires				F	0	x	40 =	0	(7c)
					L					
								Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fa	ans = (6a) + (6b))+(7a)+(7b)+	(7c) =		0		÷ (5) =	0	(8)
If a pressurisation test has t			ceed to (17),	otherwise	continue fr	rom (9) to	(16)			_
Number of storeys in t	he dwelling (ns	5)							0	(9)
Additional infiltration							[(9))-1]x0.1 =	0	(10)
Structural infiltration: 0					•	ruction			0	(11)
if both types of wall are p deducting areas of openi			g to the grea	ter wall are	ea (after					
If suspended wooden	floor, enter 0.2	(unsealed) o	r 0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	iter 0.05, else e	enter 0							0	(13)
Percentage of window	s and doors dr	aught strippe	d						0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expresse	d in cubic me	tres per h	our per s	quare m	etre of e	envelope	area	2	(17)
If based on air permeabi			-	•	•				0.1	(18)
Air permeability value applie	,					is being u	ısed		U	(- /
Number of sides sheltered	ed				-				2	(19)
Shelter factor				(20) = 1 -	[0.075 x (²	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter fac	tor		(21) = (18	s) x (20) =				0.08	(21)
Infiltration rate modified	for monthly win	d speed								_
Jan Feb	Mar Apr	May Ju	n Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed 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									
vviilu i acitii (22a)iii = (2	<i></i>	1.09 0.00	- 0.05	T 0.02			1	T	1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

0.11	0.11	0.1	0.09	0.09	0.08	0.08	0.08	(22a)m _{0.08}	0.09	0.1	0.1]		
Calculate effe		•	rate for t	he appli	cable ca	se	<u> </u>			<u> </u>	!]		_
If mechanic												0.	5	(2:
If exhaust air h		0		, ,	,	. ,	***	•) = (23a)			0.	5	(2:
If balanced with		•	•	•		,	,					76	.5	(23
a) If balance						- ` ` 	- ^ ` `	<u> </u>	<u> </u>		<u>`</u>	÷ 100]		
24a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22			(2
b) If balance							<u> </u>	<u> </u>	<u> </u>	- 		1		(0
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]		(2
c) If whole h	nouse ex n < 0.5 ×			•	•				5 v (23h	,)				
$\frac{11(220)1}{24c)m=0}$	0.5 7	0	0	0	0	0	0	0	0	0	0	1		(2
d) If natural												J		\ -
,	n = 1, the			•					0.5]					
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0			(2
Effective air	change	rate - en	ter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)		•	•	•		
25)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22			(2
3. Heat losse	o and he	not lose r	oromoto	r.										
S. Fleat 1055e	S and ne	·	Openin		Net Ar	00	U-valı	10	AXU		k-value	•	ΑX	L L
LEWIENI	area		m		A,n		W/m2		(W/I	K)	kJ/m²·l		kJ/K	
oors					2.95	Х	1.4	=	4.13					(2
Vindows Type	e 1				4.91	x1,	/[1/(1.4)+	0.04] =	6.51	Ħ				(2
Vindows Type	e 2				7.06	x1,	/[1/(1.4)+	0.04] =	9.36	=				(2
Vindows Type	e 3				1.8	—				=				1-
							/[1/(1.4)+	0.04] =	2.39					(2
loor					52.2	^"		0.04] = [– –		,
	34.5		16.72	,	52.2	×	0.12	= [6.264](2
Valls	34.5		16.72	2	17.85	x x)](2](2
Valls otal area of e	L		16.72	2	17.85 86.77	x x	0.12	= [6.264 2.14](2](2 (3
Valls otal area of e Party wall	elements	, m²			17.85 86.77 49.76	x x x x x x x x x x x x x x x x x x x	0.12	= [= [6.264 2.14	[]	paragraph)](2](2
Valls Total area of each of ea	elements	, m² ows, use e	ffective wil	ndow U-ve	17.85 86.77 49.76	x x x x x x x x x x x x x x x x x x x	0.12	= [= [6.264 2.14	as given in	paragraph	1 3.2)](2](3
Valls Total area of e Party wall for windows and * include the area	elements I roof windo	, m² ows, use e sides of in	ffective wil ternal wall	ndow U-ve	17.85 86.77 49.76	x x x x x x x x x x ated using	0.12	= [= [= [//[(1/U-valu	6.264 2.14	as given in	paragraph	13.2	79)](2](3
Valls Total area of every wall for windows and the include the area Tabric heat los	elements I roof winder as on both ss, W/K =	, m² ows, use e sides of in = S (A x	ffective wil ternal wall	ndow U-ve	17.85 86.77 49.76	x x x x x x x x x x ated using	0.12 0.12 0 of formula 1	$= \begin{bmatrix} \\ \\ \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix}$ $= \begin{bmatrix} \\ \\ \end{bmatrix} /[(1/U-valu) + (32) = \end{bmatrix}$	6.264 2.14					(2)(2)(3)(3
Valls Total area of expansion	elements I roof windd as on both ss, W/K = Cm = S(ows, use e sides of in = S (A x K)	ffective wi ternal wall U)	ndow U-va s and part	17.85 86.77 49.76 alue calculatitions	x x x x x x x x x x x x x x x x x x x	0.12 0.12 0 of formula 1	$= \begin{bmatrix} \\ \\ \\ \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix}$ $= \begin{bmatrix} \\ \\ \\ \end{bmatrix}$ $+ (32) = ((28)$	6.264 2.14 0 re)+0.04] a	2) + (32a).		30.)	(3) (3) (3) (3)
Valls Total area of expansion	elements I roof winde as on both ss, W/K = Cm = S(s parame sments wh	, m² ows, use e sides of in S (A x K) ter (TMF ere the decomposition)	ffective winternal wall U) P = Cm ÷ tails of the	ndow U-va s and part	17.85 86.77 49.76 alue calculatitions	x x x x x x x x x x x x x x x x x x x	0.12 0.12 0 1 formula 1 (26)(30)	$=$ $\begin{bmatrix} \\ \\ \end{bmatrix}$ $+$ (32) $=$ $((28)$ Indical	6.264 2.14 0 re)+0.04] a	2) + (32a). : Medium	(32e) =	30.)	(3) (3) (3) (3)
Valls Total area of eacty wall for windows and * include the area Tabric heat lost leat capacity Thermal mass for design assess an be used inste	elements If roof winder as on both as, W/K = Cm = S(as parame asments where and of a decimal contents.	ows, use esides of inesides of inesides of inesides of inesides (A x k) ter (TMF) ere the destailed calculations	ffective winternal wall U) P = Cm ÷ tails of the ulation.	ndow U-va s and part · TFA) in constructi	17.85 86.77 49.76 alue calculations kJ/m²K	x x x x x x x x x x x ated using	0.12 0.12 0 1 formula 1 (26)(30)	$=$ $\begin{bmatrix} \\ \\ \end{bmatrix}$ $+$ (32) $=$ $((28)$ Indical	6.264 2.14 0 re)+0.04] a	2) + (32a). : Medium	(32e) =	30.	60	(2)(2)(3)(3)(3)(3
Valls Total area of experience of experience of existence of existenc	elements I roof winddeas on both ss, W/K = Cm = S(s parame sments whead of a deces : S (L	ows, use esides of inesides of inesides (A x k) ter (TMF) ere the destailed calculus (X Y) calculus	ffective winternal wall U) P = Cm ÷ tails of the plation. culated to	ndow U-vas and part TFA) in constructi	17.85 86.77 49.76 alue calculations kJ/m²K fon are not	x x x x x x x x x x x ated using	0.12 0.12 0 1 formula 1 (26)(30)	$=$ $\begin{bmatrix} \\ \\ \end{bmatrix}$ $+$ (32) $=$ $((28)$ Indical	6.264 2.14 0 re)+0.04] a	2) + (32a). : Medium	(32e) =	30.	60	(2)(2)(3)(3)(3)(3
Valls Total area of exacty wall for windows and include the area fabric heat los leat capacity Thermal mass for design assess an be used instead Thermal bridg details of thermal	elements If roof winddens on both SS, W/K = Cm = S(S parame Sments where and of a decestion is considered.	ows, use esides of inesides of inesides (A x k) ter (TMF) ere the destailed calculus (X Y) calculus	ffective winternal wall U) P = Cm ÷ tails of the plation. culated to	ndow U-vas and part TFA) in constructi	17.85 86.77 49.76 alue calculations kJ/m²K fon are not	x x x x x x x x x x x ated using	0.12 0.12 0 1 formula 1 (26)(30)	= [= [] = [] = [/[(1/U-valu + (32) = ((28) Indica	6.264 2.14 0 re)+0.04] a	2) + (32a). : Medium	(32e) =	30.) 50 46	(2 (2 (3 (3) (3) (3) (3
Toor Valls Total area of every wall for windows and include the area Tabric heat lose Heat capacity Thermal mass For design assess an be used instead Thermal bridg indetails of thermal Total fabric head Ventilation head	elements If roof winder as on both as, W/K = Cm = S(a parame asments where and of a december is S (L al bridging at loss	, m² sides of in S (A x k) ter (TMF) ere the detailed calculus x Y) calculare not known	ffective winternal wall U) P = Cm ÷ tails of the plation. Culated to	TFA) in constructiusing Ap	17.85 86.77 49.76 alue calculations kJ/m²K fon are not	x x x x x x x x x x x ated using	0.12 0.12 0 1 formula 1 (26)(30)	= [= [= [6.264 2.14 0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium : TMP in T	(32e) = able 1f	30. (25) 50 46	(2)(2)(3)(3
Valls Total area of expansive wall for windows and include the area fabric heat los leat capacity Thermal mass for design asses an be used instea Thermal bridg details of therma Total fabric he	elements If roof winder as on both as, W/K = Cm = S(a parame asments where and of a december is S (L al bridging at loss	, m² sides of in S (A x k) ter (TMF) ere the detailed calculus x Y) calculare not known	ffective winternal wall U) P = Cm ÷ tails of the plation. Culated to	TFA) in constructiusing Ap	17.85 86.77 49.76 alue calculations kJ/m²K fon are not	x x x x x x x x x x x ated using	0.12 0.12 0 1 formula 1 (26)(30)	= [= [= [6.264 2.14 0 1e)+0.04] a 1.(30) + (32) 1tive Value 1 values of	2) + (32a). : Medium : TMP in T	(32e) = able 1f	30. (25) 50 46	(2)(2)(3)(3)(3)(3
Valls Total area of expansive wall for windows and include the area Tabric heat lost leat capacity Thermal mass for design assession be used instead details of thermal total fabric head fabric head and include the contilation head area.	elements I roof winder as on both as, W/K = Cm = S(a parame aments where and of a decrease is S (L al bridging at loss at loss ca	, m² ows, use e sides of in = S (A x k) ter (TMF ere the detailed calculated are not known alculated	ffective winternal wall U) P = Cm ÷ tails of the ulation. culated to the cown (36) =	TFA) in constructions of the c	17.85 86.77 49.76 alue calculations kJ/m²K ion are not	x x x x x x x x x x x x x x x x x x x	0.12 0.12 0 formula 1 (26)(30)	= [= [= [- = [6.264 2.14 0 1e)+0.04] a 1.(30) + (32) 1tive Value 1 values of (36) = = 0.33 × (2) + (32a). : Medium : <i>TMP in T</i>	(32e) = able 1f	30. (25) 50 46	(2)(2)(3)(3)(3)(3)(3
Valls Total area of expansive wall for windows and include the area Tabric heat lost leat capacity Thermal mass for design assess an be used instead Thermal bridg Idetails of thermat Total fabric head Tentilation head	elements I roof winder as on both as, W/K = Cm = S(a parame and of a der es : S (L al bridging at loss at loss ca Feb 11.18	, m² ows, use e sides of in a S (A x k) ter (TMF) ere the detailed calculated are not known alculated Mar 11.07	ffective winternal wall U) P = Cm ÷ tails of the plation. culated to the culated	ndow U-ves and part TFA) in constructiusing Ap	17.85 86.77 49.76 alue calculations kJ/m²K fon are not spendix k	x x x x x x ated using	0.12 0.12 0 formula 1. (26)(30)	= [= [= [- = [6.264 2.14 0 1e)+0.04] a .(30) + (32) tive Value a values of (36) = = 0.33 × (Oct	2) + (32a). : Medium : TMP in T	(32e) = able 1f Dec	30. (25) 50 46	(2 (2 (3 (3) (3) (3) (3

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.99	0.99	0.98	0.97	0.97	0.96	0.96	0.96	0.96	0.97	0.97	0.98		
	!	!				!			Average =	Sum(40) ₁	12 /12=	0.97	(40)
Number of day	<u> </u>												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occurring TFA > 13.1 if TFA £ 13.1	9, N = 1		[1 - exp	(-0.0003	349 x (TI	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		75		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the c	lwelling is	designed i			se target o		i.88		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i								1 - 22		1			
(44)m= 83.47	80.43	77.4	74.36	71.33	68.29	68.29	71.33	74.36	77.4	80.43	83.47		
` '		l		l	l	<u> </u>	l		Total = Su	ım(44) ₁₁₂ =	=	910.57	(44)
Energy content of	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,ı	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 123.78	108.26	111.71	97.4	93.45	80.64	74.73	85.75	86.78	101.13	110.39	119.88		
			. ,						Total = Su	ım(45) ₁₁₂ =	=	1193.9	(45)
If instantaneous v	vater heatı	ng at point	of use (no	not water	r storage),	enter 0 in	boxes (46)	to (61)		,			
(46)m= 18.57	16.24	16.76	14.61	14.02	12.1	11.21	12.86	13.02	15.17	16.56	17.98		(46)
Water storage Storage volum) includir	na anv so	olar or W	/WHRS	storane	within sa	ame ves	ല		0		(47)
If community h	` .					•		ao 100	00.		<u> </u>		(47)
Otherwise if no	-			-			, ,	ers) ente	er '0' in ((47)			
Water storage	loss:		`					,		,			
a) If manufact	turer's d	eclared I	oss facto	or is kno	wn (kWl	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufact			-										(5.4)
Hot water stor If community h	•			ie Z (KVV	n/litre/da	ay)				0.	02		(51)
Volume factor	•		JII 4.5							1	.03		(52)
Temperature f			2b							-	.6		(53)
Energy lost fro	m watei	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	.03		(54)
Enter (50) or		_	, ,							-	.03		(55)
Water storage	loss cal	culated t	or 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 cylinder contain												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)
	loce /a	nual\ 4	m Table	. 2	!	!	ļ	!		\vdash	0		(58)
Primary circuit Primary circuit	`	,			59)m = ((58) ± 36	35 × (41)	ım			•		(50)
(modified by				,	•		, ,		r thermo	stat)			
(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	calculated	for each	month ((61)m =	(60) ÷ 3	65 × (41)m							
(61)m= 0	0	0	0	0	0	0) 0		0	0	0	0	1	(61)
	L equired for	water h	L eating ca	Lulated	L I for eac	h month	(62)ı	—— m =	0 85 x (′45)m +	(46)m +	(57)m +	ı · (59)m + (61)m	
(62)m= 179.		166.99	150.89	148.73	134.14	130	141.	_	140.27	156.41	163.88	175.15]	(62)
Solar DHW inp	ut calculated	using App	endix G or	· Appendix	H (negat	ive quantity	y) (ent	er '0'	if no sola	r contribu	tion to wate	r heating)		
(add additio												-		
(63)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(63)
Output from	water hea	ter				•	•				•	•	•	
(64)m= 179.	06 158.19	166.99	150.89	148.73	134.14	130	141.	.03	140.27	156.41	163.88	175.15]	
	•	•	•		•	•		Outp	ut from wa	ater heate	er (annual) ₁	12	1844.74	(64)
Heat gains	rom water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (6	1)m	ı] + 0.8 x	((46)m	+ (57)m	+ (59)m	۱]	
(65)m= 85.3	8 75.94	81.37	75.18	75.29	69.61	69.07	72.	73	71.65	77.85	79.5	84.08]	(65)
include (5	7)m in cal	culation (of (65)m	only if c	ylinder i	s in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	e Table 5	and 5a):										
Metabolic g	ains (Table	e 5), Wat	ts											
Ja		Mar	Apr	May	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec]	
(66)m= 87.7	5 87.75	87.75	87.75	87.75	87.75	87.75	87.	75	87.75	87.75	87.75	87.75]	(66)
Lighting gai	ns (calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso s	ee 7	Table 5				-	
(67)m= 13.6	4 12.11	9.85	7.46	5.57	4.71	5.08	6.6	61	8.87	11.26	13.15	14.01]	(67)
Appliances	gains (calc	ulated in	Append	dix L, eq	uation L	.13 or L1	3a), a	also	see Tal	ble 5		_	-	
(68)m= 152.	94 154.53	150.53	142.02	131.27	121.17	114.42	112	.83	116.83	125.35	136.09	146.2]	(68)
Cooking ga	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), als	o se	e Table	5	-	-	-	
(69)m= 31.7	7 31.77	31.77	31.77	31.77	31.77	31.77	31.	77	31.77	31.77	31.77	31.77]	(69)
Pumps and	fans gains	(Table 5	5a)										-	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0]	(70)
Losses e.g.	evaporation	n (nega	tive valu	es) (Tab	le 5)								-	
(71)m= -70.	2 -70.2	-70.2	-70.2	-70.2	-70.2	-70.2	-70	.2	-70.2	-70.2	-70.2	-70.2]	(71)
Water heati	ng gains (T	Table 5)											_	
(72)m= 114.	76 113	109.36	104.42	101.2	96.68	92.83	97.	76	99.51	104.63	110.42	113.01]	(72)
Total interr	nal gains =	:			(66)m + (67)m	n + (68	8)m +	- (69)m + ((70)m + (7	71)m + (72))m	_	
(73)m= 330.	66 328.97	319.07	303.21	287.37	271.88	261.66	266	.53	274.54	290.57	308.98	322.55]	(73)
6. Solar ga														
Solar gains a		Ü				•	tions 1	to co	nvert to th	e applica		tion.		
Orientation:	Access F Table 6d		Area m²		Flu Ta	ıx ble 6a		т	g_ able 6b	т	FF able 6c		Gains (W)	
							1 1	- 1						1
East 0.9		X	4.9		-	19.64	X		0.4	_ ×	8.0	=	21.39	(76)
East 0.9		X	4.9			38.42	X		0.4	_ ×	0.8	=	41.83	(76)
East 0.9		X	4.9			63.27	X		0.4	_ ×	0.8	_ =	68.89	(76)
East 0.9		X	4.9	_	-	92.28	X		0.4	_ ×	0.8	=	100.48	(76)
East 0.9	0.77	X	4.9)1	x 1	13.09	X		0.4	X	0.8	=	123.14	(76)

East	0.9x	0.77		X	4.91		x	115.77	X		0.4	X	0.8	=	126.06	(76)
East	0.9x	0.77		X	4.91	;	x	110.22	X		0.4	x	0.8	=	120.01	(76)
East	0.9x	0.77		X	4.91		x	94.68	X		0.4	x	0.8	=	103.09	(76)
East	0.9x	0.77		X	4.91		x [73.59	X		0.4	x	0.8	=	80.13	(76)
East	0.9x	0.77		X	4.91		x [45.59	X		0.4	x	0.8	=	49.64	(76)
East	0.9x	0.77		X	4.91	;	x [24.49	X		0.4	x	0.8	=	26.66	(76)
East	0.9x	0.77		X	4.91		x [16.15	x		0.4	x	0.8	=	17.59	(76)
West	0.9x	0.77		X	7.06	;	x [19.64	x		0.4	x	0.8	=	30.75	(80)
West	0.9x	0.77		X	1.8	;	x [19.64	X		0.4	x	0.8	=	7.84	(80)
West	0.9x	0.77		X	7.06] ;	x	38.42	x		0.4	x	0.8	=	60.15	(80)
West	0.9x	0.77		X	1.8		x	38.42	X		0.4	х	0.8	=	15.34	(80)
West	0.9x	0.77		X	7.06	<u> </u>	x \Box	63.27	X		0.4	x	0.8	=	99.06	(80)
West	0.9x	0.77		X	1.8	<u> </u>	x \square	63.27	X		0.4	x	0.8	=	25.26	(80)
West	0.9x	0.77		X	7.06		x	92.28	X		0.4	х	0.8	=	144.48	(80)
West	0.9x	0.77		X	1.8	<u> </u>	x	92.28	X		0.4	x	0.8	=	36.84	(80)
West	0.9x	0.77		X	7.06		x	113.09	X		0.4	x	0.8	=	177.06	(80)
West	0.9x	0.77		X	1.8		x	113.09	X		0.4	х	0.8	=	45.14	(80)
West	0.9x	0.77		X	7.06	;	x [115.77	X		0.4	x	0.8	=	181.25	(80)
West	0.9x	0.77		X	1.8		x	115.77	X		0.4	х	0.8	=	46.21	(80)
West	0.9x	0.77		X	7.06		x	110.22	X		0.4	х	0.8	=	172.56	(80)
West	0.9x	0.77		X	1.8	<u> </u>	x $\overline{\square}$	110.22	X		0.4	x	0.8	=	44	(80)
West	0.9x	0.77		X	7.06	<u> </u>	x \square	94.68	X		0.4	x	0.8	=	148.23	(80)
West	0.9x	0.77		X	1.8	<u> </u>	x \square	94.68	X		0.4	x	0.8	=	37.79	(80)
West	0.9x	0.77		X	7.06	<u> </u>	x $\overline{\square}$	73.59	X		0.4	x	0.8	=	115.21	(80)
West	0.9x	0.77		X	1.8	<u> </u>	x \square	73.59	X		0.4	x	0.8	=	29.37	(80)
West	0.9x	0.77		X	7.06	<u> </u>	x \square	45.59	X		0.4	x	0.8	=	71.38	(80)
West	0.9x	0.77		X	1.8	<u> </u>	x $\overline{\square}$	45.59	X		0.4	x	0.8	=	18.2	(80)
West	0.9x	0.77		X	7.06	<u> </u>	x $lacksquare$	24.49	X		0.4	x	0.8	=	38.34	(80)
West	0.9x	0.77		X	1.8	<u> </u>	x \square	24.49	X		0.4	x	0.8	=	9.78	(80)
West	0.9x	0.77		X	7.06	<u> </u>	x $\overline{\square}$	16.15	X		0.4	x	0.8	=	25.29	(80)
West	0.9x	0.77		X	1.8	= ;	× $$	16.15	x		0.4	x	0.8	=	6.45	(80)
Solar g	ains in	watts, ca	alculate	ed	for each mo	onth			(83)m	n = Su	um(74)m	.(82)m			•	
(83)m=	59.97	117.32	193.2		281.79 345		353.		289).11	224.71	139.21	74.78	49.32		(83)
•				_	(84)m = (73)	.					-				1	
(84)m=	390.63	446.29	512.28	3	585 632	.72	625	.4 598.23	555	5.63	499.25	429.78	383.76	371.87		(84)
7. Me	an inter	nal temp	oeratur	e (heating sea	son)										
Temp	erature	during h	neating	ре	eriods in the	livin	g ar	ea from Tal	ole 9	, Th′	1 (°C)				21	(85)
Utilisa	ation fac	tor for g	ains fo	r li	ving area, h	1,m	(see	Table 9a)						1	1	
	Jan	Feb	Maı	·	Apr M	lay	Jι	ın Jul	Α	ug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.96		0.87 0.	7	0.5	1 0.37	0.4	41	0.67	0.92	0.99	1		(86)
Mean	interna	l temper	ature i	n li	ving area T	1 <u>(</u> fo	llow	steps 3 to 7	7 in T	[able	9c)				_	
(87)m=	20.12	20.28	20.53		20.81 20.	95	20.9	99 21	2	1	20.97	20.76	20.39	20.09		(87)

T		المارية				ali a 1111 a as	. f T.	.b.l. 0 T	LO (0 0)					
(88)m=	20.09	20.1	eating p	20.11	20.11	20.12	20.12	20.12	n2 (°C) 20.11	20.11	20.1	20.1		(88)
. ,		ļ	ains for i				<u>!</u>	<u> </u>	20.11	20.11	20.1	20.1		(00)
(89)m=	0.99	0.98	0.95	0.84	0.65	0.44	0.29	0.33	0.59	0.9	0.98	0.99		(89)
Mean	interna	l I temper	ature in	the rest	of dwelli	na T2 (f	ollow ste	ens 3 to	r 7 in Tabl	e 9c)	l			
(90)m=	18.94	19.16	19.52	19.89	20.07	20.11	20.12	20.12	20.09	19.84	19.33	18.9		(90)
		<u> </u>	<u> </u>				<u> </u>	ļ	1	LA = Livin	g area ÷ (4	1) =	0.47	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lina) = fl	LA x T1	+ (1 – fL	A) x T2					_
(92)m=	19.49	19.69	20	20.32	20.48	20.53	20.53	20.53	20.51	20.27	19.83	19.46		(92)
Apply	adjustr	nent to t	he mean	internal	tempera	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	19.49	19.69	20	20.32	20.48	20.53	20.53	20.53	20.51	20.27	19.83	19.46		(93)
8. Spa	ace hea	ting requ	uirement											
			ernal ter or gains			ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	0.99	0.98	0.95	0.85	0.67	0.47	0.33	0.37	0.63	0.9	0.98	0.99		(94)
		i — —	, W = (94					i	i	i		· 1		4
(95)m=	386.85	437.2	484.8	496.34	425.98	295.14	196.91	206.32	313.1	387.72	375.81	369.05		(95)
(96)m=	aly aver	age exte	rnal tem	perature 8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			an intern								7.1	4.2		(00)
(97)m=	782.96	760.47	692.56	580.12	445.1	297.21	197.12	206.73	322.68	490.27	647.67	779.77		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k\	Wh/mont	th = 0.02	24 x [(97	ı <u> </u>)m] x (4 ⁻	1)m			
(98)m=	294.7	217.24	154.57	60.32	14.23	0	0	0	0	76.29	195.74	305.58		
							-	Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	1318.67	(98)
Space	e heatin	g require	ement in	kWh/m²	/year								25.26	(99)
9b. En	ergy red	quiremer	nts – Cor	nmunity	heating	scheme)							
			ace hea								unity sch	neme.	0	(301)
	-		from co	-		-	_		., •	00		[1	(302)
	•			•	•	`	,	allows for	CUD and	un to four	other heat	sources; th		(002)
	-		s, geotherr			•				ир то тоит с	olitei tieal	sources, u	ie iallei	
Fractio	n of hea	at from C	Commun	ity heat _l	oump								1	(303a)
Fractio	n of tota	al space	heat from	m Comn	nunity he	eat pump	0			(3	02) x (303	a) =	1	(304a)
Factor	for cont	rol and	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m					1.1	(306)
Space	heating	g										•	kWh/yea	r
Annua	l space	heating	requirem	ent									1318.67	
Space	heat fro	m Comi	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) =	= [1450.53	(307a)
Efficier	ncy of s	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308

					_
Space heating requirement from secon	dary/supplementary system	(98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating Annual water heating requirement				1844.74	
If DHW from community scheme: Water heat from Community heat pump	p	(64) x (303a) x	(305) x (306) =	2029.21	_ (310a)
Electricity used for heat distribution		0.01 × [(307a)(307	'e) + (310a)(310e)] =	34.8	(313)
Cooling System Energy Efficiency Ration	0			0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter 0)	= (107) ÷ (314)	=	0	(315)
Electricity for pumps and fans within dumechanical ventilation - balanced, extra	• ,	side		115.43	」 (330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	ır	=(330a) + (330	b) + (330g) =	115.43	(331)
Energy for lighting (calculated in Apper	ndix L)			240.8	(332)
Electricity generated by PVs (Appendix	(M) (negative quantity)			-539.76	(333)
Electricity generated by wind turbine (A	Appendix M) (negative quanti	ty)		0	(334)
40h COO Emissions Community had	ting ochomo				
12b. CO2 Emissions – Community hea	uing scheme				
12b. CO2 Emissions – Community nea	uing scrieme	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and verificiency of heat source 1 (%)		kWh/year	kg CO2/kWh	kg CO2/year	(367a
CO2 from other sources of space and v	water heating (not CHP) If there is CHP using two	kWh/year	kg CO2/kWh	kg CO2/year](367a]](367)
CO2 from other sources of space and vertice Efficiency of heat source 1 (%)	water heating (not CHP) If there is CHP using two	kWh/year In fuels repeat (363) to (b) x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fue	319 566.14	_
CO2 from other sources of space and v Efficiency of heat source 1 (%) CO2 associated with heat source 1	water heating (not CHP) If there is CHP using two [(307b)+(310)	kWh/year In fuels repeat (363) to (b) x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	319 566.14 18.06	(367)
CO2 from other sources of space and vertical energy for heat distribution	water heating (not CHP) If there is CHP using two [(307b)+(310) [(313) systems (363)	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x 3) x (366) + (368)(372)	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	319 566.14 18.06 584.2	(367)
CO2 from other sources of space and vertical energy for heat distribution Total CO2 associated with community seems of space and vertical energy for heat distribution	water heating (not CHP) If there is CHP using two [(307b)+(310) [(313) systems (363) econdary) (309)	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x s) x (366) + (368)(372)	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	319 566.14 18.06 584.2	(367) (372) (373)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	water heating (not CHP) If there is CHP using two [(307b)+(310) [(313) systems (363) econdary) (309) rsion heater or instantaneous	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x s) x (366) + (368)(372)	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 =	319 566.14 18.06 584.2	(367) (372) (373) (374)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sources CO2 associated with space heating (see	water heating (not CHP) If there is CHP using two [(307b)+(310) [(313) systems (363) econdary) (309) rsion heater or instantaneous water heating (373)	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x 3) x)(366) + (368)(372 x s heater (312) x) + (374) + (375) =	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 =	319 566.14 18.06 584.2 0 584.2	(367) (372) (373) (374) (375)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community sources CO2 associated with space heating (see CO2 associated with water from immer	water heating (not CHP) If there is CHP using two [(307b)+(310) [(313) systems (363) econdary) (309) rsion heater or instantaneous water heating (373) aps and fans within dwelling	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x 3) x)(366) + (368)(372 x heater (312) x) + (374) + (375) = (331)) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0 = 0.52 =	319 566.14 18.06 584.2 0 584.2 59.91	(367) (372) (373) (374) (375) (376)
CO2 from other sources of space and vicinity of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the community	water heating (not CHP) If there is CHP using two [(307b)+(310) [(313) systems (363) econdary) (309) rsion heater or instantaneous water heating (373) aps and fans within dwelling ting (332)	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x 3) x)(366) + (368)(372 3) x 5 heater (312) x 1) + (374) + (375) = (331)) x (331)) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 566.14 18.06 584.2 0 584.2 59.91	(367) (372) (373) (374) (375) (376) (378)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the community of the community of the community of the control	water heating (not CHP) If there is CHP using two [(307b)+(310) [(313) systems (363) econdary) (309) rsion heater or instantaneous water heating (373) aps and fans within dwelling ting (332)	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x 3) x)(366) + (368)(372 3) x 5 heater (312) x 1) + (374) + (375) = (331)) x (331)) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 566.14 18.06 584.2 0 584.2 59.91 124.98	(367) (372) (373) (374) (375) (376) (378) (379)
CO2 from other sources of space and verificiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the community of the community of the community of the control	water heating (not CHP) If there is CHP using two [(307b)+(310) [(313) systems (363) econdary) (309) rsion heater or instantaneous water heating (373) aps and fans within dwelling ting (332) s (333) to (334) as applicable	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x 3) x)(366) + (368)(372 3) x 5 heater (312) x 1) + (374) + (375) = (331)) x (331)) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 566.14 18.06 584.2 0 584.2 59.91 124.98	(372) (373) (374) (375) (376) (378) (379)

			User D	etaile: -						
Assessor Name:	John Simpson			Strom:	a Num	her:		STRC	0006273	
Software Name:	Stroma FSAP 20)12		Softwa					on: 1.0.4.26	
		Р	roperty i	Address	AC 005	5				
Address :	AC 005, Aspen Co	ourt, Maitla	and Park	c Estate,	London	, NW3 2	EΗ			
1. Overall dwelling dim	ensions:									
			Area	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Ground floor			į	52.2	(1a) x	2	2.9	(2a) =	151.38	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1	le)+(1r	1) (52.2	(4)			_		
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	151.38	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	ır
Number of chimneys	0 +	0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	Ī + Ē	0	j = F	0	x	20 =	0	(6b)
Number of intermittent fa	ans				J	2	x	10 =	20	(7a)
Number of passive vents					L	0	x .	10 =		(7b)
•					Ļ			40 =	0	= 1
Number of flueless gas	rires					0	X 2	40 =	0	(7c)
								Air cl	hanges per ho	our
Infiltration due to chimne	evs_flues and fans =	(6a)+(6b)+(7	′a)+(7b)+('	7c) =	Г	20		÷ (5) =	0.13	(8)
If a pressurisation test has	•				ontinue fr			. (0) –	0.13	(0)
Number of storeys in		•	, ,,			, , ,	,		0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: (0.25 for steel or timbe	r frame or	0.35 for	r masonr	y constr	uction			0	(11)
	oresent, use the value corre	esponding to	the great	er wall are	a (after					
deducting areas of open If suspended wooden	• , ,	aled) or 0	1 (spale	معام (امد	antar N					(12)
If no draught lobby, er	•	,	i (Scale	<i>u)</i> , eise	enter 0				0	(13)
Percentage of window									0	(14)
Window infiltration	vo and doors dradging	ompped		0.25 - [0.2	x (14) ÷ 1	001 =			0	(15)
Infiltration rate				(8) + (10)			+ (15) =		0	(16)
Air permeability value	. a50. expressed in cu	ubic metre	s per ho	our per s	uare m	etre of e	envelope	area	5	(17)
If based on air permeab	•		•	•	•		•		0.38	(18)
Air permeability value appli	•					is being u	sed			` ′
Number of sides shelter	ed								2	(19)
Shelter factor				(20) = 1 -	0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorpora	ating shelter factor			(21) = (18)	x (20) =				0.32	(21)
Infiltration rate modified	for monthly wind spee	ed				•			-	
Jan Feb	Mar Apr May	/ Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind s	peed 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 (2	22\m · 4									
Wind Factor $(22a)m = (2a)m = (2a)m = 1.27$ 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18	7	
(220)111= 1.21 1.20	1.23 1.1 1.08	0.95	0.95	0.92	ı	1.08	1.12	1.10	J	

0.41	ation rate	0.4	0.36	0.35	0.31	0.31	0.3	0.32	0.35	0.37	0.38		
Calculate effe	ctive air	change i											
If mechanic												0	(23
If exhaust air h	eat pump ι	using Appe	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23
If balanced wit	n heat reco	very: effici	ency in %	allowing for	or in-use fa	actor (from	Table 4h) =				0	(23
a) If balance	1					<u> </u>	HR) (24a	i `	2b)m + (2	23b) × [1 – (23c)	÷ 100]	
24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
b) If balance						<u> </u>	- ``	``	<u> </u>			i	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)r	nouse ext n < 0.5 ×			•	•				5 × (23b))			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural	ventilation	on or wh	ole hous	e positiv	/e input v	ventilatio	n from l	oft					
,	m = 1, the			•					0.5]				
24d)m= 0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(24
Effective air	change	rate - en	ter (24a	or (24b	o) or (24d	c) or (24	d) in box	(25)					
25)m= 0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(2
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros	•	Openin		Net Ar	ea	U-valı	ıe	AXU		k-value	e /	ΑΧk
	area		m		A ,n		W/m2		(W/I	<)	kJ/m²·ł		κJ/K
Ooors					2.95	X	1.2	=	3.54				(26
Vindows Type	э 1				3.6	x1/	/[1/(1.4)+	0.04] =	4.77				(27
Vindows Type	∍ 2				5.18	x1/	/[1/(1.4)+	0.04] =	6.87				(27
Vindows Type	∍ 3				1.32	x1/	/[1/(1.4)+	0.04] =	1.75				(2
loor					52.2	X	0.13	= [6.786				(28
Valls	34.5	7	13.05	5	21.52	2 x	0.18	=	3.87	= [\neg	(29
otal area of e	elements	, m²			86.77								(3
Party wall					49.76	5 x	0	=	0				(3:
for windows and	l roof winda	ows, use e	ffective wi	ndow U-va	alue calcula	 ated using	formula 1	/[(1/U-valu	e)+0.04] a	s given in	paragraph	3.2	
	as on both			s and part	titions								
							(26) (30)	+ (32) =				27.59	(3:
abric heat lo		,	U)				(20)(30)					0	1/2
abric heat lo	Cm = S((Axk)	ŕ				(20)(30)	***	.(30) + (32	, , ,	(32e) =		(3
abric heat loat leat capacity hermal mass	Cm = S(parame	Axk) ter (TMF	? = Cm ÷	,			, , , ,	Indica	tive Value:	Medium		250	=
Fabric heat load load load load load load load load	Cm = S(s parame sments who	A x k) ter (TMF	P = Cm ÷	,			, , , ,	Indica	tive Value:	Medium		-	=
* include the are Fabric heat los Heat capacity Thermal mass For design asses Fan be used inste	Cm = S(s parame sments who	(A x k) ter (TMF ere the dei tailed calcu	P = Cm ÷ tails of the ulation.	constructi	ion are not	t known pr	, , , ,	Indica	tive Value:	Medium		250	(34
Fabric heat load load leat capacity Thermal mass For design asses an be used instead Thermal bridg	Cm = S(s parame sments who ead of a det es : S (L	(A x k) ter (TMF ere the det tailed calcu x Y) calc	P = Cm ÷ tails of the ulation. culated t	constructi	ion are not pendix k	t known pr	, , , ,	Indica	tive Value:	Medium		-	(3:
Fabric heat lost leat capacity Thermal mass for design assess an be used instead thermal bridged details of the matter the details of the matter the details of the deta	Cm = S(s parame sments who ead of a det es : S (L al bridging	(A x k) ter (TMF ere the det tailed calcu x Y) calc	P = Cm ÷ tails of the ulation. culated t	constructi	ion are not pendix k	t known pr	, , , ,	Indica	tive Value:	Medium		250	(3:
Fabric heat lost leat capacity Thermal mass for design asses an be used inste	Cm = S(s parame sments who ead of a det es : S (L al bridging eat loss	A x k) ter (TMF ere the det tailed calcu x Y) calcu are not kno	P = Cm ÷ tails of the ulation. culated to	constructi	ion are not pendix k	t known pr	, , , ,	Indicative	tive Value:	Medium TMP in Ta	able 1f	250	=
Fabric heat lost leat capacity Thermal mass for design asses an be used instead for thermal bridged details of thermal fotal fabric he	Cm = S(s parame sments who ead of a det es : S (L al bridging eat loss	A x k) ter (TMF ere the det tailed calcu x Y) calcu are not kno	P = Cm ÷ tails of the ulation. culated to	constructi	ion are not pendix k	t known pr	, , , ,	Indicative	tive Values of values of (36) =	Medium TMP in Ta	able 1f	250	(3:
Fabric heat lost leat capacity Thermal mass for design asses an be used instead for thermal bridged details of thermal fotal fabric head fentilation head	Cm = S(s parame sments who ead of a det es : S (L al bridging eat loss at loss ca	A x k) ter (TMF ere the det tailed calcu x Y) calc are not known	P = Cm ÷ tails of the ulation. culated to own (36) =	constructi	on are not pendix k	t known pr	ecisely the	Indicative (33) + (38)m	(36) = = 0.33 × (Medium TMP in To	able 1f	250	(3:
Tabric heat lost leat capacity Thermal mass for design assess an be used instead thermal bridged details of thermal total fabric here the design of the lead of th	Cm = S(s parame sments whe ead of a det es : S (L al bridging eat loss at loss ca Feb 29.09	A x k) ter (TMF ere the detailed calcul x Y) calculated Mar 28.93	P = Cm ÷ tails of the ulation. culated to own (36) = monthly	constructiusing Ap	pendix k	t known pr	ecisely the	Indica e indicative (33) + (38)m Sep 27.61	tive Values of values of (36) = = 0.33 × (25)m x (5) Nov 28.31	able 1f Dec	250	(3)

Heat loss para	meter (l	-II P) \///	m²K					(40)m	= (39)m ÷	. (4)			
(40)m= 1.21	1.21	1.21	1.19	1.19	1.18	1.18	1.17	1.18	1.19	1.19	1.2		
(40)111= 1.21	1.21	1.21	1.10	1.10	1.10	1.10	1.17	<u> </u>		Sum(40) ₁ .		1.19	(40)
Number of day	s in mo	nth (Tabl	le 1a)					•	Average =	Ouiii(40)1.	12 / 12-	1.10	(.0)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
` ′						<u> </u>	<u> </u>	l					
4. Water heat	ing ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occur if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		75		(42)
Annual averag Reduce the annua not more that 125	ıl average	hot water	usage by	5% if the α	lwelling is	designed t			se target o		.88	ı	(43)
								T -	_		- 1		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	
Hot water usage in	n litres pe	day for ea	ach month	Vd,m = fa	ctor from	able 1c x	(43)						
(44)m= 83.47	80.43	77.4	74.36	71.33	68.29	68.29	71.33	74.36	77.4	80.43	83.47		
Energy content of	hot water	used - cale	culated mo	onthly = 4 .	190 x Vd,r	n x nm x C	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		910.57	(44)
(45)m= 123.78	108.26	111.71	97.4	93.45	80.64	74.73	85.75	86.78	101.13	110.39	119.88		
					ı	ı	ı		Total = Su	m(45) ₁₁₂ =	=	1193.9	(45)
If instantaneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)			'		
(46)m= 18.57	16.24	16.76	14.61	14.02	12.1	11.21	12.86	13.02	15.17	16.56	17.98		(46)
Water storage	loss:			l			I						
Storage volum	e (litres)	includin	g any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
If community h	eating a	ınd no ta	nk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if no	stored	hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage												•	
a) If manufact	urer's d	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(48)
Temperature fa	actor fro	m Table	2b							0.	54		(49)
Energy lost fro		_	-				(48) x (49)) =		0.	75		(50)
b) If manufact			-									1	
Hot water stora	-			e 2 (kW	h/litre/da	ıy)					0	I	(51)
If community h	•		on 4.3										(==)
Temperature fa			2h							—	0		(52)
•							()	> .	>		0		(53)
Energy lost fro		_	, kVVh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (,								0.	75	I	(55)
Water storage	loss cal	culated f	or each	month	_	_	((56)m = (55) × (41)	m -				
(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)
If cylinder contains	dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(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)
Primary circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit				,	•	. ,	, ,						
(modified by					ı —	ı —		<u> </u>		<u> </u>		l	
(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	J	(59)

Combi loss s	oloulotod	for oach	month ((61)m –	(60) · 2	65 × (41	\m						
Combi loss o	0 0	0	0	0	0	05 × (41)	0	0	0	0	0	1	(61)
	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>			ļ	J · (59)m + (61)m	
(62)m= 170.3		158.31	142.49	140.05	125.74	121.32	132.3		147.72	155.48	166.47]	(62)
Solar DHW inpu	t calculated	using App	endix G oı	r Appendix	H (negati	ve quantity	y) (entei	''0' if no sola	r contribut	tion to wate	er heating)	,	
(add addition	al lines if	FGHRS	and/or \	NWHRS	applies	, see Ap	pendi	(G)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	water hea	ter											
(64)m= 170.3	3 150.35	158.31	142.49	140.05	125.74	121.32	132.3	5 131.87	147.72	155.48	166.47		_
							0	utput from w	ater heate	r (annual)	112	1742.51	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m] + 0.8	x [(46)m	+ (57)m	+ (59)m	<u>.</u>]	
(65)m= 78.43	69.67	74.42	68.46	68.35	62.89	62.12	65.79	64.93	70.9	72.78	77.13]	(65)
include (57	m in calc	culation	of (65)m	only if c	ylinder i	s in the	dwellir	g or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	Table 5	and 5a):									
Metabolic ga	ins (Table	5), Wat	ts									_	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	g Sep	Oct	Nov	Dec		
(66)m= 87.75	87.75	87.75	87.75	87.75	87.75	87.75	87.75	87.75	87.75	87.75	87.75		(66)
Lighting gain	s (calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso se	e Table 5					
(67)m= 13.64	12.11	9.85	7.46	5.57	4.71	5.08	6.61	8.87	11.26	13.15	14.01		(67)
Appliances g	ains (calc	ulated ir	Append	dix L, eq	uation L	13 or L1	3a), al	so see Ta	ble 5			-	
(68)m= 152.9	4 154.53	150.53	142.02	131.27	121.17	114.42	112.8	3 116.83	125.35	136.09	146.2		(68)
Cooking gair	ns (calcula	ited in A	ppendix	L, equat	ion L15	or L15a), also	see Table	5				
(69)m= 31.77	31.77	31.77	31.77	31.77	31.77	31.77	31.77	31.77	31.77	31.77	31.77		(69)
Pumps and f	ans gains	(Table 5	5a)									-	
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses e.g.	evaporatio	n (nega	tive valu	es) (Tab	le 5)							_	
(71)m= -70.2	-70.2	-70.2	-70.2	-70.2	-70.2	-70.2	-70.2	-70.2	-70.2	-70.2	-70.2		(71)
Water heatin	g gains (T	able 5)										_	
(72)m= 105.4	2 103.67	100.03	95.08	91.87	87.34	83.5	88.43	90.18	95.3	101.08	103.68]	(72)
Total interna	al gains =				(66)m + (67)m	า + (68)	m + (69)m +	(70)m + (7	71)m + (72))m	_	
(73)m= 324.3	3 322.64	312.73	296.88	281.04	265.54	255.33	260.1	9 268.2	284.23	302.65	316.21		(73)
6. Solar gai													
Solar gains are		•				•	itions to		ne applical		tion.		
Orientation:	Access F Table 6d		Area m²		Flu Ta	ıx ble 6a		g_ Table 6b	т	FF able 6c		Gains (W)	
- .							, –						1
East 0.9x		X	3.	6	X	19.64]	0.63	x	0.7	=	21.61	(76)
East 0.9x		×	3.			38.42]	0.63	x	0.7	=	42.27	[(76)
East 0.9x		×	3.			63.27]	0.63	×	0.7	=	69.61	[(76)
East 0.9x		X	3.			92.28]	0.63	x	0.7	=	101.53	(76)
East 0.9x	0.77	X	3.	6	x 1	13.09	X	0.63	х	0.7	=	124.43	(76)

East	0.9x	0.77	$\overline{}$	x	3.6	7 x		15.77	1 x		0.63	7 x	0.7		127.37	(76)
East	0.9x	0.77	_	x	3.6] ^ x		10.22] ^] _x		0.63	^ x	0.7		121.26	(76)
East	0.9x	0.77	=	x	3.6	_	-	94.68) ^] x		0.63	_ ` x	0.7	= =	104.16	(76)
East	0.9x	0.77		x	3.6	⊒ x		3.59]] _X		0.63	ا ×	0.7	= =	80.96	(76)
East	0.9x	0.77		x	3.6	d d x		5.59]]		0.63	x	0.7	= =	50.16	(76)
East	0.9x	0.77		X	3.6	d d x	-	4.49) x		0.63	_ x	0.7	= =	26.94	(76)
East	0.9x	0.77	一	X	3.6	۱ ×		6.15]] x		0.63	۲ ×	0.7	= =	17.77	(76)
West	0.9x	0.77		X	5.18	۲ ۲	-	9.64	X		0.63	i x	0.7		31.09	(80)
West	0.9x	0.77		X	1.32	i x		9.64	X		0.63	×	0.7		7.92	(80)
West	0.9x	0.77		X	5.18	i x	3	88.42	x		0.63	×	0.7		60.82	(80)
West	0.9x	0.77		X	1.32	i x	3	88.42	X		0.63	x	0.7	=	15.5	(80)
West	0.9x	0.77		X	5.18	i x		3.27	x		0.63	×	0.7		100.17	(80)
West	0.9x	0.77		X	1.32	i ×	6	3.27	x	,	0.63	×	0.7		25.52	(80)
West	0.9x	0.77		x	5.18	Ī×	9	2.28	х		0.63	×	0.7	=	146.09	(80)
West	0.9x	0.77		X	1.32	i x	9	2.28	х		0.63	x	0.7	=	37.23	(80)
West	0.9x	0.77		X	5.18	X	1	13.09	x		0.63	X	0.7	=	179.03	(80)
West	0.9x	0.77		X	1.32	×	1	13.09	x		0.63	x	0.7	=	45.62	(80)
West	0.9x	0.77		x	5.18	×	1	15.77	x	(0.63	×	0.7	=	183.27	(80)
West	0.9x	0.77		x	1.32	X	1	15.77	x		0.63	×	0.7	=	46.7	(80)
West	0.9x	0.77		x	5.18	X	1	10.22	х		0.63	x	0.7	=	174.48	(80)
West	0.9x	0.77		X	1.32	×	1	10.22	x		0.63	x	0.7	=	44.46	(80)
West	0.9x	0.77		X	5.18	×	9	4.68	x		0.63	x	0.7	=	149.88	(80)
West	0.9x	0.77		X	1.32	×	9	4.68	x		0.63	x	0.7	=	38.19	(80)
West	0.9x	0.77		X	5.18	×	7	3.59	x	(0.63	X	0.7	=	116.5	(80)
West	0.9x	0.77		X	1.32	×	7	3.59	x		0.63	x	0.7	=	29.69	(80)
West	0.9x	0.77		X	5.18	X	4	5.59	X		0.63	X	0.7	=	72.17	(80)
West	0.9x	0.77		X	1.32	×	4	5.59	X		0.63	x	0.7	=	18.39	(80)
West	0.9x	0.77		X	5.18	X	2	4.49	X		0.63	x	0.7	=	38.77	(80)
West	0.9x	0.77		X	1.32	X	2	4.49	X		0.63	X	0.7	=	9.88	(80)
West	0.9x	0.77		X	5.18	×	1	6.15	X		0.63	×	0.7	=	25.57	(80)
West	0.9x	0.77		X	1.32	X	1	6.15	X		0.63	X	0.7	=	6.52	(80)
7-				$\overline{}$	for each mor		057.05	040.04			n(74)m		75.50	10.05	7	(02)
(83)m=	60.62	118.59	195.3		$\begin{array}{c c} 284.84 & 349.0 \\ \hline (84)m = (73) \end{array}$		357.35 (83)m	340.21	292	.24	227.15	140.72	75.59	49.85		(83)
Ţ	384.95	441.23	508.0	_	581.72 630.		622.89	595.54	552	43	495.35	424.9	378.24	366.06	1	(84)
` ' L				_			022.00	000.04	1 002	. 10	100.00	724.00	070.24	000.00		(= :)
					heating seas eriods in the l		a oroo	from Tok	olo O	Th1	(°C)				24	(85)
•		_		•	ving area, h1				JIE 9	, 1111	(0)				21	(65)
T	Jan	Feb	Ma	$\overline{}$	Apr Ma		Jun	Jul	Δ	ug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.97	\rightarrow	0.92 0.79	- 	0.6	0.45	0.	- +	0.76	0.95	0.99	1	-	(86)
_					I			<u>[</u>			!		1	L	_	• •
(87)m=	19.8	19.97	20.26	$\overline{}$	ving area T1	` т	20.97	20.99	20.		9C) 20.91	20.57	20.12	19.77	1	(87)
()		. 5.51			1 20.0			L						L	_	` '

_								()					
· · ·	ature during		1			1	1	``					(00)
(88)m= 1	9.91 19.91	19.92	19.93	19.93	19.94	19.94	19.94	19.94	19.93	19.92	19.92		(88)
	on factor for	-	1		· `	i	9a)						
(89)m= (0.99	0.96	0.89	0.73	0.52	0.34	0.39	0.68	0.93	0.99	0.99		(89)
Mean in	ternal temp	erature in	the rest	of dwelli	ing T2 (f	ollow ste	ps 3 to	7 in Tabl	e 9c)				
(90)m= 1	8.33 18.58	18.99	19.49	19.8	19.92	19.94	19.94	19.87	19.45	18.81	18.3		(90)
								f	fLA = Livin	g area ÷ (4	4) =	0.47	(91)
Mean in	ternal temp	erature (fo	or the wh	ole dwe	lling) = f	LA × T1	+ (1 – fL	.A) × T2					
(92)m= 1	9.02 19.23	19.58	20.01	20.3	20.41	20.43	20.43	20.36	19.98	19.43	18.99		(92)
Apply ac	djustment to	the mear	n interna	temper	ature fro	m Table	4e, whe	re appro	opriate				
(93)m= 1	9.02 19.23	19.58	20.01	20.3	20.41	20.43	20.43	20.36	19.98	19.43	18.99		(93)
8. Space	e heating re	quiremen	t										
	the mean i		•		ned at st	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	ation factor				lup	Jul	Λιια	Con	Oct	Nov	Dec		
	Jan Feb on factor for		Apr	May	Jun	Jui	Aug	Sep	Oct	Nov	Dec		
_	0.99 0.98	0.96	0.89	0.75	0.56	0.39	0.44	0.71	0.93	0.98	0.99		(94)
	ains, hmGn		l				••••						, ,
	81.74 434.06		519.46	475.51	346.7	233.79	244.36	353.55	395.72	372.08	363.62		(95)
	average ex	ternal ten	nperature	from Ta	able 8	ļ							
	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 los	s rate for m	ean interr	nal tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 93	31.44 904.2	7 823.46	691.02	533.37	356.79	235.25	246.92	385.84	581.53	768.14	926.29		(97)
Space h	eating requ	irement fo	or each n	nonth, k	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 40	08.98 315.98	3 249.54	123.52	43.05	0	0	0	0	138.24	285.16	418.63		
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	1983.1	(98)
Space h	eating requ	irement ir	n kWh/m²	/year								37.99	(99)
9a. Energ	gy requirem	ents – Ind	lividual h	eating s	vstems i	ncludina	micro-C	CHP)					
Space h					,			, , ,					
Fraction	of space h	eat from s	econdar	y/supple	mentary	system						0	(201)
Fraction	of space he	eat from n	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction	of total hea	ting from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficienc	cy of main s	pace heat	ting syste	em 1								93.5	(206)
	y of second				g systen	ղ, %						0	(208)
_	Jan Feb	 	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	
	eating requ				I.	Jui	Aug	Sep	Oct	INOV	Dec	KVVII/ye	aı
· —	08.98 315.98		123.52	43.05	0	0	0	0	138.24	285.16	418.63		
(211)m –	[(98)m x (2	 204\1_\ v_^	100 ÷ (20	16)	l	l							(211)
	37.41 337.9		132.11	46.04	0	0	0	0	147.85	304.98	447.73		(211)
			1					l (kWh/yea				2120.96	(211)
Snace h	eating fuel	(seconda)	v) kWh/	month						710,1012		2.20.00	` ′
•	x (201)] } x	•	• , .										
(215)m=	0 0	0	0	0	0	0	0	0	0	0	0		
			•		•	•	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
0,	ND 0040 Na '-	m. 1 0 1 00	(CAD 0 00)	http://w	ot================================							Paga	

170.38 150.35 158.31 142.49 140.05 1	25.74 121.32	132.35	131.87	147.72	155.48	166.47		
Efficiency of water heater	23.74 121.32	132.33	131.07	147.72	133.46	100.47	70.0] ₍₂
· · · · · · · · · · · · · · · · · · ·	79.8 79.8	79.8	79.8	84.64	86.41	87.17	79.8	ک 2'
Fuel for water heating, kWh/month	73.0	75.0	75.0	04.04	00.41	07.17		(-
219)m = (64)m x 100 ÷ (217)m								
219)m= 195.68 173.31 184.03 168.75 170.62 1	57.56 152.03	165.85	165.25	174.54	179.93	190.96		_
		Total	= Sum(2	19a) ₁₁₂ =			2078.52	(2
Annual totals				k\	Wh/year	I	kWh/year	1
Space heating fuel used, main system 1						ļ	2120.96]
Nater heating fuel used							2078.52]
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(2
boiler with a fan-assisted flue						45		(2
Total electricity for the above, kWh/year		sum (of (230a).	(230g) =			75	(2
Electricity for lighting						Ī	240.8	(2
12a. CO2 emissions – Individual heating system	s including mi	cro-CHP						_
	Energy			Emiss	ion fac	tor	Emissions	
	Lifeigy			kg CO	2/kWh		kg CO2/yea	r
	kWh/year						,	
Space heating (main system 1)				0.2		= [458.13	(2
Space heating (main system 1) Space heating (secondary)	kWh/year				16	= [](2](2
	kWh/year			0.2	16	l I	458.13	_
Space heating (secondary) Vater heating	kWh/year (211) x (215) x	+ (263) + (2	264) =	0.2	16	=	458.13]](2
Space heating (secondary) Vater heating Space and water heating	kWh/year (211) x (215) x (219) x	+ (263) + (2	264) =	0.2	16 19 16	=	458.13 0 448.96](2](2](2
Space heating (secondary)	kWh/year (211) x (215) x (219) x (261) + (262)	+ (263) + (2	264) =	0.2	16 19 16	= [458.13 0 448.96 907.09](2

TER =

(273)

30.07

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:38:36

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 54.8m² Site Reference: Plot Reference: Maitland Park Estate AC 006

AC 006, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 29.58 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 9.00 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 50.3 kWh/m²

OK

2 Fabric U-values

Element Highest Average 0.12 (max. 0.70) External wall 0.12 (max. 0.30) OK Party wall 0.00 (max. 0.20) OK Floor 0.12 (max. 0.25) OK 0.12 (max. 0.70)

Roof (no roof)

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

Regulations Compliance Report

-1 0.14		
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:	0.5	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: East	4.91m²	
Windows facing: West	7.06m²	
Windows facing: West	1.8m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m²K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.12 W/m²K	

Community heating, heat from electric heat pump

Photovoltaic array

			User D) otoilo						
Assessor Name: Software Name:	John Simpson Stroma FSAP 20			Strom Softwa	are Vei	rsion:			0006273 on: 1.0.4.26	
Address :	AC 006, Aspen Co			Address			PEH			
1. Overall dwelling dim	•	ourt, marti	and r an	· Lotato,	London	, 14000 2	· ·			
Ground floor				a(m²) 54.8	(1a) x		ight(m) 2.9	(2a) =	Volume(m³ 158.92	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1	le)+(1r	n) [54.8	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	158.92	(5)
2. Ventilation rate:										
Number of chimneys Number of open flues	heating	secondar heating 0	ry +	0 0] = [0 0	x 2	40 = 20 =	m³ per hou	(6a) (6b)
Number of intermittent f	ans					0	X ·	10 =	0	(7a)
Number of passive vent	S					0	X ·	10 =	0	(7b)
Number of flueless gas	fires				Γ	0	X 4	40 =	0	(7c)
								Air ch	nanges per ho	our
Infiltration due to chimne	eys, flues and fans =	(6a)+(6b)+(7	7a)+(7b)+(7c) =	Γ	0		÷ (5) =	0	(8)
	been carried out or is inten	ded, procee	d to (17),	otherwise (ontinue fr	om (9) to	(16)			
Number of storeys in	the dwelling (ns)								0	(9)
Additional infiltration	0.25 for steel or timbe	r frama ar	. 0 25 fo	r maaan	v oonatr	untion	[(9)	-1]x0.1 =	0	(10)
if both types of wall are deducting areas of oper	present, use the value corre nings); if equal user 0.35	esponding to	the great	er wall are	a (after	uction			0	(11)
·	floor, enter 0.2 (unse	,	.1 (seale	ed), else	enter 0				0	(12)
•	nter 0.05, else enter 0								0	(13)
Window infiltration	vs and doors draught	siripped		0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)
Infiltration rate				(8) + (10)			+ (15) =		0	(15)
Air permeability value	e, a50, expressed in cu	ubic metre	es per ho	our per s	guare m	etre of e	envelope	area	2	(17)
If based on air permeab			•	•	•		•		0.1	(18)
Air permeability value appl	ies if a pressurisation test h	as been dor	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides shelter	red			(00)		10)1			2	(19)
Shelter factor				(20) = 1 -		[9)] =			0.85	(20)
Infiltration rate incorpora	•			(21) = (18	(20) =				0.08	(21)
Infiltration rate modified		1		Ι ,			T		1	
Jan Feb	Mar Apr May	/ Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind s	·				4	4.0	1 45	4 7	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	J	
Wind Factor (22a)m = (2	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		

	ation rat	0.1	0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.1	0.1		
Calculate effe		•	rate for t	he appli	cable ca	se							
If mechanic			l' N (0	al.) (aa		(1		. (20)	\ (00 \			0.5	(23
If exhaust air h		0 11		, ,	,	. `	,, .	•) = (23a)			0.5	(23
If balanced with		-		_					SI.) (001) [4 (00.)	76.5	(23
a) If balance						- ` 		<u> </u>	 	- 	- ` 	÷ 100] I	(24
24a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(2.
b) If balance	ea mecha 0	o o	ntilation	without	neat red	overy (i	0 (240	$\int_{0}^{\infty} \int_{0}^{\infty} dt = (22)$	0 (d2	230)	0		(24
											0		(_
c) If whole h	n < 0.5 ×			•	•				5 x (23h	o)			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural	ventilation	on or wh	ole hous	e positiv	/e input	ventilatio	on from I	oft		<u> </u>	Į.		
,	n = 1, the			•	•				0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change	rate - er	iter (24a) or (24b	o) or (24d	c) or (24	d) in box	(25)					
25)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(2
3. Heat losse	s and he	eat loss r	paramete	ėt.									
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	ıe	AXU		k-value	e /	λΧk
	area	_	m		A ,r		W/m2		(W/I		kJ/m²-ł		J/K
Doors					2.77	х	1.4	=	3.878				(2
Vindows Type) 1				4.91	x1.	/[1/(1.4)+	0.04] =	6.51				(2
Vindows Type	€ 2				7.06	x1.	/[1/(1.4)+	0.04] =	9.36	$\overline{}$			(2
Vindows Type	∍ 3				1.8	x1.	/[1/(1.4)+	0.04] =	2.39	\equiv			(2
loor					54.8	x	0.12		6.576				(2
Valls	36.3	7	16.5	4	19.83	x	0.12	<u> </u>	2.38	Ħ i			(2
otal area of e	elements	, m²			91.17	<u> </u>							(3
Party wall					49.76	x	0		0				(3
for windows and	l roof wind	ows, use e	ffective wi	ndow U-va	alue calcul	——I ated using	formula 1	L /[(1/U-valu	re)+0.04] a	as given in	paragraph	3.2	
* include the area	as on both	sides of in	ternal wal	ls and pan	titions								
Fabric heat los		•	U)				(26)(30)	+ (32) =				31.09	(3
14	Cm = S(•						** *	.(30) + (32	, , ,	(32e) =	0	(3
	parame	ter (TMF	P = Cm -	- TFA) ir	n k.I/m²K				the and Administration	: Medium		250	
Thermal mass		`		,								200	(3
Thermal mass		ere the de	tails of the	,			ecisely the				able 1f	200	(3
Thermal mass For design assess an be used inste	ad of a de	ere the de tailed calc	tails of the ulation.	construct	ion are not	t known pr	ecisely the				able 1f		
Thermal mass for design assess an be used inste Thermal bridg	ead of a dea es : S (L	ere the de tailed calco x Y) cal	tails of the ulation. culated (construct	ion are not opendix k	t known pr	recisely the				able 1f	9.58	
Thermal mass or design assess an be used instevential bridger of details of thermal bridger details of thermal second control of the	ead of a de es : S (L al bridging	ere the de tailed calco x Y) cal	tails of the ulation. culated (construct	ion are not opendix k	t known pr	ecisely the	indicative			able 1f		(3
Thermal mass For design assess Fan be used inste Thermal bridg If details of therma Total fabric he Tentilation hea	ead of a dea es:S(L al bridging eat loss	ere the de tailed calcu x Y) cal- are not kn	tails of the ulation. culated (own (36) =	constructiusing Ap	ion are not opendix k	t known pr	recisely the	e indicative	values of	TMP in T		9.58	(3
Thermal mass or design assess an be used insternal bridger details of thermal fotal fabric hermal fa	ead of a dea es:S(L al bridging eat loss	ere the de tailed calcu x Y) cal- are not kn	tails of the ulation. culated (own (36) =	constructiusing Ap	ion are not opendix k	t known pr	ecisely the	e indicative	values of (36) =	TMP in T		9.58	(3
Thermal mass for design assess an be used insternal bridg details of thermatical fabric hermatical fabric hermatic hermatical fabric hermatical fabric hermatic hermatic hermatical fabric hermatic hermatical fabric hermatic hermatic hermatic hermatic hermatic herma	ead of a deleas: S (Leal bridging eat loss cat	ere the de tailed calcu x Y) calcu are not kn	tails of the ulation. culated u own (36) =	constructiusing Ap	ppendix k	t known pr	,	(33) + (38)m	(36) = = 0.33 × (25)m x (5)	9.58	(3
Thermal mass for design assess an be used inster Thermal bridge details of thermal fotal fabric hermal fabric herm	es : S (L al bridging eat loss at loss ca Feb	ere the de tailed calculate of the delculate of the delcu	tails of the ulation. culated u own (36) = I monthly	constructs using Ap = 0.05 x (3	ppendix h	t known pr	Aug	(33) + (38)m Sep 10.62	(36) = = 0.33 × (25)m x (5 Nov 11.18) Dec	9.58	(3
Fhermal mass for design assess an be used inste Fhermal bridg f details of thermaterial fabric hermaterial f	es : S (L al bridging eat loss at loss ca Feb	ere the de tailed calculate of the delculate of the delcu	tails of the ulation. culated u own (36) = I monthly	constructs using Ap = 0.05 x (3	ppendix h	t known pr	Aug	(33) + (38)m Sep 10.62	(36) = = 0.33 × (Oct 10.95	25)m x (5 Nov 11.18) Dec	9.58	(3

leat lo	ss para	meter (F	HLP), W	m²K				,	(40)m	= (39)m ÷	· (4)			
10)m=	0.96	0.96	0.95	0.94	0.94	0.93	0.93	0.93	0.94	0.94	0.95	0.95		
umba	r of dov	o in mo	oth /Tob	lo 1o\					,	Average =	Sum(40) ₁	12 /12=	0.94	(4
Г	Jan	Feb	nth (Tab Mar	· ·	May	Jun	Jul	Λιια	Sep	Oct	Nov	Dec		
11)m=	31	28	31	Apr 30	Way 31	30	31	Aug 31	30 30	31	30	31		(4
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- 51	20	J 31		J 31		J 31	31] 30	J1		(.
4. Wat	ter heat	ing ener	rgy requi	irement:								kWh/ye	ear:	
ssume	ed occu	pancy, I	N								1	83		(4
if TF		9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13				(.
								(25 x N)				7.7		(4
		_		usage by : day (all w		-	-	to achieve	a water us	se target o	f			
Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
ot wate				<u> </u>			Table 1c x		Sep	Oct	INOV	Dec		
4)m=	85.47	82.36	79.25	76.14	73.04	69.93	69.93	73.04	76.14	79.25	82.36	85.47		
., [02.00				00.00	00.00				m(44) ₁₁₂ =		932.38	(<u>/</u>
nergy c	ontent of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	07m / 3600			ables 1b, 1			`
5)m=	126.75	110.85	114.39	99.73	95.69	82.57	76.52	87.81	88.85	103.55	113.03	122.75		
L										Total = Su	m(45) ₁₁₂ =	-	1222.49	(4
instanta _	aneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46 ₎) to (61)					
6)m=	19.01	16.63	17.16	14.96	14.35	12.39	11.48	13.17	13.33	15.53	16.96	18.41		(4
	storage													
·		` ,					Ū	within sa	ame ves	sei		0		(2
		_			-		litres in	(47) mbi boil	ore) onto	or 'O' in <i>(</i>	17 \			
	storage		not wate	וו פוווט) ופ	iciuues i	HStafftaf	ieous co	יווטט וטוווי	ers) erik	ei O III (47)			
	-		eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(4
•			m Table			`	• ,					0		(4
-				, kWh/ye	ear			(48) x (49)) =			10		(5
			_	ylinder l		or is not	known:					<u> </u>		
		•		om Tabl	e 2 (kW	h/litre/da	ıy)				0.	.02		(!
	•	_	ee secti	on 4.3										
		from Tal	bie 2a m Table	2h							—	.03		(!
•								(47) (54)	· · · (EQ) · · · (50)		.6		(;
٠.		m water 54) in (5	•	, kWh/ye	ear			(47) x (51)) X (52) X (53) =		.03		(<u>;</u>
,			•	for each	month			((56)m = (55) × (41):	m	1.	.03		(.
						i					1			,
5)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	5.11	(5
yıınaeı -	r contains	dedicate	a solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	u), eise (5	/)m = (56)	m wnere (HTT) IS TRO	m Append	хн	
7)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		(!
imary	/ circuit	loss (an	nual) fro	m Table	3							0		(5
					,	•	. ,	65 × (41)						
(mod	ified by	factor fi	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)			
9)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		(

Camb:	laaa aa	ا مدامد ما	for on	. مام		(04)	(00	١. ٥	CE (44)	١								
г	0 0	alculated	0	ICN	montn (0	(60 T	0 ÷ 30	0 × (41)			0		Ι ο		\neg		(61)
(61)m=		0		ᆜ			Ļ			(22)		0	0	0 (40)	0	\sqcup	(50) (04)	(01)
Г		·	water 169.6	_			_	r eac 36.07		(62) 143	_		` 	``	`	\neg	(59)m + (61)m	(62)
(62)m=	182.02	I			153.22	150.97			131.79			142.35	158.8		178.0			(62)
			_					-					r contrib	ution to wat	er heatir	ng)		
(63)m=	0	al lines if	0	\ <u>\</u>	0	0	a p	0 0	, see Ap	pend		0	0	0	0	\neg		(63)
L					0	0						U						(00)
(64)m=	182.02	vater hea	169.6	37 T	153.22	150.97	11	36.07	131.79	143	08	142.35	158.8	3 166.53	178.0	12		
(04)111=	102.02	100.70	100.0	<u>" </u>	100.22	100.07	L.,		101.70	l			<u> </u>	ter (annual)			1873.33	(64)
∐oot ar	nine fre	m water	hootii	24	k\\/h/m/	onth 0.2	, ,	[U 0E	v (45)m					n + (57)m		ر ۲](-,
(65)m=	86.36	76.8	82.2	- -	75.95	76.04	_	0.25	69.66	73.	_	72.34	78.65		85.03		J	(65)
L		<u> </u>					<u> </u>		<u> </u>					from com	<u> </u>		a otin a	(00)
		•					yııı	ider i	s in the t	weii	ing	or not w	alei is	HOIH COH	imunity	y rie	eaung	
		ains (see			,):												
Metabo [ns (Table Feb	5), W Ma	\neg		Mov		lun	Jul	Λ.		Son	00	Nov	De	\Box		
(66)m=	Jan 91.57	91.57	91.5	$\overline{}$	Apr 91.57	May 91.57	-	Jun 1.57	91.57	91.	ug 57	Sep 91.57	91.57	_	91.57	=		(66)
` ′ L		<u> </u>					<u> </u>		<u> </u>	l .			01.07	01.07	1 01.07			(00)
(67)m=	14.23	(calculation 12.64	10.2		7.78	_, equal	_	L9 0 I.91	5.31	6.9	_	9.26	11.76	13.72	14.63	3		(67)
L		ļ.					<u> </u>		<u> </u>	<u> </u>			<u> </u>	13.72	14.00			(01)
(68)m=	159.67	161.33	157.1		148.26	137.04	_	26.5	119.45	3a), 117		121.97	130.8	142.08	152.6	2		(68)
L							_		<u> </u>	<u> </u>			<u> </u>	142.00	132.0	,2		(00)
(69)m=	g gains 32.16	32.16	32.1	-i	32.16	L, equa	_	2.16	32.16	32.	_	32.16	32.16	32.16	32.16			(69)
` ′ L		l				32.10		2.10	32.10	52.	10	32.10	32.10	32.10	32.10	<u> </u>		(00)
(70)m=	and la	ins gains	(Tabi	e sa	a) 0	0		0	0	0		0	0	0	0	\neg		(70)
L												U			"			(10)
(71)m=	-73.26	vaporatio	-73.2		-73.26	-73.26	1	'3.26	-73.26	-73	26	-73.26	-73.2	3 -73.26	-73.2	6		(71)
L		ļ			-73.20	-73.20	′	3.20	-73.20	-73	.20	-73.20	-73.2	-73.20	-13.2	.0		(1.)
(72)m=	116.08	gains (T	110.5	´	105.49	102.2	١ ۵	7.57	93.63	98.	69	100.47	105.7	2 111.64	114.2	00		(72)
L		I			105.49	102.2				l			<u> </u>	(71)m + (72		.9		(12)
(73)m=	340.46	338.73	328.4	17 T	312.01	295.54	2	79.45	268.87	273	_	282.17	298.8	<u> </u>	332.0	12		(73)
6. Sola			320.2	†′	312.01	293.34		9.43	200.07	2/3	.00	202.17	290.0	317.91	332.0	,2		(10)
	Ť		using s	olar	flux from	Table 6a	and	assoc	iated equa	tions	to co	nvert to th	e applio	able orienta	tion.			
ŭ		Access F	ŭ		Area			Flu	•			g_		FF			Gains	
		Table 6d			m²				ble 6a		Т	able 6b		Table 6c			(W)	
East	0.9x	0.77		X	4.9)1	x	1	9.64	x		0.4	x	0.8		= [21.39	(76)
East	0.9x	0.77	一	x	4.9)1	x	3	88.42	x		0.4	×	0.8	=	- Ī	41.83	(76)
East	0.9x	0.77	一	X	4.9)1	x	6	3.27	x		0.4	×	0.8		- Ī	68.89	(76)
East	0.9x	0.77	一	X	4.9)1	x	9)2.28	X		0.4	×	0.8		- Ī	100.48	(76)
East	0.9x	0.77	뻭	x	4.9	1	x	1	13.09	x		0.4	x	0.8		= [123.14	(76)

East	٥۲					٦			1			٠		_		(70)
	0.9x	0.77	_	X	4.91	→ ×		15.77] X]		0.4	×	0.8	╡ =	126.06	(76)
East	0.9x	0.77	_	X	4.91	Ⅎ [×]	-	10.22] X]		0.4	×	0.8	╡ =	120.01	(76)
East	0.9x	0.77		X	4.91	→ ×		94.68] X]		0.4	X	0.8	╡ =	103.09	(76)
East	0.9x	0.77	_	X	4.91	_ x		73.59	X		0.4	×	0.8	_ =	80.13	(76)
East	0.9x	0.77		X	4.91	X		15.59	X		0.4	X	8.0	=	49.64	(76)
East	0.9x	0.77		X	4.91	×	2	24.49	X		0.4	X	0.8	=	26.66	(76)
East	0.9x	0.77		X	4.91	X		6.15	X		0.4	X	0.8	=	17.59	(76)
West	0.9x	0.77		X	7.06	X		19.64	X		0.4	X	0.8	=	30.75	(80)
West	0.9x	0.77		X	1.8	X		9.64	X		0.4	X	0.8	=	7.84	(80)
West	0.9x	0.77		x	7.06	X	3	38.42	X		0.4	X	0.8	=	60.15	(80)
West	0.9x	0.77		x	1.8	X	3	38.42	X		0.4	X	0.8	=	15.34	(80)
West	0.9x	0.77		x	7.06	X	(3.27	X		0.4	X	0.8	=	99.06	(80)
West	0.9x	0.77		x	1.8	x	6	3.27	x		0.4	x	0.8	=	25.26	(80)
West	0.9x	0.77		x	7.06	x	9	92.28	x		0.4	x	0.8		144.48	(80)
West	0.9x	0.77		x	1.8	x		92.28	x		0.4	x	0.8	╡ =	36.84	(80)
West	0.9x	0.77		x	7.06	T x	1	13.09	x		0.4	X	0.8		177.06	(80)
West	0.9x	0.77		x	1.8	= x	1	13.09	x		0.4	×	0.8		45.14	(80)
West	0.9x	0.77		x	7.06	= x	1	15.77	x		0.4	×	0.8	╡ -	181.25	(80)
West	0.9x	0.77		x	1.8	٦ x	1	15.77	x		0.4	= x	0.8	╡ -	46.21	(80)
West	0.9x	0.77		x	7.06	i x	1	10.22	X		0.4	×	0.8	= =	172.56	(80)
West	0.9x	0.77		x	1.8	۲ x		10.22)] x		0.4	= x	0.8	╡.	44	(80)
West	0.9x	0.77	$\overline{}$	x	7.06	╡ ×		94.68)]		0.4	٦ ×	0.8	╡ -	148.23	(80)
West	0.9x	0.77	=	x	1.8	٦ ×	-	94.68) X		0.4	٦ x	0.8	╡ -	37.79	(80)
West	0.9x	0.77		x	7.06	٦ ×	-	73.59]]		0.4	ا x	0.8	╡ -	115.21	(80)
West	0.9x	0.77		x	1.8	٦ ×		73.59]]		0.4	ا ×	0.8	╡ -	29.37	(80)
West	0.9x	0.77		x	7.06	۱ x		15.59]]		0.4	ا x	0.8	╡ ₌	71.38	(80)
West	0.9x	0.77	\dashv	X	1.8			15.59] x		0.4	= x	0.8	╡ -	18.2	(80)
West	0.9x	0.77	\dashv	x	7.06	x	—	24.49] x		0.4	x	0.8	╡ ₌		(80)
West	0.9x	0.77		x	1.8	^ x		24.49] ^] x		0.4	^ x	0.8	┥ -		(80)
West	0.9x	0.77		X	7.06	┤ ^ ×		16.15] ^] x		0.4	 	0.8	╡ -	25.29	(80)
West	0.9x		\dashv	^ X		$\exists \hat{x}$	-] ^] x			┤ ^	0.8	┥ -		(80)
******	0.91	0.77		^	1.8	^		16.15	_ ^		0.4	^	0.8		6.45	(80)
Solar a	aine in 1	watte ca	doulot	~d	for each mo	nth			(92)m	n – Sı	um(74)m	(82)m				
(83)m=	59.97	117.32	193.2	$\overline{}$	281.79 345.		353.52	336.57	289	_	224.71	139.2	74.78	49.32	٦	(83)
` '					$\frac{1}{(84)m = (73)}$				<u> </u>		[<u> </u>	_	
Ĭ,	400.43	456.05	521.6	_	593.8 640.		632.97	605.43	562	.95	506.89	438.02	392.69	381.34	7	(84)
7 Mea	an inter	nal temp	eratui	e (heating seas	son)		•			,					
					eriods in the		area	from Tal	ole 9	. Th	1 (°C)				21	(85)
•		•	_	•	ving area, h	_				,	(- /					``
Γ	Jan	Feb	Ма	$\overline{}$	`	ay T	Jun	Jul	Α	ug	Sep	Oct	Nov	Dec	7	
(86)m=	0.99	0.99	0.96	+	0.88 0.7	- 	0.51	0.37	0.4	_	0.67	0.93	0.99	1	1	(86)
Mean	internal	l temner	aturo i	n li	ving area T1	(foll	OW sto	ns 3 to 3	7 in T	Table			-1	<u> </u>	_	
(87)m=	20.15	20.3	20.54	_	20.81 20.9		20.99	21	2	\neg	20.98	20.77	20.41	20.12	7	(87)
` ' ' [<u> </u>		!					_	, ,

Temperature during heating periods in rest of dwelling from Table 9, Th2 (/°C)
	0.14 20.13 20.13 20.13 (88)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)	
	0.6 0.9 0.98 0.99 (89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in	Table 9c)
	0.12 19.88 19.37 18.95 (90)
	$fLA = Living area \div (4) = 0.48$ (91)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA)$	× T2
(92)m= 19.55 19.73 20.03 20.35 20.51 20.55 20.55 20.55 20.55	0.53 20.3 19.87 19.51 (92)
Apply adjustment to the mean internal temperature from Table 4e, where	appropriate
(93)m= 19.55 19.73 20.03 20.35 20.51 20.55 20.55 20.55 20	0.53 20.3 19.87 19.51 (93)
8. Space heating requirement	
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, s the utilisation factor for gains using Table 9a	o that Ti,m=(76)m and re-calculate
	Sep Oct Nov Dec
Utilisation factor for gains, hm:	
(94)m= 0.99 0.98 0.95 0.85 0.68 0.48 0.33 0.38 0	.63 0.91 0.98 0.99 (94)
Useful gains, hmGm , W = (94)m x (84)m	
(95)m= 396.88 447.46 495.4 507.19 435.5 301.79 201.65 211.24 32	0.39 396.89 385.13 378.71 (95)
Monthly average external temperature from Table 8	
	4.1 10.6 7.1 4.2 (96)
Heat loss rate for mean internal temperature, Lm , W = $[(39)\text{m} \times [(93)\text{m} - (93)\text{m}] = [(39)\text{m} \times [(93)\text{m}] = (97)\text{m} = (39)\text{m} \times [(93)\text{m}] = (39)\text{m} \times [(93)\text{m}]$	96)m] 9.8.1 500.95 662.06 797.33 (97)
Space heating requirement for each month, kWh/month = $0.024 \times [(97)m^{-1}]$	
(98)m= 300.46 221.7 157.89 61.35 14.22 0 0 0	0 77.43 199.39 311.45
	r year (kWh/year) = Sum(98) _{15,912} = 1343.89 (98)
Space heating requirement in kWh/m²/year	24.52 (99)
9b. Energy requirements – Community heating scheme	
This part is used for space heating, space cooling or water heating provide	d by a community scheme.
Fraction of space heat from secondary/supplementary heating (Table 11) '0	0 (301)
Fraction of space heat from community system 1 – (301) =	1 (302)
The community scheme may obtain heat from several sources. The procedure allows for CHF	
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix Fraction of heat from Community heat pump	C. 1 (303a
Fraction of total space heat from Community heat pump	
	$(302) \times (303a) = $
Factor for control and charging method (Table 4c(3)) for community heating	
Distribution loss factor (Table 12c) for community heating system	1.1 (306)
Space heating Annual space heating requirement	kWh/year
,	1343.89 3) x (304a) x (305) x (306) = 1478.28 (307a)
Efficiency of secondary/supplementary heating system in % (from Table 4a	or Appendix E) 0 (308

Space heating requirement from secon	dary/supplementary systen	ງ (98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating					_
Annual water heating requirement				1873.33	
If DHW from community scheme: Water heat from Community heat pump)	(64) x (303a) x	(305) x (306) =	2060.67	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	(e) + (310a)(310e)] =	35.39	(313)
Cooling System Energy Efficiency Ratio	0			0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter 0)	= (107) ÷ (314)	=	0	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	<u> </u>	ıtside		121.18	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330l	b) + (330g) =	121.18	(331)
Energy for lighting (calculated in Appen	dix L)			251.39	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)			-566.53	(333)
Electricity generated by wind turbine (A	ppendix M) (negative quan	tity)		0	(334)
12b. CO2 Emissions - Community hea	ting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)		kWh/year		kg CO2/year	(367a)
•	If there is CHP using to	kWh/year	kg CO2/kWh	kg CO2/year	(367a) (367)
Efficiency of heat source 1 (%)	If there is CHP using tw	kWh/year wo fuels repeat (363) to	kg CO2/kWh (366) for the second fue	319 575.77	⊒``` =
Efficiency of heat source 1 (%) CO2 associated with heat source 1	If there is CHP using tv [(307b)+(31	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	kg CO2/year 319 575.77 18.37	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	If there is CHP using tw [(307b)+(31 [(3*)	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	319 575.77 18.37 594.14	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community s	If there is CHP using tw [(307b)+(31) [(37b)+(31) [(37	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(372 9) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	319 575.77 18.37 594.14	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	If there is CHP using tw [(307b)+(31) [(37b)+(31) [(37	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(372 9) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 =	319 575.77 18.37 594.14	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see	If there is CHP using tw [(307b)+(31) [(37b)+(31) [(37	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(372 9) x us heater (312) x (3) + (374) + (375) =	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 =	319 575.77 18.37 594.14 0 594.14	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and water	If there is CHP using tw [(307b)+(31) [(37b) [(37b)	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(372 9) x us heater (312) x (3) + (374) + (375) =	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 575.77 18.37 594.14 0 594.14 62.89	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and water CO2 associated with electricity for pum	If there is CHP using tw [(307b)+(31) [(37b)+(31) [(37	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(372 9) x us heater (312) x (3) + (374) + (375) = (331)) x 2))) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 575.77 18.37 594.14 0 594.14 62.89	(367) (372) (373) (374) (375) (376) (378)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and w CO2 associated with electricity for pum CO2 associated with electricity for light Energy saving/generation technologies	If there is CHP using tw [(307b)+(31) [(37b)+(31) [(37	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(372 9) x us heater (312) x (3) + (374) + (375) = (331)) x 2))) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 575.77 18.37 594.14 0 594.14 62.89 130.47	(367) (372) (373) (374) (375) (376) (378) (379)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and w CO2 associated with electricity for pum CO2 associated with electricity for light Energy saving/generation technologies Item 1	If there is CHP using tw [(307b)+(31 [(37b)+(31) [(37b	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(372 9) x us heater (312) x (3) + (374) + (375) = (331)) x 2))) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 575.77 18.37 594.14 0 594.14 62.89 130.47	(367) (372) (373) (374) (375) (376) (378) (379)

			User D	Notaile:										
Access Names	John Circo	200	– USEI L		_ NI	.b.e		CTDA	0006070					
Assessor Name:	John Simps			Strom					0006273					
Software Name:	Stroma FS	-		Softwa				versic	on: 1.0.4.26					
			Property											
Address :		en Court, Mait	land Parl	k Estate,	London	, NW3 2	2EH							
1. Overall dwelling dime	ensions:													
			Are	a(m²)	1	Av. He	ight(m)	_	Volume(m ³	<u>-</u>				
Ground floor				54.8	(1a) x		2.9	(2a) =	158.92	(3a)				
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	54.8	(4)									
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	158.92	(5)				
2. Ventilation rate:														
	main heating	seconda heating		other		total			m³ per hou	ır				
Number of chimneys	0	+ 0	+	0] = [0	X	40 =	0	(6a)				
Number of open flues	0	+ 0	╡ + ┌	0		0	x	20 =	0	(6b)				
Number of intermittent fa	ans					2	x	10 =	20	(7a)				
Number of passive vents														
Number of flueless gas f	umber of passive vents 0 × 10 umber of flueless gas fires 0 × 40													
					L									
								Air ch	nanges per ho	our				
Infiltration due to chimne	ys, flues and fa	ans = $(6a)+(6b)+$	(7a)+(7b)+((7c) =		20		÷ (5) =	0.13	(8)				
If a pressurisation test has b			ed to (17),	otherwise (continue fr	om (9) to	(16)							
Number of storeys in t	he dwelling (ns)							0	(9)				
Additional infiltration							[(9))-1]x0.1 =	0	(10)				
Structural infiltration: 0	.25 for steel or	timber frame of	or 0.35 fo	r mason	ry consti	ruction			0	(11)				
if both types of wall are p deducting areas of openi			to the great	ter wall are	a (after									
If suspended wooden	floor, enter 0.2	(unsealed) or (0.1 (seale	ed), else	enter 0				0	(12)				
If no draught lobby, en	iter 0.05, else e	enter 0							0	(13)				
Percentage of window	s and doors dra	aught stripped							0	(14)				
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)				
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)				
Air permeability value,	q50, expresse	d in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	5	(17)				
If based on air permeabi	lity value, then	$(18) = [(17) \div 20] +$	(8), otherw	ise (18) =	(16)				0.38	(18)				
Air permeability value applie	es if a pressurisatio	n test has been do	one or a de	gree air pe	rmeability	is being u	sed							
Number of sides sheltered	ed								2	(19)				
Shelter factor				(20) = 1 -	[0.075 x ([*]	19)] =			0.85	(20)				
Infiltration rate incorpora	ting shelter fact	tor		(21) = (18) x (20) =				0.32	(21)				
Infiltration rate modified	for monthly win	d speed							_					
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec						
Monthly average wind sp	peed from Table	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 <i>÷ 1</i>													
vviilu i acitii (22a)iii = (2	T	1.00	T 0.05	1 0 02			T	T	1					

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

0.41					d wind s	` 	`	<u> </u>	00:	0.00	0.00	1	
Calculate effect	0.4 Ctive air c	0.39 Change	0.35 rate for t	0.34 he appli	0.3 cable ca	0.3 se	0.3	0.32	0.34	0.36	0.38		
If mechanica		_										0	(23
If exhaust air h	eat pump u	sing Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23
If balanced with	n heat recov	very: effic	iency in %	allowing f	or in-use f	actor (from	n Table 4h) =				0	(23
a) If balance	d mecha	anical ve	ntilation	with hea	at recove	ery (MVI	HR) (24a	m = (22)	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
b) If balance						· · · · ·	<u> </u>	m = (22)	2b)m + (2	23b)		1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)n	ouse extended on $< 0.5 \times$			-	-				5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural									_	!		l	
	n = 1, the	` '			<u> </u>	_	- `					Ī	(0.4
(24d)m= 0.58	0.58	0.58	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		(24
Effective air (25)m= 0.58	change r	0.58	iter (24a _{0.56}	or (24b) 0.56	0.55 or (24)	c) or (24 0.55	d) in box	0.55	0.56	0.56	0.57	1	(25)
(25)m= 0.58	0.56	0.56	0.56	0.56	0.55	0.55	0.54	0.55	0.56	0.56	0.57		(20)
3. Heat losse	s and he	at loss p	oaramete	er:									
ELEMENT	Gros: area (Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²-ł		X k J/K
Doors					2.77	х	1.2	=	3.324				(26)
Windows Type) 1				3.9	x1,	/[1/(1.4)+	0.04] =	5.17				(27)
Windows Type	2				5.6	x1,	/[1/(1.4)+	0.04] =	7.42				(27)
Windows Type	3				1.43	x1,	/[1/(1.4)+	0.04] =	1.9				(27)
Floor					54.8	x	0.13		7.124	= [(28
Walls	36.37	7	13.7		22.67	7 X	0.18	=	4.08	=		= =	=
	lomonto						00	=	7.00				(29
Total area of e	ilements,	m²			91.17	7	0.10	= [4.00				
	nements,	m²			91.17	=	0	= [0			」	(31
Party wall * for windows and	roof windo	ows, use e			49.76	3 x	0	= [0	as given in	paragraph	3.2	(31
Party wall * for windows and ** include the area	l roof windo as on both s	ows, use e sides of in	ternal wall		49.76	x lated using	0 formula 1	= [/[(1/U-valu	0	as given in	paragraph		(31)
Party wall * for windows and ** include the area Fabric heat los	roof windo as on both s	ows, use e sides of in = S (A x	ternal wall		49.76	x lated using	0	$= \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} $	0 e)+0.04] a			29.02	(31)
Party wall * for windows and ** include the area Fabric heat los Heat capacity	l roof windo as on both s ss, W/K = Cm = S(/	ows, use e sides of in = S (A x A x k)	ternal wali U)	ls and part	49.76 alue calcul titions	X ated using	0 formula 1	= [/[(1/U-valu + (32) = ((28)	0 re)+0.04] a	2) + (32a).		29.02	(31) (32) (33) (34)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	roof windo as on both s ss, W/K = Cm = S(/ paramet	ows, use e sides of in S (A x A x k) ter (TMF	ternal wall U) P = Cm ÷	's and part - TFA) ir	49.76 alue calcul titions	X dated using	0 1 formula 1 (26)(30)	= [/[(1/U-valu + (32) = ((28)	0 e)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	29.02	(31) (32) (33) (34)
Party wall * for windows and ** include the area Fabric heat los Heat capacity	roof windo as on both s ss, W/K = Cm = S(/ paramet sments whe	ows, use e sides of in S (A x A x k) ter (TMF	ternal wall $U)$ $P = Cm \div tails of the$'s and part - TFA) ir	49.76 alue calcul titions	X dated using	0 1 formula 1 (26)(30)	= [/[(1/U-valu + (32) = ((28)	0 e)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	29.02	(31) (32) (33) (34)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	roof windo as on both s ss, W/K = Cm = S(A paramet sments whe ad of a deta	ows, use e sides of in S (A x A x k) ter (TMF ere the de ailed calca	ternal wall $U)$ $P = Cm \div tails of the ulation.$	s and pari - TFA) ir constructi	49.76 alue calculatitions n kJ/m²K ion are not	x x ated using	0 1 formula 1 (26)(30)	= [/[(1/U-valu + (32) = ((28)	0 e)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	29.02	(31 (32 (33 (34 (35)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of thermal	roof windo as on both s as, W/K = Cm = S(A paramet aments whe ad of a deta es : S (L :	ows, use e sides of in = S (A x A x k) ter (TMF ere the de ailed calco x Y) cal	ternal wall U) $P = Cm \div tails of the ulation. culated t$	s and part - TFA) ir constructi	49.76 alue calcul titions kJ/m²K ion are not	x x ated using	0 1 formula 1 (26)(30)	= [/[(1/U-valu + (32) = ((28) Indica	0 re)+0.04] a .(30) + (32 tive Value values of	2) + (32a). : Medium	(32e) =	29.02 0 250	(31 (32 (33 (34 (35) (36)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric he	roof windo as on both s as, W/K = Cm = S(/ paramet aments whe ad of a deta es : S (L : al bridging a at loss	ows, use e sides of in S (A x A x k) ter (TMF ere the de ailed calcu x Y) calcu are not kn	ternal wall U) $P = Cm \div tails of the ulation. culated toown (36) =$	- TFA) ir constructi using Ap	49.76 alue calcul titions kJ/m²K ion are not	x x ated using	0 1 formula 1 (26)(30)	= [/[(1/U-valu + (32) = ((28) Indica e indicative	0 e)+0.04] a .(30) + (32 tive Value e values of	2) + (32a). : Medium : TMP in Ta	(32e) = able 1f	29.02 0 250	(31 (32 (33 (34 (35) (36)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric he Ventilation hea	roof windo as on both s as, W/K = Cm = S(A paramet sments whe ad of a deta ad of a deta at loss ca	ows, use e sides of in S (A x A x k) ter (TMF ere the de ailed calcu x Y) calcu are not kn	ternal wall U) $P = Cm \div tails of the ulation. culated ulated ula$	- TFA) ir constructi using Ap	49.76 alue calcul titions n kJ/m²K tion are not opendix k	x ated using	0 of formula 1. (26)(30) recisely the	= [/[(1/U-valu + (32) = ((28) Indica e indicative (33) + (38)m	0 ae)+0.04] a .(30) + (32) tive Value a values of (36) = = 0.33 × (2) + (32a). : Medium : <i>TMP in Ta</i> 25)m x (5)	(32e) = able 1f	29.02 0 250 6.55	(31 (32 (33 (34 (35) (36)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric he Ventilation hea	roof windo as on both s ss, W/K = Cm = S(A paramet sments whe ad of a deta es : S (L : al bridging a at loss at loss ca	ows, use e sides of in = S (A x A x k) ter (TMF ere the de ailed calcu x Y) calcu are not kn ulculated	ternal wall U) P = Cm ÷ tails of the ulation. culated u own (36) =	- TFA) ir constructi using Ap = 0.05 x (3	49.76 alue calcul titions n kJ/m²K ion are not opendix h 1) Jun	ated using t known pr	0 I formula 1 (26)(30) Recisely the	= [/[(1/U-valu + (32) = ((28) Indica indicative (33) + (38)m Sep	0 e)+0.04] a .(30) + (32 tive Value e values of (36) = = 0.33 × (Oct	2) + (32a). : Medium : <i>TMP in Ta</i> 25)m x (5) Nov	(32e) = able 1f Dec	29.02 0 250 6.55	(29) (31) (32) (33) (34) (35) (36) (37)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric he Ventilation hea Jan (38)m= 30.57	roof windo as on both s ss, W/K = Cm = S(/ paramet sments whe ad of a deta es : S (L : al bridging a at loss at loss ca Feb 30.4	ows, use esides of interest (TMF) ere the detailed calculated are not known all culated are all are al	ternal wall U) $P = Cm \div tails of the ulation. culated ulated ula$	- TFA) ir constructi using Ap	49.76 alue calcul titions n kJ/m²K tion are not opendix k	x ated using	0 of formula 1. (26)(30) recisely the	= [/(1/U-valu + (32) = ((28) Indica * indicative (33) + (38)m Sep 28.9	0 (30) + (32) tive Value values of (36) = = 0.33 × (Oct 29.31	2) + (32a). : Medium : TMP in Ta 25)m x (5) Nov 29.61	(32e) = able 1f	29.02 0 250 6.55	(31) (32) (33) (34) (35) (36)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric he Ventilation hea	roof windo as on both s ss, W/K = Cm = S(/ paramet sments whe ad of a deta es : S (L : al bridging a at loss at loss ca Feb 30.4	ows, use esides of interest (TMF) ere the detailed calculated are not known all culated are all are al	ternal wall U) P = Cm ÷ tails of the ulation. culated u own (36) =	- TFA) ir constructi using Ap = 0.05 x (3	49.76 alue calcul titions n kJ/m²K ion are not opendix h 1) Jun	ated using t known pr	0 I formula 1 (26)(30) Recisely the	= [/(1/U-valu + (32) = ((28) Indica * indicative (33) + (38)m Sep 28.9	0 e)+0.04] a .(30) + (32 tive Value e values of (36) = = 0.33 × (Oct	2) + (32a). : Medium : TMP in Ta 25)m x (5) Nov 29.61	(32e) = able 1f Dec	29.02 0 250 6.55	(31 (32 (33 (34 (35) (36) (37)

leat lo	ss para	meter (F	HLP), W	m²K					(40)m	= (39)m ÷	- (4)			
10)m=	1.21	1.2	1.2	1.19	1.18	1.17	1.17	1.17	1.18	1.18	1.19	1.2		
	(.) .		. (l. / T - l. l	l - 4 - \						Average =	Sum(40) ₁	12 /12=	1.19	(4
lumbe	i		nth (Tab		N/	1	11	A	0	0-4	N ₁			
14\	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(4
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(4
4. Wa	ter heat	ing ener	rgy requi	rement:								kWh/ye	ear:	
ssum	ed occu	pancy, I	N								1.	83		(4
			+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13	.9)			
	A £ 13.9	•	otor uco	no in litro	oc par da	w Vd av	orago –	(25 x N)	. 26					(4
								(25 X IN) to achieve		se target o		7.7		(4
ot more	that 125	litres per p	person per	day (all w	ater use, l	not and co	ld)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
ot wate	er usage ir	n litres per	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)			•			
14)m=	85.47	82.36	79.25	76.14	73.04	69.93	69.93	73.04	76.14	79.25	82.36	85.47		
											m(44) ₁₁₂ =	L	932.38	(4
nergy (content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
5)m=	126.75	110.85	114.39	99.73	95.69	82.57	76.52	87.81	88.85	103.55	113.03	122.75		
										Total = Su	m(45) ₁₁₂ =	=	1222.49	(4
instan	aneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)					
6)m=	19.01	16.63	17.16	14.96	14.35	12.39	11.48	13.17	13.33	15.53	16.96	18.41		(4
	storage		منام مان مان		۸۱ سمیر	//// IDC	-4	م منطقتین		امما		1		, ,
_		, ,		•			_	within sa	ame ves	Sei		150		(4
	•	-	nd no ta		-			(47) mbi boil	are) ant	ar '∩' in <i>(</i>	7 47)			
	storage		not wate	ar (uno n	iciuues i	iistaiitai	ieous co	ilibi boli	ers) erik	51 0 111 ((47)			
	_		eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(4
empe	rature fa	actor fro	m Table	2b			• •				0.	54		(4
-			storage		ear			(48) x (49)) =			75		` (5
٠.			eclared o	•		or is not	known:							(-
		•	factor fr		e 2 (kW	h/litre/da	ıy)					0		(5
		•	ee secti	on 4.3										
	e factor			O.b.								0		(5
•			m Table									0		(5
٠.			storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	-	0		(5
	(50) or (, ,	•					((50)	(44)		0.	75		(5
vater		loss cal	culated f		month		г	((56)m = (55) × (41)	m				
6)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		(5
cylinde	er contains	dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	ix H	
7)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		(5
rimar	v circuit	loss (an	nual) fro	m Table	3				_			0		(5
	•	,	,			59)m = ((58) ÷ 36	65 × (41)	m					
	-				,		. ,	ng and a		r thermo	stat)			
	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(5

Cambila		alata d	fa., a a a	ممر جا	th /	C4\	/CO	v . 20	CE (44)	١								
Combi lo	oss car	culated	or eac	n m	nonth (0	(60 	0 + 30	0)m o		0	0	0	0]	(61)
				hea			L l fo						<u> </u>	<u> </u>			J (59)m + (61)m	(-)
	73.34	152.94	160.99	_	144.82	142.29		27.67	123.11	134	_	133.95	150.15	158.13	169.3			(62)
Solar DHW							<u> </u>		L	<u> </u>				1			l	` ,
(add add								_										
(63)m=	0	0	0	Τ	0	0	Ė	0	0	0)	0	0	0	0			(63)
Output fr	om wa	ater hea	ter	•			•						•	•	•		•	
(64)m= 1	73.34	152.94	160.99	1	144.82	142.29	12	27.67	123.11	134	1.4	133.95	150.15	158.13	169.3	34		
				•							Outp	out from wa	ater heate	er (annual) ₁	12		1771.11	(64)
Heat gair	ns fror	n water	heating	g, k\	Wh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	د [(46)m	+ (57)m	+ (59	})m]	
(65)m= 7	79.42	70.53	75.31	(69.23	69.09	6	3.53	62.72	66.	47	65.62	71.71	73.66	78.0	19		(65)
include	e (57)r	m in calc	culation	of	(65)m	only if o	ylir	nder i	s in the o	dwell	ing	or hot w	ater is f	rom com	munit	ty h	eating	
5. Inter	nal ga	ins (see	Table	5 a	and 5a)):												
Metabolio	c gain	s (Table	5), Wa	atts														
	Jan	Feb	Mar	\neg	Apr	May		Jun	Jul	Α	ug	Sep	Oct	Nov	De	ЭС		
(66)m=	91.57	91.57	91.57	(91.57	91.57	9	1.57	91.57	91.	57	91.57	91.57	91.57	91.5	57		(66)
Lighting (gains	(calculat	ted in A	\ppe	endix l	_, equat	ion	L9 o	r L9a), a	lso s	ee -	Table 5						
(67)m= 1	14.23	12.64	10.28		7.78	5.82	4	1.91	5.31	6.9	9	9.26	11.76	13.72	14.6	3		(67)
Appliance	es gai	ns (calc	ulated	in A	Append	lix L, eq	uat	ion L	13 or L1	3a),	also	see Ta	ble 5		-		•	
(68)m= 1	59.67	161.33	157.15	5 1	148.26	137.04	1	26.5	119.45	117	7.8	121.97	130.86	142.08	152.0	62		(68)
Cooking	gains	(calcula	ted in	Арр	endix	L, equa	tior	L15	or L15a)	, als	o se	e Table	5				•	
(69)m= 3	32.16	32.16	32.16	Ţ;	32.16	32.16	3	2.16	32.16	32.	16	32.16	32.16	32.16	32.1	6		(69)
Pumps a	nd far	ns gains	(Table	5a))													
(70)m=	3	3	3		3	3		3	3	3	1	3	3	3	3			(70)
Losses e	.g. ev	aporatio	n (neg	ativ	e value	es) (Tal	le :	5)					-					
(71)m= -	73.26	-73.26	-73.26	-	-73.26	-73.26	-7	73.26	-73.26	-73	.26	-73.26	-73.26	-73.26	-73.2	26		(71)
Water he	ating	gains (T	able 5)	-				_	-			-	-				
(72)m= 1	06.75	104.95	101.22	2 9	96.16	92.87	8	8.24	84.3	89.	34	91.14	96.38	102.3	104.9	96		(72)
Total int	ernal	gains =						(66)	m + (67)m	+ (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m			
(73)m= 3	34.12	332.39	322.13	3	305.68	289.2	27	73.12	262.53	267	.51	275.84	292.47	311.58	325.0	69		(73)
6. Solar	Ť																	
_			-	lar flu	ux from	Table 6a	and			tions	to co	nvert to th	e applica	ble orienta	tion.			
Orientation		ccess Fable 6d	actor		Area m²			Flu	x ble 6a		т	g_ able 6b	т	FF able 6c			Gains (W)	
	_			_	111-					1	-		_ ' 				(()	,
East	0.9x	0.77		×	3.9	9	X	1	9.64	X		0.63	x	0.7	_	=	23.41	(76)
East	0.9x	0.77	=	× L	3.9		X		88.42	X		0.63		0.7		=	45.79	(76)
East	0.9x	0.77	=	× L	3.9	==	X		3.27	X		0.63	x	0.7	_	=	75.41	(76)
East	0.9x	0.77	_	x L	3.9		X	9	2.28	X		0.63	x	0.7	_	=	109.99	(76)
East	0.9x	0.77		x L	3.9	9	X	1	13.09	X		0.63	х	0.7		=	134.79	(76)

East	٥۲					٦			1			Г		_	ı		7(70)
East	0.9x	0.77	_	X	3.9	X		15.77] X]	0.63	_	× [0.7	=	=	137.99	 (76)
	0.9x	0.77	_	X	3.9	J X	_	10.22	X	0.63		X L	0.7	=	=	131.37](76)
East	0.9x	0.77		X	3.9	」 ^X		14.68	X	0.63	_	X L	0.7	=	=	112.84	」 (76)
East	0.9x	0.77	_	X	3.9	X	7	3.59	X	0.63		X	0.7	_	=	87.71	<u> </u> (76)
East -	0.9x	0.77		X	3.9	X	4	5.59	X	0.63		x [0.7	_	=	54.34	(76)
East	0.9x	0.77		X	3.9	X	2	4.49	X	0.63		x [0.7		=	29.19	(76)
East	0.9x	0.77		X	3.9	X		6.15	Х	0.63		x [0.7		=	19.25	(76)
West	0.9x	0.77		X	5.6	X	1	9.64	X	0.63		x	0.7		=	33.61	(80)
West	0.9x	0.77		X	1.43	X	1	9.64	X	0.63		х	0.7		=	8.58	(80)
West	0.9x	0.77		x	5.6	X	3	88.42	X	0.63		x	0.7		=	65.75	(80)
West	0.9x	0.77		x	1.43	X	3	8.42	X	0.63		x	0.7		=	16.79	(80)
West	0.9x	0.77		x	5.6	X	6	3.27	X	0.63		x [0.7		=	108.29	(80)
West	0.9x	0.77		x	1.43	X	6	3.27	x	0.63		x [0.7		=	27.65	(80)
West	0.9x	0.77		x	5.6	X	9	2.28	x	0.63		x [0.7		=	157.93	(80)
West	0.9x	0.77		x	1.43	X	9	2.28	x	0.63		x [0.7		=	40.33	(80)
West	0.9x	0.77		x	5.6	X	1	13.09	x	0.63		x [0.7		=	193.55	(80)
West	0.9x	0.77		x	1.43	X	1	13.09	x	0.63		x [0.7		=	49.42	(80)
West	0.9x	0.77		x	5.6	X	1	15.77	x	0.63		x [0.7	司	=	198.13	(80)
West	0.9x	0.77		x	1.43	x	1	15.77	x	0.63		x [0.7	Ħ	=	50.59	(80)
West	0.9x	0.77		x	5.6	x	1	10.22	х	0.63		x [0.7	Ħ	=	188.63	(80)
West	0.9x	0.77		x	1.43	X	1	10.22	x	0.63		χĪ	0.7	一	=	48.17	(80)
West	0.9x	0.77		x	5.6	j×		4.68	x	0.63		x [0.7	一	=	162.03	(80)
West	0.9x	0.77		x	1.43	X	9	4.68	x	0.63		x [0.7		=	41.38	(80)
West	0.9x	0.77		x	5.6	X	7	3.59	X	0.63		x [0.7	司	=	125.94	(80)
West	0.9x	0.77		x	1.43	X	7	3.59	x	0.63		x [0.7	一	=	32.16	(80)
West	0.9x	0.77		x	5.6	X	4	5.59	X	0.63		x [0.7		=	78.02	(80)
West	0.9x	0.77		x	1.43	X	4	5.59	X	0.63		x [0.7		=	19.92	(80)
West	0.9x	0.77		x	5.6	X		4.49	X	0.63		x [0.7	一	_	41.91	(80)
West	0.9x	0.77		x	1.43	X		4.49	X	0.63		χ	0.7	〓	_	10.7	(80)
West	0.9x	0.77		x	5.6	X		6.15	X	0.63		x [0.7	一	_	27.64	(80)
West	0.9x	0.77		x	1.43	X	_	6.15) x	0.63		x [0.7	一	_	7.06	(80)
	L					_			1						,		J, ,
Solar g	ains in	watts, ca	lculat	ed	for each mon	ıth			(83)m	n = Sum(74)	m(82	!)m					
(83)m=	65.61	128.34	211.3	$\overline{}$	308.25 377.7	-	886.71	368.17	316	.25 245.8	31 152	2.28	81.8	53.9	5		(83)
Total g	ains – ir	nternal a	nd sol	ar	(84)m = (73) r	n + (83)m	, watts									
(84)m=	399.73	460.73	533.4	В	613.92 666.9	7 6	59.83	630.7	583	.76 521.6	65 444	4.75	393.38	379.6	64		(84)
7. Me	an inter	nal temp	eratur	e (heating seas	on)											
Temp	erature	during h	eating	ре	eriods in the li	iving	area	from Tal	ole 9	, Th1 (°C))					21	(85)
Utilisa	tion fac	tor for ga	ains fo	r li	ving area, h1	,m (s	see Ta	ble 9a)							,		_
	Jan	Feb	Ма	r	Apr Ma	y	Jun	Jul	Α	ug Se	p C	Oct	Nov	De	С		
(86)m=	1	0.99	0.97	T	0.92 0.79		0.6	0.44	0.	5 0.76	0.	95	0.99	1			(86)
ا Mean	interna	l temper:	ature i	n li	ving area T1	(follo	ow ste	ns 3 to 7	7 in T	able 9c)							
(87)m=	19.8	19.97	20.26	$\overline{}$	20.62 20.87		20.97	20.99	20.		2 20	.57	20.12	19.7	7		(87)
· [I			Į	!					!			

_									()					
				eriods ir		<u>_</u>			- ` ´					(00)
(88)m=	19.91	19.92	19.92	19.93	19.93	19.94	19.94	19.94	19.94	19.93	19.93	19.92		(88)
Г				rest of d		```	·	 						(00)
(89)m=	0.99	0.99	0.96	0.89	0.73	0.51	0.34	0.39	0.67	0.93	0.99	1		(89)
Mean						, ` `		· ·	7 in Tabl	e 9c)				
(90)m=	18.34	18.58	19	19.5	19.81	19.93	19.94	19.94	19.88	19.45	18.81	18.3		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.48	(91)
Mean_	interna	l temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m=	19.04	19.25	19.61	20.04	20.32	20.43	20.45	20.45	20.38	19.99	19.44	19.01		(92)
Apply	adjustn	nent to t			temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	19.04	19.25	19.61	20.04	20.32	20.43	20.45	20.45	20.38	19.99	19.44	19.01		(93)
			uirement											
				mperatur using Ta		ed at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
L Litilisat			ains, hm		iviay	Juli	Jui	Aug	Sep	OCI	NOV	Dec		
(94)m=	0.99	0.98	0.96	0.89	0.75	0.55	0.39	0.44	0.71	0.93	0.98	0.99		(94)
L				4)m x (84				-						` '
(95)m=	396.55	453.41	512.47	547.14	500.39	364.13	245.55	256.65	371.36	414.43	387.21	377.24		(95)
Month	ly avera	age exte	rnal tem	perature	from Ta	able 8	<u> </u>	<u> </u>	ļ		<u> </u>	<u> </u>		
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat lo	oss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	974.91	946.76	862.52	724.26	559.14	374.25	247	259.24	404.64	609.33	804.36	969.72		(97)
Space	heatin	g require	ement fo	r each m	nonth, k	Wh/mon	th = 0.02	4 x [(97))m – (95)m] x (4 ⁻	1)m			
(98)m=	430.3	331.53	260.44	127.53	43.71	0	0	0	0	145	300.34	440.81		
-								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2079.66	(98)
Space	heatin	g require	ement in	kWh/m²	/year								37.95	(99)
9a. Ene	ergy rec	uiremer	nts – Indi	ividual h	eating s	ystems i	ncluding	micro-C	CHP)					
	e heatir					,	<u>_</u>		,					
Fraction	on of sp	ace hea	t from s	econdar	y/supple	mentary	system						0	(201)
Fractio	on of sp	ace hea	t from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fractio	on of to	tal heati	ng from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficie	ncy of r	nain spa	ace heat	ing syste	em 1								93.5	(206)
	•	•		ementar		g system	າ, %						0	(208)
Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	
Space				alculate		L	Jui	Aug	Оер	Oct	INOV	Dec	KVVII/ye	aı
Γ	430.3	331.53	260.44	127.53	43.71	0	0	0	0	145	300.34	440.81		
(211)m	- {[(98)m x (20	Δ)]	00 ÷ (20	16)	l	l		ļ					(211)
(211)	460.21	354.58	278.54	136.4	46.75	0	0	0	0	155.08	321.22	471.45		(211)
L						<u> </u>			l (kWh/yea				2224.24	(211)
Snace	heatin	a fuel (s	econdar	y), kWh/	month						710,1012			` ′
•		•	00 ÷ (20	• , .										
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
L						•		Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
O	OAD 004	0.\/===!==	10126/	(CAD 0 00)	h44m . //	+							Paga	

Water heating								
Output from water heater (calculated above) 173.34 152.94 160.99 144.82 142.29 1	27.67 123.11	134.4	133.95	150.15	158.13	169.34		
Efficiency of water heater		ļ!					79.8	(216)
(217)m= 87.14 86.82 86.09 84.48 82.08	79.8 79.8	79.8	79.8	84.72	86.5	87.25		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m	•				•	•	•	
(219)m= 198.91 176.15 187 171.43 173.35 1	59.98 154.28	168.42	167.85	177.22	182.8	194.08		_
		Total	= Sum(2	19a) ₁₁₂ =			2111.48	(219)
Annual totals				k\	Wh/year	•	kWh/year	7
Space heating fuel used, main system 1							2224.24	_
Water heating fuel used							2111.48	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(2300
boiler with a fan-assisted flue						45		(230
Total electricity for the above, kWh/year		sum	of (230a).	(230g) =			75	(231)
Electricity for lighting							251.39	(232)
12a. CO2 emissions – Individual heating system	s including mi	cro-CHP						
	Energy kWh/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	ır
Space heating (main system 1)	(211) x			0.2	16	=	480.44	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	456.08	(264)
Space and water heating	(261) + (262)	+ (263) + (2	264) =				936.51	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	130.47	(268)
Total CO2, kg/year			oum o	of (265)(2	271) _		1105.91	(272)

TER =

(273)

29.58

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:38:46

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 52.3m² Site Reference: Plot Reference: Maitland Park Estate AC 007

AC 007, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

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

Dwelling Carbon Dioxide Emission Rate (DER) 9.49 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 54.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 52.1 kWh/m²

OK

2 Fabric U-values

Element Highest Average External wall 0.12 (max. 0.30) 0.12 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK Floor 0.12 (max. 0.25) OK 0.12 (max. 0.70)

Roof (no roof)

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

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:	0.5	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: East	4.91m²	
Windows facing: West	7.06m²	
Windows facing: West	2.69m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m ² K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.12 W/m ² K	

Community heating, heat from electric heat pump

Photovoltaic array

			lloor D) otoilo:						
Assessor Name: Software Name:	John Simpson Stroma FSAP 20		User D	Strom Softwa	are Ve	rsion:			0006273 on: 1.0.4.26	
Address :	AC 007, Aspen Co			Address Estate			DEH.			
1. Overall dwelling din		urt, Maille	anu ran	C LSiale,	LUTICUTI	, 14445 2				
1. Overall awelling and	ionolono.		Are	a(m²)		Av. He	eight(m)		Volume(m ³	3)
Ground floor				<u> </u>	(1a) x		2.9	(2a) =	151.67	(3a)
Total floor area TFA = ((1a)+(1b)+(1c)+(1d)+(1	e)+(1r	n) [52.3	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	151.67	(5)
2. Ventilation rate:										
		secondar heating	у	other		total			m³ per hou	ır
Number of chimneys	0 +	0	7 + [0	=	0	X e	40 =	0	(6a)
Number of open flues	0 +	0	Ī + Ē	0	Ī = Ē	0	x	20 =	0	(6b)
Number of intermittent	fans					0	x	10 =	0	(7a)
Number of passive ven	ts				F	0	x	10 =	0	(7b)
Number of flueless gas					L	0	X	40 =	0	(7c)
rtamber et maelees gae					L				<u> </u>	(,,,)
								Air ch	nanges per ho	our
Infiltration due to chimn	eys, flues and fans = ((6a)+(6b)+(7	a)+(7b)+(7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has	s been carried out or is intend	ded, procee	d to (17),	otherwise (continue fr	om (9) to	(16)			
Number of storeys in	the dwelling (ns)								0	(9)
Additional infiltration	0.05 (a.e. at a al a a that a		0.05.6				[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber present, use the value corre				•	uction			0	(11)
	nings); if equal user 0.35	oponang to	rino groui	or wan are	a (anoi					
If suspended wooder	n floor, enter 0.2 (unsea	aled) or 0	.1 (seale	ed), else	enter 0				0	(12)
•	enter 0.05, else enter 0								0	(13)
J	ws and doors draught s	stripped		0.05 10.0		0.01			0	(14)
Window infiltration				0.25 - [0.2] (8) + (10)			. (15) _		0	(15)
Infiltration rate	e, q50, expressed in cu	ibio motro	o par ba	. , , ,	. , ,	, , ,	, ,	aroa	0	(16)
If based on air permeal	• • •		•	•	•	elle ol e	envelope	area	0.1	(17)
•	lies if a pressurisation test h					is being u	sed		0.1	(10)
Number of sides shelte	red								2	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorpor	ating shelter factor			(21) = (18) x (20) =				0.08	(21)
Infiltration rate modified		ed				1			1	
Jan Feb	Mar Apr May	/ Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind	speed from Table 7							•	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]	
L			ь				-		1	

0.11	0.11	0.1	0.09	0.09	0.08	0.08	0.08	(22a)m _{0.08}	0.09	0.1	0.1]	
Calculate effe		-			l	l	0.00	0.00	0.00	0.1	0.1	J	
If mechanic	al ventila	tion:										0.5	(23
If exhaust air h		0		, ,	, ,	. `	,, .	,) = (23a)			0.5	(23
If balanced wit	h heat reco	very: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				76.5	(23
a) If balance						- ` ` 	- 	ŕ	– `	23b) × [1 – (23c)	÷ 100]	
(24a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(24
b) If balance					i	- 	ЛV) (24b	m = (22)	2b)m + (23b)		1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h				-					F (00h	. \			
	n < 0.5 ×	(23b), t	nen (240 0	0 = (230	o); otnerv	wise (24)	C) = (220)	o) m + 0.	5 × (230	0	0	1	(24
				_	<u> </u>				0	0	0	J	(24
d) If natural if (22b)r	ventilation								0.51				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
Effective air	change	rate - er	ıter (24a	or (24b	o) or (24	c) or (24	d) in box	· (25)	<u> </u>		!	J	
(25)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]	(25
												,	
3. Heat losse		·											
ELEMENT	Gros area	_	Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I		k-value kJ/m²-l		۹Xk ۸J/K
Doors	u. • u	()	•••		2.93		1.4	 	4.102				(26
Windows Type	e 1				4.91	〓 ,	/[1/(1.4)+	0.041 =	6.51	=			(27
Windows Type						=		· [0.01				(
						I VI	/[1/(1.4)+	0.041 -	0.36				(27
					7.06	=	/[1/(1.4)+ /[1/(1.4)+	L	9.36				`
Windows Type					2.69	x1	/[1/(1.4)+	0.04] =	3.57			-	(27
Windows Type Floor	3		47.5		2.69	x1.	/[1/(1.4)+ 0.12	0.04] = [3.57 6.276] <u> </u>	(27
Windows Type Floor Walls	34.6		17.59	9	2.69 52.3 17.04	x1, x	/[1/(1.4)+	0.04] =	3.57				(27
Windows Type Floor Walls Total area of e	34.6		17.59)	2.69 52.3 17.04 86.93	x1. x 4 x 3	0.12 0.12	0.04] = [3.57 6.276 2.04				(27 (27 (28 (29 (31
Windows Type Floor Walls Fotal area of e Party wall	34.6 3elements	, m²			2.69 52.3 17.04 86.93 49.76	x14 x x 3 x x	0.12 0.12	0.04] = [3.57 6.276 2.04				(27)
Windows Type Floor Walls Fotal area of e Party wall	34.6 selements	, m² ows, use e	ffective wi	ndow U-va	2.69 52.3 17.04 86.93 49.76 alue calcul	x14 x x 3 x x	0.12 0.12	0.04] = [3.57 6.276 2.04	as given in	paragraph] [(27)
Windows Type Floor Walls Fotal area of e Party wall for windows and	34.6 34.6 selements	, m² ows, use e sides of in	ffective wi	ndow U-va	2.69 52.3 17.04 86.93 49.76 alue calcul	x1 x 4 x 3 x 4 x a x a x	0.12 0.12	0.04] = [3.57 6.276 2.04	as given in	paragraph	31.86	(27) (28) (37) (32)
Windows Type Floor Walls Fotal area of e Party wall For windows and include the area Fabric heat los	34.6 34.6 elements I roof windows on both ss, W/K =	, m² ows, use e sides of in = S (A x	ffective wi	ndow U-va	2.69 52.3 17.04 86.93 49.76 alue calcul	x1 x 4 x 3 x 4 x a x a x	0.12 0.12 0 on formula 1	$0.04] = \begin{bmatrix} \\ \\ \\ \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix}$ $= \begin{bmatrix} \\ \\ \end{bmatrix} /[(1/U-valu)] + (32) = \begin{bmatrix} \\ \end{bmatrix}$	3.57 6.276 2.04				(27) (28) (31) (32) (33)
Windows Type Floor Walls Fotal area of e Party wall For windows and include the are Fabric heat los	34.6 Selements Froof winder as on both as, W/K = Cm = S(, m² ows, use e sides of int S (A x A x k)	ffective wi ternal wali U)	ndow U-va	2.69 52.3 17.04 86.93 49.76 alue calcultitions	x1. x 4 x 3 3 6 x Pated using	0.12 0.12 0 on formula 1	0.04] = [3.57 6.276 2.04 0 ue)+0.04] a	2) + (32a).		31.86	(27) (26) (27) (37) (32) (34) (34)
Windows Type Floor Walls Fotal area of e Party wall * for windows and ** include the are Fabric heat los Heat capacity Thermal mass	34.6 34.6 A roof windows on both SS, W/K = Cm = S(parame	, m² bws, use e sides of in a S (A x A x A x B) ter (TMF	ffective wil ternal wall U) P = Cm ÷	ndow U-va Is and part	2.69 52.3 17.04 86.93 49.76 alue calculatitions	x1 x 4 x 3 x 4 x 4 x 3 a 5 x	0.12 0.12 0.12 0 of formula 1	0.04] = [3.57 6.276 2.04 0 (e)+0.04] a tive Value	2) + (32a). : Medium	(32e) =	31.86	(27) (28) (32) (32) (34) (34)
Windows Type Floor Walls Fotal area of e Party wall For windows and Finclude the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste	34.6 A roof windows on both SS, W/K = Cm = S(S parame Sments while ad of a determination of a determin	, m² cows, use e sides of in = S (A x A x k) ter (TMF ere the de tailed calcu	ffective winternal walk U) P = Cm ÷ tails of the ulation.	ndow U-va s and part - TFA) ir constructi	2.69 52.3 17.04 86.93 49.76 alue calcultitions	x1. x 4 x 3 x dated using	0.12 0.12 0.12 0 of formula 1	0.04] = [3.57 6.276 2.04 0 (e)+0.04] a tive Value	2) + (32a). : Medium	(32e) =	31.86	(27 (28 (29 (37 (32 (32 (34 (34)
Windows Type Floor Walls Fotal area of e Party wall For windows and include the area Fabric heat lose Heat capacity Thermal mass can be used inste	34.6 34.6 A roof winder as on both as, W/K = Cm = S(a parame asments whead of a det es : S (L	, m² sides of interpolation S (A x A x k) ter (TMF) ere the dentalled calculus x Y) calculus	ffective winternal wall U) P = Cm ÷ tails of the ulation. culated to	ndow U-vals and part - TFA) ir constructi	2.69 52.3 17.04 86.93 49.76 alue calcul titions h kJ/m²K ion are not	x1. x 4 x 3 x dated using	0.12 0.12 0.12 0 of formula 1	0.04] = [3.57 6.276 2.04 0 (e)+0.04] a tive Value	2) + (32a). : Medium	(32e) =	31.86	(27 (28 (29 (31 (32 (32 (33 (34 (38
Windows Type Floor Walls Fotal area of e Party wall for windows and include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste	34.6 A roof windown as on both ss, W/K = Cm = S(a parame sments whead of a detection and of a detection and bridging	, m² sides of interpolation S (A x A x k) ter (TMF) ere the dentalled calculus x Y) calculus	ffective winternal wall U) P = Cm ÷ tails of the ulation. culated to	ndow U-vals and part - TFA) ir constructi	2.69 52.3 17.04 86.93 49.76 alue calcul titions h kJ/m²K ion are not	x1. x 4 x 3 x dated using	0.12 0.12 0.12 0 of formula 1	0.04] = [3.57 6.276 2.04 0 ue)+0.04] a(30) + (32) tive Value e values of	2) + (32a). : Medium	(32e) =	31.86 0 250 9.61	(27 (28 (32 (33 (33 (34 (34) (34)
Windows Type Floor Walls Fotal area of e Party wall For windows and include the area Fabric heat lose Heat capacity Thermal mass For design assess an be used instea Thermal bridg If details of therma	34.6 34.6 Plements I roof windo as on both as, W/K = Cm = S(a parame and of a det es : S (L al bridging at loss	, m² sides of in S (A x A x k) ter (TMF) ere the de tailed calcu x Y) calcu are not kn	ffective winternal walk U) P = Cm ÷ tails of the ulation. culated to	ndow U-vals and part - TFA) ir constructi using Ap	2.69 52.3 17.04 86.93 49.76 alue calcul titions h kJ/m²K ion are not	x1. x 4 x 3 x dated using	0.12 0.12 0.12 0 of formula 1	0.04] = [3.57 6.276 2.04 0 ue)+0.04] a tive Value e values of	2) + (32a). : Medium : TMP in Ta	(32e) =	31.86 0 250	(27 (28 (32 (33 (33 (34 (34) (34)
Windows Type Floor Walls Fotal area of e Party wall For windows and Findle the area Fabric heat lose Heat capacity Thermal mass For design assess Fan be used instea Thermal bridg If details of thermal Fotal fabric head Ventilation head	34.6 elements I roof windo as on both as, W/K = Cm = S(a parame and of a det es : S (L al bridging eat loss at loss ca	, m² sides of in S (A x A x k) ter (TMF ere the de tailed calcu x Y) calcu are not kn	ffective winternal walk U) P = Cm ÷ tails of the valuation. culated to cown (36) =	ndow U-ve ls and part - TFA) ir constructi using Ap = 0.05 x (3	2.69 52.3 17.04 86.93 49.76 alue calcul titions h kJ/m²K ion are not opendix h	x1. x 4 x 3 x 4 x 4 x 3 x 4 x 4 x 6 x 4 dated using	0.12 0.12 0.12 0 of formula 1 (26)(30)	0.04] = [3.57 6.276 2.04 0 0 0e)+0.04] a tive Value e values of (36) = = 0.33 × (2) + (32a). : Medium : <i>TMP in T</i> 3	(32e) = able 1f	31.86 0 250 9.61	(27 (28 (29 (37 (32 (32 (34 (34 (36)
Windows Type Floor Walls Total area of e Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass can be used inste Thermal bridg if details of therma Total fabric hea Ventilation hea	34.6 A roof winder as on both as on both as where as parame as ments where ad of a det al bridging at loss at loss ca	, m² ows, use esides of intermediale calculated mare mare mare	ffective winternal walk U) P = Cm ÷ tails of the ulation. culated to	ndow U-vals and part - TFA) ir constructi using Ap = 0.05 x (3	2.69 52.3 17.04 86.93 49.76 alue calcul titions h kJ/m²K ion are not opendix H	x1. x 4 x 3 x dated using	0.12 0.12 0.12 0 of formula 1	0.04] = [3.57 6.276 2.04 0 1e)+0.04] a tive Value a values of (36) = = 0.33 × (Oct	2) + (32a). : Medium : <i>TMP in Ta</i> (25)m x (5) Nov	(32e) =	31.86 0 250 9.61	(27
Windows Type Floor Walls Fotal area of expansive wall for windows and include the area Fabric heat lose Heat capacity Thermal mass For design assess can be used instea Thermal bridg of details of therma Fotal fabric heav Ventilation heav Jan 38)m= 11.31	34.6 A roof windows on both ss, W/K = Cm = S(a parame whead of a detection and bridging that loss at loss cat loss ca	, m² ows, use e sides of in a	ffective winternal wall U) P = Cm ÷ tails of the ulation. culated u own (36) =	ndow U-ve ls and part - TFA) ir constructi using Ap = 0.05 x (3	2.69 52.3 17.04 86.93 49.76 alue calcul titions h kJ/m²K ion are not opendix h	x1 x x x x x x x x x x x x x x x x x x	0.12 0.12 0 formula 1 (26)(30)	0.04] = [3.57 6.276 2.04 0 1e)+0.04] a tive Value a values of (36) = = 0.33 × (Oct 10.45	2) + (32a). : Medium : TMP in Ta (25)m x (5) Nov 10.67	(32e) = able 1f Dec	31.86 0 250 9.61	(27 (28 (31) (32) (32) (34) (35) (36) (36)
Windows Type Floor Walls Fotal area of e Party wall For windows and Finclude the area Fabric heat los Heat capacity Thermal mass For design assess For design assess For he used inste	34.6 A roof windows on both ss, W/K = Cm = S(a parame whead of a detection and bridging that loss at loss cat loss ca	, m² ows, use e sides of in a	ffective winternal wall U) P = Cm ÷ tails of the ulation. culated u own (36) =	ndow U-vals and part - TFA) ir constructi using Ap = 0.05 x (3	2.69 52.3 17.04 86.93 49.76 alue calcultitions h kJ/m²K ion are not opendix H	x1 x x x x x x x x x x x x x x x x x x	0.12 0.12 0 formula 1 (26)(30)	0.04] = [3.57 6.276 2.04 0 1e)+0.04] a tive Value a values of (36) = = 0.33 × (Oct	2) + (32a). : Medium : TMP in Ta (25)m x (5) Nov 10.67	(32e) = able 1f Dec	31.86 0 250 9.61	(27 (28 (29 (37 (32 (32 (33 (34 (34 (34 (35) (34 (35) (35) (35)

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 1.01	1.01	1.01	0.99	0.99	0.98	0.98	0.98	0.99	0.99	1	1		
		!	<u>. </u>	<u>. </u>	<u>. </u>	<u>. </u>	!		Average =	Sum(40) ₁ .	12 /12=	0.99	(40)
Number of day		' ` 			· .				<u> </u>				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(44)
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occurring TFA > 13.1 if TFA £ 13.1	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		76		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the α	lwelling is	designed t			se target c		.95		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i	in litres pe	r day for ea				Table 1c x				!			
(44)m= 83.55	80.51	77.47	74.43	71.39	68.36	68.36	71.39	74.43	77.47	80.51	83.55		
		•			100 1/1		·			m(44) ₁₁₂ =		911.41	(44)
Energy content of													
(45)m= 123.9	108.36	111.82	97.49	93.54	80.72	74.8	85.83	86.86	101.22	110.49	119.99		(45)
If instantaneous v	vater heati	ing at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1195	(45)
(46)m= 18.58	16.25	16.77	14.62	14.03	12.11	11.22	12.87	13.03	15.18	16.57	18		(46)
Water storage					<u> </u>	<u> </u>	<u> </u>						
Storage volum	ne (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	•			-			, ,						
Otherwise if no		hot wate	er (this ir	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in ((47)			
Water storage a) If manufact		eclared I	oss facto	or is kno	wn (kWł	n/dav):					0		(48)
Temperature f					(.,, , .					0		(49)
Energy lost fro				ear			(48) x (49)) =			10		(50)
b) If manufact		•			or is not	known:							` '
Hot water stor	-			e 2 (kW	h/litre/da	ıy)				0.	02		(51)
If community he Volume factor	•		on 4.3								02		(52)
Temperature f			2b							-	.6		(52)
Energy lost fro				ear			(47) x (51)) x (52) x (53) =		03		(54)
Enter (50) or		_	, ,				. , , , ,		,		03		(55)
Water storage	loss cal	culated t	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 cylinder contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	x 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)
Primary circuit	· · loss (ar	nnual) fro	m Table	· 3				•	•		0		(58)
Primary circuit	`	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by				,	•	. ,	, ,		r thermo	stat)			
(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 c	alculated	for each	month ((61)m =	(60) ÷ 3	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(61)
	 guired for	water he	eating ca	Lulated	L I for eac	h month	(62)m	= 0.85 × 0	L (45)m +	(46)m +	(57)m +	ı (59)m + (61)m	
(62)m= 179.17		167.09	150.98	148.82	134.21	130.07	141.1		156.5	163.99	175.26]	(62)
Solar DHW inpu	t calculated	using App	endix G oı	Appendix	H (negati	ve quantity	L/) (enter	'0' if no sola	r contribu	tion to wate	r heating)	1	
(add addition											0,		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(63)
Output from	water hea	ter				!	•		•	•	•	•	
(64)m= 179.17	7 158.29	167.09	150.98	148.82	134.21	130.07	141.1	1 140.35	156.5	163.99	175.26]	
						l	0	utput from wa	ater heate	er (annual)	112	1845.84	(64)
Heat gains fr	om water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m] + 0.8 x	k [(46)m	ı + (57)m	+ (59)m	1]	
(65)m= 85.42	75.97	81.4	75.21	75.32	69.63	69.09	72.76	71.67	77.88	79.53	84.12	1	(65)
include (57	')m in cal	culation of	of (65)m	only if c	ylinder i	s in the o	dwellin	g or hot w	ater is t	rom com	munity h	reating	
5. Internal	gains (see	Table 5	and 5a):									
Metabolic ga	ins (Table	e 5), Wat	ts										
Jan		Mar	Apr	May	Jun	Jul	Aug	g Sep	Oct	Nov	Dec		
(66)m= 87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9		(66)
Lighting gain	s (calcula	ted in Ap	pendix	L, equati	ion L9 o	r L9a), a	lso se	e Table 5					
(67)m= 13.66	12.13	9.87	7.47	5.58	4.71	5.09	6.62	8.89	11.28	13.17	14.04		(67)
Appliances g	ains (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), al	so see Ta	ble 5	•			
(68)m= 153.2	154.79	150.79	142.26	131.49	121.37	114.61	113.0	2 117.03	125.56	136.33	146.44		(68)
Cooking gain	ıs (calcula	ted in A	opendix	L, equat	ion L15	or L15a)), also	see Table	5	-			
(69)m= 31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79		(69)
Pumps and fa	ans gains	(Table 5	āa)			•		•			•	•	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g. 6	evaporatio	n (negat	ive valu	es) (Tab	le 5)	-		-		-	-		
(71)m= -70.32	-70.32	-70.32	-70.32	-70.32	-70.32	-70.32	-70.3	2 -70.32	-70.32	-70.32	-70.32		(71)
Water heatin	g gains (T	able 5)				•		-		-			
(72)m= 114.8°	1 113.05	109.41	104.46	101.24	96.71	92.86	97.8	99.55	104.67	110.46	113.06		(72)
Total interna	al gains =	:			(66)m + (67)m	1 + (68)r	n + (69)m + ((70)m + (71)m + (72))m		
(73)m= 331.0 ⁴	329.35	319.43	303.55	287.69	272.17	261.94	266.8	1 274.83	290.89	309.33	322.91		(73)
6. Solar gai	ns:												
Solar gains are		•	r flux from	Table 6a		•	itions to	convert to th	ne applica		tion.		
Orientation:	Access F Table 6d		Area m²		Flu	ıx ble 6a		g_ Table 6b	-	FF able 6c		Gains (W)	
							, –					` '	1
East 0.9x	_	X	4.9	91	X	19.64	x	0.4	x	0.8	_ =	21.39	(76)
East 0.9x		X	4.9			38.42	x	0.4	x [0.8	=	41.83	(76)
East 0.9x		X	4.9	91	-	53.27	x	0.4	x [0.8	=	68.89	(76)
East 0.9x		X	4.9	91	-	92.28	X	0.4	×	0.8	=	100.48	(76)
East 0.9x	0.77	X	4.9	91	x 1	13.09	X	0.4	X	0.8	=	123.14	(76)

East	٥.٠.٢					¬			1			ا ר		_		7(70)
	0.9x	0.77	_	X	4.91	X		15.77	J X I).4	X	0.8	=	126.06	(76)
East East	0.9x	0.77		X	4.91	」 [×]	<u> </u>	10.22	X).4	_ ×	0.8	= =	120.01	(76)
	0.9x	0.77		X	4.91	」 [×]		14.68	X).4	_ ×	0.8	_ =	103.09	(76)
East	0.9x	0.77		X	4.91	_ X	7	3.59	X	C).4	× [0.8	=	80.13	(76)
East	0.9x	0.77		X	4.91	X	4	5.59	X	C).4	_ x	0.8	=	49.64	(76)
East	0.9x	0.77		X	4.91	×	2	4.49	X	C).4	X	0.8	=	26.66	(76)
East	0.9x	0.77		X	4.91	X		6.15	X	C).4	X	0.8	=	17.59	(76)
West	0.9x	0.77		X	7.06	X	1	9.64	X	C).4	X	0.8	=	30.75	(80)
West	0.9x	0.77		X	2.69	X		9.64	X	C).4	X	0.8	=	11.72	(80)
West	0.9x	0.77		X	7.06	X	3	88.42	X	С).4	X	0.8	=	60.15	(80)
West	0.9x	0.77		X	2.69	X	3	8.42	X	С).4	X	0.8	=	22.92	(80)
West	0.9x	0.77		X	7.06	X	6	3.27	X	C).4	X	0.8	=	99.06	(80)
West	0.9x	0.77		X	2.69	X	6	3.27	x	C).4	X	0.8	=	37.74	(80)
West	0.9x	0.77		X	7.06	X	9	2.28	x	C).4	X	0.8	=	144.48	(80)
West	0.9x	0.77		x	2.69	X	9	2.28	x	C).4	x	0.8	=	55.05	(80)
West	0.9x	0.77		X	7.06	X	1	13.09	x	C).4	x_[0.8	=	177.06	(80)
West	0.9x	0.77		X	2.69	x	1	13.09	x	C).4	x	0.8	=	67.46	(80)
West	0.9x	0.77		X	7.06	x	1	15.77	x	C).4	x	0.8	=	181.25	(80)
West	0.9x	0.77		x	2.69	×	1	15.77	x	C).4	x	0.8	=	69.06	(80)
West	0.9x	0.77		x	7.06	×	1	10.22	x	C).4	x	0.8	=	172.56	(80)
West	0.9x	0.77		x	2.69	X	1	10.22	x	C).4	×	0.8	=	65.75	(80)
West	0.9x	0.77		X	7.06	×	9	4.68	х	C).4	Īx	0.8	=	148.23	(80)
West	0.9x	0.77		x	2.69	X	9	4.68	х	C).4	X	0.8	=	56.48	(80)
West	0.9x	0.77		x	7.06	X	7	3.59	x	C).4	T x	0.8	=	115.21	(80)
West	0.9x	0.77	一	X	2.69	i x	7	3.59	x	C).4	i x	0.8	_ =	43.9	(80)
West	0.9x	0.77	i	x	7.06	X	4	5.59	x	C).4	×	0.8	=	71.38	(80)
West	0.9x	0.77	-	x	2.69	X	4	5.59	x	C).4	×	0.8		27.2	(80)
West	0.9x	0.77	一	X	7.06	i x	2	4.49	x	C).4	i x	0.8	_ =	38.34	(80)
West	0.9x	0.77	i	X	2.69	X	2	4.49	x	C).4	- x	0.8		14.61	(80)
West	0.9x	0.77	一	X	7.06	 x		6.15	x	C).4		0.8		25.29	(80)
West	0.9x	0.77	一	x	2.69	X		6.15	x	C).4	j x [0.8	_ =	9.63	(80)
	L					_			1							
Solar g	ains in	watts, ca	lculat	ed	for each mo	nth			(83)m	n = Sum	(74)m	.(82)m				
(83)m=	63.85	124.91	205.7	7	300 367.	66 3	376.37	358.32	307	.79 2	39.24	148.21	79.61	52.51		(83)
Total g	ains – ir	nternal a	nd so	lar	(84)m = (73)	m + ((83)m	, watts								
(84)m=	394.89	454.25	525.1	3	603.56 655.	35 6	648.54	620.26	574	1.6 5	14.07	439.1	388.94	375.42		(84)
7. Mea	an inter	nal temp	eratu	re (heating seas	son)										
Tempe	erature	during h	eating	g pe	eriods in the	living	area	from Tal	ole 9	, Th1 (°C)				21	(85)
Utilisa	tion fac	tor for ga	ains fo	or li	ving area, h	1,m (s	see Ta	ble 9a)								
[Jan	Feb	Ma	r	Apr M	ay	Jun	Jul	А	ug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.96		0.87 0.7	, T	0.5	0.36	0.4	11 (0.66	0.92	0.99	1		(86)
Mean	interna	l tempera	ature	in li	ving area T1	(follo	ow ste	ps 3 to 7	in T	able 9	 (c)					
(87)m=	20.1	20.26	20.52	\neg	20.8 20.9		20.99	21	2		0.97	20.75	20.37	20.07		(87)
L				_	I	!_		!					Į.		ı	

Temn	oraturo	during h	neating p	ariade ir	rest of	dwelling	from Ta	hla 0 T	h2 (°C)					
(88)m=	20.08	20.08	20.08	20.09	20.09	20.1	20.1	20.1	20.09	20.09	20.09	20.08		(88)
. ,		<u>!</u>	ains for i								20.00	_0.00		, ,
(89)m=	0.99	0.98	0.95	0.83	0.64	0.43	0.29	0.33	0.59	0.89	0.98	0.99		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to 1	7 in Tabl	e 9c)				
(90)m=	18.89	19.12	19.49	19.87	20.05	20.09	20.1	20.1	20.08	19.82	19.29	18.84		(90)
								Į.	f	LA = Livin	g area ÷ (4	1) =	0.47	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	LA × T1	+ (1 – fL	.A) × T2			•		
(92)m=	19.45	19.66	19.97	20.31	20.47	20.52	20.52	20.52	20.5	20.26	19.79	19.42		(92)
Apply	adjustr	nent to t	he mean	internal	temper	ature fro	m Table	4e, whe	re appro	opriate				
(93)m=	19.45	19.66	19.97	20.31	20.47	20.52	20.52	20.52	20.5	20.26	19.79	19.42		(93)
			uirement											
			ternal ter or gains	•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
110 01	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:	,									
(94)m=	0.99	0.98	0.94	0.84	0.67	0.47	0.32	0.37	0.62	0.9	0.98	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (84	4)m									
(95)m=	390.98	444.63	495.68	508.55	436.03	301.87	201.23	210.88	320.05	395.23	380.72	372.52		(95)
		 	rnal tem					I				· ·		4
(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 (97)m=	799.76	777.21	an intern	al tempe 593.66	455.44	Lm , W =	=[(39)m : 201.46	x [(93)m 211.32	- (96)m 330.05	501.34	661.82	796.57		(97)
,			ement fo									790.57		(37)
(98)m=	304.13	223.49	158.17	61.28	14.44	0	0.02	0	0	78.95	202.4	315.5		
(00)								<u> </u>	l per year		<u> </u>		1358.36	(98)
Space	e heatin	a reauir	ement in	kWh/m²	?/vear					(**************************************	,(-		25.97	(99)
·		•	nts – Cor			scheme								
			ace hea		The state of the s			ting prov	ided by	a comm	unity sch	neme.		
			from se								,		0	(301)
Fractio	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-		y obtain he s, geothern							up to four (other heat	sources; th	ne latter	
Fractio	n of hea	at from C	Commun	ity heat _l	pump								1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity he	eat pump)			(3	02) x (303	a) =	1	(304a)
Factor	for cont	trol and	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for c	communi	ity heatii	ng syste	m					1.1	(306)
Space	heating	g											kWh/yea	_
Annua	l space	heating	requirem	nent									1358.36	
Space	heat fro	om Comi	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) =	= [1494.19	(307a)
Efficier	ncy of s	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308

Space heating requirement from secon	ndary/supplementary system	າ (98) x (301) x 1	100 ÷ (308) =	0	(309)
Water heating	, ,,				
Annual water heating requirement				1845.84	7
If DHW from community scheme:	_	(0.4) (202-)	(205) ;; (200)		_
Water heat from Community heat pump	D .		$(305) \times (306) =$	2030.42	(310a)
Electricity used for heat distribution		0.01 × [(30/a)(30/	7e) + (310a)(310e)] =	35.25	(313)
Cooling System Energy Efficiency Ratio			l	0	(314)
Space cooling (if there is a fixed cooling	- ,	$= (107) \div (314)$) =	0	(315)
Electricity for pumps and fans within dv mechanical ventilation - balanced, extra	<u> </u>	ıtside		115.65	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	ır	=(330a) + (330	(b) + (330g) =	115.65	(331)
Energy for lighting (calculated in Apper	ndix L)		Ī	241.21	(332)
Electricity generated by PVs (Appendix	(M) (negative quantity)		ĺ	-540.63	(333)
Electricity generated by wind turbine (A	Appendix M) (negative quan	tity)		0	(334)
12b. CO2 Emissions – Community hea	iting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v		kWh/year		kg CO2/year	(367a)
•	If there is CHP using tw	kWh/year	kg CO2/kWh	kg CO2/year	(367a) (367)
Efficiency of heat source 1 (%)	If there is CHP using tw	kWh/year wo fuels repeat (363) to	kg CO2/kWh (366) for the second fuel	kg CO2/year	`` `
Efficiency of heat source 1 (%) CO2 associated with heat source 1	If there is CHP using tw [(307b)+(31	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 =	319 573.44	
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	If there is CHP using tw [(307b)+(31) [(37b) [(37b)	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 =	319 573.44 18.29	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community	If there is CHP using tw [(307b)+(31) [(337b)+(31) [(33	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(373)	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 = 2) =	319 573.44 18.29 591.73	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	If there is CHP using tw [(307b)+(31) [(37) systems (36) econdary) (30) rsion heater or instantaneous	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(373)	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 = 0.52 = 0 =	319 573.44 18.29 591.73	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community source CO2 associated with space heating (see	If there is CHP using tw [(307b)+(31) [(337b)+(31) [(347b)+(31) [(34	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(373) 9) x us heater (312) x (3) + (374) + (375) =	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 = 0.52 = 0 =	319 573.44 18.29 591.73 0	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and water	If there is CHP using tw [(307b)+(31) [(37) systems (36) econdary) (30) rsion heater or instantaneous water heating (37) the ps and fans within dwelling	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(373) 9) x us heater (312) x (3) + (374) + (375) =	kg CO2/kWh (366) for the second fuel 0.52 = 0.52	319 573.44 18.29 591.73 0 591.73	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and water CO2 associated with electricity for pum	If there is CHP using tw [(307b)+(31) [(337b)+(31) [(347b)+(31) [(34	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(373) 9) x us heater (312) x (3) + (374) + (375) = (331)) x (2))) x	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 = 0.52 = 0.52 = 0 = 0.52 =	319 573.44 18.29 591.73 0 591.73 60.02	(367) (372) (373) (374) (375) (376) (378)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and co2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and with co2 associated with electricity for pure CO2 associated with electricity for light Energy saving/generation technologies litem 1	If there is CHP using tw [(307b)+(31) [(337b)+(31) [(347b)+(31) [(34	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(373) 9) x us heater (312) x (3) + (374) + (375) = (331)) x (2))) x	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 573.44 18.29 591.73 0 0 591.73 60.02 125.19	(367) (372) (373) (374) (375) (376) (378) (379)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community and co2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and with co2 associated with electricity for pure CO2 associated with electricity for light Energy saving/generation technologies	If there is CHP using tw [(307b)+(31 [(337b)+(31) [(337	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(373) 9) x us heater (312) x (3) + (374) + (375) = (331)) x (2))) x	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 573.44 18.29 591.73 0 0 591.73 60.02 125.19	(367) (372) (373) (374) (375) (376) (378) (379)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community of the community of the control of the contr	If there is CHP using tw [(307b)+(31 [(37b)+(31) [(37b	kWh/year vo fuels repeat (363) to 0b)] x 100 ÷ (367b) x 13) x 3)(366) + (368)(373) 9) x us heater (312) x (3) + (374) + (375) = (331)) x (2))) x	kg CO2/kWh (366) for the second fuel 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 573.44 18.29 591.73 0 0 591.73 60.02 125.19 -280.58 496.36	(367) (372) (373) (374) (375) (376) (378) (379) (380) (383)

			lloor D) otoilo						
Assessor Name: Software Name:	John Simpson Stroma FSAP 201	12	User D	Strom Softwa					0006273 on: 1.0.4.26	
Address	AC 007 Appen Cou			Address			ьги			
Address: 1. Overall dwelling dime	AC 007, Aspen Cou	urt, Maitia	and Pari	CESIAIE,	London	, INVV3 Z	EH			
1. Overall dwelling diffle	11310113.		Δτο:	a(m²)		Δν Ηρ	ight(m)		Volume(m³	١
Ground floor					(1a) x		2.9	(2a) =	151.67	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e	e)+(1r	n) :	52.3	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	151.67	(5)
2. Ventilation rate:										
Number of chimneys		econdar heating	'y □ + □	other 0] = [total	x	40 =	m³ per hou	r
Number of open flues			┧]		<u> </u>	20 =		╡``
·		0	J ' L	0	Ţ	0			0	(6b)
Number of intermittent fa	ns					2	x '	10 =	20	(7a)
Number of passive vents						0	Χ.	10 =	0	(7b)
Number of flueless gas fi	res					0	X 4	40 =	0	(7c)
								Air ch	nanges per ho	our
Infiltration due to chimney	ys, flues and fans = (6	6a)+(6b)+(7	a)+(7b)+(7c) =	Γ	20		÷ (5) =	0.13	(8)
If a pressurisation test has b	een carried out or is intend	led, procee	d to (17), (otherwise o	ontinue fr	om (9) to	(16)			
Number of storeys in the	ne dwelling (ns)								0	(9)
Additional infiltration		_					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0. if both types of wall are priced deducting areas of openir	resent, use the value corres				•	uction			0	(11)
If suspended wooden f	loor, enter 0.2 (unsea	led) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent	ter 0.05, else enter 0								0	(13)
Percentage of windows	s and doors draught s	tripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate				(8) + (10)	• • • •	, , ,	, ,		0	(16)
Air permeability value,			•	•	•	etre of e	envelope	area	5	(17)
If based on air permeabili Air permeability value applie.	•					is heina u	sed		0.38	(18)
Number of sides sheltere			.0 0. 0 00	y. 00 a po		.o 2011.g u	000		2	(19)
Shelter factor				(20) = 1 -	0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorporat	ing shelter factor			(21) = (18	x (20) =				0.32	(21)
Infiltration rate modified for	or monthly wind speed	d								
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed 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	2)m ÷ 4									
	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	

0.41	0.41	0.4	0.36	0.35	0.31	0.31	0.3	0.32	0.35	0.37	0.38		
alculate effe		•	rate for t	he appli	cable ca	se	!	Į.	Į.	•			
If mechanica			" 11 (0	(22		(4	.=	. (22)	\			0	(23
If exhaust air h		0		, ,	,	. `	,, .	`) = (23a)			0	(23
If balanced with		-	-	_					.	(001)	4 (22.)	0	(23
a) If balance	i	i			1	- 		```	 	` 	' ' '	÷ 100] I	(24
24a)m= 0	0	0	0	0	0	0 (1	0	0	0	0	0	-	(22
b) If balance	ea mecha 0	i	ntilation		neat red	, , , ,	- ^ ` ` - 	í `	 	- 		1	(2
-,	<u> </u>	0		0	<u> </u>	0	0	0	0	0	0		(2
c) If whole h				•		ventilatio wise (24)			5 × (23h	n)			
24c)m= 0	0.07	0	0	0	0	0	0	0	0 7 (20)	0	0		(2
d) If natural					<u> </u>		<u> </u>	<u> </u>					`
•				•		24d)m = 0			0.5]				
24d)m= 0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(2
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)	•	•	•	•	
25)m= 0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(2
0						•				<u>'</u>			
3. Heat losse	s and ne Gros				Net Ar	200	U-valı	10	A X U		k-value	`	A X k
LEMENT	area	-	Openin m		A,r		W/m2		(W/		kJ/m²-l		kJ/K
oors					2.93	x	1.2		3.516				(2
/indows Type	e 1				3.4	x1,	/[1/(1.4)+	0.04] =	4.51				(2
/indows Type	2				4.89	x1,	/[1/(1.4)+	0.04] =	6.48				(2
/indows Type					1.86		/[1/(1.4)+	0.04] =	2.47				(2
loor					52.3		0.13		6.799			-	(2
/alls	34.6	3	13.08	$\overline{}$	21.55	=	0.18	-	3.88	ᆿ ¦		╡	(2
otal area of e			13.00		86.93		0.10		3.00				(3
arty wall	7011101110	,				_				r		-	(3
for windows and	roof wind	NWS 1150 G	iffective wi	ndow I I-v:	49.76		o formula 1	= /[(1/ -valu	0	l	naragranh		(3
include the area						atou using	nonnula 1	/[((C)+0.0+j (as giveir iii	paragrapi	0.2	
abric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				27.65	(3
eat capacity	Cm = S((Axk)						((28)	.(30) + (3	2) + (32a)	(32e) =	0	(3
hermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(3
or design assess				construct	ion are no	t known pr	ecisely the	indicative	values of	TMP in T	able 1f		
an be used inste hermal bridge				ıcina Λr	nondiy l	/						0.40	
details of therma	•	,			•	· ·						6.46	(3
otal fabric he		are not kii	OWII (30) =	- 0.00 X (0	, , , , , , , , , , , , , , , , , , ,			(33) +	(36) =			34.11	(3
entilation hea	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5)		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8)m= 29.31	29.15	28.98	28.22	28.07	27.41	27.41	27.28	27.66	28.07	28.36	28.67		(3
	L					L	L	L	<u> </u>			ı	
eat transfer o	nefficier	nt \M/K						(39)m	= (37) + (38)m			
eat transfer (coefficier 63.26	nt, W/K 63.1	62.33	62.19	61.52	61.52	61.4	(39)m 61.78	= (37) + (62.19	38)m 62.48	62.78		

Heat loss para	meter (l	-II D) \///	m²K					(40)m	= (39)m ÷	. (4)			
(40)m= 1.21	1.21	1.21	1.19	1.19	1.18	1.18	1.17	1.18	1.19	1.19	1.2	ı	
(40)1112	1.21	1.21	1.10	1.10	1.10	1.10	1.17			Sum(40) ₁ .		1.19	(40)
Number of day	s in mo	nth (Tab	le 1a)					,	Average =	Ouiii(40)1.	12 / 12-	1.10	(10)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	ı	
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31	ı	(41)
		<u> </u>		<u> </u>	<u> </u>	<u> </u>		l	l	<u> </u>			
4. Water heat	ing ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occupancy, N 1.76 if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1													
Annual average Reduce the annual not more that 125	l average	hot water	usage by	5% if the α	lwelling is	designed t			se target o		.95		(43)
					ioi and co						1	ı	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage ir	ı litres pei	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)					ı	
(44)m= 83.55	80.51	77.47	74.43	71.39	68.36	68.36	71.39	74.43	77.47	80.51	83.55		
Energy content of	hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x C)Tm / 3600			m(44) ₁₁₂ = ables 1b, 1		911.41	(44)
(45)m= 123.9	108.36	111.82	97.49	93.54	80.72	74.8	85.83	86.86	101.22	110.49	119.99	ı	
L1								-	Total = Su	m(45) ₁₁₂ =	=	1195	(45)
If instantaneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46 ₎) to (61)					
(46)m= 18.58	16.25	16.77	14.62	14.03	12.11	11.22	12.87	13.03	15.18	16.57	18	ı	(46)
Water storage	loss:			l		l							
Storage volum	e (litres)) includin	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150	ı	(47)
If community h	eating a	and no ta	nk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if no	stored	hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage												1	
a) If manufacti	urer's d	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(48)
Temperature fa	actor fro	m Table	2b							0.	54	ı	(49)
Energy lost fro		_	-				(48) x (49)) =		0.	75	ı	(50)
b) If manufacti			-									ı	
Hot water store	•			e 2 (kW	h/litre/da	ıy)					0		(51)
If community h Volume factor	_		on 4.3									ı	(50)
Temperature fa			2h							—	0	ı	(52) (53)
•							(47) (54)) (5 0) (50)		0	ı	, ,
Energy lost fro Enter (50) or (_	, KVVN/ye	ear			(47) X (51)) x (52) x (53) =		0	ı	(54)
` , ,	, ,	,					((50) (FE) (44)		0.	75		(55)
Water storage	loss cal	culated t	or each	month			((56)m = (55) × (41)ı	m 			1	
(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	ı	(56)
If cylinder contains	dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	x H	
(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	ı	(57)
Primary circuit	•	•									0		(58)
Primary circuit				,	•	. ,	, ,						
(modified by					ı —	ı —				<u> </u>		ı	
(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)

Comb:	laaa aa	المعادية	.	ملئدت محمد حا	(C4)	(00) . 0	CE (44	١						
(61)m=	OSS Ca	alculated 0	or eac	n month	$\frac{(61)m = 0}{10}$	(60) ÷ 3	05 × (41)m 0	0	0	Ιο	0	1	(61)
		ļ.	<u> </u>					<u> </u>		<u> </u>	ļ	<u> </u>	(F0)m + (61)m	(01)
(62)m=	170.49	_	158.41		140.13	125.81	121.39	132.4		147.82	155.58	166.58	(59)m + (61)m]	(62)
					ļ		I		'0' if no sola		ļ		J	(02)
		al lines if								ii continbut	ion to wate	er neating)		
(63)m=	0	0	0	0	0	0	0	0		0	0	0	1	(63)
	from v	vater hea	L ter	ļ	ļ.		!	ļ					J	
(64)m=	170.49		158.41	142.58	140.13	125.81	121.39	132.4	3 131.95	147.82	155.58	166.58]	
` ′		1			1		<u> </u>	0	 utput from w	ater heate	r (annual)₁	l12	1743.62	(64)
Heat g	ains fro	m water	heating	g, kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61	m] + 0.8	x [(46)m	+ (57)m	+ (59)m	 .]	-
(65)m=	78.47	69.7	74.46	68.49	68.38	62.91	62.15	65.81	1	70.93	72.81	77.17	ĺ	(65)
inclu	de (57))m in calc	culation	of (65)m	only if c	vlinder i	s in the	dwellin	g or hot w	ater is f	rom com	munity h	ı neating	
	· · ·	ains (see		· · ·	•	,						,	<u> </u>	
		ns (Table			,									
	Jan	Feb	Mar		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(66)m=	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	87.9	1	(66)
Lightin	g gains	(calcula	ted in A	ppendix	L, equat	ion L9 o	r L9a), a	lso se	e Table 5	•	•	•	•	
(67)m=	13.66	12.13	9.87	7.47	5.58	4.71	5.09	6.62	8.89	11.28	13.17	14.04]	(67)
Appliar	nces ga	ains (calc	ulated	in Appen	dix L, eq	uation L	13 or L1	3a), al	so see Ta	ble 5			•	
(68)m=	153.2	154.79	150.79	142.26	131.49	121.37	114.61	113.0	2 117.03	125.56	136.33	146.44]	(68)
Cookin	g gains	s (calcula	ted in <i>i</i>	Appendix	L, equat	ion L15	or L15a	, also	see Table	5	•	•	•	
(69)m=	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79	31.79]	(69)
Pumps	and fa	ns gains	(Table	5a)					•				•	
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses	e.g. e	vaporatio	n (neg	ative valu	ies) (Tab	le 5)	-			-	-	-	-	
(71)m=	-70.32	-70.32	-70.32	-70.32	-70.32	-70.32	-70.32	-70.32	-70.32	-70.32	-70.32	-70.32		(71)
Water	heating	g gains (T	able 5)	-	-	-	-	-	-	-	-	-	
(72)m=	105.47	103.72	100.07	95.12	91.91	87.38	83.53	88.46	90.21	95.34	101.13	103.73		(72)
Total i	nterna	l gains =	:			(66)m + (67)m	ı + (68)r	n + (69)m +	(70)m + (7	'1)m + (72))m		
(73)m=	324.7	323.01	313.1	297.22	281.35	265.83	255.61	260.4 ⁻	7 268.5	284.55	302.99	316.58		(73)
6. Sol	ar gain	ıs:												
•			•				•	itions to	convert to th	ne applicat		tion.		
Orienta		Access F Table 6d		Area m²	l	Flu	ıx ble 6a		g_ Table 6b	т	FF able 6c		Gains (W)	
								. –		_ '				,
East	0.9x	0.77	_		.4	X	19.64	X	0.63	x	0.7	=	20.41	(76)
East	0.9x	0.77	_		.4		38.42	x	0.63	x	0.7	=	39.92	(76)
East	0.9x	0.77	_		.4		53.27	X	0.63		0.7	=	65.75	(76)
East	0.9x	0.77			.4	-	92.28	x	0.63	x	0.7	=	95.89	(76)
East	0.9x	0.77	:	× 3	.4	x 1	13.09	X	0.63	X	0.7	=	117.51	(76)

East	0.9x	0.77		X	3.4	٦ ×		15.77] x		0.63	×	0.7		120.3	(76)
East	0.9x	0.77		X	3.4	」 ^ 		10.22] ^] x		0.63	┤ ^ ┤ x	0.7	╡ -	114.53	(76)
East	0.9x	0.77		X	3.4	」 ^ 		94.68] ^] x		0.63	┤ ^ ┤ x	0.7	╡ -	98.38	(76)
East	0.9x	0.77		X	3.4]		73.59]		0.63	X	0.7	╡ -	76.47	(76)
East	0.9x	0.77		X	3.4]		15.59]		0.63]	0.7	╡ -	47.37	(76)
East	0.9x	0.77		X	3.4] x		24.49] x		0.63	X	0.7	╡ -	25.45	(76)
East	0.9x	0.77		X	3.4] x		6.15] x		0.63	X	0.7	╡ -	16.78	(76)
West	0.9x	0.77		X	4.89] x		9.64] x		0.63	X	0.7	= =	29.35	(80)
West	0.9x	0.77		X	1.86	」 】x		9.64]]		0.63	ا ×	0.7	╡ -	11.16	(80)
West	0.9x	0.77		X	4.89	i x	—	88.42]]		0.63	╡ ×	0.7	╡ -	57.42	(80)
West	0.9x	0.77		X	1.86	i x	-	88.42]]		0.63	ا ×	0.7	╡ -	21.84	(80)
West	0.9x	0.77		X	4.89	i x	-	3.27]] x		0.63	→ ×	0.7	╡ -	94.56	(80)
West	0.9x	0.77		X	1.86	i x	—	3.27)]		0.63	╡ ×	0.7	╡ -	35.97	(80)
West	0.9x	0.77		X	4.89	i x	-	92.28)] x		0.63	۲ ×	0.7	╡ -	137.91	(80)
West	0.9x	0.77		X	1.86	i x		92.28)] x		0.63	×	0.7	_ =	52.46	(80)
West	0.9x	0.77		X	4.89	i x		13.09)] x		0.63	۲ ×	0.7	╡ -	169.01	(80)
West	0.9x	0.77		X	1.86	i x	-	13.09)] x		0.63	×	0.7	_ =	64.29	(80)
West	0.9x	0.77		X	4.89	j×		15.77	X		0.63	×	0.7		173.01	(80)
West	0.9x	0.77		X	1.86	j×	1	15.77	X		0.63	╡ ×	0.7		65.81	(80)
West	0.9x	0.77		X	4.89	i x	1	10.22	X		0.63	×	0.7	= =	164.72	(80)
West	0.9x	0.77		X	1.86	Ī×	1	10.22	x		0.63	×	0.7	╡ -	62.65	(80)
West	0.9x	0.77		X	4.89	j ×	9	94.68	X		0.63	×	0.7	_ =	141.49	(80)
West	0.9x	0.77		X	1.86	Ī×	9	94.68	x		0.63	×	0.7	=	53.82	(80)
West	0.9x	0.77		X	4.89	Ī×	7	73.59	x		0.63	×	0.7	=	109.98	(80)
West	0.9x	0.77		X	1.86	Ī×	7	73.59	x		0.63	×	0.7	=	41.83	(80)
West	0.9x	0.77		X	4.89	×		15.59	x		0.63	x	0.7	_ =	68.13	(80)
West	0.9x	0.77		X	1.86	×		15.59	x		0.63	×	0.7		25.91	(80)
West	0.9x	0.77		X	4.89	×	2	24.49	x		0.63	×	0.7		36.6	(80)
West	0.9x	0.77		X	1.86	×	2	24.49	x		0.63	×	0.7	=	13.92	(80)
West	0.9x	0.77		X	4.89	x	1	6.15	X		0.63	×	0.7	=	24.14	(80)
West	0.9x	0.77		X	1.86	×	1	6.15	x		0.63	x	0.7	=	9.18	(80)
						_			_			_				
-		watts, ca		$\overline{}$	for each mor	nth			(83)m	n = Su	m(74)m		1		7	
(83)m=	60.92	119.18	196.2		286.25 350.8		359.12	341.89	293	.68	228.27	141.4	2 75.96	50.1		(83)
_				_	(84)m = (73) i		` '		T					T	٦	(0.4)
(84)m=	385.63	442.19	509.3	37	583.47 632.1	6	624.95	597.5	554	.16	496.77	425.9	7 378.95	366.68		(84)
					heating seas											_
		_		•	eriods in the I	_			ole 9	, Th1	(°C)				21	(85)
Utilisa				-	ving area, h1	Ť							<u> </u>		٦	
(00):	Jan	Feb	Ma	\rightarrow	Apr Ma	- 	Jun	Jul	_	ug	Sep	Oct	_	Dec	4	(86)
(86)m=	1	0.99	0.97		0.92 0.79		0.6	0.45	0.		0.76	0.95	0.99	1	J	(00)
		· ·		-	ving area T1	` т		i	_				. 1	1 ,-	7	(07)
(87)m=	19.8	19.97	20.2	5	20.61 20.8	6	20.97	20.99	20.	99	20.91	20.57	20.12	19.77	J	(87)

- .						, -							
Temperatur						1	i	``	10.00	40.00	40.00		(00)
(88)m= 19.91	19.91	19.91	19.93	19.93	19.94	19.94	19.94	19.94	19.93	19.92	19.92	ı	(88)
Utilisation f		1			```		9a)					1	
(89)m= 0.99	0.99	0.96	0.89	0.73	0.51	0.34	0.39	0.68	0.93	0.99	0.99	l	(89)
Mean interr	nal tempei	rature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	le 9c)				
(90)m= 18.33	3 18.58	18.99	19.49	19.8	19.92	19.94	19.94	19.87	19.45	18.81	18.3		(90)
								f	fLA = Livin	g area ÷ (4	4) =	0.47	(91)
Mean interr	nal tempei	rature (fo	r the wh	ole dwe	lling) = f	LA × T1	+ (1 – fL	.A) × T2					
(92)m= 19.02	19.23	19.58	20.01	20.3	20.41	20.43	20.43	20.36	19.97	19.42	18.99		(92)
Apply adjus	stment to t	he mear	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m= 19.02	2 19.23	19.58	20.01	20.3	20.41	20.43	20.43	20.36	19.97	19.42	18.99		(93)
8. Space he	eating req	uirement											
Set Ti to the the utilisation			•		ned at sto	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation f			<u> </u>				7 10.9						
(94)m= 0.99	 	0.96	0.89	0.75	0.56	0.39	0.44	0.71	0.93	0.98	0.99		(94)
Useful gain	s, hmGm	, W = (94	4)m x (84	4)m									
(95)m= 382.4	1 435	489.29	520.88	476.76	347.54	234.32	244.92	354.41	396.64	372.79	364.23		(95)
Monthly av	erage exte	ernal tem	perature	from Ta	able 8	•							
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	ate for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 933.6		825.44	692.71	534.67	357.64	235.78	247.49	386.75	582.91	769.95	928.47		(97)
Space heat		1			i	th = 0.02	24 x [(97)m – (95				1	
(98)m= 410.0	9 316.79	250.1	123.72	43.08	0	0	0	0	138.59	285.95	419.79		_
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	1988.11	(98)
Space heat	ing requir	ement in	kWh/m²	/year								38.01	(99)
9a. Energy r	•	nts – Indi	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space hea Fraction of	_	at from c	ocondor	//cupple	montary	, evetom					i	0	(201)
	•				ineniary	-	(202) = 1 -	(201) -				0	╡`
Fraction of	•		-	` ,			` '	, ,	(000)1			1	(202)
Fraction of		Ū	•				(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficiency c	of main spa	ace heat	ing syste	em 1								93.5	(206)
Efficiency of	f seconda	ry/suppl	ementar	y heating	g systen	ո, %						0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heat	ing requir	ement (c	alculate	d above))							•	
410.0	9 316.79	250.1	123.72	43.08	0	0	0	0	138.59	285.95	419.79		
(211)m = {[(9	98)m x (20	04)] } x 1	00 ÷ (20	06)									(211)
438.6	338.81	267.48	132.32	46.08	0	0	0	0	148.22	305.83	448.97		
	-		-		-	_	Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	_	2126.32	(211)
Space heat	ing fuel (s	econdar	y), kWh/	month									_
$= \{[(98)m x ($	201)] } x 1	00 ÷ (20	8)									1	
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		_
							Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	F	0	(215)
												_	

Water heating								
Output from water heater (calculated above) 170.49	25.81 121.39	132.43	131.95	147.82	155.58	166.58]	
Efficiency of water heater		ļ		ļ		!	79.8	(216)
(217)m= 87.07 86.75 86.03 84.44 82.08	79.8 79.8	79.8	79.8	84.64	86.42	87.18		」 (217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m	•						_	
(219)m= 195.81 173.42 184.14 168.85 170.73 1	57.66 152.12	165.95	165.35 I = Sum(2	174.64	180.04	191.08		_
		2079.77	(219)					
Annual totals				k\	Wh/year	•	kWh/year	7
Space heating fuel used, main system 1					2126.32	_		
Water heating fuel used	2079.77	_						
Electricity for pumps, fans and electric keep-hot								
central heating pump:				30		(2300		
boiler with a fan-assisted flue						45		(230
Total electricity for the above, kWh/year		sum of (230a)(230g) = 75						
Electricity for lighting							241.21	(232)
12a. CO2 emissions – Individual heating system	s including mi	cro-CHP						
	Energy kWh/year			Emission factor kg CO2/kWh			Emissions kg CO2/yea	
Space heating (main system 1)	(211) x			0.2	16	=	459.29	(261)
Space heating (secondary)	(215) x			0.5	19	=	0	(263)
Water heating	(219) x			0.2	16	=	449.23	(264)
Space and water heating	(261) + (262)	+ (263) + (264) =				908.51	(265)
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267)
Electricity for lighting	(232) x			0.5	19	=	125.19	(268)
Total CO2, kg/year			0	of (265)(2	274)			(272)

TER =

(273)

30.06

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:38:55

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 89.3m² Site Reference: Plot Reference: Maitland Park Estate AC 008

AC 008, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 26.65 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 7.22 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 56.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 49.7 kWh/m²

OK 2 Fabric U-values

Element Highest Average

External wall 0.12 (max. 0.30) 0.12 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK OK 0.12 (max. 0.70)

Floor 0.12 (max. 0.25)

Roof (no roof)

1.40 (max. 3.30)

2a Thermal bridging

Openings

Thermal bridging calculated from linear thermal transmittances for each junction

1.40 (max. 2.00)

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

Regulations Compliance Report

Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.5	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
Summertime temperature		
Overheating risk (Thames valley):	Slight	OK
sed on:		
Overshading:	Average or unknown	
Windows facing: West	2.24m²	
Windows facing: North	11.21m²	
Windows facing: West	1.8m²	
Windows facing: West	1.8m²	
Windows facing: North	2.69m²	
Windows facing: West	3.44m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
) Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m ² K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.12 W/m ² K	
Community heating, heat from electric heat pump Photovoltaic array		

			User D	etails:						
Assessor Name:	John Simpson			Strom	STRO	STRO006273				
Software Name:	Stroma FSAP 2	2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.26	
		Р	roperty .	Address	AC 008	3				
Address :	AC 008, Aspen 0	Court, Maitla	and Park	c Estate,	London	, NW3 2	EH			
1. Overall dwelling dime	ensions:									
Ground floor				a(m²)	(4.)		ight(m)	٦,, ١	Volume(m	<u> </u>
Fround 1100r				39.3	(1a) x	2	2.9	(2a) =	258.97	(3
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+	+(1e)+(1r	1) [39.3	(4)					
Owelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	258.97	(5)
2. Ventilation rate:										
	main	secondar	у	other		total			m³ per hou	ır
Number of chimneys	heating 0 +	heating 0	기 +	0] = [0	X	40 =	0	(6:
Number of open flues	0 +	0	」	0	」 L 1 = 「	0	x	20 =	0	` (6I
·	0			0	J L					╡`
Number of intermittent fa	ans				L	0	×	10 =	0	(7
Number of passive vents	5					0	Х	10 =	0	(7
Number of flueless gas f	ires				Γ	0	X	40 =	0	(7
									_	
								Air ch	anges per h	our
nfiltration due to chimne	•					0		÷ (5) =	0	(8)
If a pressurisation test has l		ended, procee	d to (17), o	otherwise o	ontinue fr	rom (9) to	(16)	1		—
Number of storeys in t Additional infiltration	ne aweiling (ns)						[(0)]	-1]x0.1 =	0	(9)
Structural infiltration: 0) 25 for steel or timb	ner frame or	0 35 for	r masonr	v constr	ruction	[(9)	-1]XU.1 =	0	(1)
if both types of wall are p					•	detion			0	('
deducting areas of openi	ings); if equal user 0.35									
If suspended wooden	•	,	.1 (seale	ed), else	enter 0				0	(1:
If no draught lobby, er									0	(13
Percentage of window	s and doors draugh	nt stripped							0	(14
Window infiltration				0.25 - [0.2	. ,	_	(4.5)		0	(1
Infiltration rate	50			(8) + (10)					0	(16
Air permeability value,	• •		•	•	•	etre of e	envelope	area	2	(17
If based on air permeabi Air permeability value applie	-					is heina u	ead		0.1	(18
Number of sides shelter		t rias been don	ie or a deg	gree all per	meability	is being u	360		2	(19
Shelter factor	-			(20) = 1 -	0.0 75 x (1	19)] =			0.85	(20
nfiltration rate incorpora	ting shelter factor			(21) = (18)	x (20) =				0.08	(2
nfiltration rate modified	for monthly wind sp	eed						!		
Jan Feb	Mar Apr M	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	<u> </u>	•			· · ·	•	•		•	
(22)m= 5.1 5	4.9 4.4 4.3	3 3.8	3.8	3.7	4	4.3	4.5	4.7		
		1	<u> </u>			·			I	
Wind Factor $(22a)m = (2a)m =$	2)m ÷ 4									

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

0.11	0.11	0.1	0.09	0.09	0.08	0.08	0.08	(22a)m 0.08	0.09	0.1	0.1	1	
Calculate effec		-			ı	1	0.00	0.00	0.09	0.1	0.1	l	
If mechanica	al ventilati	on:										0.5	(2:
If exhaust air he	eat pump us	ing Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0.5	(2:
If balanced with	heat recov	ery: effici	iency in %	allowing f	or in-use f	actor (from	n Table 4h) =				76.5	(2:
a) If balance	d mechar	nical ve	ntilation	with he	at recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (2	23b) × [1 – (23c)	÷ 100]	
24a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]	(24
b) If balance	d mechar	nical ve	ntilation	without	heat red	covery (N	ИV) (24b	p)m = (22)	2b)m + (2	23b)		1	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	j	(2
c) If whole h if (22b)n	ouse extra $1 < 0.5 \times 0$			•					.5 × (23b)			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)n	ventilatior			•	•				0.5]			•	
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change ra	ate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in bo	x (25)	•		•	•	
25)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(2
3. Heat losse	s and hea	at loss r	naramete	or.									
LEMENT	Gross	·	Openin		Net Ar	·ea	U-val	ue	AXU		k-value		ΑΧk
	area (ı	m²)	'nm	=	A ,r	n²	W/m2		(W/ł	<)	kJ/m²-		kJ/K
/indows Type	1				2.24	x1.	/[1/(1.4)+	0.04] =	2.97				(2
/indows Type	2				11.2	1 x1,	/[1/(1.4)+	0.04] =	14.86				(2
/indows Type	3				1.8	х1.	/[1/(1.4)+	0.04] =	2.39				(2
indows Type	: 4				1.8	x1.	/[1/(1.4)+	0.04] =	2.39				(2
indows Type/	÷ 5				2.69	x1 .	/[1/(1.4)+	0.04] =	3.57				(2
/indows Type	÷ 6				3.44	, x1,	/[1/(1.4)+	0.04] =	4.56				(2
loor					89.3	X	0.12	=	10.716				(2
/alls	59.25		23.18	3	36.07	7 X	0.12	=	4.33				(2
otal area of e	lements,	m²			148.5	5							(3
arty wall					49.76	6 X	0		0				(3
for windows and						lated using	formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	paragraph	1 3.2	
include the area				s and par	titions		(00) (00)) . (OO)					
abric heat los		,	U)				(26)(30)	, , ,	(22) (22	. (22.)	(22.)	45.78	(3
eat capacity	•	•	0	TEA):				., ,	(30) + (32	, , ,	(32e) =	0	(3
hermal mass	•	•		•			raciaaly the		tive Value:		abla 1f	250	(3
or design assess an be used instea				CONSTRUCT	ion ale 110	ι πιοννιι ρι	GUISCIY III	= iriuicatiVe	values 01	TIVIE III T	avic II		
hermal bridge	∍s : S (L x	(Y) cal	culated i	using Ap	pendix l	K						13.25	(3
	al bridging a	re not kn	own (36) =	= 0.05 x (3	11)								
details of therma													
details of therma otal fabric he entilation hea	at loss							(33) +	(36) =			59.02	(3

(38)m= 19.3	19.12	18.94	18.03	17.85	16.94	16.94	16.76	17.31	17.85	18.21	18.58		(38)
` ′	1	l	10.03	17.05	10.94	10.94	10.70			l	10.30		(00)
Heat transfer (39)m= 78.33	78.15	77.96	77.06	76.87	75.97	75.97	75.79	76.33	= (37) + (37) 76.87	77.24	77.6		
(00)111= 10.00	70.10	77.00	77.00	7 0.01	70.07	70.01	70.70			Sum(39) ₁		77.01	(39)
Heat loss par	ameter (H	HLP), W	m²K						= (39)m ÷		,		_
(40)m= 0.88	0.88	0.87	0.86	0.86	0.85	0.85	0.85	0.85	0.86	0.86	0.87		¬
Number of da	vs in mo	nth (Tab	le 1a)					/	Average =	Sum(40) ₁	12 /12=	0.86	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ating ene	rgy requi	irement:								kWh/ye	ear:	
													(40)
Assumed occ if TFA > 13 if TFA £ 13.	.9, N = 1		[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (1	ΓFA -13.		.62		(42)
Annual average	•	ater usaç	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		96	5.33		(43)
Reduce the annu	•		• •		•	-	to achieve	a water us	se target o	f			
						<u> </u>	Διια	Son	Oct	Nov	Doo		
Jan Hot water usage	Feb in litres per	Mar day for ea	Apr ach month	May $Vd, m = fa$	Jun ctor from 7	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 105.96	102.11	98.26	94.4	90.55	86.7	86.7	90.55	94.4	98.26	102.11	105.96		
` /	ļ	ļ		<u> </u>			<u> </u>		Γotal = Su	L m(44) ₁₁₂ =	=	1155.96	(44)
Energy content o	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,n	n x nm x C	OTm / 3600	kWh/mon	th (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 157.14	137.44	141.82	123.64	118.64	102.38	94.87	108.86	110.16	128.38	140.14	152.18		_
If instantaneous	water heati	na at point	of use (no	o hot water	r storage).	enter 0 in	boxes (46		Γotal = Su	m(45) ₁₁₂ =	=	1515.65	(45)
(46)m= 23.57	20.62	21.27	18.55	17.8	15.36	14.23	16.33	16.52	19.26	21.02	22.83		(46)
Water storage			10.00	17.0	10.00	14.20	10.00	10.02	10.20	21.02	22.00		(1-)
Storage volun	ne (litres)	includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	•			_			, ,			`			
Otherwise if n Water storage		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
a) If manufac		eclared I	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature	factor fro	m Table	2b			• •					0		(49)
Energy lost from	om water	storage	, kWh/ye	ear			(48) x (49)) =		1	10		(50)
b) If manufac			-										
Hot water sto	•			ie Z (KVV	n/litre/da	ıy)				0.	.02		(51)
Volume factor	•		011 110							1.	.03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost from	om water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	1.	.03		(54)
Enter (50) or	, , ,	,								1.	.03		(55)
Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)r	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 cylinder contain	ns dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	x 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)

Primary circuit loss (annual) from Table 3	0 (58)											
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 x (41)m												
(modified by factor from Table H5 if there is solar water heating and a cylinder thermo	ostat)											
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 23.26 22.51 23.26	22.51 23.26 (59)											
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m												
(61)m= 0 0 0 0 0 0 0 0 0	0 0 (61)											
Total heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m +$	· (46)m + (57)m + (59)m + (61)m											
(62)m= 212.42 187.36 197.1 177.14 173.92 155.87 150.14 164.14 163.66 183.66	193.63 207.46 (62)											
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribu	ition to water heating)											
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)												
(63)m= 0 0 0 0 0 0 0 0 0	0 0 (63)											
Output from water heater												
(64)m= 212.42 187.36 197.1 177.14 173.92 155.87 150.14 164.14 163.66 183.66	193.63 207.46											
Output from water heate	er (annual) ₁₁₂ 2166.49 (64)											
Heat gains from water heating, kWh/month 0.25 $^{\prime}$ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m	n + (57)m + (59)m]											
(65)m= 96.47 85.64 91.38 83.91 83.67 76.84 75.76 80.42 79.42 86.91	89.39 94.82 (65)											
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is f	from community heating											
5. Internal gains (see Table 5 and 5a):												
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov Dec											
(66)m= 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8	130.8 130.8 (66)											
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
(67)m= 21.2 18.83 15.31 11.59 8.67 7.32 7.9 10.28 13.79 17.51	20.44 21.79 (67)											
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	1 , , ,											
(68)m= 237.78 240.25 234.03 220.8 204.09 188.38 177.89 175.42 181.64 194.88	211.59 227.29 (68)											
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	211.00											
(69)m= 36.08 36.08 36.08 36.08 36.08 36.08 36.08 36.08 36.08 36.08 36.08 36.08	36.08 36.08 (69)											
	30.00 30.00											
Pumps and fans gains (Table 5a) (70)m=	0 0 (70)											
	0 0 (70)											
Losses e.g. evaporation (negative values) (Table 5)	T404.04 T404.04 (74)											
(71)m=	-104.64 -104.64 (71)											
Water heating gains (Table 5)	(70)											
(72)m= 129.66 127.44 122.82 116.54 112.46 106.72 101.83 108.09 110.31 116.81	, ,											
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (68)m + (69)m + (69)m$												
(73)m= 450.89 448.76 434.41 411.17 387.45 364.65 349.87 356.03 367.98 391.44	418.42 438.77 (73)											
6. Solar gains:												
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applica												
Orientation: Access Factor Area Flux g_ Table 6d m ² Table 6a Table 6b	FF Gains Fable 6c (W)											
North 0.9x 0.77 x 11.21 x 10.63 x 0.4 x	0.8 = 26.43 (74)											
North 0.9x 0.77 x 2.69 x 10.63 x 0.4 x	0.8 = 6.34 (74)											

N I =4I=			1		1		1		ı		1		٦
North	0.9x	0.77	X	11.21	X	20.32	X	0.4	X	0.8	=	50.52	(74)
North	0.9x	0.77	X	2.69	X	20.32	X	0.4	X	0.8	=	12.12	(74)
North	0.9x	0.77	X	11.21	X	34.53	X	0.4	X	0.8	=	85.84	(74)
North	0.9x	0.77	X	2.69	X	34.53	X	0.4	X	0.8	=	20.6	(74)
North	0.9x	0.77	X	11.21	X	55.46	X	0.4	X	0.8	=	137.88	(74)
North	0.9x	0.77	X	2.69	X	55.46	X	0.4	X	0.8	=	33.09	(74)
North	0.9x	0.77	X	11.21	x	74.72	X	0.4	X	0.8	=	185.74	(74)
North	0.9x	0.77	X	2.69	X	74.72	X	0.4	X	0.8	=	44.57	(74)
North	0.9x	0.77	X	11.21	X	79.99	X	0.4	X	0.8	=	198.84	(74)
North	0.9x	0.77	X	2.69	X	79.99	X	0.4	x	0.8	=	47.71	(74)
North	0.9x	0.77	X	11.21	X	74.68	X	0.4	X	0.8	=	185.64	(74)
North	0.9x	0.77	X	2.69	x	74.68	X	0.4	X	0.8	=	44.55	(74)
North	0.9x	0.77	X	11.21	x	59.25	x	0.4	x	0.8	=	147.28	(74)
North	0.9x	0.77	X	2.69	x	59.25	X	0.4	x	0.8	=	35.34	(74)
North	0.9x	0.77	X	11.21	x	41.52	x	0.4	x	0.8	=	103.21	(74)
North	0.9x	0.77	X	2.69	x	41.52	x	0.4	x	0.8	=	24.77	(74)
North	0.9x	0.77	X	11.21	x	24.19	х	0.4	x	0.8	=	60.13	(74)
North	0.9x	0.77	X	2.69	x	24.19	x	0.4	x	0.8	=	14.43	(74)
North	0.9x	0.77	X	11.21	x	13.12	x	0.4	x	0.8	=	32.61	(74)
North	0.9x	0.77	x	2.69	x	13.12	x	0.4	x	0.8	=	7.83	(74)
North	0.9x	0.77	X	11.21	x	8.86	x	0.4	x	0.8	=	22.04	(74)
North	0.9x	0.77	x	2.69	x	8.86	x	0.4	x	0.8	=	5.29	(74)
West	0.9x	0.77	x	2.24	x	19.64	x	0.4	х	0.8	=	9.76	(80)
West	0.9x	0.77	X	1.8	x	19.64	x	0.4	x	0.8	=	7.84	(80)
West	0.9x	0.77	x	1.8	x	19.64	x	0.4	x	0.8	=	7.84	(80)
West	0.9x	0.77	x	3.44	x	19.64	x	0.4	x	0.8	=	14.98	(80)
West	0.9x	0.77	X	2.24	x	38.42	x	0.4	x	0.8	=	19.09	(80)
West	0.9x	0.77	x	1.8	x	38.42	x	0.4	x	0.8	=	15.34	(80)
West	0.9x	0.77	X	1.8	x	38.42	x	0.4	x	0.8	=	15.34	(80)
West	0.9x	0.77	X	3.44	x	38.42	x	0.4	x	0.8	=	29.31	(80)
West	0.9x	0.77	X	2.24	x	63.27	x	0.4	x	0.8	j =	31.43	(80)
West	0.9x	0.77	x	1.8	x	63.27	х	0.4	x	0.8	j =	25.26	(80)
West	0.9x	0.77	X	1.8	x	63.27	x	0.4	x	0.8	j =	25.26	(80)
West	0.9x	0.77	x	3.44	x	63.27	x	0.4	x	0.8	=	48.27	(80)
West	0.9x	0.77	X	2.24	x	92.28	x	0.4	x	0.8	j =	45.84	(80)
West	0.9x	0.77	×	1.8	×	92.28	x	0.4	x	0.8	=	36.84	(80)
West	0.9x	0.77	X	1.8	x	92.28	x	0.4	x	0.8	=	36.84	(80)
West	0.9x	0.77	x	3.44	x	92.28	x	0.4	x	0.8	=	70.4	(80)
West	0.9x	0.77	X	2.24	x	113.09	X	0.4	X	0.8	 =	56.18	(80)
West	0.9x	0.77	X	1.8	x	113.09	X	0.4	x	0.8	 =	45.14	(80)
West	0.9x	0.77	X	1.8	X	113.09	X	0.4	x	0.8	 =	45.14	(80)
	<u> </u>		1		1		1	-	I		ı		_ ′

West	о о . Г								1			тг		_		(00)
West	0.9x	0.77	×	3.4		Х		3.09] X]	0.4]	0.8	╡ -	00.27	
West	0.9x	0.77	X	2.2		Х	_	5.77] X]	0.4]	0.8	╡ ‐	01.01	
	0.9x	0.77	X	1.8		X		5.77	J X 1	0.4]	0.8	=	10.2	
West	0.9x	0.77	×	1.8	3	X	11	5.77	X	0.4]	0.8	_ =	46.21	(80)
West	0.9x	0.77	X	3.4	4	X	11	5.77	X	0.4		_ x	0.8	=	88.32	(80)
West	0.9x	0.77	X	2.2	4	X	11	0.22	X	0.4		X	0.8	=	54.75	(80)
West	0.9x	0.77	X	1.8	3	X	11	0.22	X	0.4		X	0.8	=	44	(80)
West	0.9x	0.77	X	1.8	3	X	11	0.22	X	0.4		x	0.8	=	44	(80)
West	0.9x	0.77	X	3.4	4	X	11	0.22	X	0.4	ļ	X	0.8	=	84.08	(80)
West	0.9x	0.77	X	2.2	4	X	94	4.68	X	0.4		X	0.8	=	47.03	(80)
West	0.9x	0.77	X	1.8	3	X	94	4.68	X	0.4		x	0.8		37.79	(80)
West	0.9x	0.77	X	1.8	3	X	9.	4.68	X	0.4		x[0.8	=	37.79	(80)
West	0.9x	0.77	X	3.4	4	X	94	4.68	x	0.4	ļ	x[0.8	=	72.22	(80)
West	0.9x	0.77	X	2.2	4	X	7:	3.59	x	0.4	ļ	_ x [0.8	=	36.55	(80)
West	0.9x	0.77	х	1.8	3	X	7:	3.59	X	0.4		x	0.8		29.37	(80)
West	0.9x	0.77	X	1.8	3	X	7:	3.59	x	0.4		x	0.8		29.37	(80)
West	0.9x	0.77	X	3.4	4	x	7:	3.59	x	0.4		x	0.8		56.14	(80)
West	0.9x	0.77	x	2.2	4	X	4:	5.59	x	0.4	ļ	x	0.8		22.65	(80)
West	0.9x	0.77	x	1.8	3	X	4:	5.59	x	0.4		ĪxĪ	0.8		18.2	(80)
West	0.9x	0.77	x	1.8	3	X	4	5.59	x	0.4		x	0.8	_	18.2	(80)
West	0.9x	0.77	x	3.4	4	X	4	5.59	x	0.4		x	0.8	=	34.78	(80)
West	0.9x	0.77	x	2.2	4	X	24	4.49	jx	0.4	ļ	x	0.8		12.16	(80)
West	0.9x	0.77	x	1.8	3	X	24	4.49	X	0.4] x [0.8	= =	9.78	(80)
West	0.9x	0.77	x	1.8	3	X	24	4.49	X	0.4] x [0.8		9.78	(80)
West	0.9x	0.77	x	3.4	4	X	24	4.49	X	0.4		֓֞֞֞֞֞֓֞֞֓֞֞֞֓֓֞֓֓֓֞֞֞֓֓֓֓֞֡֓֓	0.8		18.68	(80)
West	0.9x	0.77	x	2.2	4	X	10	6.15	X	0.4		_ x [0.8		8.02	(80)
West	0.9x	0.77	x	1.8	3	x]] x	0.4] x [0.8			(80)
West	0.9x		x			X]] x]				(80)
West	0.9x	X														
	L	<u> </u>		0	<u>·</u>				J	0.1		J L				`
Solar o	ains in	watts, ca	lculated	for eacl	n mont	h			(83)m	ı = Sum(7	4)m	.(82)m				
(83)m=	73.2					_	184.8	457.01					90.83	60.56		(83)
Total g	ains – i	nternal ar	nd solar	(84)m =	(73)m	+ (83)m ,	watts					•	•	_	
(84)m=	524.08	590.47	671.06	772.04	850.5	8	49.45	806.88	733	.49 64	7.4	559.82	509.25	499.33		(84)
7. Me	an inter	nal temp	erature	(heating	seaso	n)				-						
Temp	erature	during he	eating p	eriods ir	the liv	ing	area f	rom Tal	ble 9	Th1 (°0	C)				21	(85)
Utilisa	ation fac	tor for ga	ins for I	iving are	ea, h1,r	n (s	ee Tal	ole 9a)								
	Jan	Feb	Mar	Apr	May	Ī	Jun	Jul	Α	ug S	ер	Oct	Nov	Dec	7	
(86)m=	1	1	0.98	0.93	0.78	1	0.57	0.41	0.4	7 0.	76	0.97	1	1	7	(86)
Mean	interna	l tempera	ature in	living ar	ea T1 (follo	w ster	os 3 to 7	7 in T	able 9c)		•	•	_	
(87)m=	20.13	20.26	20.48	20.76	20.94	_	20.99	21	2			20.71	20.37	20.11	7	(87)
		<u> </u>	oatina n	oriodo ir	root o			from To	able (1	<u> </u>	_	
(88)m=	20.19	during he	20.19	20.2	20.2	_	20.21	20.21	20.	<u>`</u>		20.2	20.2	20.19	7	(88)
(50).11-	_5.70		_50	_0.2	_0.2				1		<u> L</u>		1	1 _0.10	_	(33)

Litilio	ation for	tor for a	ains for i	roct of d	wolling	h2 m (cc	o Tabla	00)						
(89)m=	1	0.99	0.98	0.91	0.73	0.5	0.34	0.39	0.69	0.95	0.99	1		(89)
	interna	<u> </u>	ature in	ļ	ļ		<u>!</u>	<u> </u>						, ,
(90)m=	19.02	19.2	19.53	19.93	20.15	20.21	20.21	20.21	20.18	19.87	19.38	18.99		(90)
		!							l f	LA = Livin	g area ÷ (4	4) =	0.39	(91)
Moor	intorno	Ltompor	oturo (fo	r tha wh	olo duro	lling) – fl	I A T1	. /1 fl	۸) T2					
(92)m=	19.45	19.61	ature (fo	20.25	20.45	20.51	20.51	20.51	20.48	20.19	19.76	19.42		(92)
			he mean											(- /
(93)m=	19.45	19.61	19.89	20.25	20.45	20.51	20.51	20.51	20.48	20.19	19.76	19.42		(93)
8. Sp	ace hea	ting requ	uirement											
Set T	i to the i	mean int	ernal ter	mperatu	re obtain	ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the u	tilisation	r	or gains		ble 9a			·						
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			ains, hm		0.75	0.50	0.07	0.40	0.70	0.05	0.00	4		(04)
(94)m=	1	0.99	0.98	0.91	0.75	0.52	0.37	0.42	0.72	0.95	0.99	1		(94)
(95)m=	522.35	586.09	, W = (9 ² 655.67	703.92	634.61	445.45	297.07	311.13	464.96	533.08	505.35	498.09		(95)
		<u> </u>	rnal tem	<u> </u>			207.07	011.10	404.00	000.00	000.00	400.00		()
(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)
		e for me	an intern	ıal tempe	L erature,	L Lm , W =	 =[(39)m :	x [(93)m	L – (96)m]				
(97)m=		1149.57			672.99	448.96	297.37	311.85	487.07	737.56	977.87	1181.14		(97)
Spac	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=	494.11	378.66	289.1	122.85	28.56	0	0	0	0	152.13	340.21	508.19		
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2313.82	(98)
Spac	e heatin	g require	ement in	kWh/m²	² /year								25.91	(99)
9b. En	erav red	guiremer	nts – Cor	nmunity	heating	scheme)							
			ace hea	· ·	The state of the s			ting prov	ided by	a comm	unity sch	neme.		
Fraction	on of spa	ace heat	from se	condary	/supplen	nentary I	heating ((Table 1	1) '0' if n	one			0	(301)
Fraction	on of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
The con	nmunity so	cheme ma	y obtain he	eat from se	everal soul	ces. The p	orocedure	allows for	CHP and t	up to four	other heat	sources; ti	he latter	_
			s, geotherr			rom powe	r stations.	See Appe	ndix C.			ı		-
Fraction	on of hea	at from (Commun	ity heat	pump								1	(303a)
Fraction	on of tota	al space	heat fro	m Comn	nunity he	eat pump)			(3	02) x (303	a) =	1	(304a)
Factor	for conf	trol and	charging	method	(Table	4c(3)) fo	r comm	unity hea	ating sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for o	commun	ity heatii	ng syste	m					1.1	(306)
Space	heating	g											kWh/yea	<u>r_</u>
Annua	I space	heating	requiren	nent									2313.82	
Space	heat fro	m Com	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) =	=	2545.2	(307a)
Efficie	ncy of s	econdar	y/supple	mentary	heating	system	in % (fro	om Table	4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/sur	plemen	tary sys	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
												•		_

Water heating Annual water heating requirement			2166.49	٦
If DHW from community scheme:				⊣ ¬
Water heat from Community heat pump	(64) x (303a) x	(305) x (306) =	2383.14	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	7e) + (310a)(310e)] =	49.28	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter	$= (107) \div (314)$) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from	om outside		197.46	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	197.46	(331)
Energy for lighting (calculated in Appendix L)			374.37	(332)
Electricity generated by PVs (Appendix M) (negative quantity	')		-923.21	(333)
Electricity generated by wind turbine (Appendix M) (negative	quantity)		0	(334)
12b. CO2 Emissions – Community heating scheme				
	Energy	Emission factor	Emissions	
	kWh/year	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%)	-	_		(367a)
Efficiency of heat source 1 (%) If there is CHP u	P)	_	319	(367a) (367)
Efficiency of heat source 1 (%) If there is CHP u	P) using two fuels repeat (363) to	(366) for the second fuel	319	_
Efficiency of heat source 1 (%) CO2 associated with heat source 1 [(307)	P) using two fuels repeat (363) to b+(310b)] x 100 ÷ (367b) x	0.52 = 0.52 =	319 801.82	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 [(307) Electrical energy for heat distribution	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x	0.52 = 0.52 =	319 801.82 25.58	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x	0.52 = 0.52 = 2) =	319 801.82 25.58 827.4	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary)	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(376) (309) x	0.52 = 0.	319 801.82 25.58 827.4	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantal	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) =	0.52 = 0.	319 801.82 25.58 827.4 0 0 827.4	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantation Total CO2 associated with space and water heating	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) =	0.52 = 0.	319 801.82 25.58 827.4 0 0 827.4	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantated total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dward control con	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x (332))) x	0.52 = 0.	319 801.82 25.58 827.4 0 0 827.4 102.48	(367) (372) (373) (374) (375) (376) (378)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantated total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dward co2 associated with electricity for lighting Energy saving/generation technologies (333) to (334) as approximately associated with space and water heating	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x (332))) x	0.52 = 0.	319 801.82 25.58 827.4 0 0 827.4 102.48 194.3	(367) (372) (373) (374) (375) (376) (378) (379)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantated total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dward co2 associated with electricity for lighting Energy saving/generation technologies (333) to (334) as applied to the condition of the con	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37) (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x (332))) x	0.52 = 0.	319 801.82 25.58 827.4 0 0 827.4 102.48 194.3	(367) (372) (373) (374) (375) (376) (378) (379) (380)

			User D	etails:						
Assessor Name: Software Name:	John Simpson Stroma FSAP 2	2012		Stroma Softwa					0006273 on: 1.0.4.26	
		Р	roperty .	Address:	AC 008	}				
Address :	AC 008, Aspen 0	Court, Maitla	and Park	c Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
			Area	a(m²)		Av. He	eight(m)		Volume(m	³)
Ground floor			8	39.3	(1a) x	2	2.9	(2a) =	258.97	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+	·(1e)+(1r	n)	39.3	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	258.97	(5)
2. Ventilation rate:										` ′
2. Vortilation rate.	main heating	secondar heating	у	other		total			m³ per hou	ır
Number of chimneys			1 + [0] - Г	0	X	40 =	0	(6a)
Number of open flues	0 +	0	┪╻┝	0] = [0	X	20 =	0	(6b)
Number of intermittent fa					J		 ,	10 =		= ``
					Ļ	3			30	(7a)
Number of passive vents	5				L	0	X	10 =	0	(7b)
Number of flueless gas f	ires					0	X	40 =	0	(7c)
								Δir ch	nanges per h	our
Infiltration due to chimen	we flues and force	(60) ((6b) (/7	70)	7 0) –	г					_
Infiltration due to chimne	-				ontinue fr	30		÷ (5) =	0.12	(8)
Number of storeys in t		eridea, procee	u 10 (11), t	ourier wise c	onunae n	om (9) to	(10)		0	(9)
Additional infiltration	a						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	0.25 for steel or timb	er frame or	0.35 fo	r masonr	y constr	uction	. ,		0	(11)
if both types of wall are μ	oresent, use the value co	rresponding to	the great	er wall are	a (after					
deducting areas of open			4 /	حمام (اما						
If suspended wooden	,	•	.1 (seale	ea), eise	enter u				0	(12)
If no draught lobby, er Percentage of window									0	(13)
Window infiltration	s and doors draugn	ii sirippea		0.25 - [0.2	y (14) ± 1	001 -			0	(14)
Infiltration rate				(8) + (10)			+ (15) =		0	(15)
Air permeability value,	a50 everessed in	cubic metre	s nar ho	. , . ,	, , ,	, , ,		area	0	(16)
If based on air permeabi	•		-	•	-	cue oi e	rivelope	alca	0.37	(17)
Air permeability value applie	-					is being u	sed		0.37	(10)
Number of sides sheltered	•			,	,	Ü			2	(19)
Shelter factor				(20) = 1 -	0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter factor			(21) = (18)	x (20) =				0.31	(21)
Infiltration rate modified	for monthly wind spe	eed								
Jan Feb	Mar Apr Ma	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed 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 $(22a)m = (2a)m =$	22)m ÷ 4	0 005	0.05	,		,			Ī	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

Adjusted infiltr	ation rat	e (allowi	ing for sl	nelter ar	nd wind s	speed) =	(21a) x	(22a)m					
0.4	0.39	0.38	0.34	0.33	0.3	0.3	0.29	0.31	0.33	0.35	0.37]	
Calculate effective of the Calculate of		•	rate for t	ne appii	cable ca	ise						0	(23a
If exhaust air h			endix N, (2	23b) = (23a	a) × Fmv (equation (I	N5)) , othe	rwise (23b) = (23a)			0	(23b
If balanced with	n heat reco	overy: effic	ciency in %	allowing	for in-use f	actor (fron	n Table 4h) =				0	(23c)
a) If balance	ed mech	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (2	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (I	ЛV) (24b	o)m = (22	2b)m + (2	23b)		_	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b
c) If whole h				•					E (22h	.)			
(24c)m = 0	0.5 x	(230), 1	nen (24)	(231) = (231)	o); otner	wise (24	$\frac{C}{C} = (22)$	b) m + 0.	5 × (230	0	0	1	(24c)
d) If natural				<u> </u>								J	(210)
,								2b)m² x	0.5]				
(24d)m= 0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(24d
Effective air	change	rate - er	nter (24a) or (24l	o) or (24	c) or (24	d) in bo	x (25)				_	
(25)m= 0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57]	(25)
3. Heat losse	s and he	eat loss i	paramet	er:									
ELEMENT	Gros area		Openir m		Net Ar A ,r		U-val W/m2		A X U (W/I		k-value kJ/m²-		A X k kJ/K
Windows Type	e 1				2.16	x1	/[1/(1.4)+	0.04] =	2.86				(27)
Windows Type	2				10.8	x1	/[1/(1.4)+	0.04] =	14.32				(27)
Windows Type	e 3				1.73	x1	/[1/(1.4)+	0.04] =	2.29	$\overline{}$			(27)
Windows Type	e 4				1.73	x1	/[1/(1.4)+	0.04] =	2.29	$\overline{}$			(27)
Windows Type	e 5				2.59	x1	/[1/(1.4)+	0.04] =	3.43				(27)
Windows Type	e 6				3.31	x1	/[1/(1.4)+	0.04] =	4.39				(27)
Floor					89.3	X	0.13	= i	11.609	<u>=</u>			(28)
Walls	59.2	25	22.3	2	36.93	3 X	0.18	-	6.65	T i			(29)
Total area of e	elements	, m²	·		148.5	5							(31)
Party wall					49.76	3 X	0		0				(32)
* for windows and ** include the area						lated using	formula 1	/[(1/U-valu	ıe)+0.04] a	as given in	paragrapi	h 3.2	
Fabric heat los				іѕ апи раг	แนบกร		(26)(30) + (32) =				47.85	(33)
Heat capacity		,	0,					, , ,	(30) + (32	2) + (32a).	(32e) =	0	(34)
Thermal mass		. ,	⊃ = Cm -	: TFA) iı	n kJ/m²K			., ,	tive Value	, , ,	, ,	250	(35)
For design assess	sments wh	ere the de	tails of the				ecisely the	e indicative	values of	TMP in Ta	able 1f		(/
can be used inste Thermal bridge				ueina Ar	nandiv	K							(20)
if details of therma					-							9.3	(36)
Total fabric he		are not ki	.5,,,, (50) =	= 0.00 X (d	•••			(33) +	(36) =			57.15	(37)
Ventilation hea	at loss ca	alculated	d monthl	y				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	

	_	,										•	
(38)m= 49.45	5 49.19	48.93	47.73	47.51	46.46	46.46	46.27	46.86	47.51	47.96	48.43		(38)
Heat transfe	r coefficie	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 106.5	106.33	106.08	104.88	104.65	103.61	103.61	103.41	104.01	104.65	105.11	105.58		_
Heat loss pa	arameter (I	HLP), W	/m²K				-				12 /12=	104.88	(39)
(40)m= 1.19	1.19	1.19	1.17	1.17	1.16	1.16	1.16	1.16	1.17	1.18	1.18		_
Number of d	lave in ma	nth (Tah	lo 1a\					,	Average =	Sum(40) ₁	12 /12=	1.17	(40)
	- i	1 ` ` 	· ·	May	lun	lul	Διια	Sen	Oct	Nov	Dec		
	-	1											(41)
. ,													
4 Water he	ating ene	rav reau	irement:								k\/\/h/\/e	ar.	
4. Water ne	saling ene	igy requi	irement.							_	KVVII/ y	zai.	
if TFA > 1	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	-A -13.9)2)] + 0.0	0013 x (ΓFA -13.		.62		(42)
	′	ater usad	ae in litre	s per da	av Vd.av	erage =	(25 x N)	+ 36		96	33		(43)
Reduce the ani	nual average	hot water	usage by	5% if the a	lwelling is	designed			se target o		,,,,,,		(10)
not more that 1	25 litres per	person pei	r day (all w r	ater use, I	not and co	ld) 						I	
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			1			гаріе 1с х Г				1	1	I	
(44)m= 105.9	06 102.11	98.26	94.4	90.55	86.7	86.7	90.55	94.4	98.26	102.11	105.96		٦
Energy content	of hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x E	OTm / 3600			· /		1155.96	(44)
(45)m= 157.1	4 137.44	141.82	123.64	118.64	102.38	94.87	108.86	110.16	128.38	140.14	152.18		_
If instantaneous	s water heati	ina at noint	of use (no	hot water	r storage)	enter () in	hoxes (46		Γotal = Su	m(45) ₁₁₂ =	=	1515.65	(45)
		· ·							10.26	21.02	22.02		(46)
` '		21.21	10.33	17.0	15.50	14.23	10.33	10.32	19.20	21.02	22.03		(40)
Storage volu	ıme (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
If community	heating a	and no ta	ınk in dw	elling, e	nter 110	litres in	(47)					•	
		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
		oolorod l	ooo foot	ar ia kna	wo /k\\/h	2/dox4):							(40)
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		(48)											
Heat loss parameter (HLP), W/m²K (40)m= 1.19				(49)									
• • •	Jan Feb Mar Apr May Jun Jul Aug Sep 31 28 31 30 31 30 31 30 31 30 32 31 30 31 30 31 30 33 30 31 30 31 30 34 30 31 30 31 30 35 31 30 31 30 31 30 36 31 30 31 30 31 30 37 30 31 30 31 30 31 30 38 31 30 31 30 31 30 31 30 39 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 30 31 30 31 30 31 30 31 31 30 31 30 31 31 30 31 30 31 30 31 30 31 30 31 31 31 30 31 30 31 31 30 31 30 31 31 31 30 31 30 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 30 31 31 30 30 31 31 31 30 31 30 31 31 31 30 31 30 31 31 30		0.	.75		(50)							
•			-								0		(51)
•			on 4.3										
			0.1								0		(52)
·											0		(53)
•••		_	, kWh/ye	ear			(47) x (51)	x (52) x (53) =	-	0		(54)
` ,	, , ,	,	طممم سما				(/50) /	FF) (44)	_	0.	.75		(55)
		1			I	ı	,, ,	, , ,		ı	i	1	(==)
(56)m= 23.33		23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	iv L	(56)
If cylinder conta			1			1						IX TI	
(57)m= 23.33	3 21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(57)

Primary circuit loss (annual) from Table 3	0	(58)
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 x (41)m		
(modified by factor from Table H5 if there is solar water heating and a cylinder 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)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m		
(61)m= 0 0 0 0 0 0 0 0 0 0	0 0	(61)
Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m +	(46)m + (57)m +	(59)m + (61)m
(62)m= 203.74 179.52 188.42 168.74 165.23 147.47 141.46 155.46 155.25 174.98	185.23 198.78	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribut	tion to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)		
(63)m= 0 0 0 0 0 0 0 0 0 0	0 0	(63)
Output from water heater	<u> </u>	
(64)m= 203.74 179.52 188.42 168.74 165.23 147.47 141.46 155.46 155.25 174.98	185.23 198.78	1
Output from water heate		2064.27 (64)
Heat gains from water heating, kWh/month 0.25 $^{\prime}$ [0.85 \times (45)m + (61)m] + 0.8 \times [(46)m		, · · ·
(65)m= 89.53 79.37 84.43 77.19 76.72 70.11 68.82 73.47 72.7 79.96	82.67 87.88	(65)
		` '
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is f	rom community n	eating
5. Internal gains (see Table 5 and 5a):		
Metabolic gains (Table 5), Watts		1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov Dec	1
(66)m= 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8 130.8	130.8 130.8	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5		
(67)m= 21.2 18.83 15.31 11.59 8.67 7.32 7.9 10.28 13.79 17.51	20.44 21.79	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5		
(68)m= 237.78 240.25 234.03 220.8 204.09 188.38 177.89 175.42 181.64 194.88	211.59 227.29	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5		
(69)m= 36.08 36.08 36.08 36.08 36.08 36.08 36.08 36.08 36.08 36.08	36.08 36.08	(69)
Pumps and fans gains (Table 5a)		
(70)m= 3 3 3 3 3 3 3 3 3 3 3 3	3 3	(70)
Losses e.g. evaporation (negative values) (Table 5)		
(71)m= -104.64 -104.64 -104.64 -104.64 -104.64 -104.64 -104.64 -104.64 -104.64 -104.64 -104.64 -104.64	-104.64 -104.64	(71)
Water heating gains (Table 5)	1 1	
(72)m= 120.33 118.1 113.48 107.2 103.12 97.38 92.5 98.75 100.98 107.48	114.82 118.11	(72)
	<u> </u>	· /
	412.09 432.43	(73)
(73)m= 444.55 442.42 428.07 404.83 381.12 358.32 343.53 349.69 361.65 385.11 6. Solar gains:	412.09 432.43	(73)
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applical	ole orientation	
	FF	Gains
0=	able 6c	(W)
		· <i>′</i>
0.00 A 0.00 A	0.7 =	
North 0.9x 0.77 x 2.59 x 10.63 x 0.63 x	0.7	8.42 (74)

	_		_						i		,		_
North	0.9x	0.77	X	10.8	X	20.32	X	0.63	X	0.7	=	67.07	(74)
North	0.9x	0.77	X	2.59	X	20.32	X	0.63	X	0.7	=	16.08	(74)
North	0.9x	0.77	X	10.8	X	34.53	X	0.63	X	0.7	=	113.97	(74)
North	0.9x	0.77	X	2.59	X	34.53	X	0.63	X	0.7	=	27.33	(74)
North	0.9x	0.77	x	10.8	X	55.46	X	0.63	X	0.7	=	183.07	(74)
North	0.9x	0.77	X	2.59	X	55.46	X	0.63	X	0.7	=	43.9	(74)
North	0.9x	0.77	X	10.8	x	74.72	X	0.63	X	0.7	=	246.61	(74)
North	0.9x	0.77	X	2.59	x	74.72	x	0.63	x	0.7	=	59.14	(74)
North	0.9x	0.77	X	10.8	x	79.99	X	0.63	x	0.7	=	264	(74)
North	0.9x	0.77	X	2.59	x	79.99	x	0.63	x	0.7] =	63.31	(74)
North	0.9x	0.77	X	10.8	x	74.68	x	0.63	x	0.7	=	246.48	(74)
North	0.9x	0.77	x	2.59	x	74.68	X	0.63	x	0.7	=	59.11	(74)
North	0.9x	0.77	x	10.8	x	59.25	X	0.63	x	0.7	=	195.55	(74)
North	0.9x	0.77	x	2.59	x	59.25	X	0.63	x	0.7	=	46.9	(74)
North	0.9x	0.77	x	10.8	x	41.52	X	0.63	x	0.7	=	137.03	(74)
North	0.9x	0.77	x	2.59	x	41.52	X	0.63	x	0.7	=	32.86	(74)
North	0.9x	0.77	x	10.8	x	24.19	X	0.63	x	0.7	=	79.84	(74)
North	0.9x	0.77	X	2.59	x	24.19	x	0.63	x	0.7	=	19.15	(74)
North	0.9x	0.77	x	10.8	x	13.12	X	0.63	x	0.7	=	43.3	(74)
North	0.9x	0.77	X	2.59	x	13.12	x	0.63	x	0.7	=	10.38	(74)
North	0.9x	0.77	X	10.8	x	8.86	x	0.63	x	0.7	=	29.26	(74)
North	0.9x	0.77	x	2.59	x	8.86	X	0.63	x	0.7	=	7.02	(74)
West	0.9x	0.77	x	2.16	x	19.64	X	0.63	X	0.7	=	12.97	(80)
West	0.9x	0.77	x	1.73	x	19.64	X	0.63	x	0.7	=	10.38	(80)
West	0.9x	0.77	X	1.73	x	19.64	X	0.63	X	0.7	=	10.38	(80)
West	0.9x	0.77	x	3.31	x	19.64	X	0.63	X	0.7	=	19.87	(80)
West	0.9x	0.77	x	2.16	x	38.42	x	0.63	x	0.7	=	25.36	(80)
West	0.9x	0.77	x	1.73	x	38.42	X	0.63	x	0.7	=	20.31	(80)
West	0.9x	0.77	X	1.73	x	38.42	x	0.63	x	0.7	=	20.31	(80)
West	0.9x	0.77	x	3.31	x	38.42	x	0.63	x	0.7	=	38.87	(80)
West	0.9x	0.77	X	2.16	x	63.27	X	0.63	x	0.7	=	41.77	(80)
West	0.9x	0.77	x	1.73	x	63.27	X	0.63	x	0.7	=	33.45	(80)
West	0.9x	0.77	x	1.73	x	63.27	X	0.63	x	0.7	=	33.45	(80)
West	0.9x	0.77	x	3.31	x	63.27	x	0.63	x	0.7] =	64.01	(80)
West	0.9x	0.77	X	2.16	x	92.28	x	0.63	x	0.7] =	60.92	(80)
West	0.9x	0.77	x	1.73	x	92.28	x	0.63	x	0.7] =	48.79	(80)
West	0.9x	0.77	x	1.73	x	92.28	x	0.63	x	0.7] =	48.79	(80)
West	0.9x	0.77	x	3.31	x	92.28	x	0.63	x	0.7] =	93.35	(80)
West	0.9x	0.77	X	2.16	x	113.09	x	0.63	x	0.7	j =	74.66	(80)
West	0.9x	0.77	x	1.73	x	113.09	x	0.63	x	0.7] =	59.79	(80)
West	0.9x	0.77	x	1.73	×	113.09	x	0.63	x	0.7	j =	59.79	(80)
	_		_		•		•		•		•		_

West	ا م م								٦		_			_			7(00)
	0.9x	0.77	×	3.3		X		13.09	X	0.63	×		0.7	ᆗ	=	114.4	(80)
West	0.9x	0.77	X	2.1	6	X	1	15.77	X	0.63	×		0.7	ᆗ	=	76.42	(80)
West	0.9x	0.77	X	1.7	'3	X	1	15.77	X	0.63	×		0.7	_	=	61.21	<u> </u> (80)
West	0.9x	0.77	X	1.7	'3	X	1	15.77	X	0.63	×		0.7	ᆜ	=	61.21	(80)
West	0.9x	0.77	X	3.3	31	X	1	15.77	X	0.63	×		0.7		=	117.11	(80)
West	0.9x	0.77	X	2.1	6	X	1	10.22	X	0.63	X		0.7		=	72.76	(80)
West	0.9x	0.77	X	1.7	'3	X	1	10.22	X	0.63	×		0.7		=	58.27	(80)
West	0.9x	0.77	X	1.7	'3	X	1	10.22	X	0.63	×		0.7		=	58.27	(80)
West	0.9x	0.77	X	3.3	31	X	1	10.22	X	0.63	X		0.7		=	111.49	(80)
West	0.9x	0.77	X	2.1	6	X	9	4.68	X	0.63	×		0.7		=	62.5	(80)
West	0.9x	0.77	X	1.7	'3	X	9	4.68	X	0.63	X		0.7		=	50.06	(80)
West	0.9x	0.77	X	1.7	'3	X	9	4.68	X	0.63	X		0.7		=	50.06	(80)
West	0.9x	0.77	X	3.3	31	X	9	4.68	X	0.63	X		0.7		=	95.77	(80)
West	0.9x	0.77	X	2.1	6	X	7	3.59	X	0.63	X		0.7		=	48.58	(80)
West	0.9x	0.77	X 1.73 X 73.59 X 0.63 X 0.7 = 38.91 X 1.73 X 73.59 X 0.63 X 0.7 = 38.91 X 3.31 X 73.59 X 0.63 X 0.7 = 74.44 X 2.16 X 45.59 X 0.63 X 0.7 = 30.09 X 1.73 X 45.59 X 0.63 X 0.7 = 24.1 X 1.73 X 45.59 X 0.63 X 0.7 = 24.1 X 2.16 X 24.49 X 0.63 X 0.7 = 16.17 X 1.73 X 24.49 X 0.63 X 0.7 = 12.95 X 1.73 X 24.49 X 0.63 X 0.7 = 12.95 X 3.31 X 24.49 X 0.63 X 0.7 = 12.95 </td <td>38.91</td> <td>(80)</td>	38.91	(80)												
West	0.9x	0.77	X	1.7	'3	X	7	3.59	X	0.63	×		0.7		=	38.91	(80)
West	0.9x	0.77	X	3.3	31	X	7	3.59	X	0.63	X		0.7		=	74.44	(80)
West	0.9x	0.77	X	2.1	6	X	4	5.59	X	0.63	x		0.7		=	30.09	(80)
West	0.9x	0.77	X	1.7	'3	X	4	5.59	X	0.63	X		0.7		=	24.1	(80)
West	0.9x	0.77	X	1.7	'3	X	4	5.59	X	0.63	X		0.7		=	24.1	(80)
West	0.9x	0.77	x	3.3	31	X	4	5.59	X	0.63	×		0.7		=	46.12	(80)
West	0.9x	0.77	X	2.1	6	X	2	4.49	X	0.63	×		0.7		=	16.17	(80)
West	0.9x	0.77	X	1.7	'3	X	2	4.49	X	0.63	×		0.7		=	12.95	(80)
West	0.9x	0.77	0.77		(80)												
West	0.9x	0.77 x 1.73 x 73.59 x 0.63 x 0.7 = 38. 0.77 x 1.73 x 73.59 x 0.63 x 0.7 = 38. 0.77 x 3.31 x 73.59 x 0.63 x 0.7 = 74. 0.77 x 2.16 x 45.59 x 0.63 x 0.7 = 30. 0.77 x 1.73 x 45.59 x 0.63 x 0.7 = 24 0.77 x 1.73 x 45.59 x 0.63 x 0.7 = 24 0.77 x 3.31 x 45.59 x 0.63 x 0.7 = 24 0.77 x 3.31 x 45.59 x 0.63 x 0.7 = 16 0.77 x 1.73 x 24.49 x 0.63 x 0.7 = 12 0.77				24.77	(80)										
West	0.9x	0.77	X	2.1	6	X	1	6.15	X	0.63	×		0.7		=	10.66	(80)
West	0.9x	0.77	X	1.7	'3	X	1	6.15	X	0.63	×		0.7		=	8.54	(80)
West	0.9x	0.77	x	1.7	'3	X	1	6.15	x	0.63	×		0.7		=	8.54	(80)
West	0.9x	0.77	X	3.3	31	X	1	6.15	X	0.63	×		0.7		=	16.34	(80)
									_								_
Solar g	ains in	watts, cal	lculated	for eac	h montl	<u>1</u>			(83)m	= Sum(74)m	(82)ı	n				•	
(83)m=	97.11	LL	313.98	478.81	614.39		43.26	606.39	500	.83 370.73	223.	41 12	0.51	80.	35		(83)
		nternal ar				-										İ	
(84)m=	541.67	630.44	742.05	883.64	995.51	10	01.58	949.92	850	.52 732.37	608.	51 5	32.6	512	.79		(84)
7. Me	an inter	nal tempe	erature	(heating	seaso	n)											
Temp	erature	during he	eating p	eriods ir	the liv	ing	area f	rom Tal	ble 9	Th1 (°C)						21	(85)
Utilisa	ation fac	tor for ga	ins for I	iving are	ea, h1,r	n (s	ee Ta	ble 9a)		·	,	-				•	
	Jan	Feb	Mar	Apr	May	_	Jun	Jul	A	ug Sep	0	ct I	Vov	D	ес		
(86)m=	1	1	0.99	0.94	0.82		0.63	0.47	0.5	0.82	0.9	7	1	1			(86)
Mean	interna	l tempera	ture in	living are	ea T1 (1	follo	w ste	ps 3 to 7	7 in T	able 9c)							
(87)m=	19.71	19.87	20.16	20.54	20.84	2	20.97	20.99	20.	99 20.88	20.4	8 20	0.03	19.	68		(87)
Temp	erature	during he	eating p	eriods ir	rest o	f dw	elling	from Ta	able 9	9, Th2 (°C)							
(88)m=	19.93	19.93	19.93	19.94	19.94	_	9.95	19.95	19.		19.9	94 19	9.94	19.	93		(88)
						•			•	•				•		•	

Litilicat	tion foo	tor for a	aine for I	rest of d	volling k	2 m (cc	o Tabla	00)						
(89)m=	1	0.99	0.98	0.92	0.77	0.54	0.36	9a) 0.43	0.75	0.96	0.99	1		(89)
` ′ L				<u> </u>	<u> </u>		<u> </u>				0.99	'		(00)
Mean (90)m=	18.21	18.44	18.86	the rest	of dwellii 19.79	ng 12 (fo	ollow ste	ps 3 to 19.95	/ In Tabl	e 9c) 19.34	18.68	18.17		(90)
(90)111=	10.21	10.44	10.00	19.41	19.79	19.93	19.93	19.93	!	!	g area ÷ (4	ļ	0.39	(91)
											g a.oa . (.,	0.39	(01)
Г				r the wh			r			1		1		(0.0)
(92)m=	18.79	18.99	19.36	19.85	20.2	20.33	20.35	20.35	20.25	19.78	19.2	18.76		(92)
				internal	· ·		i		· · ·	·	40.0	40.70		(02)
(93)m=	18.79	18.99	19.36	19.85	20.2	20.33	20.35	20.35	20.25	19.78	19.2	18.76		(93)
			uirement				44 -£	T-1-1- 01	41	4 T: /	70)	-11-	lata	
				nperatur using Ta		ed at ste	ep 11 of	i able 9i	o, so tha	it 11,m=(/6)m an	d re-calc	ulate	
L	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisat	tion fac	tor for g	ains, hm	ı:							•			
(94)m=	1	0.99	0.98	0.92	0.78	0.57	0.41	0.47	0.77	0.96	0.99	1		(94)
				4)m x (84	· 1		ı		I	Ι	I			(0.5)
` ' L	539.54	625.1	724.43	812.97	778.18	575.22	386.16	402.99	565.24	583.61	528.35	511.24		(95)
г				perature								1		(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)
				al tempe			-``	- ,	<u>`</u>		4074.00	4500.00		(07)
` ′		1498.54		1148.46	889.08	593.83	388.84	408.5	639.74	960.81	1271.88	1536.86		(97)
· -	747.36	586.95	476.19	r each m 241.55	82.51	0	$\ln = 0.02$	4 X [(97))m – (95 0	280.64	535.34	763.06		
(90)111=	747.50	300.93	470.19	241.55	02.51	0				<u> </u>	<u> </u>	L	3713.6	(98)
Space	heatin	a requir	omont in	kWh/m²	!/voor			TOIA	l per year	(KVVII/yeai) = Sum(9	O)15,912 =](99)
•		• ,			•								41.59	(99)
			nts – Indi	ividual h	eating sy	/stems i	ncluding	micro-C	CHP)					
•	heating on of so	_	at from se	econdar	v/supple	mentarv	svstem					ı	0	(201)
	•			nain syst		,	•	(202) = 1 -	- (201) =				1	(202)
	•			main sys	` '			(204) = (204)	02) x [1 –	(203)] =		ļ	1	(204)
			•	ing syste								ļ	93.5	(206)
	•	•		ementar		g system	າ, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊒ ar
Space				alculate				- 3					.,	
· -	747.36	586.95	476.19	241.55	82.51	0	0	0	0	280.64	535.34	763.06		
(211)m	= {[(98)m x (20	4)1 } x 1	00 ÷ (20)6)									(211)
` <i>′</i> г	799.31	627.76	509.29	258.35	88.24	0	0	0	0	300.15	572.56	816.11		,
L					· · · · · · · · ·			Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3971.76	(211)
Space	heating	g fuel (s	econdar	y), kWh/	month							l		
-		-	00 ÷ (20											
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		
_					!		•	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	- -	0	(215)
												I		_

Output from water heater (calculated above) 203.74 179.52 188.42 168.74 165.23 1	47.47 14°	1.46 155.46	155.25	174.98	185.23	198.78		
Efficiency of water heater	1		1				79.8](2
	79.8 79	9.8 79.8	79.8	86.07	87.48	88.06		J` (2
ruel for water heating, kWh/month	!	l						
(219) m = (64) m x $100 \div (217)$ m (219)m = (217) m = (217) m = (219) m = (217) m = (219)	184.8 177	7.27 194.81	194.55	203.3	211.73	225.73		
201.00 204.0 210.11 100.70 100.01	104.0		tal = Sum(2		211.70	220.70	2440.12](2
Annual totals			·		Wh/yeaı	, ,	kWh/year	J (-
pace heating fuel used, main system 1					, , ,		3971.76	1
Vater heating fuel used							2440.12	Ī
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(2
boiler with a fan-assisted flue						45		(2
		SIII	n of (230a)	(230a) -		45	75	۔ 2)[
otal electricity for the above, kWh/year		Sui	11 OI (230a)	(230g) =			75]]
-lectricity for lighting							374.37	(2
						-		
	ıs includin	g micro-CH	Р					_
Electricity for lighting 12a. CO2 emissions – Individual heating system	Energ	y	Р		ion fac	tor	Emissions	
, , ,		y	P	Emiss kg CO		tor	Emissions kg CO2/yea	ır
, , ,	Energ	y ear	P		2/kWh	tor = [r](2
12a. CO2 emissions – Individual heating system	Energ kWh/y	y ear	P	kg CO	2/kWh		kg CO2/yea	_
12a. CO2 emissions – Individual heating system Space heating (main system 1)	Energ kWh/y	y ear	P	kg CO	2/kWh	=	kg CO2/yea](2
12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary)	Energ kWh/y (211) x (215) x (219) x	y ear		0.2 0.5	2/kWh	=	kg CO2/yea](2
12a. CO2 emissions – Individual heating system pace heating (main system 1) pace heating (secondary) Vater heating pace and water heating	Energ kWh/y (211) x (215) x (219) x	ear ((((262) + (263) +		0.2 0.5	2/kWh 16 19	=	kg CO2/yea 857.9 0 527.07	(2)
12a. CO2 emissions – Individual heating system space heating (main system 1) space heating (secondary) Vater heating	Energ kWh/y (211) x (215) x (219) x (261) + (y ear (((262) + (263) +		0.2 0.5 0.2	2/kWh 16 19 16	=	kg CO2/yea 857.9 0 527.07 1384.97](2](2](2

TER =

(273)

26.65

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:39:04

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:** Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 52.4m² Site Reference: Plot Reference: Maitland Park Estate AC 009

AC 009, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 30.21 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 9.41 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 54.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 51.5 kWh/m²

OK 2 Fabric U-values

Element Highest Average

External wall 0.12 (max. 0.30) 0.12 (max. 0.70) OK Party wall 0.00 (max. 0.20) OK Floor OK

0.12 (max. 0.25)

0.12 (max. 0.70) Roof (no roof)

1.40 (max. 3.30)

2a Thermal bridging

Openings

Thermal bridging calculated from linear thermal transmittances for each junction

1.40 (max. 2.00)

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

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:	0.5	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: South	4.91m²	
Windows facing: North	7.06m²	
Windows facing: North	1.97m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m ² K	
Party Walls U-value	0 W/m²K	
Floors U-value	0.12 W/m ² K	
Community heating, heat from electric heat pump		

Photovoltaic array

			lloor D) etaile.						
Assessor Name: Software Name:	John Simpson Stroma FSAP 20		User D	Strom Softwa	are Vei	rsion:			0006273 on: 1.0.4.26	
Address :	AC 009, Aspen Co			Address			PEH			
1. Overall dwelling din		ourt, iviaitie	anu ran	C LState,	London	, 14445 2	. L 11			
1. Overall awalling all	nonciono.		Are	a(m²)		Av. He	ight(m)		Volume(m ³	3)
Ground floor					(1a) x		2.9	(2a) =	151.96	(3a)
Total floor area TFA =	(1a)+(1b)+(1c)+(1d)+(1	e)+(1r	n) [52.4	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	(3n) =	151.96	(5)
2. Ventilation rate:										
	main heating	secondai heating	у	other		total			m³ per hou	ır
Number of chimneys	0 +	0	+ [0] = [0	X e	40 =	0	(6a)
Number of open flues	0 +	0	Ī + Ē	0	Ī = Ē	0	x	20 =	0	(6b)
Number of intermittent	fans				, <u> </u>	0	x	10 =	0	(7a)
Number of passive ven	ts					0	x	10 =	0	(7b)
Number of flueless gas					<u> </u>	0	x	40 =	0	(7c)
rtamber er maelees gae					L				<u> </u>	(,,,)
								Air ch	nanges per ho	our
Infiltration due to chimn	neys, flues and fans =	(6a)+(6b)+(7	a)+(7b)+(7c) =	Γ	0		÷ (5) =	0	(8)
If a pressurisation test has	s been carried out or is inten	ded, procee	d to (17),	otherwise o	continue fr	om (9) to	(16)			_
Number of storeys in	the dwelling (ns)								0	(9)
Additional infiltration		_					[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timbe present, use the value corre				•	uction			0	(11)
	nings); if equal user 0.35	esponding to	ine great	er wan are	a (aitei					
If suspended wooder	n floor, enter 0.2 (unse	aled) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, e	enter 0.05, else enter 0								0	(13)
ŭ	ws and doors draught	stripped							0	(14)
Window infiltration				0.25 - [0.2			(45)		0	(15)
Infiltration rate	50			(8) + (10)	, , ,	, , ,	, ,		0	(16)
If based on air permeal	e, q50, expressed in cubility value, then $(18) = 1$		•	•	•	etre or e	envelope	area	2	(17)
•	ollies if a pressurisation test h					is beina u	sed		0.1	(18)
Number of sides shelte				, ,	,	3			2	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorpor	ating shelter factor			(21) = (18	x (20) =				0.08	(21)
Infiltration rate modified	for monthly wind spec	ed								
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		
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	1	
(0 1.10	1 0.00	L 3.55	1 3.02		L	I ''' ²	Lo	J	

0.11		<u> </u>			d wind s	` 	`	<u>`</u>	ı	ı		1	
Calculate ette	0.11 Ctive air ch	0.1	0.09 rate for t	0.09 he appli	0.08 Cable ca	0.08 Se	0.08	0.08	0.09	0.1	0.1		
If mechanica		_	410 707 1	το αρριι	<i>34870 04</i>							0.5	(23
If exhaust air h	eat pump usi	ng Appe	endix N, (2	3b) = (23a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0.5	(23
If balanced with	n heat recove	ry: effici	ency in %	allowing f	or in-use f	actor (from	n Table 4h) =				76.5	(23
a) If balance	ed mechan	ical ve	ntilation	with hea	at recove	ery (MVI	HR) (24a	n)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m = 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(24
b) If balance	ed mechan	ical ve	ntilation	without	heat rec	covery (N	ЛV) (24b)m = (22	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)n	ouse extra n < 0.5 × (2			•					5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)n	ventilation n = 1, then								0.5]			•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change ra	ite - en	ter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)					
(25)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(25
3. Heat losse	s and heat	t loss r	paramete	ār.									
ELEMENT	Gross		Openin		Net Ar	ea	U-valı	ıe	AXU		k-value	e A	Χk
	area (n	n²)	' m		A ,r	m²	W/m2	K	(W/I	K)	kJ/m²-l	K k	J/K
Doors					2.93	X	1.4	= [4.102				(26
Windows Type	e 1				4.91	x1,	/[1/(1.4)+	0.04] =	6.51				(27
Windows Type	e 2				7.06	x1,	/[1/(1.4)+	0.04] =	9.36				(27
Windows Type	e 3				1.97	x1,	/[1/(1.4)+	0.04] =	2.61				(27
Floor					52.4	Х	0.12	=	6.288				(28
Walls	34.68		16.87	7	17.81	X	0.12	_ = [2.14				_
	elements r	n2					U.12		2.17				(29
otal area of e	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	11			87.08	3	0.12	[2.17				
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	11			87.08 49.76	=	0	= [0				(31
Party wall * for windows and	l roof window	/s, use ei			49.76	, x	0	= [0	as given in	paragraph	3.2	(31
Party wall * for windows and ** include the area	l roof window as on both sid	rs, use ei des of int	ternal wali		49.76	x ated using	0 formula 1	= [/[(1/U-valu	0	as given in	paragraph		(31
Party wall * for windows and ** include the area Fabric heat los	I roof window as on both sic ss, W/K = \$	vs, use endes of inc	ternal wali		49.76	x ated using	0	= [/[(1/U-valu) + (32) =	0 re)+0.04] a			31.01	(31)
Party wall * for windows and ** include the area Fabric heat los Heat capacity	I roof window as on both sid ss, W/K = S Cm = S(A	vs, use endes of ind S (A x I x k)	ternal wali U)	s and part	49.76 alue calcul	X ated using	0 formula 1	= [/[(1/U-valu) + (32) = ((28)	0 re)+0.04] a	2) + (32a).		31.01	(31) (32) (33) (34)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	I roof window as on both sid ss, W/K = S Cm = S(A paramete	vs, use endes of ind S (A x I x k) er (TMP	ternal wall U) ' = Cm ÷	s and part	49.76 alue calcul itions	X ated using	0 of formula 1 (26)(30)	= [/[(1/U-valu) + (32) = ((28) Indica	0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	31.01	(31) (32) (33) (34)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	I roof window as on both sid ss, W/K = S Cm = S(A paramete sments where	vs, use endes of income S (A x x k) er (TMP e the det	ternal wall U) P = Cm ÷ tails of the	s and part	49.76 alue calcul itions	X ated using	0 of formula 1 (26)(30)	= [/[(1/U-valu) + (32) = ((28) Indica	0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	31.01	(31)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste	I roof window as on both sid ss, W/K = S Cm = S(A paramete sments where ad of a detail	s, use endes of indes	ternal wall U) P = Cm ÷ tails of the	s and part - TFA) ir constructi	49.76 alue calculations a kJ/m²K fon are not	x ated using	0 of formula 1 (26)(30)	= [/[(1/U-valu) + (32) = ((28) Indica	0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	31.01	(31 (32 (33 (34 (35
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma	I roof window as on both sid ss, W/K = S Cm = S(A paramete sments where ad of a detail es : S (L x al bridging an	rs, use endes of indes of inde	ternal wall U) P = Cm ÷ tails of the lation. culated t	s and part - TFA) ir constructi	49.76 alue calculations a kJ/m²K fon are not	x ated using	0 of formula 1 (26)(30)	= [/[(1/U-valu) + (32) = ((28) Indica e indicative	0 re)+0.04] a .(30) + (32 tive Value e values of	2) + (32a). : Medium	(32e) =	31.01 0 250	(31 (32 (33 (34 (35) (36)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric he	I roof window as on both sides, W/K = S Cm = S(A paramete sments where ad of a detail es : S (L x al bridging an	rs, use endes of indes	ternal wall U) P = Cm ÷ tails of the lation. culated to	TFA) ir constructiusing Ap	49.76 alue calculations a kJ/m²K fon are not	x ated using	0 of formula 1 (26)(30)	= [/[(1/U-valu) + (32) = ((28) Indica e indicative	0 (30) + (32) (30) + (32) (30) + (32) (36) =	2) + (32a). : Medium : TMP in Ta	(32e) =	31.01 0 250	(31 (32 (33 (34 (35) (36)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric hea	I roof window as on both sides, W/K = \$ Cm = S(A paramete sments where ad of a detail es : S (L x al bridging and at loss at loss calc	rs, use endes of indes	ternal wall U) P = Cm ÷ tails of the ulation. culated u own (36) =	TFA) ir constructiusing Ap	49.76 alue calculations a kJ/m²K fon are not	x ated using t known pr	0 of formula 1 (26)(30) recisely the	= [/[(1/U-valu) + (32) = ((28) Indica e indicative (33) + (38)m	0 (30) + (32) tive Value values of (36) = = 0.33 × (2) + (32a). : Medium : <i>TMP in Ta</i> 25)m x (5)	(32e) =	31.01 0 250 9.49	(31 (32 (33 (34 (35) (36)
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric he Ventilation hea	roof window as on both sides, W/K = S Cm = S(A paramete sments where ad of a detail es : S (L x al bridging are eat loss at loss calc	x, use endes of interest of the detection of the detectio	ternal wall O = Cm ÷ tails of the ulation. culated u own (36) = monthly	s and part TFA) ir constructi using Ap 0.05 x (3	49.76 Idue calculations KJ/m²K Ion are not pendix I	x ated using t known pr	0 I formula 1 (26)(30) Pecisely the	= [/(1/U-valu) + (32) = ((28) Indica e indicative (33) + (38)m Sep	0 (30) + (32) tive Values of (36) = = 0.33 × (Oct	2) + (32a). : Medium : <i>TMP in Ta</i> 25)m x (5) Nov	(32e) = able 1f	31.01 0 250 9.49	(31 (32 (33 (34 (35) (36) (37)
(38)m= 11.33	roof window as on both sid as, W/K = S Cm = S(A paramete sments where ad of a detail es : S (L x al bridging an at loss at loss calc	xs, use endes of interest of the detection of the culated Mar 11.11	ternal wall U) P = Cm ÷ tails of the ulation. culated u own (36) =	TFA) ir constructiusing Ap	49.76 alue calculations a kJ/m²K fon are not	x ated using t known pr	0 of formula 1 (26)(30) recisely the	= [/(1/U-valu 1+(32) = ((28) Indica e indicative (33) + (38)m Sep 10.15	0 (30) + (32) tive Values of (36) = = 0.33 × (Oct 10.47	2) + (32a). : Medium : TMP in Ta 25)m x (5) Nov 10.69	(32e) =	31.01 0 250 9.49	(39 (31) (32) (33) (34) (35) (36) (37) (38
Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste Thermal bridge if details of therma Total fabric he Ventilation hea	roof window as on both sid as, W/K = \$ Cm = \$(A) a paramete and of a detail as : \$ (L x) al bridging an at loss at loss calc Feb 11.22 coefficient,	xs, use endes of interest of the detection of the culated Mar 11.11	ternal wall O = Cm ÷ tails of the ulation. culated u own (36) = monthly	s and part TFA) ir constructi using Ap 0.05 x (3	49.76 Idue calculations KJ/m²K Ion are not pendix I	x ated using t known pr	0 I formula 1 (26)(30) Pecisely the	= [/(1/U-valu 1+(32) = ((28) Indica e indicative (33) + (38)m Sep 10.15	0 (30) + (32) tive Values of (36) = = 0.33 × (Oct	2) + (32a). : Medium : TMP in Ta 25)m x (5) Nov 10.69	(32e) = able 1f	31.01 0 250 9.49	(31 (32 (33 (34 (35) (36) (37)

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.99	0.99	0.99	0.97	0.97	0.96	0.96	0.96	0.97	0.97	0.98	0.98		
		!		!					Average =	Sum(40) ₁ .	12 /12=	0.97	(40)
Number of day	<u> </u>								<u> </u>				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occi if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		76		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed t			se target c		.02		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage							_	*F					
(44)m= 83.62	80.58	77.54	74.5	71.46	68.42	68.42	71.46	74.5	77.54	80.58	83.62		
	•								Total = Su	m(44) ₁₁₂ =	=	912.25	(44)
Energy content of	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x C	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 124.01	108.46	111.92	97.58	93.63	80.79	74.87	85.91	86.94	101.32	110.59	120.1		
If instantaneous	vator hooti	na ot noint	of upo (no	a hat water	r otorogol	antar O in	hayaa (16		Total = Su	m(45) ₁₁₂ =	- [1196.1	(45)
If instantaneous v			,		, , , , , , , , , , , , , , , , , , ,	·	` '	, , , I	1	1	i I		(40)
(46)m= 18.6 Water storage	16.27	16.79	14.64	14.04	12.12	11.23	12.89	13.04	15.2	16.59	18.01		(46)
Storage volum) includir	ia anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	•					_							()
Otherwise if n	-			-			' '	ers) ente	er '0' in (47)			
Water storage													
a) If manufac	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	factor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufactHot water stor			-								02		(51)
If community h	-			IC 2 (KVV)	11/11110/00	·y /				0.	02		(31)
Volume factor	•									1.	03		(52)
Temperature f	factor fro	m Table	2b							0	.6		(53)
Energy lost fro	om watei	storage	, 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 f	or 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 cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хН	
(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)
Primary circuit	t loss (ar	nual) fro	m Table	 e 3							0		(58)
Primary circuit	`	,			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by				,	•	. ,	, ,		r thermo	stat)			
(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 of	salaulatad	for oach	month /	(61)m -	(60) · ·	265 v (41	/m							
(61)m= 0	0	0	0	01)111 =	00) + 1	0 7 (41	0		0	0	0	0	1	(61)
	<u> </u>							 				<u> </u>	J (59)m + (61)m	(0.)
(62)m= 179.2		167.2	151.07	148.9	134.29		141.	_	140.43	156.59	164.09	175.37	(39)111 + (01)111	(62)
Solar DHW inpu				<u> </u>										(02)
(add addition										CONTINU	ion to wat	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	1	0	0	0	0	1	(63)
Output from	water hea	ter		<u>I</u>				!_					l	
(64)m= 179.2		167.2	151.07	148.9	134.29	130.14	141.	19	140.43	156.59	164.09	175.37	1	
	-1	<u> </u>		ļ	ļ	1		Output	t from wa	ater heate	r (annual) ₁	l12	1846.94	(64)
Heat gains fi	om water	heating,	kWh/me	onth 0.2	8.0] ` 5	5 × (45)m	ı + (61	1)m]	+ 0.8 x	: [(46)m	+ (57)m	+ (59)m]	-
(65)m= 85.45		81.44	75.24	75.35	69.66	69.11	72.7	' i	71.7	77.91	79.57	84.15	ĺ	(65)
include (5	7)m in cal	culation of	of (65)m	only if c	vlinder	is in the	dwelli	ng o	r hot w	ater is f	rom com	munity h	ı neating	
5. Internal gains (see Table 5 and 5a):														
Metabolic gains (Table 5), Watts														
Jan		Mar	Apr	May	Jun	Jul	Au	ıg	Sep	Oct	Nov	Dec]	
(66)m= 88.04	88.04	88.04	88.04	88.04	88.04	88.04	88.0)4	88.04	88.04	88.04	88.04		(66)
Lighting gair	ıs (calcula	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso se	ee Ta	able 5		•	•	•	
(67)m= 13.68	3 12.15	9.88	7.48	5.59	4.72	5.1	6.63	3	8.9	11.3	13.19	14.06		(67)
Appliances of	gains (calc	ulated in	Append	dix L, eq	uation	L13 or L1	3a), a	also s	see Tal	ole 5			•	
(68)m= 153.4	6 155.06	151.04	142.5	131.72	121.58	114.81	113.2	22	117.23	125.77	136.56	146.69		(68)
Cooking gair	ns (calcula	ted in A	pendix	L, equat	ion L1	or L15a), alsc	see	Table	5			•	
(69)m= 31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8	В	31.8	31.8	31.8	31.8		(69)
Pumps and t	ans gains	(Table 5	āa)			•						•	•	
(70)m= 0	0	0	0	0	0	0	0		0	0	0	0		(70)
Losses e.g.	evaporatio	n (negat	ive valu	es) (Tab	le 5)	•						•	-	
(71)m= -70.4	3 -70.43	-70.43	-70.43	-70.43	-70.43	-70.43	-70.4	43	-70.43	-70.43	-70.43	-70.43		(71)
Water heating	ng gains (T	able 5)				-							•	
(72)m= 114.8	6 113.1	109.46	104.5	101.28	96.75	92.9	97.8	33	99.58	104.72	110.51	113.11		(72)
Total intern	al gains =	:			(6	6)m + (67)m	า + (68))m + ((69)m + (70)m + (7	'1)m + (72))m	•	
(73)m= 331.4	2 329.72	319.79	303.89	288	272.46	262.22	267.0	09	275.13	291.2	309.67	323.28		(73)
6. Solar gai	ns:													
Solar gains ar	e calculated	using sola	r flux from	Table 6a	and asso	ciated equa	tions to	o conv	vert to the	e applical		tion.		
Orientation:			Area m²			ux able 6a			g_ ble 6b	т	FF able 6c		Gains	
	Table 6d				- 1	able ba		ıaı	DIE OD	_ '	able oc		(W)	7
North 0.93		X	7.0)6	X	10.63	X		0.4	_ ×	8.0	=	16.65	(74)
North 0.93		X	1.9	97	X	10.63	X		0.4	_ x	0.8	=	4.65	(74)
North 0.9		Х	7.0	06	x	20.32	X		0.4	x	0.8	=	31.82	(74)
North 0.93		Х	1.9	97	x	20.32	X		0.4	_ x	8.0	=	8.88	(74)
North 0.9	0.77	X	7.0)6	X	34.53	x		0.4	X	8.0	=	54.06	(74)

						_			_								_
North	0.9x	0.77		X	1.97	X	3	34.53	X		0.4	X	0.8	:	= [15.09	(74)
North	0.9x	0.77		X	7.06	x		55.46	X		0.4	x	0.8		= [86.84	(74)
North	0.9x	0.77		X	1.97	X	5	55.46	X		0.4	x	0.8	:	= [24.23	(74)
North	0.9x	0.77		X	7.06	X	7	4.72	X		0.4	x	0.8	-	= [116.98	(74)
North	0.9x	0.77		X	1.97	x	7	4.72	x		0.4	x	0.8	-	= [32.64	(74)
North	0.9x	0.77		X	7.06	X	7	9.99	X		0.4	x	0.8	:	= [125.23	(74)
North	0.9x	0.77		X	1.97	X	7	9.99	X		0.4	x	0.8	-	= [34.94	(74)
North	0.9x	0.77		X	7.06	X	7	4.68	X		0.4	x	0.8	-	= [116.92	(74)
North	0.9x	0.77		X	1.97	X	7	' 4.68	X		0.4	x	0.8	:	= [32.62	(74)
North	0.9x	0.77		X	7.06	X	5	9.25	X		0.4	x	0.8	:	= [92.76	(74)
North	0.9x	0.77		X	1.97	X	5	9.25	X		0.4	x	0.8	:	= [25.88	(74)
North	0.9x	0.77		X	7.06	X	4	1.52	X		0.4	x	0.8	:	= [65	(74)
North	0.9x	0.77		X	1.97	X	4	1.52	X		0.4	x	0.8	-	= [18.14	(74)
North	0.9x	0.77		X	7.06	X	2	24.19	X		0.4	x	0.8	:	= [37.87	(74)
North	0.9x	0.77		X	1.97	X	2	24.19	X		0.4	x	0.8	:	= [10.57	(74)
North	0.9x	0.77		X	7.06	X	1	3.12	X		0.4	x	0.8	-	= [20.54	(74)
North	0.9x	0.77		X	1.97	X	1	3.12	X		0.4	x	0.8	-	= [5.73	(74)
North	0.9x	0.77		X	7.06	X		8.86	X		0.4	x	0.8	:	= [13.88	(74)
North	0.9x	0.77		X	1.97	X		8.86	X		0.4	x	0.8	-	= [3.87	(74)
South	0.9x	0.77		X	4.91	X	4	6.75	X		0.4	x	0.8	:	= [50.91	(78)
South	0.9x	0.77		X	4.91	X	7	6.57	X		0.4	x	0.8	:	= [83.37	(78)
South	0.9x	0.77		X	4.91	X	9	7.53	X		0.4	x	0.8	-	= [106.2	(78)
South	0.9x	0.77		X	4.91	X	1	10.23	X		0.4	x	0.8	-	= [120.03	(78)
South	0.9x	0.77		X	4.91	X	1	14.87	X		0.4	x	0.8	-	= [125.08	(78)
South	0.9x	0.77		X	4.91	X	1	10.55	X		0.4	x	0.8	:	= [120.37	(78)
South	0.9x	0.77		X	4.91	X	1	08.01	X		0.4	x	0.8	:	= [117.61	(78)
South	0.9x	0.77		X	4.91	X	1	04.89	X		0.4	x	0.8	:	= [114.21	(78)
South	0.9x	0.77		X	4.91	x	1	01.89	X		0.4	x	0.8		= [110.94	(78)
South	0.9x	0.77		X	4.91	X	8	32.59	X		0.4	x	0.8	:	= [89.92	(78)
South	0.9x	0.77		X	4.91	X		55.42	X		0.4	x	0.8		= [60.34	(78)
South	0.9x	0.77		X	4.91	x		40.4	X		0.4	x	0.8		= [43.99	(78)
Ť				_	for each mon	_		i	_		m(74)m		_		_		(0.0)
(83)m=	72.2	124.06	175.35		231.09 274.6		280.54	267.15	232	85	194.07	138.36	86.61	61.74	1		(83)
Ī				_	(84)m = (73) r	_	. ,		100	. 05	400.0	100.50	1 000 00	1 005 0	_		(0.4)
(84)m=	403.62	453.79	495.14	1	534.99 562.6	9	553	529.37	499	.95	469.2	429.56	396.28	385.0	1		(84)
					heating seaso										_		_
•		_	_	•	eriods in the li				ole 9	, Th1	(°C)					21	(85)
Utilisa				$\overline{}$	ving area, h1,				_		- 1			1	_		
ļ	Jan	Feb	Mar	_	Apr Ma	- +	Jun	Jul	_	ug	Sep	Oct	+	De	_		(0.0)
(86)m=	0.99	0.99	0.97	\perp	0.91 0.77		0.57	0.42	0.4	46	0.7	0.93	0.98	0.99			(86)
Mean	interna		ature i	n li	ving area T1	(fol		ps 3 to 7	7 in T	able	9c)		<u> </u>				
(87)m=	20.14	20.29	20.5		20.75 20.92	2	20.99	21	2	1	20.97	20.75	20.41	20.11			(87)

Temn	aratura	during h	neating p	ariade ir	rest of	dwelling	from Ta	hla 0 T	h2 (°C)					
(88)m=	20.09	20.09	20.1	20.1	20.11	20.11	20.11	20.12	20.11	20.11	20.1	20.1		(88)
. ,		<u>!</u>	ains for											, ,
(89)m=	0.99	0.98	0.96	0.88	0.72	0.5	0.33	0.37	0.63	0.9	0.98	0.99		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to	7 in Tabl	e 9c)		<u> </u>		
(90)m=	18.96	19.17	19.48	19.83	20.04	20.11	20.11	20.12	20.09	19.84	19.35	18.92		(90)
								Į.	f	LA = Livin	g area ÷ (4	1) =	0.47	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwel	lling) = fl	LA × T1	+ (1 – fL	.A) × T2			•		
(92)m=	19.52	19.7	19.96	20.26	20.46	20.52	20.53	20.53	20.5	20.27	19.85	19.48		(92)
Apply	adjustr	nent to t	he mear	internal	temper	ature fro	m Table	4e, whe	re appro	priate				
(93)m=	19.52	19.7	19.96	20.26	20.46	20.52	20.53	20.53	20.5	20.27	19.85	19.48		(93)
			uirement											
			ternal ter or gains	•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	0.99	0.98	0.95	0.88	0.74	0.53	0.37	0.41	0.66	0.9	0.98	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (84	4)m									
(95)m=	399.18	444.06	472.12	473.07	415.61	294.87	197.87	207.2	311.39	388.27	387.07	381.66		(95)
		 	rnal tem					<u> </u>		<u> </u>				(0.0)
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
(97)m=	788.69	765.39	an intern 694.71	ai tempe 580.49	446.33	LM , VV =	=[(39)m : 198.29	x [(93)m 207.94	- (96)m 324.23	492.94	652.52	785.53		(97)
,			ement fo					l				700.00		(01)
(98)m=	289.8	215.94	165.61	77.34	22.86	0	0	0	0	77.87	191.13	300.48		
` '		ļ	ļ					I Tota	l per year	l (kWh/year) = Sum(9	8) _{15,912} =	1341.03	(98)
Space	e heatin	g require	ement in	kWh/m²	?/year							· [25.59	(99)
9b. En	ergy red	quiremer	nts – Cor	nmunity	heating	scheme						L		
This pa	art is us	ed for sp	ace hea	ting, spa	ace cooli	ng or wa	ater heat				unity sch	neme.		_
Fractio	n of spa	ace heat	from se	condary/	/supplem	nentary I	neating (Table 1	1) '0' if n	one			0	(301)
Fractio	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-		y obtain he s, geotherr							up to four (other heat	sources; th	ne latter	
			Commun			•							1	(303a)
Fractio	n of tota	al space	heat fro	m Comn	nunity he	eat pump)			(3	02) x (303	a) =	1	(304a)
Factor	for con	trol and	charging	method	(Table 4	4c(3)) fo	r commu	unity hea	ating sys	tem		Ī	1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m					1.1	(306)
Space	heatin	g										•	kWh/yea	r r
Annua	l space	heating	requirem	nent								[1341.03	
Space	heat fro	om Comi	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) =	= [1475.13	(307a)
Efficier	ncy of s	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)	[0	(308

				-	_
Space heating requirement from secon	dary/supplementary system	(98) x (301) x 1	00 ÷ (308) =	0	(309)
Water heating Annual water heating requirement				1846.94	
If DHW from community scheme: Water heat from Community heat pump)	(64) x (303a) x	(305) x (306) =	2031.64	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	'e) + (310a)(310e)] =	35.07	(313)
Cooling System Energy Efficiency Ratio)			0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter 0)	= (107) ÷ (314)	=	0	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	· ,	side		115.87	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =	115.87	(331)
Energy for lighting (calculated in Appen	dix L)			241.62	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)			-541.49	(333)
Electricity generated by wind turbine (A	ppendix M) (negative quantit	ty)		0	(334)
12b. CO2 Emissions - Community hea	ting scheme				
	•				
	Ŭ	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)		kWh/year	kg CO2/kWh	kg CO2/year	(367a)
·	vater heating (not CHP) If there is CHP using two	kWh/year	kg CO2/kWh	kg CO2/year	(367a) (367)
Efficiency of heat source 1 (%)	vater heating (not CHP) If there is CHP using two	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fue	319 570.54	_
Efficiency of heat source 1 (%) CO2 associated with heat source 1	vater heating (not CHP) If there is CHP using two [(307b)+(310b)	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	319 570.54	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	vater heating (not CHP) If there is CHP using two [(307b)+(310t) [(313) systems (363)	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x) x (366) + (368)(372	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	319 570.54 18.2 588.74	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community s	vater heating (not CHP) If there is CHP using two [(307b)+(310t) [(313 systems (363) condary) (309)	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x) x (366) + (368)(372)	kg CO2/kWh (366) for the second fue 0.52 = 0.52 =	319 570.54 18.2 588.74	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so	vater heating (not CHP) If there is CHP using two [(307b)+(310t) [(313 systems (363) condary) (309) sion heater or instantaneous	kWh/year fuels repeat (363) to b)] x 100 ÷ (367b) x) x (366) + (368)(372)	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 =	319 570.54 18.2 588.74	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see	vater heating (not CHP) If there is CHP using two [(307b)+(310t) [(313 systems (363) condary) (309) sion heater or instantaneous vater heating (373)	fuels repeat (363) to b)] x 100 ÷ (367b) x) x(366) + (368)(372 x heater (312) x + (374) + (375) =	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 =	319 570.54 18.2 588.74 0 588.74	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and water	vater heating (not CHP) If there is CHP using two [(307b)+(310t) [(313 systems (363) condary) (309) sion heater or instantaneous vater heating (373) ps and fans within dwelling	fuels repeat (363) to b)] x 100 ÷ (367b) x) x(366) + (368)(372 x heater (312) x + (374) + (375) = (331)) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 570.54 18.2 588.74 0 0 588.74 60.14	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and water CO2 associated with electricity for pum	vater heating (not CHP) If there is CHP using two [(307b)+(310b) [(313) systems (363) scondary) (309) sion heater or instantaneous vater heating (373) ps and fans within dwelling ing (332)	fuels repeat (363) to b)] x 100 ÷ (367b) x) x(366) + (368)(372 x heater (312) x + (374) + (375) = (331)) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 570.54 18.2 588.74 0 588.74 60.14	(367) (372) (373) (374) (375) (376) (378)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and w CO2 associated with electricity for pum CO2 associated with electricity for light Energy saving/generation technologies	vater heating (not CHP) If there is CHP using two [(307b)+(310b) [(313) systems (363) scondary) (309) sion heater or instantaneous vater heating (373) ps and fans within dwelling ing (332)	fuels repeat (363) to b)] x 100 ÷ (367b) x) x(366) + (368)(372 x heater (312) x + (374) + (375) = (331)) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 570.54 18.2 588.74 0 0 588.74 60.14 125.4	(367) (372) (373) (374) (375) (376) (378) (379)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community so CO2 associated with space heating (see CO2 associated with water from immer Total CO2 associated with space and w CO2 associated with electricity for pum CO2 associated with electricity for light Energy saving/generation technologies Item 1	vater heating (not CHP) If there is CHP using two [(307b)+(310t) [(313 systems (363) scondary) (309) sion heater or instantaneous vater heating (373) ps and fans within dwelling ing (332) (333) to (334) as applicable	fuels repeat (363) to b)] x 100 ÷ (367b) x) x(366) + (368)(372 x heater (312) x + (374) + (375) = (331)) x	kg CO2/kWh (366) for the second fue 0.52 = 0.52 = 0.52 = 0.52 = 0.52 = 0.52 =	319 570.54 18.2 588.74 0 0 588.74 60.14 125.4	(372) (373) (374) (375) (376) (378) (379)

			U <u>ser I</u>	Details:						
Assessor Name: Software Name:	John Simpson Stroma FSAP 20)12		Strom Softwa					0006273 on: 1.0.4.26	
				Address						
Address :	AC 009, Aspen Co	ourt, Maitla	and Par	k Estate,	London	, NW3 2	EH			
1. Overall dwelling dim	ensions:		A	- (2)		A 11 .	• l. (/))/ - l / 2	,
Ground floor				a(m²) 52.4	(1a) x		2.9	(2a) =	Volume(m³	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1	1e)+(1r	n)	52.4	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	151.96	(5)
2. Ventilation rate:										
Number of chimneys	main heating 0 +	secondar heating	'у 	other 0	7 = [total 0	x	40 =	m³ per hou	r
Number of open flues		0	┙		」 ┐ ₌ ├	0	x	20 =		(6b)
·	U	0	J	0	╛				0	╡`′
Number of intermittent fa					Ĺ	2		10 =	20	(7a)
Number of passive vents	S				L	0	X '	10 =	0	(7b)
Number of flueless gas	fires					0	X 4	40 =	0	(7c)
								Air ch	nanges per ho	our
Infiltration due to chimne	evs. flues and fans =	(6a)+(6b)+(7	′a)+(7b)+	(7c) =	Г	20		÷ (5) =	0.13	(8)
If a pressurisation test has					continue fr	_		. (0) –	0.13	
Number of storeys in	the dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: (0.25 for steel or timbe present, use the value corn				•	uction			0	(11)
deducting areas of open	ings); if equal user 0.35									_
If suspended wooden	•	,	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er									0	(13)
Percentage of window	s and doors draught	stripped		0.25 - [0.2) v (1.4\ · 1	001 -			0	(14)
Window infiltration Infiltration rate				(8) + (10)	. ,	-	+ (15) =		0	(15)
Air permeability value	a50 expressed in a	uhic metre	s ner h					area	0	(16)
If based on air permeab	•		•	•	•		листорс	arou	0.38	(18)
Air permeability value appli	•					is being u	sed		0.00	(,
Number of sides shelter	ed								2	(19)
Shelter factor				(20) = 1 -	`	9)] =			0.85	(20)
Infiltration rate incorpora	•			(21) = (18) x (20) =				0.32	(21)
Infiltration rate modified	for monthly wind spec	ed	1					•	7	
Jan Feb	Mar Apr May	y Jun	Jul	Aug	Sep	Oct	Nov	Dec	J	
Monthly average wind s	 		ı			1		1	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	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]	
									J	

Calculate effect	0.41	0.4	0.36	0.35	0.31	0.31	0.3	0.32	0.35	0.36	0.38]	
		•	rate for t	he appli	cable ca	se	ļ		<u>I</u>	<u> </u>	!		
If mechanica			andin N. (O	0h) (00-	.)		IC\\ _+th		\ (00-\			0	(23
If exhaust air h		0		, ,	, ,	. ,	,, .	•) = (23a)			0	(23
If balanced with		-		_					SI.) (001) [4 (00.)	0	(23
a) If balance	1					- ` ` 	- 	<u> </u>	 	23b) × [i i	i ÷ 100] I	(24
(24a)m= 0	0	0	0	0	0	0	0	0	0		0	J	(24
b) If balance	o mecha	anicai ve	nillation 0	0 Without	neat rec		//V) (24b	0 = (22)	0 (d2	230)	0	1	(24
				-								J	(2
c) If whole h	n < 0.5 x			•					5 x (23h))			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
d) If natural	ventilation	on or wh	ole hous	e positiv	/e input	ventilatio	n from l	oft		<u> </u>		J	
,	n = 1, the				•				0.5]				
24d)m= 0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(24
Effective air	change	rate - en	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)			-		
25)m= 0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(2
3. Heat losse	s and he	at loss r	paramete	ār.									
ELEMENT	Gros	·	Openin		Net Ar	ea	U-valı	ıe	AXU		k-value	9	ΑΧk
	area	-	m		A ,r		W/m2		(W/I	K)	kJ/m²·l		kJ/K
Doors					2.93	X	1.2	= [3.516				(26
Vindows Type) 1				3.58	x1,	/[1/(1.4)+	0.04] =	4.75				(27
Nindows Type	2				5.15	x1,	/[1/(1.4)+	0.04] =	6.83				(27
Nindows Type	3				1.44	x1,	/[1/(1.4)+	0.04] =	1.91				(27
Floor					52.4	x	0.13	=	6.812	<u> </u>			(28
<i>N</i> alls	34.6	i8	13.1		21.58	3 x		_ :		= 7			
, valio							0.18	=	3.89				(2
Total area of e					87.08	=	0.18	= [3.89				
							0.18	= [3.89				(3
Total area of e	elements	, m²		ndow U-va	87.08 49.76	3 x	0	= [0	as given in	paragraph	3.2	(3
Fotal area of e Party wall for windows and * include the area	elements I roof windo	, m² ows, use e sides of in	effective win		87.08 49.76 alue calcul	3 x lated using	0 formula 1.	= [/[(1/U-valu	0	as given in	paragraph	13.2	(3
Fotal area of e Party wall for windows and it include the area Fabric heat los	I roof windo as on both ss, W/K =	, m² ows, use e sides of in = S (A x	effective win		87.08 49.76 alue calcul	3 x lated using	0	= [/[(1/U-valu	0	as given in	paragraph	27.7	(3:
Fotal area of earty wall for windows and include the area Fabric heat los Heat capacity	elements. I roof windo as on both as, W/K = Cm = S(ows, use e sides of in = S (A x (A x k)	offective winternal wall	s and part	87.08 49.76 alue calcul titions	3 X	0 formula 1.	= [/[(1/U-valu + (32) = ((28)	0 re)+0.04] a	2) + (32a).	, ,		(3:
Fotal area of e Party wall for windows and include the area Fabric heat los Heat capacity Thermal mass	Plements. I roof windon as on both ss, W/K = Cm = S(, m² ows, use e sides of in = S (A x k) ter (TMF	effective winternal wall U) $P = Cm \div$	s and part	87.08 49.76 alue calcul titions	X x lated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28)	0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	27.7	(3:
Fotal area of earty wall for windows and include the area Fabric heat los Heat capacity Thermal mass	elements. I roof windo as on both ss, W/K = Cm = S(parame	, m² ows, use e sides of in S (A x K) ter (TMF ere the details	effective winternal wall U) $P = Cm \div tails of the$	s and part	87.08 49.76 alue calcul titions	X x lated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28)	0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	27.7	(3:
Fotal area of earty wall for windows and include the area Fabric heat los Heat capacity Thermal mass For design assess can be used inste	Plements I roof windo as on both as, W/K = Cm = S(a parame aments who ad of a det	ows, use e sides of in = S (A x (A x k) ter (TMF ere the detailed calcu	offective winternal wall U) P = Cm ÷ tails of the culation.	s and part - TFA) ir constructi	87.08 49.76 alue calcul titions kJ/m²K	X x ated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28)	0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	27.7 0 250	(3)
Fotal area of earty wall for windows and include the area Fabric heat los Heat capacity Fhermal mass For design assess an be used inste	elements. I roof windown on both ss, W/K = Cm = S(parame sments who ad of a det es : S (L	, m² ows, use e sides of in S (A x k) ter (TMF) ere the detailed calculus X Y) calculus	effective winternal wall U) $P = Cm \div tails of the ulation.$ culated t	s and part TFA) ir constructi using Ap	87.08 49.76 alue calcul titions kJ/m²K tion are not	X x ated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28)	0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	27.7	(3:
Fotal area of earty wall for windows and include the area Fabric heat los Heat capacity Thermal mass For design assess an be used inste	elements. I roof windon as on both as, W/K = Cm = S(a parame aments who ad of a det es : S (L al bridging	, m² ows, use e sides of in S (A x k) ter (TMF) ere the detailed calculus X Y) calculus	effective winternal wall U) $P = Cm \div tails of the ulation.$ culated t	s and part TFA) ir constructi using Ap	87.08 49.76 alue calcul titions kJ/m²K tion are not	X x ated using	0 formula 1. (26)(30)	= [/[(1/U-valu + (32) = ((28) Indica	0 re)+0.04] a .(30) + (32 tive Value	2) + (32a). : Medium	(32e) =	27.7 0 250	(3)
Fotal area of e Party wall * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	elements. I roof windows on both ss, W/K = Cm = S(parame sments who ad of a det es : S (L al bridging at loss	, m² sides of in S (A x k) ter (TMF) ere the detailed calculus x Y) calculare not known	effective winternal wall U) $P = Cm \div tails of the ulation.$ culated town (36) =	s and part TFA) ir constructi using Ap	87.08 49.76 alue calcul titions kJ/m²K tion are not	X x ated using	0 formula 1. (26)(30)	= [//(1/ <i>U</i> -valu + (32) = ((28) Indica e indicative	0 re)+0.04] a .(30) + (32 tive Value e values of	3 : Medium : <i>TMP in T</i>	(32e) =	27.7 0 250	(3)
Fotal area of eparty wall for windows and initial include the area Fabric heat los Heat capacity Thermal mass For design assess tan be used inste Thermal bridge If details of therma Total fabric he	elements. I roof windows on both ss, W/K = Cm = S(parame sments who ad of a det es : S (L al bridging at loss	, m² sides of in S (A x k) ter (TMF) ere the detailed calculus x Y) calculare not known	effective winternal wall U) $P = Cm \div tails of the ulation.$ culated town (36) =	s and part TFA) ir constructi using Ap	87.08 49.76 alue calcul titions kJ/m²K tion are not	X x ated using	0 formula 1. (26)(30)	= [//(1/ <i>U</i> -valu + (32) = ((28) Indica e indicative	0 (30) + (32) (30) + (32) (30) + (32) (36) =	3 : Medium : <i>TMP in T</i>	(32e) =	27.7 0 250	(3)
Party wall for windows and initial include the area fabric heat los Heat capacity Thermal mass For design assess an be used inste Thermal bridge f details of therma Total fabric he fentilation hea	elements. I roof windon as on both as, W/K = Cm = S(a parame aments who ad of a det es : S (L al bridging at loss at loss ca	, m² ows, use e sides of in = S (A x k) ter (TMF ere the detailed calculated are not known alculated	effective winternal wall U) $P = Cm \div tails of the valuation. culated to cown (36) =$	s and part TFA) ir constructi using Ap	87.08 49.76 Alue calcul titions kJ/m²K ion are not spendix k	x dated using	0 formula 1, (26)(30)	= [/[(1/U-valu + (32) = ((28) Indica e indicative (33) + (38)m	0 (30) + (32) tive Value values of (36) = = 0.33 × (2) + (32a). : Medium : <i>TMP in Ta</i> 25)m x (5)	(32e) = able 1f	27.7 0 250	(3)
Party wall for windows and include the area Fabric heat los Heat capacity Thermal mass For design assess an be used inste Thermal bridge details of therma Total fabric he Jan	elements. I roof windows on both ss, W/K = Cm = S(parame sments who ad of a det es : S (L al bridging at loss at loss ca Feb 29.2	, m² ows, use e sides of in a S (A x k) ter (TMF) ere the detailed calculated are not known alculated Mar 29.03	effective winternal wall U) P = Cm ÷ tails of the culation. culated to cown (36) = I monthly	s and part TFA) ir constructi using Ap 0.05 x (3	87.08 49.76 alue calcul titions kJ/m²K fon are not spendix h 1) Jun	x dated using	0 formula 1. (26)(30) ecisely the	= [/[(1/U-valu + (32) = ((28) Indica * indicative (33) + (38)m Sep 27.71	0 (30) + (32) tive Values of (36) = = 0.33 × (Oct	2) + (32a). : Medium : TMP in Ta 25)m x (5) Nov 28.41	(32e) = able 1f Dec	27.7 0 250	(3:

Heat loss para	ameter (I	HLP), W	/m²K					(40)m	= (39)m ÷	· (4)			
(40)m= 1.21	1.21	1.21	1.19	1.19	1.18	1.18	1.17	1.18	1.19	1.19	1.2		
		!	Į.	Į.	Į.	<u> </u>	<u>I</u>		Average =	Sum(40) ₁ .	12 /12=	1.19	(40)
Number of day	ys in mo	nth (Tab	le 1a)										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occi if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		76		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.02		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	in litres pe	r day for ea			ctor from	Table 1c x		•	•				
(44)m= 83.62	80.58	77.54	74.5	71.46	68.42	68.42	71.46	74.5	77.54	80.58	83.62		
		•				!	!			m(44) ₁₁₂ =		912.25	(44)
Energy content of	f hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 124.01	108.46	111.92	97.58	93.63	80.79	74.87	85.91	86.94	101.32	110.59	120.1		
If instantaneous v	vator hoati	na at naint	of uso (no	hot water	r storago)	ontor O in	havas (16		Total = Su	m(45) ₁₁₂ =	=	1196.1	(45)
	ı		·	1	, , , , , , , , , , , , , , , , , , ,		· · ·						(40)
(46)m= 18.6 Water storage	16.27	16.79	14.64	14.04	12.12	11.23	12.89	13.04	15.2	16.59	18.01		(46)
Storage volum) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
If community h	,					_							` '
Otherwise if n	_			_			. ,	ers) ente	er '0' in (47)			
Water storage													
a) If manufac				or is kno	wn (kWł	n/day):				1.	39		(48)
Temperature f										0.	54		(49)
Energy lost fro		•					(48) x (49)) =		0.	75		(50)
b) If manufact Hot water stor			-								0		(51)
If community h	-			C 2 (KVV)	11/11(10/00	·y <i>)</i>					0		(31)
Volume factor	•										0		(52)
Temperature f	actor fro	m Table	2b								0		(53)
Energy lost fro	m wate	rstorage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or	(54) in (55)								0.	75		(55)
Water storage	loss cal	culated t	for each	month			((56)m = (55) × (41)	m				
(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)
If cylinder contain	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5		7)m = (56)	m where (m Append	ix H	
(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)
Primary circuit	· · loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	,	•			59)m = ((58) ÷ 36	65 × (41)	m					` '
(modified by				,	•	` '	, ,		r thermo	stat)			
(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	laaa aa	oloviloto d	for ooo	h manth	(61)m	(CO) ·	265 · · /44	\m							
(61)m=	0	0 0	or eac	n month	$\frac{(61)m}{0}$	(60) ÷	$\frac{365 \times (41)}{0}$)m o)	0	0	0	0	1	(61)
L		<u> </u>	<u> </u>	<u> </u>	<u> </u>			<u>. </u>				<u>. </u>	<u> </u>	J · (59)m + (61)m	(-)
г	170.61		158.52		140.22	125.8		132		132.03	147.91	155.69	166.69	(00)	(62)
` ' L		I			<u> </u>		ative quantit	I					er heating)		` '
							es, see Ap						· · · · · · · · · · · · · · · · · ·		
(63)m=	0	0	0	0	0	0	0	0	_	0	0	0	0]	(63)
Output	from w	vater hea	ter	•	•		•	•			•	•	•	•	
(64)m=	170.61	150.55	158.52	142.67	140.22	125.8	8 121.46	132	2.5	132.03	147.91	155.69	166.69]	
_		•					•		Outp	out from w	ater heate	r (annual)	I12	1744.72	(64)
Heat ga	ains fro	m water	heating	g, kWh/m	onth 0.2	5 ′ [0.	35 × (45)m	า + (6	(1)m	n] + 0.8 x	د [(46)m	+ (57)m	+ (59)m	n]	
(65)m=	78.51	69.73	74.49	68.52	68.41	62.9	62.17	65.	84	64.98	70.96	72.85	77.21		(65)
includ	de (57)	m in calc	culation	of (65)m	only if c	ylinde	r is in the	dwell	ing	or hot w	ater is f	rom com	munity h	- neating	
5. Inte	ernal g	ains (see	Table	5 and 5a	ı):										
Metabo	lic gai	ns (Table	5), Wa	itts											
	Jan	Feb	Mar	Apr	May	Jui	n Jul	A	ug	Sep	Oct	Nov	Dec]	
(66)m=	88.04	88.04	88.04	88.04	88.04	88.0	88.04	88.	04	88.04	88.04	88.04	88.04		(66)
Lighting	gains	(calcula	ted in A	ppendix	L, equat	ion L9	or L9a), a	also s	ee -	Table 5		-		-	
(67)m=	13.68	12.15	9.88	7.48	5.59	4.72	5.1	6.6	33	8.9	11.3	13.19	14.06		(67)
Applian	ces ga	ains (calc	ulated	n Appen	dix L, eq	uation	L13 or L1	3a), a	also	see Ta	ble 5			-	
(68)m=	153.46	155.06	151.04	142.5	131.72	121.5	8 114.81	113	.22	117.23	125.77	136.56	146.69		(68)
Cooking	g gains	s (calcula	ted in A	Appendix	L, equa	tion L	5 or L15a), als	o se	ee Table	5			-	
(69)m=	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.	.8	31.8	31.8	31.8	31.8]	(69)
Pumps	and fa	ıns gains	(Table	5a)										-	
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3	3]	(70)
Losses	e.g. e	vaporatio	n (neg	ative valu	ies) (Tab	le 5)					-			_	
(71)m=	-70.43	-70.43	-70.43	-70.43	-70.43	-70.4	3 -70.43	-70.	.43	-70.43	-70.43	-70.43	-70.43		(71)
Water h	neating	gains (T	able 5)				-	-			-			_	
(72)m=	105.52	103.77	100.12	95.16	91.94	87.4	83.56	88.	.5	90.25	95.38	101.17	103.77]	(72)
Total ir	nterna	l gains =				(66)m + (67)r	n + (68	3)m +	+ (69)m +	(70)m + (7	71)m + (72))m		
(73)m=	325.08	323.39	313.46	297.56	281.67	266.1	3 255.88	260	.76	268.79	284.87	303.33	316.94		(73)
6. Sola	ar gain	s:												_	
_			_				ociated equa	ations	to co	nvert to th	e applical		tion.		
Orienta		Access F Table 6d	actor	Area m²	l		lux able 6a		т	g_ able 6b	т	FF able 6c		Gains (W)	
N 1 41						_		,	_ '		, -, -			(v v)	7
North	0.9x	0.77		5.	15	x	10.63	X		0.63	x	0.7	_ =	16.74	[74]
North	0.9x	0.77	==		44	X	10.63	X		0.63	x	0.7	=	4.68	」 (74)
North	0.9x	0.77	=		15	X	20.32	X		0.63	x	0.7	=	31.98	<u> </u> (74)
North	0.9x	0.77	,	1.	44	X	20.32	X	<u></u>	0.63	x	0.7	=	8.94	[74]
North	0.9x	0.77	,	5.	15	X	34.53	X		0.63	X	0.7	=	54.35	(74)

Nlauth	, . r					٦ .	_		1			_				—
North	0.9x	0.77		X	1.44	_ X		34.53	X		0.63	×	0.7	=	15.2	(74)
North	0.9x	0.77		X	5.15	X		55.46	X		0.63	X	0.7	=	87.3	(74)
North	0.9x	0.77		X	1.44	X	5	55.46	X		0.63	×	0.7	=	24.41	(74)
North	0.9x	0.77		X	5.15	X	7	4.72	X		0.63	X	0.7	=	117.6	(74)
North	0.9x	0.77		X	1.44	X	7	4.72	X		0.63	X	0.7	=	32.88	(74)
North	0.9x	0.77		X	5.15	X	7	79.99	X		0.63	X	0.7	=	125.89	(74)
North	0.9x	0.77		X	1.44	X	7	79.99	X		0.63	X	0.7	=	35.2	(74)
North	0.9x	0.77		X	5.15	X	7	4.68	X		0.63	X	0.7	=	117.53	(74)
North	0.9x	0.77		X	1.44	X	7	4.68	X		0.63	X	0.7		32.86	(74)
North	0.9x	0.77		X	5.15	X		9.25	X		0.63	X	0.7	=	93.25	(74)
North	0.9x	0.77		X	1.44	X	5	9.25	X		0.63	X	0.7	=	26.07	(74)
North	0.9x	0.77		X	5.15	x	4	1.52	X		0.63	X	0.7	=	65.34	(74)
North	0.9x	0.77		X	1.44	x		1.52	X		0.63	X	0.7	=	18.27	(74)
North	0.9x	0.77		x	5.15	x	2	24.19	x		0.63	x	0.7	=	38.07	(74)
North	0.9x	0.77		x	1.44	x	2	24.19	x		0.63	x	0.7	=	10.65	(74)
North	0.9x	0.77		x	5.15	x	1	3.12	X		0.63	x	0.7	=	20.65	(74)
North	0.9x	0.77		x	1.44	x	1	3.12	x		0.63	x	0.7	=	5.77	(74)
North	0.9x	0.77		x	5.15	x		8.86	x		0.63	x	0.7	=	13.95	(74)
North	0.9x	0.77		x	1.44	x		8.86	X		0.63	x	0.7	=	3.9	(74)
South	0.9x	0.77		x	3.58	x	4	6.75	x		0.63	x	0.7	=	51.15	(78)
South	0.9x	0.77		x	3.58	x	7	6.57	X		0.63	x	0.7	=	83.77	(78)
South	0.9x	0.77		x	3.58	x	9	7.53	X		0.63	x	0.7	=	106.71	(78)
South	0.9x	0.77		x	3.58	×	1	10.23	x		0.63	x	0.7	=	120.61	(78)
South	0.9x	0.77		x	3.58	×	1	14.87	X		0.63	x	0.7	=	125.68	(78)
South	0.9x	0.77		x	3.58	Īx	1	10.55	x		0.63	x	0.7		120.95	(78)
South	0.9x	0.77		x	3.58	×	1	08.01	x		0.63	x	0.7	=	118.18	(78)
South	0.9x	0.77		x	3.58	×	1	04.89	X		0.63	x	0.7	=	114.76	(78)
South	0.9x	0.77		x	3.58	×	1	01.89	x		0.63	x	0.7	=	111.47	(78)
South	0.9x	0.77		x	3.58	×	8	32.59	x		0.63	x	0.7	=	90.36	(78)
South	0.9x	0.77		x	3.58	×	5	55.42	X		0.63	x	0.7	=	60.63	(78)
South	0.9x	0.77		x	3.58	Īx		40.4	x		0.63	x	0.7		44.2	(78)
	_															
Solar	ains in	watts, ca	alculat	ed	for each mor	nth			(83)m	n = Si	um(74)m	(82)m			_	
(83)m=	72.57	124.7	176.2		232.31 276.1		282.04	268.57	234	.09	195.09	139.07	87.05	62.05		(83)
Total g				_	(84)m = (73) i		` '							1	٦	
(84)m=	397.65	448.09	489.7	1	529.87 557.8	32	548.17	524.46	494	.84	463.88	423.94	390.38	378.99		(84)
7. Me	an inter	nal temp	eratu	е (heating seas	on)										
Temp	erature	during h	eating	ре	eriods in the I	iving	g area	from Tal	ole 9	, Th	1 (°C)				21	(85)
Utilisa	ation fac	tor for g	ains fo	r li	ving area, h1	,m (see Ta	ble 9a)								
	Jan	Feb	Ма	r	Apr Ma	ıy	Jun	Jul	Α	ug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.99	0.98		0.94 0.85	5	0.67	0.51	0.5	56	0.79	0.95	0.99	1		(86)
Mean	interna	l temper	ature i	n li	ving area T1	(foll	ow ste	ps 3 to 7	7 in T	able	e 9c)				_	
(87)m=	19.82	19.98	20.22	2	20.54 20.8	1	20.95	20.99	20.	99	20.9	20.57	20.14	19.79		(87)
															=	

T			('				(T.	LL O T	LO (0 0)					
•		during h							``					(00)
(88)m=	19.91	19.91 ctor for g	19.92	19.93	19.93	19.94	19.94	19.94	19.94	19.93	19.93	19.92		(88)
(89)m=	0.99	0.99	0.97	0.92	0.79	0.58	0.39	0.44	0.71	0.93	0.98	0.99		(89)
		l temper				<u> </u>	<u> </u>							, ,
(90)m=	18.36	18.59	18.95	19.4	19.75	19.91	19.94	19.94	19.86	19.45	18.84	18.33		(90)
` '							<u> </u>		f	LA = Livin	g area ÷ (4	4) =	0.47	(91)
Mean	interna	ıl temper	ature (fo	r the wh	ole dwe	llina) = fl	LA × T1	+ (1 – fL	.A) × T2			L	-	` ′
(92)m=	19.05	19.25	19.55	19.94	20.25	20.4	20.43	20.43	20.35	19.97	19.45	19.02		(92)
Apply	adjustr	ment to t	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate		<u> </u>		
(93)m=	19.05	19.25	19.55	19.94	20.25	20.4	20.43	20.43	20.35	19.97	19.45	19.02		(93)
8. Sp	ace hea	ating requ	uirement			1								
		mean int				ned at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
uic ui	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa		ctor for g			iviay	L	L	, lug	_ оср		1400			
(94)m=	0.99	0.98	0.97	0.92	0.81	0.62	0.45	0.49	0.75	0.93	0.98	0.99		(94)
	∟ ul gains.	hmGm	. W = (9 ²	1)m x (84	4)m	1	l .					<u> </u>		
(95)m=	393.94	440.49	472.92	486.76	451.98	341.05	233.54	243.64	346.66	395.34	383.34	376.14		(95)
Month	nly aver	age exte	rnal tem	perature	from T	able 8	ļ							
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	936.5	908.38	824.17	688.83	532.11	357.37	236.08	247.74	386.33	583.52	772.48	931.39		(97)
Space	e heatin	g require	ement fo	r each m	nonth, k	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m=	403.67	314.42	261.33	145.49	59.62	0	0	0	0	140	280.17	413.11		
								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2017.82	(98)
Space	e heatin	ig require	ement in	kWh/m²	/year								38.51	(99)
9a. En	ergy red	quiremer	nts – Indi	vidual h	eating s	ystems i	ncluding	micro-C	CHP)					
-	e heatii	_										r		_
	-	pace hea				ementary	-					إ	0	(201)
Fracti	ion of sp	pace hea	it from m	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fracti	ion of to	tal heati	ng from	main sys	stem 1			(204) = (2	02) x [1 – ((203)] =		[1	(204)
Efficie	ency of	main spa	ace heat	ing syste	em 1								93.5	(206)
Efficie	ency of	seconda	ry/suppl	ementar	y heatin	g system	າ, %					[0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space	e heatin	g require	ement (c	alculate	d above)						•		
	403.67	314.42	261.33	145.49	59.62	0	0	0	0	140	280.17	413.11		
(211)m	n = {[(98	3)m x (20	4)] } x 1	00 ÷ (20	6)		_							(211)
	431.73	336.28	279.5	155.61	63.77	0	0	0	0	149.74	299.65	441.83		
								Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	F	2158.1	(211)
•		ng fuel (s 01)] } x 1		. , .	month							•		_
$= \{[(90)]$		0	00 + (20	0	0	0	0	0	0	0	0	0		
(= 10)111=	<u>_</u> _								l (kWh/yea				0	(215)
0.	50 A D 66	10.1/	40400	(OAD 0.65)	http://w				,	, (-	r 15,1012	_		6 of 7

1 470 04 1 450 55 1 450 50 1 440 07 1 440 00 1 4	05.00 404.40	420.5	400.00	4.47.04	455.00	400.00		
	25.88 121.46	132.5	132.03	147.91	155.69	166.69		1,04
Efficiency of water heater	700 700	70.0	70.0	04.07	00.00	07.44	79.8	(21
` ' <u> </u>	79.8 79.8	79.8	79.8	84.67	86.36	87.14		(21
Fuel for water heating, kWh/month 219)m = (64)m x 100 ÷ (217)m								
	57.75 152.21		165.45	174.69	180.27	191.29		_
		Total =	: Sum(21	9a) ₁₁₂ =			2078.94	(21
Annual totals				k۱	Wh/year		kWh/year	1
Space heating fuel used, main system 1						إ	2158.1]
Nater heating fuel used							2078.94	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(23
boiler with a fan-assisted flue						45		(23
Total electricity for the above, kWh/year		sum of	(230a)	(230g) =			75	(23
Electricity for lighting						Ī	241.62	(23
12a. CO2 emissions – Individual heating system	s including mi	cro-CHP				-		_
	Energy			Emiss	ion fac	tor	Emissions	
				kg CO	2/kWh		kg CO2/yea	r
	kWh/year			0.216				
Space heating (main system 1)	kWh/year			0.2	16	= [466.15	(26
Space heating (main system 1) Space heating (secondary)	•			0.2		= [466.15	(26 (26
	(211) x				19	l r		,
Space heating (secondary) Vater heating	(211) x (215) x	+ (263) + (26		0.5	19	= [0]](26
Space heating (secondary) Vater heating Space and water heating	(211) x (215) x (219) x	+ (263) + (26		0.5	19	= [0 449.05](26](26](26
Space heating (secondary)	(211) x (215) x (219) x (261) + (262)	+ (263) + (26		0.5	19 16 19	= [0 449.05 915.2](26](26

TER =

(273)

30.21

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:39:16

Project Information:

Assessed By: John Simpson (STRO006273) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 78.1m²

Site Reference: Maitland Park Estate

Plot Reference: AC 010

Address: AC 010, Aspen Court, Maitland Park Estate, London, NW3 2EH

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 26.84 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 7.56 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 48.8 kWh/m²

OK
2 Fabric U-values

Element Average Highest

 Element
 Average
 Highest

 External wall
 0.12 (max. 0.30)
 0.12 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor 0.12 (max. 0.25) 0.12 (max. 0.70) **OK**

Roof (no roof)

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

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:	0.5	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: South	2.69m²	
Windows facing: South	4.91m²	
Windows facing: North	7.06m²	
Windows facing: North	2.69m²	
Windows facing: North	2.01m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m²K	
Party Walls U-value	0.12 W/III-K 0 W/m²K	
Floors U-value	0.12 W/m²K	
Community heating, heat from electric heat pump	U. 12 VV/III-IX	
Photovoltaic array		

			Hoor	Details:						
	0:		Useri					OTDO	2222	
Assessor Name:	John Simp				a Num				006273	
Software Name:	Stroma FS	AP 2012	_		are Ve			Versic	n: 1.0.4.26	
			Property							
Address :	•	en Court, M	aitland Par	k Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
			Are	ea(m²)	1	Av. He	eight(m)	_	Volume(m ³	<u>-</u>
Ground floor				78.1	(1a) x		2.9	(2a) =	226.49	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	.(1n)	78.1	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	226.49	(5)
2. Ventilation rate:										
	main heating	secon heatir		other		total			m³ per hou	ır
Number of chimneys	0	+ 0	+ [0	=	0	×	40 =	0	(6a)
Number of open flues	0			0		0	x	20 =	0	(6b)
Number of intermittent fa	ans					0	x	10 =	0	(7a)
Number of passive vents	5				F	0	x	10 =	0	(7b)
Number of flueless gas f	ires				F	0	×	40 =	0	(7c)
					L					
								Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fa	ans = (6a) + (6b))+(7a)+(7b)+	(7c) =		0		÷ (5) =	0	(8)
If a pressurisation test has t			ceed to (17),	otherwise	continue fr	rom (9) to	(16)			_
Number of storeys in t	he dwelling (ns	5)							0	(9)
Additional infiltration							[(9])-1]x0.1 =	0	(10)
Structural infiltration: 0					•	ruction			0	(11)
if both types of wall are p deducting areas of openi			ng to the grea	iter wall are	ea (after					
If suspended wooden	floor, enter 0.2	(unsealed) o	r 0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	nter 0.05, else e	enter 0							0	(13)
Percentage of window	s and doors dr	aught strippe	d						0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expresse	d in cubic me	etres per h	our per s	quare m	etre of e	envelope	area	2	(17)
If based on air permeabi			-	•	•		•		0.1	(18)
Air permeability value applie	•					is being u	ısed		0.1	(,
Number of sides sheltered	ed				-				2	(19)
Shelter factor				(20) = 1 -	[0.075 x (²	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter fac	tor		(21) = (18	s) x (20) =				0.08	(21)
Infiltration rate modified	for monthly win	d speed						,		
Jan Feb	Mar Apr	May Ju	n Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	need 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										
vviilu i aciti (22a)iii = (2	. <i></i> //// 7 4	1.00	F 0.05	1 0 00			_	T	1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

0.11	ation rate	0.1	0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.1	0.1	1	
Calculate effec	-	-				1	0.00	0.00	0.09	0.1	0.1	J	
If mechanica	al ventila	tion:										0.5	(2:
If exhaust air he	eat pump ι	using Appe	endix N, (2	3b) = (23a	a) × Fmv (equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(2:
If balanced with	heat reco	very: effic	iency in %	allowing t	for in-use f	actor (fron	n Table 4h) =				76.5	(2:
a) If balance	d mecha	anical ve	entilation	with he	at recov	ery (MV	HR) (24a	a)m = (22)	2b)m + (23b) × [1 – (23c)) ÷ 100]	
24a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]	(24
b) If balance	d mecha	anical ve	entilation	without	heat red	covery (l	ИV) (24b	m = (22)	2b)m + (23b)	•	,	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
c) If whole h if (22b)n				•	•				5 v (22h	.)			
$\frac{11(220)11}{24c)m=0}$	0.5 X	(230), (0	(231) = (231)		0	$\frac{C}{C} = (221)$	0	0	0	0	1	(2
												J	(=
d) If natural if (22b)n				•	•				0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
Effective air	change	rate - er	nter (24a) or (24l	b) or (24	c) or (24	d) in bo	x (25)	•	•	•	•	
25)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]	(2
3. Heat losse	s and he	at loss i	naramet	or.	•							-	
LEMENT	Gros	•	Openin		Net Ar	ea	U-val	ue	AXU		k-value	e e	ΑΧk
	area	_	n	=	Ι, Α		W/m2		(W/I	K)	kJ/m²-		kJ/K
oors					2.93	X	1.4	=	4.102				(2
indows Type/	1				2.69	_X 1	/[1/(1.4)+	0.04] =	3.57				(2
indows Type	2				4.91	x1	/[1/(1.4)+	0.04] =	6.51				(2
indows Type	3				7.06	_x 1	/[1/(1.4)+	0.04] =	9.36				(2
indows Type	4				2.69	x1	/[1/(1.4)+	0.04] =	3.57				(2
indows Type	5				2.01	<u>x</u> 1	/[1/(1.4)+	0.04] =	2.66				(2
loor					78.1	x	0.12	¬ ₌i	9.372	= [(2
/alls	51.7	9	22.2	9	29.5	x	0.12	-	3.54	F i		7 F	(2
otal area of e	lements,	, m²			129.8	9							(3
arty wall					49.76	3 x	0	─	0				(3
or windows and	roof windo	ows, use e	effective wi	ndow U-va				 /[(1/U-valu		as given in	paragrapl		`
include the area	as on both	sides of ir	nternal wal	ls and par	titions								
abric heat los		•	U)				(26)(30)) + (32) =				42.68	(3
eat capacity	,	,						((28).	(30) + (32	2) + (32a).	(32e) =	0	(3
nermal mass	•	•		•					tive Value			250	(3
or design assess In be used inste				construct	tion are no	t known pi	ecisely the	e indicative	e values of	TMP in Ta	able 1f		
nermal bridge				using Ap	pendix	K						12.18	(3
details of therma	,	,		• .	•							.2.10	
otal fabric he	at loss					(33) + (36) =							(3
entilation hea	t loss ca	alculated	monthl	<u> </u>				(38)m	= 0.33 × (25)m x (5))	_	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		

(38)m= 16.88 16.72 16.56 15.77 15.61 14.82 14.82 14.66 15.14 15.61 15.93 16.25	(38)
	(30)
Heat transfer coefficient, W/K (39)m = (37) + (38)m	
(39)m= 71.74 71.58 71.42 70.63 70.47 69.68 69.68 69.52 69.99 70.47 70.79 71.11	
Heat loss parameter (HLP), W/m ² K	(39)
(40)m= 0.92 0.92 0.91 0.9 0.9 0.89 0.89 0.9 0.9 0.9 0.91 0.91	
Average = $Sum(40)_{112}/12=$ Number of days in month (Table 1a)	.9 (40)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
(41)m= 31 28 31 30 31 30 31 30 31 30 31	(41)
4. Water heating energy requirement: kWh/year:	
Assumed assurance M	(40)
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1	(42)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36	(43)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of	
not more that 125 litres per person per day (all water use, hot and cold)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)	
(44)m= 100.99 97.32 93.65 89.98 86.3 82.63 82.63 89.98 93.65 97.32 100.99	. = - 1(40)
Total = Sum $(44)_{112}$ = 110 Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)	11.76 (44)
(45)m= 149.77 130.99 135.17 117.85 113.08 97.58 90.42 103.76 105 122.36 133.57 145.05	
Total = $Sum(45)_{112}$ = 144 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)	4.58 (45)
	(46)
(46)m= 22.47 19.65 20.28 17.68 16.96 14.64 13.56 15.56 15.75 18.35 20.04 21.76 Water storage loss:	(40)
Storage volume (litres) including any solar or WWHRS storage within same vessel 0	(47)
If community heating and no tank in dwelling, enter 110 litres in (47)	
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)	
Water storage loss:	
a) If manufacturer's declared loss factor is known (kWh/day):	(48)
Temperature factor from Table 2b	(49)
Energy lost from water storage, kWh/year (48) x (49) = 110	(50)
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02	(51)
If community heating see section 4.3	(01)
Volume factor from Table 2a	(52)
Temperature factor from Table 2b 0.6	(53)
Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) = 1.03$	(54)
Enter (50) or (54) in (55)	(55)
Water storage loss calculated for each month $((56)m = (55) \times (41)m$	
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01	(56)
If cylinder contains dedicated solar storage, $(57)m = (56)m \times [(50) - (H11)] \div (50)$, else $(57)m = (56)m$ where $(H11)$ is from Appendix H	

Primary circuit loss (annual) from Table 3	0	(58)
Primary circuit loss calculated for each month (59) m = $(58) \div 365 \times (41)$ m		ı
(modified by factor from Table H5 if there is solar water heating and a cylinder thermo-	stat)	_
(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 calculated for each month (61)m = (60) ÷ 365 × (41)m		
(61)m= 0 0 0 0 0 0 0 0 0 0	0 0	(61)
Total heat required for water heating calculated for each month (62) m = $0.85 \times (45)$ m + (62) m = $(62$	(46)m + (57)m +	, (59)m + (61)m
(62)m= 205.05 180.92 190.45 171.34 168.35 151.07 145.7 159.03 158.49 177.64	187.06 200.32	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contributi	on to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see Appendix G)	g,	
(63)m= 0 0 0 0 0 0 0 0 0 0	0 0	(63)
Output from water heater	<u> </u>	
(64)m= 205.05 180.92 190.45 171.34 168.35 151.07 145.7 159.03 158.49 177.64	187.06 200.32	
Output from water heater		2095.42 (64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m	,	
(65)m= 94.02 83.5 89.17 81.98 81.82 75.24 74.29 78.72 77.71 84.91	87.21 92.45	(65)
include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from	ļ	l · · ·
	on community r	leating
5. Internal gains (see Table 5 and 5a):		
Metabolic gains (Table 5), Watts		1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct	Nov Dec	(66)
(66)m= 121.29 121.29 121.29 121.29 121.29 121.29 121.29 121.29 121.29 121.29 121.29 121.29	121.29 121.29	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5		1 (07)
(67)m= 19.21 17.06 13.87 10.5 7.85 6.63 7.16 9.31 12.49 15.86	18.52 19.74	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5		1
(68)m= 215.42 217.66 212.03 200.03 184.9 170.67 161.16 158.93 164.56 176.55	191.69 205.92	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5		•
(69)m= 35.13 35.13 35.13 35.13 35.13 35.13 35.13 35.13 35.13 35.13	35.13 35.13	(69)
Pumps and fans gains (Table 5a)		_
(70)m= 0 0 0 0 0 0 0 0 0 0	0 0	(70)
Losses e.g. evaporation (negative values) (Table 5)		
(71)m= -97.03 -97.03 -97.03 -97.03 -97.03 -97.03 -97.03 -97.03 -97.03 -97.03	-97.03 -97.03	(71)
Water heating gains (Table 5)		
(72)m= 126.37 124.25 119.85 113.86 109.97 104.5 99.85 105.81 107.92 114.12	121.12 124.26	(72)
Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m	1)m + (72)m	1
(73)m= 420.39 418.36 405.13 383.78 362.11 341.18 327.56 333.43 344.37 365.93	390.71 409.3	(73)
6. Solar gains:	•	
Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicab	le orientation.	
Orientation: Access Factor Area Flux g_	FF	Gains
Table 6d m² Table 6a Table 6b Ta	able 6c	(W)
North 0.9x 0.77 x 7.06 x 10.63 x 0.4 x	0.8	16.65 (74)
North 0.9x 0.77 x 2.69 x 10.63 x 0.4 x	0.8 =	6.34 (74)

	_		_										_
North	0.9x	0.77	X	2.01	X	10.63	X	0.4	X	0.8	=	4.74	(74)
North	0.9x	0.77	X	7.06	X	20.32	X	0.4	X	0.8	=	31.82	(74)
North	0.9x	0.77	X	2.69	X	20.32	X	0.4	x	0.8	=	12.12	(74)
North	0.9x	0.77	X	2.01	X	20.32	X	0.4	X	0.8	=	9.06	(74)
North	0.9x	0.77	X	7.06	X	34.53	X	0.4	X	0.8	=	54.06	(74)
North	0.9x	0.77	X	2.69	X	34.53	X	0.4	X	0.8	=	20.6	(74)
North	0.9x	0.77	X	2.01	X	34.53	x	0.4	X	0.8	=	15.39	(74)
North	0.9x	0.77	X	7.06	X	55.46	x	0.4	x	0.8	=	86.84	(74)
North	0.9x	0.77	X	2.69	X	55.46	X	0.4	X	0.8	=	33.09	(74)
North	0.9x	0.77	X	2.01	X	55.46	x	0.4	X	0.8	=	24.72	(74)
North	0.9x	0.77	X	7.06	X	74.72	x	0.4	x	0.8	=	116.98	(74)
North	0.9x	0.77	X	2.69	X	74.72	x	0.4	x	0.8	=	44.57	(74)
North	0.9x	0.77	X	2.01	X	74.72	x	0.4	x	0.8	=	33.3	(74)
North	0.9x	0.77	x	7.06	x	79.99	x	0.4	x	0.8	=	125.23	(74)
North	0.9x	0.77	X	2.69	x	79.99	x	0.4	X	0.8	=	47.71	(74)
North	0.9x	0.77	X	2.01	x	79.99	x	0.4	x	0.8	=	35.65	(74)
North	0.9x	0.77	X	7.06	x	74.68	x	0.4	x	0.8	=	116.92	(74)
North	0.9x	0.77	X	2.69	x	74.68	x	0.4	x	0.8	=	44.55	(74)
North	0.9x	0.77	X	2.01	x	74.68	x	0.4	x	0.8	=	33.29	(74)
North	0.9x	0.77	X	7.06	x	59.25	x	0.4	X	0.8	=	92.76	(74)
North	0.9x	0.77	X	2.69	x	59.25	x	0.4	x	0.8	=	35.34	(74)
North	0.9x	0.77	x	2.01	x	59.25	х	0.4	x	0.8	=	26.41	(74)
North	0.9x	0.77	х	7.06	x	41.52	х	0.4	x	0.8	=	65	(74)
North	0.9x	0.77	X	2.69	x	41.52	x	0.4	x	0.8	=	24.77	(74)
North	0.9x	0.77	x	2.01	x	41.52	x	0.4	x	0.8] =	18.51	(74)
North	0.9x	0.77	x	7.06	x	24.19	x	0.4	x	0.8] =	37.87	(74)
North	0.9x	0.77	X	2.69	x	24.19	x	0.4	x	0.8	=	14.43	(74)
North	0.9x	0.77	X	2.01	x	24.19	x	0.4	x	0.8] =	10.78	(74)
North	0.9x	0.77	X	7.06	x	13.12	x	0.4	X	0.8	=	20.54	(74)
North	0.9x	0.77	X	2.69	x	13.12	x	0.4	x	0.8	=	7.83	(74)
North	0.9x	0.77	X	2.01	x	13.12	x	0.4	x	0.8] =	5.85	(74)
North	0.9x	0.77	X	7.06	x	8.86	x	0.4	x	0.8] =	13.88	(74)
North	0.9x	0.77	X	2.69	x	8.86	x	0.4	x	0.8] =	5.29	(74)
North	0.9x	0.77	x	2.01	x	8.86	x	0.4	x	0.8	j =	3.95	(74)
South	0.9x	0.77	x	2.69	x	46.75	x	0.4	x	0.8] =	27.89	(78)
South	0.9x	0.77	x	4.91	x	46.75	x	0.4	x	0.8	j =	50.91	(78)
South	0.9x	0.77	x	2.69	x	76.57	x	0.4	x	0.8] =	45.68	(78)
South	0.9x	0.77	x	4.91	x	76.57	x	0.4	x	0.8] =	83.37	(78)
South	0.9x	0.77	x	2.69	x	97.53	x	0.4	x	0.8] =	58.18	(78)
South	0.9x	0.77	x	4.91	x	97.53	x	0.4	x	0.8] =	106.2	(78)
South	0.9x	0.77	x	2.69	x	110.23	x	0.4	x	0.8	j =	65.76	(78)
	<u> </u>		_		•		•		•	•	•		_

South	0.9x	0.77	X	4.9	91	X	1	10.23	x		0.4	x	0.8	=	120.03	(78)
South	0.9x	0.77	X	2.6	69	x	1	14.87	x		0.4	x	0.8	=	68.52	(78)
South	0.9x	0.77	X	4.9	91	x	1	14.87	x		0.4	x	0.8	=	125.08	(78)
South	0.9x	0.77	X	2.6	69	x	1	10.55	x		0.4	x	0.8	=	65.95	(78)
South	0.9x	0.77	X	4.9	91	x	1	10.55	х		0.4	X	0.8	=	120.37	(78)
South	0.9x	0.77	X	2.6	69	X	1	08.01	х		0.4	x	0.8	=	64.43	(78)
South	0.9x	0.77	X	4.9	91	x	1	08.01	x		0.4	x	0.8	=	117.61	(78)
South	0.9x	0.77	X	2.6	69	x	1	04.89	х		0.4	X	0.8	=	62.57	(78)
South	0.9x	0.77	X	4.9	91	x	1	04.89	x		0.4	x	0.8	=	114.21	(78)
South	0.9x	0.77	X	2.6	69	x	1	01.89	x		0.4	X	0.8	=	60.78	(78)
South	0.9x	0.77	X	4.9	91	x	1	01.89	x		0.4	X	0.8	=	110.94	(78)
South	0.9x	0.77	X	2.6	69	X	8	32.59	X		0.4	X	0.8	=	49.27	(78)
South	0.9x	0.77	X	4.9	91	X	8	32.59	x		0.4	X	0.8	=	89.92	(78)
South	0.9x	0.77	X	2.6	69	X	5	55.42	x		0.4	X	0.8	=	33.06	(78)
South	0.9x	0.77	X	4.9	91	X	5	55.42	X		0.4	X	0.8	=	60.34	(78)
South	0.9x	0.77	X	2.6	69	X		40.4	x		0.4	X	0.8	=	24.1	(78)
South	0.9x	0.77	X	4.9	91	x		40.4	X		0.4	X	0.8	=	43.99	(78)
Solar g	ains in	watts, ca	lculated	for eac	h mont	h_			(83)m	n = Sum	n(74)m .	(82)m	_		-	
(83)m=	106.53	182.04	254.43	330.43	388.45	3	94.91	376.79	331	1.3 2	279.99	202.2	7 127.61	91.2		(83)
Total g	ains – i	nternal ar	nd solar	(84)m =	= (73)m	+ (83)m	, watts						_	=	
(84)m=	526.91	600.4	659.57	714.21	750.56	7	36.09	704.35	664	.73 6	324.35	568.2	518.32	500.51		(84)
7. Mea	an inter	nal tempe	erature	(heating	seaso	n)										
Temp	erature	during he	eating p	eriods ir	n the liv	ing	area	from Tal	ole 9	, Th1	(°C)				21	(85)
Utilisa	tion fac	tor for ga	ins for I	iving are	ea, h1,r	n (s	ee Ta	ıble 9a)								
	Jan	Feb	Mar	Apr	May	,	Jun	Jul	Α	ug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.98	0.92	0.8		0.59	0.43	0.4	18	0.73	0.94	0.99	1		(86)
Mean	interna	l tempera	ture in	living are	ea T1 (follo	w ste	ps 3 to 7	7 in T	able 9	9c)					
(87)m=	20.15	20.3	20.51	20.75	20.93	2	0.99	21	2	1 :	20.97	20.75	20.41	20.13		(87)
Temp	erature	during he	eating p	eriods ir	n rest o	f dw	elling	from Ta	able 9	9, Th2	(°C)		-		_	
(88)m=	20.15	20.15	20.16	20.16	20.17	$\overline{}$	20.17	20.17	20.		20.17	20.17	20.16	20.16		(88)
ı دوالزا ا	tion fac	tor for ga	ins for i	est of d	welling	h2	m (se	a Tahla	0a)						_	
(89)m=	0.99	0.99	0.97	0.9	0.75	$\overline{}$	0.52	0.35	0.3	39	0.66	0.92	0.99	1	1	(89)
L					<u> </u>		TO /	<u> </u>	I			- O-)		<u> </u>	_	
(90)m=	19.02	tempera 19.24	19.54	19.88	20.1	Ť	12 (1) 20.17	20.17	20.		n rabi	e 90) 19.89	19.4	18.99	1	(90)
(30)111=	19.02	19.24	13.54	19.00	20.1		.0.17	20.17	20.	<u>'' '</u>			ving area ÷ (ļ	0.25	(91)
													.5 2.50 . (,	0.35	(31)
Mean		tempera				\neg			<u> </u>	-					1	
(92)m=	19.43	19.61	19.88	20.19	20.39		0.46	20.47	20.		20.44	20.19		19.39		(92)
		nent to th				_		i				•	1	10.00	7	(00)
(93)m=	19.43	19.61	19.88	20.19	20.39	1 2	0.46	20.47	20.	47	20.44	20.19	19.76	19.39		(93)
8. Spa	ace hea	ting requi	irement													
	_		_		_	_			_				:	_	_	
Set Ti		mean inte		•		ined	at st	ep 11 of	Tabl	le 9b,	so tha	t Ti,m=	=(76)m an	d re-cal	culate	

Apr

May

Jul

Jun

Aug

Mar

Jan

Feb

Oct

Sep

Nov

Dec

Utilisation factor for gains, hm:						
	0.42 0.68	0.92	0.98	1		(94)
Useful gains, hmGm , W = (94)m x (84)m						
	281.9 426.4	524.26	510.44	498.01		(95)
Monthly average external temperature from Table 8	<u> </u>	-			ı	(00)
	16.4 14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W = $[(39)$ m x $[(97)$ m= 1085.11 1053.19 955.63 797.61 612.47 408.25 269.39 269.39	1(93)m- (96)1 282.71 443.5	- - -	896.03	1080.15		(97)
Space heating requirement for each month, kWh/month = 0.024 x				1000.13		(0.)
(98)m= 417.88 310.18 237.59 110.29 31.49 0 0	0 0	113	277.62	433.11		
	Total per yea	ar (kWh/yeai) = Sum(9	8) _{15,912} =	1931.16	(98)
Space heating requirement in kWh/m²/year					24.73	(99)
9b. Energy requirements – Community heating scheme						
This part is used for space heating, space cooling or water heating	• .	•	unity sch	neme.		
Fraction of space heat from secondary/supplementary heating (Ta	able 11) '0' if	none			0	(301)
Fraction of space heat from community system 1 – (301) =					1	(302)
The community scheme may obtain heat from several sources. The procedure allo includes boilers, heat pumps, geothermal and waste heat from power stations. See		d up to four	other heat	sources; ti	he latter	
Fraction of heat from Community heat pump	е Аррепаіх С.				1	(303a)
Fraction of total space heat from Community heat pump		(3	02) x (303	a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for communit	ity heating sy	rstem			4	(305)
	1	(333)				
Distribution loss factor (Table 12c) for community heating system		0.0			1.1	(306)
Distribution loss factor (Table 12c) for community heating system Space heating		o.com				(306)
		o.o.n			1.1	(306)
Space heating		(304a) x (30	5) x (306) :	 - -	1.1 kWh/ye	(306)
Space heating Annual space heating requirement	(98) x	(304a) x (30		=	1.1 kWh/ye 1931.16	(306)
Space heating Annual space heating requirement Space heat from Community heat pump	(98) x n Table 4a or	(304a) x (30	E)	=	1.1 kWh/ye 1931.16 2124.28	(306)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system)	(98) x n Table 4a or	304a) x (309 Appendix	E)	=	1.1 kWh/ye 1931.16 2124.28	(306) ear (307a) (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from	(98) x n Table 4a or	304a) x (309 Appendix	E)	=	1.1 kWh/ye 1931.16 2124.28	(306) ear (307a) (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system) Water heating	(98) x n Table 4a or m (98) x	304a) x (309 Appendix	E) - (308) =		1.1 kWh/ye 1931.16 2124.28 0 0	(306) ear (307a) (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme:	(98) x n Table 4a or m (98) x	304a) x (309 Appendix 301) x 100 -	E) - (308) =	=	1.1 kWh/ye 1931.16 2124.28 0 0 2095.42	(306) ear (307a) (308 (309)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump	(98) x n Table 4a or m (98) x	304a) x (309 Appendix 301) x 100 -	E) - (308) =	=	1.1 kWh/ye 1931.16 2124.28 0 0 2095.42 2304.96	(306) ear (307a) (308 (309)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307	304a) x (309 Appendix 301) x 100 -	E) - (308) =	=	1.1 kWh/ye 1931.16 2124.28 0 0 2095.42 2304.96 44.29	(306) ear (307a) (308 (309) (310a) (313)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f):	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307)	(304a) x (309 Appendix (301) x 100 - (303a) x (309 a)(307e) +	E) - (308) =	=	1.1 kWh/ye 1931.16 2124.28 0 0 2095.42 2304.96 44.29 0	(306) ear (307a) (308 (309) (310a) (313) (314) (315)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from our	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307)	(304a) x (309 Appendix (301) x 100 - (303a) x (309 a)(307e) +	E) - (308) =	=	1.1 kWh/ye 1931.16 2124.28 0 0 2095.42 2304.96 44.29 0	(306) Par (307a) (308 (309) (310a) (313) (314) (315) (330a)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f):	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307)	(304a) x (309 Appendix (301) x 100 - (303a) x (309 a)(307e) +	E) - (308) =	=	1.1 kWh/ye 1931.16 2124.28 0 0 2095.42 2304.96 44.29 0 0	(306) ear (307a) (308 (309) (310a) (313) (314) (315)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from our	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307)	(304a) x (309 Appendix (301) x 100 - (303a) x (309 a)(307e) +	E) - (308) =	=	1.1 kWh/ye 1931.16 2124.28 0 0 2095.42 2304.96 44.29 0 172.7	(306) Par (307a) (308 (309) (310a) (313) (314) (315) (330a)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from our warm air heating system fans	(98) x 1 Table 4a or 1 (98) x 1 (64) x 1 (307) 1 (107) 2 (107)	(304a) x (309 Appendix (301) x 100 - (303a) x (309 a)(307e) +	E) - (308) = - (308) = - (306) : - (310a)(=	1.1 kWh/ye 1931.16 2124.28 0 0 2095.42 2304.96 44.29 0 172.7 0	(306) Par (307a) (308 (309) (310a) (313) (314) (315) (330a) (330b)

Energy for lighting (calculated in Appendix L)				339.17	(332)
Electricity generated by PVs (Appendix M) (negative qu	uantity)			-807.48	(333)
Electricity generated by wind turbine (Appendix M) (neg	gative quantity)			0	(334)
12b. CO2 Emissions – Community heating scheme					
	Energy kWh/year	Emission factor kg CO2/kWh		missions g CO2/year	
CO2 from other sources of space and water heating (no Efficiency of heat source 1 (%)	ot CHP) CHP using two fuels repeat (363) to	(366) for the second	fuel	319	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	=	720.62	(367)
Electrical energy for heat distribution	[(313) x	0.52	=	22.99	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372	2)	=	743.61	(373)
CO2 associated with space heating (secondary)	(309) x	0	=	0	(374)
CO2 associated with water from immersion heater or in	stantaneous heater (312) x	0.52	=	0	(375)
Total CO2 associated with space and water heating	(373) + (374) + (375) =			743.61	(376)
CO2 associated with electricity for pumps and fans with	nin dwelling (331)) x	0.52	=	89.63	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	=	176.03	(379)
Energy saving/generation technologies (333) to (334) a Item 1	s applicable	0.52 x 0.01	= [-419.08	(380)
Total CO2, kg/year sum of (376)(38	32) =			590.18	(383)
Dwelling CO2 Emission Rate $(383) \div (4) =$				7.56	(384)

El rating (section 14)

(385)

93.58

			User D	etails:						
Assessor Name: Software Name:	John Simpsor Stroma FSAP			Stroma Softwa					006273 on: 1.0.4.26	
			i í	Address:						
Address :	AC 010, Aspen	Court, Maitla	and Park	c Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
			Area	a(m²)		Av. He	eight(m)	_	Volume(m ³	<u>^</u>
Ground floor				78.1	(1a) x		2.9	(2a) =	226.49	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d))+(1e)+(1r	n) 📑	78.1	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	226.49	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	ır
Number of chimneys		+ 0	+ [0] = [0	X	40 =	0	(6a)
Number of open flues	0	+ 0	ī + F	0] = F	0	x	20 =	0	(6b)
Number of intermittent fa	uns					3	x	10 =	30	(7a)
					Ļ			10 =		= '
Number of passive vents					Ĺ	0			0	(7b)
Number of flueless gas f	ires					0	X	40 =	0	(7c)
								Air ch	anges per ho	our
Infiltration due to chimne	vs. flues and fans	= (6a)+(6b)+(7a)	'a)+(7b)+(7c) =	Г	30		÷ (5) =	0.13	(8)
If a pressurisation test has b	•				ontinue fr			. (0) –	0.13	
Number of storeys in t		.,	, ,,			, ,	,		0	(9)
Additional infiltration							[(9))-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or tim	nber frame or	0.35 fo	r masonr	y constr	uction			0	(11)
if both types of wall are p			the great	er wall are	a (after					
deducting areas of openi If suspended wooden			1 (coalc	nd) alca	ontor O					— (40)
If no draught lobby, en	•	•	i (Seale	u), eise	enter 0				0	(12)
Percentage of window									0	(13)
Window infiltration	s and doors draug	Jiit Stripped		0.25 - [0.2	x (14) ± 1	001 =			0	(14)
Infiltration rate				(8) + (10)			+ (15) =		0	(15)
Air permeability value,	a50 expressed in	n cubic metre	e nar ho	. , . ,	, , ,	, , ,		area	0	(16) (17)
If based on air permeabi	• •		•	•	•	cue oi e	rivelope	aica	5	(18)
Air permeability value applie	-					is beina u	sed		0.38	(10)
Number of sides sheltered	•			, , ,	,	3			2	(19)
Shelter factor				(20) = 1 -	0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter factor			(21) = (18)	x (20) =				0.33	(21)
Infiltration rate modified t	or monthly wind s	peed								
Jan Feb	Mar Apr N	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7									
(22)m= 5.1 5	1	1.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
		•				•		•	•	
Wind Factor $(22a)m = (2$	2)m ÷ 4	00 005	0.05							

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

Adjuste	d infiltra	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
	0.41	0.41	0.4	0.36	0.35	0.31	0.31	0.3	0.33	0.35	0.37	0.38		
			•	rate for t	he appli	cable ca	se					•	•	
		l ventila		or d'a N. (O	OL) (00 -			15)\ () (00-)			0	(23a
						a) × Fmv (e) = (23a)			0	(23k
			•	•	ŭ	or in-use f	`		,				0	(230
· -	1					i	<u> </u>	<u> </u>	í `	2b)m + (2		<u>`</u>	÷ 100] I	(0.4
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24a
´ _	palance		anical ve	ntilation		heat rec	overy (N	/IV) (24b	m = (22)	2b)m + (2	23b)	1	1	
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24h
					•	e input v				_				
Г	` 		<u> </u>	· ·	, ,	ŕ		<u> </u>	ŕ	.5 × (23b		I -	1	(0.4)
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(240
,					•	ve input erwise (2				0.5]				
(24d)m=	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(240
Effect	tive air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)				_	
(25)m=	0.59	0.58	0.58	0.56	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.57		(25)
3 Hea	at Insses	s and he	eat loss p	naramete	۶r.									
ELEM		Gros	·	Openin		Net Ar	ea	U-valı	IE.	AXU		k-value	<u>.</u>	ΑΧk
		area	-	m		A ,r		W/m2		(W/h	<)	kJ/m²·l		kJ/K
Doors						2.93	X	1.2	=	3.516				(26)
Window	vs Type	1				2.31	x1,	/[1/(1.4)+	0.04] =	3.06	$\overline{}$			(27)
Window	vs Type	2				4.21	x1,	/[1/(1.4)+	0.04] =	5.58	=			(27)
Window	vs Type	3				6.05	x1,	/[1/(1.4)+	0.04] =	8.02				(27)
Window	vs Type	4				2.31		/[1/(1.4)+	0.04] =	3.06	Ħ			(27)
Window						1.72		- /[1/(1.4)+	l.	2.28	=			(27)
Floor	,						X	0.13		10.153	=			(28)
Walls				40.54	$\overline{}$	78.1	=		=				╡	
		51.7		19.53	3	32.26	=	0.18	= [5.81				(29)
Total ar		ements	, m²			129.8	9							(31)
Party wa						49.76		0	=	0				(32)
			ows, use e sides of in				ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	paragraph	1 3.2	
			= S (A x		o ana pan			(26)(30)	+ (32) =				41.48	(33)
Heat ca		·	`	•,						(30) + (32) + (32a).	(32e) =	0	(34)
			,	P = Cm -	- TFA) ir	n kJ/m²K				tive Value:	, , ,	()		(35)
		•	`		,			eciselv the		values of		able 1f	250	(33)
·			tailed calcu				101							
Therma	al bridge	s : S (L	x Y) cal	culated ı	using Ap	pendix ł	<						8.46	(36)
if details (are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			49.94	(37)
Total fal	ibric hea	at ioss							(33) +	(30) –			49.94	1(57)
			alculated	l monthly	/					$= 0.33 \times (20)$	25)m x (5))	49.94	(37)

					,	,				,		ı	
(38)m= 43.7	79 43.54	43.3	42.15	41.93	40.94	40.94	40.75	41.32	41.93	42.37	42.82		(38)
Heat transfe	er coefficie	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 93.7	73 93.48	93.24	92.09	91.88	90.88	90.88	90.69	91.26	91.88	92.31	92.77		_
Heat loss p	arameter (I	HLP), W	/m²K		_	_			Average = = (39)m ÷		12 /12=	92.09	(39)
(40)m= 1.2	2 1.2	1.19	1.18	1.18	1.16	1.16	1.16	1.17	1.18	1.18	1.19		_
Number of	davs in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.18	(40)
Ja	-i	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)
												l	
4. Water h	eating ene	rgy requi	irement:								kWh/ye	ear:	
Assumed o	ooupopov	NI										I	(40)
	13.9, N = 1 13.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.43		(42)
Annual ave	,	ater usaç	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		91	.81		(43)
Reduce the ar	•		• •		-	-	to achieve	a water us	se target o	f		l	
	<u> </u>		· .			<u> </u>	Ι	0	0.1	N		1	
Ja Hot water usag		Mar r day for ea	Apr ach month	May $Vd.m = fa$	Jun	Jul Table 1c x	(43)	Sep	Oct	Nov	Dec		
	· ·		1	1	1	1		90.00	02.65	07.22	100.00		
(44)m= 100.	99 97.32	93.65	89.98	86.3	82.63	82.63	86.3	89.98	93.65 Total = Su	97.32	100.99	1101.76	(44)
Energy conten	nt of hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x D	OTm / 3600			· /		1101.70	
(45)m= 149.	77 130.99	135.17	117.85	113.08	97.58	90.42	103.76	105	122.36	133.57	145.05		_
If instantaneou	us water heati	ing at point	of use (no	hot water	r storage),	enter 0 in	boxes (46)		Total = Su	m(45) ₁₁₂ =	=	1444.58	(45)
(46)m= 22.4	17 19.65	20.28	17.68	16.96	14.64	13.56	15.56	15.75	18.35	20.04	21.76		(46)
Water stora	ige loss:			Į	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>	l		
Storage vol	ume (litres) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
If communit	,			•			` '						
Otherwise if Water stora		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
a) If manuf	•	eclared I	oss facto	or is kno	wn (kWh	n/dav):				1	.39		(48)
Temperatur					(., e. e. j / :					.54		(49)
Energy lost				ear			(48) x (49)) =			.75		(50)
b) If manuf		_	-		or is not		, , , ,				.10		(00)
Hot water s	•			e 2 (kW	h/litre/da	ay)					0		(51)
If communit			on 4.3									ı	(=0)
Volume factor Temperatur			2h								0		(52)
·							(47) (54)	(FO) (50)		0		(53)
Energy lost Enter (50)		_	, KVVN/ye	ear			(47) x (51)) X (52) X (53) =	-	0 .75		(54) (55)
Water stora	, , ,	,	for each	month			((56)m = (55) × (41):	m	0.	.73		(55)
(56)m= 23.3		23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(56)
If cylinder cont												 ix H	(50)
(57)m= 23.3		23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(57)
20.0	2.007	1	L		I	1	1 _0.00			I	1 _0.00		\- /

Primary circuit loss (annual) fr	om Table 3			Γ	0		(58)
Primary circuit loss calculated		9)m = (58) ÷ 36	55 × (41)m	_			
(modified by factor from Tal	ole H5 if there is so	olar water heatir	ng and a cylin	der thermos	tat)		
(59)m= 23.26 21.01 23.26	22.51 23.26	22.51 23.26	23.26 22.5	1 23.26	22.51	23.26	(59)
Combi loss calculated for eac	h month (61)m = (6	60) ÷ 365 × (41)	m				
(61)m= 0 0 0	0 0	0 0	0 0	0	0	0	(61)
Total heat required for water h	neating calculated f	for each month	(62)m = 0.85	× (45)m + (4	46)m + (5	 57)m + (59)m + (61)m	
(62)m= 196.37 173.08 181.77	, , , , , , , , , , , , , , , , , , , 	142.67 137.01	150.35 150.0	ì í ì		191.64	(62)
Solar DHW input calculated using Ap	pendix G or Appendix F	I (negative guantity	() (enter '0' if no s	olar contributio	n to water h	heating)	
(add additional lines if FGHRS							
(63)m = 0 0 0	0 0	0 0	0 0	0	0	0	(63)
Output from water heater	1 1	I	<u> </u>	<u> </u>	Į		
(64)m= 196.37 173.08 181.77	162.94 159.67	142.67 137.01	150.35 150.0	9 168.96	178.66 1	191.64	
(6.7)	102.01			water heater ((64)
Heat gains from water heating	kWh/month 0.25	′ [0 85 × (45)m](- /
(65)m= 87.08 77.22 82.22	75.26 74.87	68.52 67.34	71.77 70.9			85.5	(65)
` '			ļļ	<u> </u>			(00)
include (57)m in calculation		linder is in the d	welling or not	t water is tro	m commi	unity neating	
5. Internal gains (see Table	5 and 5a):						
Metabolic gains (Table 5), Wa		<u>, </u>	<u> </u>	 	i		
Jan Feb Mar	Apr May	Jun Jul	Aug Se	` 	Nov	Dec	
(66)m= 121.29 121.29 121.29	121.29 121.29	121.29 121.29	121.29 121.2	29 121.29	121.29 1	121.29	(66)
Lighting gains (calculated in A	ppendix L, equatio	on L9 or L9a), a	lso see Table	5			
(67)m= 19.21 17.06 13.87	10.5 7.85	6.63 7.16	9.31 12.4	9 15.86	18.52	19.74	(67)
Appliances gains (calculated i	n Appendix L, equa	ation L13 or L13	3a), also see	Table 5			
(68)m= 215.42 217.66 212.03	200.03 184.9	170.67 161.16	158.93 164.5	56 176.55	191.69 2	205.92	(68)
Cooking gains (calculated in A	Appendix L, equation	on L15 or L15a)	, also see Tal	ole 5			
(69)m= 35.13 35.13 35.13	35.13 35.13	35.13 35.13	35.13 35.13	3 35.13	35.13	35.13	(69)
Pumps and fans gains (Table	5a)		•		-		
(70)m= 3 3 3	3 3	3 3	3 3	3	3	3	(70)
Losses e.g. evaporation (nega	ative values) (Table	= 5)	ļ .		!		
(71)m= -97.03 -97.03 -97.03	, , , , , , , , , , , , , , , , , , , 	-97.03 -97.03	-97.03 -97.0	3 -97.03	-97.03 -	-97.03	(71)
Water heating gains (Table 5)	1 1	l			I		
(72)m= 117.04 114.92 110.51	104.52 100.64	95.16 90.51	96.47 98.5	9 104.79	111.78 1	114.92	(72)
Total internal gains =	1		+ (68)m + (69)m				
(73)m= 414.05 412.02 398.8	377.45 355.77	334.85 321.22	327.09 338.0	 		402.97	(73)
6. Solar gains:	077.40 000.77	004.00	027.00	000.00	004.00	402.07	(* -)
Solar gains are calculated using sol	ar flux from Table 6a an	nd associated equa	tions to convert to	o the applicable	e orientation	n.	
Orientation: Access Factor	Area	Flux	g_		FF	Gains	
Table 6d	m²	Table 6a	Table 6	6b Tal	ble 6c	(W)	
North 0.9x 0.77	6.05 X	10.63	x 0.63	x	0.7	= 19.66	(74)
5	2.31 ×		x 0.63	^	0.7	= 7.51](74)
0.77	2.01	10.00	0.00		0.7],, ,

	_		_								,		_
North	0.9x	0.77	X	1.72	X	10.63	X	0.63	X	0.7	=	5.59	(74)
North	0.9x	0.77	X	6.05	X	20.32	X	0.63	X	0.7	=	37.57	(74)
North	0.9x	0.77	X	2.31	X	20.32	X	0.63	X	0.7	=	14.35	(74)
North	0.9x	0.77	X	1.72	X	20.32	X	0.63	X	0.7	=	10.68	(74)
North	0.9x	0.77	X	6.05	X	34.53	X	0.63	X	0.7	=	63.85	(74)
North	0.9x	0.77	X	2.31	X	34.53	X	0.63	X	0.7	=	24.38	(74)
North	0.9x	0.77	X	1.72	x	34.53	X	0.63	X	0.7	=	18.15	(74)
North	0.9x	0.77	X	6.05	x	55.46	x	0.63	x	0.7	=	102.55	(74)
North	0.9x	0.77	X	2.31	x	55.46	X	0.63	X	0.7	=	39.16	(74)
North	0.9x	0.77	X	1.72	x	55.46	x	0.63	X	0.7	=	29.16	(74)
North	0.9x	0.77	x	6.05	x	74.72	X	0.63	x	0.7	=	138.15	(74)
North	0.9x	0.77	X	2.31	x	74.72	X	0.63	x	0.7	=	52.75	(74)
North	0.9x	0.77	X	1.72	x	74.72	X	0.63	x	0.7	=	39.27	(74)
North	0.9x	0.77	X	6.05	x	79.99	X	0.63	x	0.7	=	147.89	(74)
North	0.9x	0.77	X	2.31	x	79.99	X	0.63	X	0.7	=	56.47	(74)
North	0.9x	0.77	X	1.72	x	79.99	X	0.63	x	0.7	=	42.04	(74)
North	0.9x	0.77	X	6.05	x	74.68	X	0.63	X	0.7	=	138.07	(74)
North	0.9x	0.77	X	2.31	x	74.68	X	0.63	x	0.7	=	52.72	(74)
North	0.9x	0.77	X	1.72	x	74.68	X	0.63	x	0.7	=	39.25	(74)
North	0.9x	0.77	X	6.05	x	59.25	X	0.63	X	0.7	=	109.54	(74)
North	0.9x	0.77	X	2.31	x	59.25	x	0.63	x	0.7	=	41.83	(74)
North	0.9x	0.77	X	1.72	x	59.25	X	0.63	X	0.7	=	31.14	(74)
North	0.9x	0.77	X	6.05	x	41.52	X	0.63	X	0.7	=	76.76	(74)
North	0.9x	0.77	X	2.31	x	41.52	X	0.63	x	0.7	=	29.31	(74)
North	0.9x	0.77	X	1.72	x	41.52	X	0.63	x	0.7	=	21.82	(74)
North	0.9x	0.77	X	6.05	x	24.19	X	0.63	X	0.7	=	44.73	(74)
North	0.9x	0.77	X	2.31	x	24.19	x	0.63	x	0.7	=	17.08	(74)
North	0.9x	0.77	X	1.72	x	24.19	X	0.63	x	0.7	=	12.72	(74)
North	0.9x	0.77	X	6.05	x	13.12	x	0.63	x	0.7	=	24.25	(74)
North	0.9x	0.77	X	2.31	x	13.12	x	0.63	x	0.7	=	9.26	(74)
North	0.9x	0.77	X	1.72	x	13.12	X	0.63	X	0.7	=	6.9	(74)
North	0.9x	0.77	X	6.05	x	8.86	X	0.63	X	0.7	=	16.39	(74)
North	0.9x	0.77	X	2.31	x	8.86	X	0.63	x	0.7	=	6.26	(74)
North	0.9x	0.77	x	1.72	x	8.86	x	0.63	x	0.7	=	4.66	(74)
South	0.9x	0.77	x	2.31	x	46.75	x	0.63	x	0.7	=	33.01	(78)
South	0.9x	0.77	x	4.21	x	46.75	x	0.63	x	0.7] =	60.15	(78)
South	0.9x	0.77	x	2.31	x	76.57	x	0.63	x	0.7	j =	54.05	(78)
South	0.9x	0.77	x	4.21	x	76.57	x	0.63	x	0.7	j =	98.51	(78)
South	0.9x	0.77	x	2.31	x	97.53	x	0.63	x	0.7] =	68.86	(78)
South	0.9x	0.77	x	4.21	x	97.53	x	0.63	x	0.7	j =	125.49	(78)
South	0.9x	0.77	x	2.31	x	110.23	x	0.63	x	0.7	j =	77.82	(78)
	_		_		•		•		•		•		_

South 0.9x 0.77 x 4.21 x 110.23 x 0.63 x 0.7 = South 0.9x 0.77 x 2.31 x 114.87 x 0.63 x 0.7 = South 0.9x 0.77 x 4.21 x 114.87 x 0.63 x 0.7 =		
	141.83	(78)
South 0.9x 0.77 x 4.21 x 114.87 x 0.63 x 0.7 =	81.1	(78)
0.77 11 4.21 11 114.07 11 0.00 11 0.11	147.8	(78)
South 0.9x 0.77 x 2.31 x 110.55 x 0.63 x 0.7 =	78.04	(78)
South 0.9x 0.77 x 4.21 x 110.55 x 0.63 x 0.7 =	142.23	(78)
South 0.9x 0.77 x 2.31 x 108.01 x 0.63 x 0.7 =	76.25	(78)
South 0.9x 0.77 x 4.21 x 108.01 x 0.63 x 0.7 =	138.97	(78)
South 0.9x 0.77 x 2.31 x 104.89 x 0.63 x 0.7 =	74.05	(78)
South 0.9x 0.77 x 4.21 x 104.89 x 0.63 x 0.7 =	134.96	(78)
South 0.9x 0.77 x 2.31 x 101.89 x 0.63 x 0.7 =	71.93	(78)
South 0.9x 0.77 x 4.21 x 101.89 x 0.63 x 0.7 =	131.09	(78)
South 0.9x 0.77 x 2.31 x 82.59 x 0.63 x 0.7 =	58.3	(78)
South 0.9x 0.77 x 4.21 x 82.59 x 0.63 x 0.7 =	106.26	(78)
South 0.9x 0.77 x 2.31 x 55.42 x 0.63 x 0.7 =	39.12	(78)
South 0.9x 0.77 x 4.21 x 55.42 x 0.63 x 0.7 =	71.3	(78)
South 0.9x 0.77 x 2.31 x 40.4 x 0.63 x 0.7 =	28.52	(78)
South 0.9x 0.77 x 4.21 x 40.4 x 0.63 x 0.7 =	51.98	(78)
Solar gains in watts, calculated for each month (83)m = $Sum(74)m(82)m$ (83)m= 125.92 215.17 300.72 390.52 459.06 466.68 445.27 391.53 330.91 239.08 150.83 107.8 Total gains – internal and solar (84)m = $(73)m + (83)m$, watts (84)m= 539.97 627.19 699.52 767.96 814.83 801.52 766.49 718.62 668.94 598.67 535.21 510.77		(83)
7. Mean internal temperature (heating season)		
7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C)	21	(85)
7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a)	21	(85)
Temperature during heating periods in the living area from Table 9, Th1 (°C)	21	(85)
Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a)	21	(85)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1	21	_
Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	21	_
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75	21	(86)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)	21	(86)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93	21	(86)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)	21	(86)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1	21	(86) (87) (88)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)	21	(86) (87) (88) (89)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.3 18.55 18.93 19.4 19.75 19.92 19.95 19.95 19.86 19.42 18.79 18.27		(86) (87) (88) (89)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.3 18.55 18.93 19.4 19.75 19.92 19.95 19.95 19.86 19.42 18.79 18.27 fLA = Living area ÷ (4) =	0.35	(86) (87) (88) (89)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.3 18.55 18.93 19.4 19.75 19.92 19.95 19.95 19.86 19.42 18.79 18.27 FLA = Living area ÷ (4) =		(86) (87) (88) (89) (90) (91)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.3 18.55 18.93 19.4 19.75 19.92 19.95 19.95 19.86 19.42 18.79 18.27 FLA = Living area ÷ (4) = Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2 (92)m= 18.82 19.05 19.38 19.8 20.13 20.29 20.32 20.31 20.23 19.82 19.25 18.79		(86) (87) (88) (89)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.3 18.55 18.93 19.4 19.75 19.92 19.95 19.95 19.86 19.42 18.79 18.27 fLA = Living area ÷ (4) = Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 – fLA) × T2 (92)m= 18.82 19.05 19.38 19.8 20.13 20.29 20.32 20.31 20.23 19.82 19.25 18.79 Apply adjustment to the mean internal temperature from Table 4e, where appropriate		(86) (87) (88) (89) (90) (91) (92)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.3 18.55 18.93 19.4 19.75 19.92 19.95 19.95 19.86 19.42 18.79 18.27 FLA = Living area ÷ (4) = Mean internal temperature (for the whole dwelling) = fLA × T1 + (1 - fLA) × T2 (92)m= 18.82 19.05 19.38 19.8 20.13 20.29 20.32 20.31 20.23 19.82 19.25 18.79 Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 18.82 19.05 19.38 19.8 20.13 20.29 20.32 20.31 20.23 19.82 19.25 18.79		(86) (87) (88) (89) (90) (91)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.99 0.98 0.94 0.85 0.68 0.51 0.56 0.81 0.96 0.99 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.78 19.95 20.21 20.53 20.81 20.95 20.99 20.99 20.89 20.54 20.1 19.75 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.92 19.92 19.92 19.94 19.94 19.95 19.95 19.95 19.95 19.95 19.94 19.93 19.93 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 0.99 0.97 0.92 0.8 0.59 0.39 0.44 0.73 0.94 0.99 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.3 18.55 18.93 19.4 19.75 19.92 19.95 19.95 19.86 19.42 18.79 18.27 fLA = Living area ÷ (4) = Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m= 18.82 19.05 19.38 19.8 20.13 20.29 20.32 20.31 20.23 19.82 19.25 18.79 Apply adjustment to the mean internal temperature from Table 4e, where appropriate	0.35	(86) (87) (88) (89) (90) (91) (92)

Apr

May

Jul

Jun

Aug

Mar

Feb

Oct

Sep

Nov

Dec

Utilisat	ion factor	for a	ains. hm) :										
(94)m=		0.99	0.97	0.92	0.81	0.62	0.44	0.49	0.75	0.94	0.99	0.99		(94)
Useful	gains, hm	nGm ,	W = (94	4)m x (84	4)m									
(95)m=	536.3 61	18.35	677.69	707.36	659.7	494.54	334.53	349.58	501.75	562.41	527.76	508.08		(95)
Monthl	y average	exte	rnal tem	perature	from Ta	able 8					•			
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat lo	ss rate fo							- ` ´ ´ 	– (96)m		,	11		
` ′ _		22.57	1200.99		774.29	516.81	337.75	355	559.18	847.21	1121.84	1353.66		(97)
· -	heating re			r		r		 	ì	<u> </u>				
(98)m=	613.92 47	73.24	389.33	213.57	85.26	0	0	0	0	211.89	427.73	629.11		٦,,,,
								Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	3044.06	(98)
Space	heating re	equire	ement in	kWh/m²	/year								38.98	(99)
9a. Enei	rgy requir	emen	ıts – Indi	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
•	heating:													_
Fractio	n of space	e hea	t from s	econdar	y/supple	mentary	system						0	(201)
Fractio	n of space	e hea	t from m	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fractio	n of total	heatir	ng from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficier	ncy of mai	in spa	ce heat	ing syste	em 1							Ī	93.5	(206)
Efficier	ncy of sec	onda	ry/suppl	ementar	y heating	g system	າ, %					İ	0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space	heating re	equire	ement (c	alculate	d above))		•			•			
	613.92 47	73.24	389.33	213.57	85.26	0	0	0	0	211.89	427.73	629.11		
(211)m :	= {[(98)m	x (20	4)] } x 1	00 ÷ (20	06)									(211)
	656.6 50	06.14	416.4	228.42	91.18	0	0	0	0	226.62	457.47	672.85		
								Tota	I (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3255.68	(211)
Space	heating fu	uel (se	econdar	y), kWh/	month							-		_
	m x (201)]	} x 1	00 ÷ (20	8)		-					1			
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		,
								Tota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	<u></u>	0	(215)
Water h	_													
	rom wate	r heat	ter (calc 181.77	ulated al	oove) 159.67	142.67	137.01	150.35	150.09	168.96	178.66	191.64		
	cy of wate		-	102.94	139.07	142.07	137.01	130.33	130.09	100.90	170.00	191.04	79.8	(216)
_		7.36	86.8	85.54	83.23	79.8	79.8	79.8	79.8	85.42	87.06	87.75	79.0	(217)
` ' L	water hea				05.25	79.0	7 9.0	7 9.0	7 9.0	00.42	07.00	07.73		(211)
	= (64)m	•												
(219)m=		98.11	209.42	190.49	191.85	178.78	171.7	188.41	188.08	197.8	205.21	218.39		
_	-					=		Tota	I = Sum(2	19a) ₁₁₂ =			2362.27	(219)
Annual										k'	Wh/year	. '	kWh/year	-
Space h	neating fue	el use	d, main	system	1								3255.68]
Water h	eating fue	el use	d										2362.27]
Electricit	ty for pum	nps, fa	ans and	electric	keep-ho	t								

central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (230a)(230g) =		75	(231)
Electricity for lighting				339.17	(232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	Energy kWh/year	Emission fac kg CO2/kWh	tor	Emissions kg CO2/yea	
Space heating (main system 1)	(211) x	0.216	=	703.23	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	510.25	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1213.48	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	176.03	(268)
Total CO2, kg/year	sum	of (265)(271) =		1428.43	(272)

TER =

(273)

26.84

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:39:25

Project Information:

Assessed By: John Simpson (STRO006273) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 95.2m²

Site Reference: Maitland Park Estate

Plot Reference: AC 011

Address: AC 011, Aspen Court, Maitland Park Estate, London, NW3 2EH

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 27.36 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

8.66 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 59.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 57.8 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.12 (max. 0.30) 0.12 (max. 0.70) OK
Party wall 0.00 (max. 0.20) - OK

Floor 0.12 (max. 0.25) 0.12 (max. 0.70)

Roof (no roof)
Openings 1.40 (max. 2.00) 1.40 (max. 3.30) **OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.00 (design value)

Maximum 10.0 OK

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

Regulations Compliance Report

w energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	
echanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.53	
Maximum	1.5	
MVHR efficiency:	90%	
Minimum	70%	
Summertime temperature		
Overheating risk (Thames valley):	Medium	
sed on:		
Overshading:	Average or unknown	
Windows facing: South	3.44m²	
Windows facing: East	3.44m²	
Windows facing: East	5.36m²	
Windows facing: East	3.44m²	
Windows facing: North	3.44m²	
Windows facing: North	2.83m²	
Windows facing: North	2.75m²	
Windows facing: North	2.69m²	
Windows facing: North	1.8m²	
Windows facing: South	1.8m²	
Windows facing: South	4.91m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m²K	
Party Walls U-value	0 W/m²K	

Party Walls U-value 0 W/m²K Floors U-value 0.12 W/m²K

Community heating, heat from electric heat pump

Photovoltaic array

			lloor F	Notaile						
Assessor Name: Software Name:	John Simpson Stroma FSAP 20		User D	Strom Softwa	are Vei	rsion:			0006273 on: 1.0.4.26	
Address :	AC 011, Aspen Co			Address k Estate			PFH			
1. Overall dwelling dim	•	art, marti	and r an	r Estato,	London	, 14000 2				
Ground floor				a(m²) 95.2	(1a) x		ight(m) 2.9	(2a) =	Volume(m ³	(3a)
	(4 -) . (4 -) . (4 -) . (4 -) . (4	-). (4.					2.9	_(2a) =	270.00	(04)
Total floor area TFA = ((1a)+(1b)+(1c)+(1d)+(1	e)+(11	1)	95.2	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	(3n) =	276.08	(5)
2. Ventilation rate:	<u>.</u>								2	
Number of chimneys	main heating	secondar heating	″y □ + □	other 0] = [total	x	40 =	m³ per hou	(6a)
Number of open flues	0 +	0	┤	0	」	0	x	20 =	0	(6b)
Number of intermittent			J L	0	J		<u> </u>	10 =		= ' '
					Ļ	0			0	(7a)
Number of passive ven	ts				L	0	x	10 =	0	(7b)
Number of flueless gas	fires					0	Χ 4	40 =	0	(7c)
								Air ch	nanges per ho	our
Infiltration due to chimn	over fluor and fanc -	(6a)+(6b)+(7	7a)±(7h)±((7c) -	г					_
	been carried out or is inten-				continue fr	0 om (9) to		÷ (5) =	0	(8)
Number of storeys in		, ,	(/ ,			(-)	(• •)		0	(9)
Additional infiltration	- ,						[(9)	-1]x0.1 =	0	(10)
Structural infiltration:	0.25 for steel or timbe	r frame or	0.35 fo	r masoni	y constr	uction			0	(11)
	present, use the value corre	esponding to	the great	ter wall are	a (after					
•	nings); if equal user 0.35 n floor, enter 0.2 (unsea	aled) or 0	.1 (seale	ed). else	enter 0				0	(12)
•	enter 0.05, else enter 0	,	(,,					0	(13)
•	ws and doors draught								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)
	e, q50, expressed in cu		•	•	•	etre of e	envelope	area	2	(17)
If based on air permeat	•								0.1	(18)
	lies if a pressurisation test h	as been dor	ne or a de	gree air pe	rmeability	is being u	sed			7(10)
Number of sides shelter Shelter factor	rea			(20) = 1 -	[0.075 x (1	[9)] =			0.92	(19) (20)
Infiltration rate incorpora	ating shelter factor			(21) = (18		,-			0.09	(21)
Infiltration rate modified	•	ed		, , ,	, ,				0.03	(=.)
Jan Feb	Mar Apr May	1	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind s	1 . 1 .		1	<u> </u>	•	l .		1	J	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7]	
					<u> </u>	ı			1	
Wind Factor (22a)m = ('	_	1	1		1	1		1	
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltra	ation rat	e (allowi	ng for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.12	0.12	0.11	0.1	0.1	0.09	0.09	0.09	0.09	0.1	0.1	0.11		
Calculate effec		-	rate for t	he appli	cable ca	se					!	I	_
If mechanica			or d'or NL (O	OL.) (00.	-) - - (-		(IE)\\ - (I) (00-)			0.5	(23a)
If exhaust air he) = (23a)			0.5	(23b)
If balanced with		-		_					> /		. ()	76.5	(23c)
a) If balance								í `	 		1 ` ´	· ÷ 100] I	(246)
(24a)m= 0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.22	0.23		(24a)
b) If balance			ı		1		- 	í `	r Ó - Ò	- 	T .	1	(O4b)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h if (22b)n				•					5 v (23h	.)			
(24c)m = 0	0.5 7	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural		<u> </u>				<u> </u>							(= : =)
if (22b)n				•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effective air	change	rate - er	nter (24a	or (24l	b) or (24	c) or (24	d) in bo	x (25)	!	•		•	
(25)m= 0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.22	0.23		(25)
2 Heat lease	a and he	at loss r	oromote	\v.	•		•	•	•	•			
3. Heat losse:	Gros		Openin		Net Ar	00	U-val	110	AXU		k-value	Δ Λ	Χk
ELEMENT	area	_	m		A,r		W/m2		(W/I		kJ/m²-		J/K
Doors					3.89	х	1.4	=	5.446				(26)
Windows Type	: 1				3.44	x1.	/[1/(1.4)+	0.04] =	4.56				(27)
Windows Type	2				3.44	x1,	/[1/(1.4)+	0.04] =	4.56	=			(27)
Windows Type	3				5.36	x1.	/[1/(1.4)+	0.04] =	7.11				(27)
Windows Type	4				3.44	x1.	/[1/(1.4)+	0.04] =	4.56				(27)
Windows Type	5				3.44		/[1/(1.4)+	· 0.04] =	4.56	=			(27)
Windows Type					2.83		/[1/(1.4)+		3.75	_			(27)
Windows Type					2.75	_	- /[1/(1.4)+		3.65	=			(27)
Windows Type					2.69		/[1/(1.4)+		3.57	=			(27)
Windows Type							/[1/(1.4)+		2.39	=			(27)
Windows Type					1.8	_	/[1/(1.4)+			\exists			, ,
,,					1.8		/[1/(1.4)+		2.39	<u>_</u>			(27)
Windows Type	: 11				4.91	=			6.51	亅 ,			(27)
Floor					95.2	×	0.12	=	11.424			_	(28)
Walls	88.2		39.79	9	48.49) X	0.12	=	5.82				(29)
Total area of e	lements	, m²			183.4	8							(31)
Party wall					24.88		0	=	0				(32)
* for windows and ** include the area						ated using	formula 1	1/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	3.2	
Fabric heat los				s and par	uuons		(26)(30) + (32) =				70.28	(33)
Heat capacity		•	-1				•		(30) + (32	2) + (32a).	(32e) =	0	(34)
		,	2 – Cm ·	TEA) i	a k 1/m2k						. ,		=
Thermal mass	parame	CEI (IIVIF	- = OIII -	. 164) !!	1 KJ/111~K			mulca	llive value	: Medium		250	(35)

can be used inste	ad of a de	tailed calci	ulation										
Thermal bridge				usina Ap	pendix ł	<						18.17	(36)
if details of therma	,	,		• .	•								()
Total fabric he	at loss							(33) +	(36) =			88.45	(37)
Ventilation hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5)			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 21.45	21.24	21.03	19.98	19.76	18.71	18.71	18.5	19.13	19.76	20.19	20.61		(38)
Heat transfer of	coefficier	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m= 109.9	109.69	109.48	108.43	108.22	107.16	107.16	106.95	107.59	108.22	108.64	109.06		
Heat loss para	meter (H	HLP), W/	′m²K						Average = = (39)m ÷		12 /12=	108.38	(39)
(40)m= 1.15	1.15	1.15	1.14	1.14	1.13	1.13	1.12	1.13	1.14	1.14	1.15		
Number of day	s in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.14	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
							•		•	•	•	•	
4. Water heat	ting ener	rgy requi	irement:								kWh/ye	ear:	
Assumed see	manay l	N I										1	(40)
Assumed occu if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		69		(42)
Annual averag	e hot wa										3.1		(43)
Reduce the annua not more that 125	_				_	-	to achieve	a water us	se target o	f		•	
				<u> </u>			۸	Can	004	Nav	Daa]	
Jan Hot water usage ii	Feb n litres per	Mar dav for ea	Apr ach month	May <i>Vd.m</i> = fa	Jun ctor from 7	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 107.91	103.98	100.06	96.14	92.21	88.29	88.29	92.21	96.14	100.06	103.98	107.91		
(44)1112 107.31	100.00	100.00	00.14	02.21	00.20	00.20	02.21		Total = Su	<u> </u>	<u> </u>	1177.17	(44)
Energy content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 160.02	139.96	144.42	125.91	120.82	104.25	96.61	110.86	112.18	130.74	142.71	154.97		
									Total = Su	m(45) ₁₁₂ =	=	1543.46	(45)
If instantaneous w												1	
(46)m= 24 Water storage	20.99	21.66	18.89	18.12	15.64	14.49	16.63	16.83	19.61	21.41	23.25		(46)
Storage volum		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	, ,		•			_							, ,
Otherwise if no	•			_			. ,	ers) ente	er '0' in (47)			
Water storage												•	
a) If manufact				or is kno	wn (kWh	n/day):					0		(48)
Temperature f											0		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)) =		1	10		(50)
Hot water stor			-							0.	.02		(51)
If community h	•			`		- /						I	` '
Volume factor			0.1							1.	.03		(52)
Temperature fa	actor fro	m Table	2b							0	.6		(53)

Energy lost from water	storage kWh/s	/ear			(47) x (51)) x (52) x (5	53) =		.03	I	(54)
Enter (50) or (54) in (5	•	Cai			(47) X (01)) X (02) X (0	JO) –		.03		(55)
Water storage loss cale	,	n month			((56)m = (55) × (41)r	n				(00)
(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 cylinder contains dedicated	d solar storage, (57)m = (56)m x	[(50) – (l	H11)] ÷ (5	0), else (5 ⁻	7)m = (56)	m where (H11) is fro	m Append	I 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)
Primary circuit loss (an	nual) from Tab	e 3							0		(58)
Primary circuit loss cale			9)m = (58) ÷ 36	5 × (41)	m				•	
(modified by factor fr	om Table H5 if	there is so	lar wat	er heatir	ng and a	cylinde	thermo	stat)		•	
(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 calculated	for each month	(61)m = $(6$	60) ÷ 36	65 × (41)	m						
(61)m= 0 0	0 0	0	0	0	0	0	0	0	0		(61)
Total heat required for	water heating of	alculated f	for each	n month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 215.3 189.89	199.7 179.41	176.09	157.75	151.88	166.14	165.68	186.01	196.2	210.25		(62)
Solar DHW input calculated	using Appendix G	or Appendix H	H (negativ	ve quantity	') (enter '0	' if no sola	contribut	ion to wate	er heating)	•	
(add additional lines if	FGHRS and/or	WWHRS a	applies,	see Ap	pendix (3)					
(63)m= 0 0	0 0	0	0	0	0	0	0	0	0		(63)
Output from water hear	ter										
(64)m= 215.3 189.89	199.7 179.41	176.09	157.75	151.88	166.14	165.68	186.01	196.2	210.25		
<u> </u>	-				Outp	out from wa	ater heate	r (annual) ₁	12	2194.3	(64)
Heat gains from water	heating, kWh/n	nonth 0.25	´ [0.85	× (45)m	+ (61)m	n1 + 0 8 x	[(46)m	+ (57)m	+ (59)m	1	
				()	1 (01)11	.,	. [(-0)111	. (0,,,,,,	. (00)	1	
(65)m= 97.43 86.48	92.24 84.66	84.39	77.46	76.34	81.08	80.1	87.69	90.25	95.75	, 	(65)
(65)m= 97.43 86.48 include (57)m in calc	ļ		77.46	76.34	81.08	80.1	87.69	90.25	95.75		(65)
` '	culation of (65)n	n only if cyl	77.46	76.34	81.08	80.1	87.69	90.25	95.75		(65)
include (57)m in calc 5. Internal gains (see	culation of (65)n Table 5 and 5	n only if cyl	77.46	76.34	81.08	80.1	87.69	90.25	95.75		(65)
include (57)m in calc	culation of (65)n Table 5 and 5	n only if cyl	77.46	76.34	81.08	80.1	87.69	90.25	95.75		(65)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table	culation of (65)n Table 5 and 5a 5), Watts	n only if cyl	77.46 linder is	76.34 s in the o	81.08 dwelling	80.1 or hot w	87.69 ater is fr	90.25 com com	95.75 munity h		(65)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb	tulation of (65)n Table 5 and 53 5), Watts Mar Apr 134.52 134.52	May 134.52	77.46 linder is Jun 134.52	76.34 s in the c	81.08 dwelling Aug 134.52	80.1 or hot was Sep 134.52	87.69 ater is fr	90.25 om com	95.75 munity h		
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52	tulation of (65)n Table 5 and 53 5), Watts Mar Apr 134.52 134.52	May 134.52	77.46 linder is Jun 134.52	76.34 s in the c	81.08 dwelling Aug 134.52	80.1 or hot was Sep 134.52	87.69 ater is fr	90.25 om com	95.75 munity h		
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate) (67)m= 22.14 19.66	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11	May 134.52 L, equatio 9.05	77.46 linder is Jun 134.52 on L9 or 7.64	76.34 s in the c Jul 134.52 L9a), a 8.26	81.08 dwelling Aug 134.52 lso see 10.73	80.1 or hot was Sep 134.52 Table 5	87.69 ater is fr Oct 134.52	90.25 rom com Nov 134.52	95.75 munity h		(66)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11	May 134.52 L, equatio 9.05 dix L, equa	77.46 linder is Jun 134.52 on L9 or 7.64	76.34 s in the c Jul 134.52 L9a), a 8.26	81.08 dwelling Aug 134.52 lso see 10.73	80.1 or hot was Sep 134.52 Table 5	87.69 ater is fr Oct 134.52	90.25 rom com Nov 134.52	95.75 munity h		(66)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate (67)m= 22.14 19.66 Appliances gains (calculate (68)m= 248.33 250.9	Eulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59	May 134.52 L, equatio 9.05 dix L, equa	77.46 linder is Jun 134.52 on L9 or 7.64 ation L1 196.73	76.34 s in the c Jul 134.52 L9a), a 8.26 13 or L1: 185.78	81.08 dwelling Aug 134.52 lso see 10.73 3a), also 183.2	80.1 or hot was Sep 134.52 Table 5 14.4 o see Tal 189.69	87.69 ater is fr Oct 134.52 18.29 ole 5 203.52	90.25 rom com Nov 134.52	95.75 munity h		(66) (67)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate) (67)m= 22.14 19.66 Appliances gains (calculate)	Eulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59	May 134.52 L, equatio 9.05 dix L, equa	77.46 linder is Jun 134.52 on L9 or 7.64 ation L1 196.73	76.34 s in the c Jul 134.52 L9a), a 8.26 13 or L1: 185.78	81.08 dwelling Aug 134.52 lso see 10.73 3a), also 183.2	80.1 or hot was Sep 134.52 Table 5 14.4 o see Tal 189.69	87.69 ater is fr Oct 134.52 18.29 ole 5 203.52	90.25 rom com Nov 134.52	95.75 munity h		(66) (67)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate (67)m= 22.14 19.66 Appliances gains (calculate (68)m= 248.33 250.9 Cooking gains (calculate (69)m= 36.45 36.45	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45	May 134.52 L, equation 9.05 dix L, equation 213.14 L, equation	77.46 linder is Jun 134.52 on L9 or 7.64 ation L4 196.73 on L15	Jul 134.52 L9a), a 8.26 13 or L1 185.78 or L15a)	81.08 dwelling 134.52 lso see 10.73 3a), also 183.2	Sep 134.52 Table 5 14.4 o see Table 189.69 ee Table	87.69 ater is fr Oct 134.52 18.29 ole 5 203.52 5	90.25 rom com Nov 134.52 21.34	95.75 munity h		(66) (67) (68)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate (67)m= 22.14 19.66 Appliances gains (calculate (68)m= 248.33 250.9 Cooking gains (calculate (69)m= 36.45 36.45 Pumps and fans gains	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45	May 134.52 L, equation 9.05 dix L, equation 213.14 L, equation	77.46 linder is Jun 134.52 on L9 or 7.64 ation L4 196.73 on L15	Jul 134.52 L9a), a 8.26 13 or L1 185.78 or L15a)	81.08 dwelling 134.52 lso see 10.73 3a), also 183.2	Sep 134.52 Table 5 14.4 o see Table 189.69 ee Table	87.69 ater is fr Oct 134.52 18.29 ole 5 203.52 5	90.25 rom com Nov 134.52 21.34	95.75 munity h		(66) (67) (68)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculat (67)m= 22.14 19.66 Appliances gains (calculat (68)m= 248.33 250.9 Cooking gains (calculat (69)m= 36.45 36.45 Pumps and fans gains (70)m= 0 0	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45 (Table 5a) 0 0	May 134.52 L, equatio 9.05 dix L, equatio 213.14 CL, equatio 36.45	77.46 Jun 134.52 on L9 or 7.64 ation L7 196.73 on L15 36.45	Jul 134.52 L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45	Aug 134.52 Iso see 10.73 3a), also 183.2 , also se 36.45	Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table 36.45	87.69 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45	90.25 rom com Nov 134.52 21.34 220.97	95.75 munity h Dec 134.52 22.75 237.37		(66) (67) (68) (69)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate (67)m= 22.14 19.66 Appliances gains (calculate (68)m= 248.33 250.9 Cooking gains (calculate (69)m= 36.45 36.45 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporation	tulation of (65)n Table 5 and 53 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45 (Table 5a) 0 0 n (negative value	May 134.52 L, equatio 9.05 dix L, equa 213.14 c L, equatic 36.45 0 ues) (Table	77.46 Jun 134.52 on L9 or 7.64 ation L1 196.73 on L15 36.45	76.34 s in the c Jul 134.52 L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45	81.08 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se 36.45	80.1 or hot was Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table 36.45	87.69 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45	90.25 rom com Nov 134.52 21.34 220.97 36.45	95.75 munity h Dec 134.52 22.75 237.37		(66) (67) (68) (69)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate (67)m= 22.14 19.66 Appliances gains (calculate (68)m= 248.33 250.9 Cooking gains (calculate (69)m= 36.45 36.45 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -107.62 -107.62	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45 (Table 5a) 0 0 n (negative value)	May 134.52 L, equatio 9.05 dix L, equa 213.14 c L, equatic 36.45 0 ues) (Table	77.46 Jun 134.52 on L9 or 7.64 ation L7 196.73 on L15 36.45	Jul 134.52 L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45	Aug 134.52 Iso see 10.73 3a), also 183.2 , also se 36.45	Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table 36.45	87.69 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45	90.25 rom com Nov 134.52 21.34 220.97	95.75 munity h Dec 134.52 22.75 237.37		(66) (67) (68) (69)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculat (67)m= 22.14 19.66 Appliances gains (calculat (68)m= 248.33 250.9 Cooking gains (calculat (69)m= 36.45 36.45 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -107.62 -107.62 Water heating gains (T	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45 (Table 5a) 0 0 n (negative valuation of (65)n (Table 5)	May 134.52 L, equation 9.05 dix L, equation 36.45	77.46 Jun 134.52 on L9 or 7.64 ation L7 196.73 on L15 36.45 0 e 5)	76.34 s in the co Jul 134.52 L9a), a 8.26 13 or L1 185.78 or L15a) 36.45	81.08 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se 36.45	80.1 or hot was Sep 134.52 Table 5 14.4 o see Table 189.69 ee Table 36.45	87.69 ater is fr Oct 134.52 18.29 ole 5 203.52 5 36.45	90.25 rom com Nov 134.52 21.34 220.97 36.45	95.75 munity h Dec 134.52 22.75 237.37 36.45 0		(66) (67) (68) (69) (70) (71)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate (67)m= 22.14 19.66 Appliances gains (calculate (68)m= 248.33 250.9 Cooking gains (calculate (69)m= 36.45 36.45 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -107.62 -107.62 Water heating gains (T (72)m= 130.95 128.69	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45 (Table 5a) 0 0 n (negative valuation of (65)n 123.98 117.58	May 134.52 L, equation 9.05 dix L, equation 36.45	77.46 Jun 134.52 on L9 or 7.64 ation L 196.73 on L15 36.45 0 2 5) -107.62	76.34 s in the c Jul 134.52 L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45 0 -107.62	81.08 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se 36.45 0 -107.62	80.1 or hot was seep 134.52 Table 5 14.4 o see Tale 189.69 ee Table 36.45 0 -107.62	87.69 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45 0 -107.62	90.25 rom com Nov 134.52 21.34 220.97 36.45 0 -107.62	95.75 munity h Dec 134.52 22.75 237.37 36.45 0 -107.62		(66) (67) (68) (69)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculat (67)m= 22.14 19.66 Appliances gains (calculat (68)m= 248.33 250.9 Cooking gains (calculat (69)m= 36.45 36.45 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -107.62 -107.62 Water heating gains (T (72)m= 130.95 128.69 Total internal gains =	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ded in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45 (Table 5a) 0 0 n (negative valuation of (65)n 123.98 117.58	May 134.52 L, equation 213.14 L, equation 36.45	77.46 Jun 134.52 on L9 or 7.64 ation L* 196.73 on L15 36.45 0 e 5) -107.62	76.34 S in the control of the contr	81.08 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se 36.45 0 -107.62	80.1 or hot was Sep 134.52 Table 5 14.4 o see Table 189.69 ee Table 36.45 0 -107.62	87.69 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45 0 -107.62 117.87 70)m + (7	90.25 rom com Nov 134.52 21.34 220.97 36.45 0 -107.62 125.34 1)m + (72)	95.75 munity h Dec 134.52 22.75 237.37 36.45 0 -107.62		(66) (67) (68) (69) (70) (71)
include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculate (67)m= 22.14 19.66 Appliances gains (calculate (68)m= 248.33 250.9 Cooking gains (calculate (69)m= 36.45 36.45 Pumps and fans gains (70)m= 0 0 Losses e.g. evaporatio (71)m= -107.62 -107.62 Water heating gains (T (72)m= 130.95 128.69	tulation of (65)n Table 5 and 56 5), Watts Mar Apr 134.52 134.52 ted in Appendix 15.99 12.11 ulated in Apper 244.41 230.59 ted in Appendix 36.45 36.45 (Table 5a) 0 0 n (negative valuation of (65)n 123.98 117.58	May 134.52 L, equation 213.14 CL, equation 36.45	77.46 Jun 134.52 on L9 or 7.64 ation L 196.73 on L15 36.45 0 2 5) -107.62	76.34 s in the c Jul 134.52 L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45 0 -107.62	81.08 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se 36.45 0 -107.62	80.1 or hot was seep 134.52 Table 5 14.4 o see Tale 189.69 ee Table 36.45 0 -107.62	87.69 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45 0 -107.62	90.25 rom com Nov 134.52 21.34 220.97 36.45 0 -107.62	95.75 munity h Dec 134.52 22.75 237.37 36.45 0 -107.62		(66) (67) (68) (69) (70) (71)

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

Orienta	tion:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	3.44	x	10.63	x	0.4	x	0.8] =	8.11	(74)
North	0.9x	0.77	x	2.83	x	10.63	х	0.4	x	0.8	=	6.67	(74)
North	0.9x	0.77	х	2.75	x	10.63	х	0.4	x	0.8	=	6.48	(74)
North	0.9x	0.77	х	2.69	x	10.63	x	0.4	x	0.8] =	6.34	(74)
North	0.9x	0.77	x	1.8	x	10.63	х	0.4	x	0.8	=	4.24	(74)
North	0.9x	0.77	x	3.44	x	20.32	x	0.4	x	0.8	=	15.5	(74)
North	0.9x	0.77	х	2.83	x	20.32	х	0.4	x	0.8	=	12.75	(74)
North	0.9x	0.77	x	2.75	x	20.32	x	0.4	X	0.8	=	12.39	(74)
North	0.9x	0.77	x	2.69	x	20.32	x	0.4	x	0.8	=	12.12	(74)
North	0.9x	0.77	x	1.8	x	20.32	x	0.4	x	0.8	=	8.11	(74)
North	0.9x	0.77	x	3.44	x	34.53	x	0.4	x	0.8	=	26.34	(74)
North	0.9x	0.77	x	2.83	x	34.53	x	0.4	x	0.8	=	21.67	(74)
North	0.9x	0.77	x	2.75	x	34.53	x	0.4	x	0.8	=	21.06	(74)
North	0.9x	0.77	x	2.69	x	34.53	x	0.4	x	0.8	=	20.6	(74)
North	0.9x	0.77	x	1.8	x	34.53	x	0.4	x	0.8	=	13.78	(74)
North	0.9x	0.77	x	3.44	x	55.46	x	0.4	x	0.8	=	42.31	(74)
North	0.9x	0.77	x	2.83	x	55.46	x	0.4	x	0.8	=	34.81	(74)
North	0.9x	0.77	x	2.75	x	55.46	x	0.4	x	0.8	=	33.82	(74)
North	0.9x	0.77	x	2.69	x	55.46	x	0.4	X	0.8	=	33.09	(74)
North	0.9x	0.77	x	1.8	x	55.46	x	0.4	x	0.8	=	22.14	(74)
North	0.9x	0.77	x	3.44	x	74.72	x	0.4	x	0.8	=	57	(74)
North	0.9x	0.77	x	2.83	x	74.72	x	0.4	x	0.8	=	46.89	(74)
North	0.9x	0.77	X	2.75	x	74.72	x	0.4	X	0.8	=	45.56	(74)
North	0.9x	0.77	X	2.69	x	74.72	x	0.4	X	0.8	=	44.57	(74)
North	0.9x	0.77	X	1.8	x	74.72	x	0.4	X	0.8	=	29.82	(74)
North	0.9x	0.77	X	3.44	x	79.99	x	0.4	X	0.8	=	61.02	(74)
North	0.9x	0.77	X	2.83	x	79.99	X	0.4	X	0.8	=	50.2	(74)
North	0.9x	0.77	X	2.75	x	79.99	X	0.4	X	0.8	=	48.78	(74)
North	0.9x	0.77	X	2.69	x	79.99	x	0.4	X	0.8	=	47.71	(74)
North	0.9x	0.77	X	1.8	x	79.99	x	0.4	X	0.8	=	31.93	(74)
North	0.9x	0.77	X	3.44	x	74.68	X	0.4	X	0.8	=	56.97	(74)
North	0.9x	0.77	X	2.83	x	74.68	x	0.4	X	0.8	=	46.87	(74)
North	0.9x	0.77	X	2.75	x	74.68	x	0.4	X	0.8	=	45.54	(74)
North	0.9x	0.77	X	2.69	x	74.68	X	0.4	X	0.8	=	44.55	(74)
North	0.9x	0.77	x	1.8	x	74.68	x	0.4	x	0.8	=	29.81	(74)
North	0.9x	0.77	x	3.44	x	59.25	x	0.4	x	0.8	=	45.2	(74)
North	0.9x	0.77	x	2.83	x	59.25	x	0.4	x	0.8	=	37.18	(74)
North	0.9x	0.77	x	2.75	x	59.25	x	0.4	x	0.8	=	36.13	(74)
North	0.9x	0.77	X	2.69	×	59.25	X	0.4	x	0.8	=	35.34	(74)

			_		_		_		_		_		_
North	0.9x	0.77	X	1.8	X	59.25	X	0.4	X	0.8	=	23.65	(74)
North	0.9x	0.77	X	3.44	X	41.52	x	0.4	X	0.8	=	31.67	(74)
North	0.9x	0.77	X	2.83	X	41.52	X	0.4	x	0.8	=	26.05	(74)
North	0.9x	0.77	X	2.75	X	41.52	X	0.4	X	0.8	=	25.32	(74)
North	0.9x	0.77	X	2.69	X	41.52	x	0.4	X	0.8	=	24.77	(74)
North	0.9x	0.77	X	1.8	X	41.52	X	0.4	X	0.8	=	16.57	(74)
North	0.9x	0.77	X	3.44	X	24.19	X	0.4	X	0.8	=	18.45	(74)
North	0.9x	0.77	X	2.83	X	24.19	x	0.4	X	0.8	=	15.18	(74)
North	0.9x	0.77	X	2.75	X	24.19	X	0.4	X	0.8	=	14.75	(74)
North	0.9x	0.77	X	2.69	X	24.19	x	0.4	X	0.8	=	14.43	(74)
North	0.9x	0.77	X	1.8	X	24.19	X	0.4	X	0.8	=	9.66	(74)
North	0.9x	0.77	X	3.44	X	13.12	X	0.4	X	0.8	=	10.01	(74)
North	0.9x	0.77	X	2.83	X	13.12	x	0.4	X	0.8	=	8.23	(74)
North	0.9x	0.77	X	2.75	X	13.12	x	0.4	X	0.8	=	8	(74)
North	0.9x	0.77	X	2.69	X	13.12	X	0.4	X	0.8	=	7.83	(74)
North	0.9x	0.77	x	1.8	X	13.12	x	0.4	x	0.8	=	5.24	(74)
North	0.9x	0.77	X	3.44	X	8.86	x	0.4	X	0.8	=	6.76	(74)
North	0.9x	0.77	X	2.83	X	8.86	X	0.4	X	0.8	=	5.56	(74)
North	0.9x	0.77	X	2.75	X	8.86	x	0.4	X	0.8	=	5.41	(74)
North	0.9x	0.77	X	2.69	X	8.86	X	0.4	X	0.8	=	5.29	(74)
North	0.9x	0.77	X	1.8	X	8.86	X	0.4	X	0.8	=	3.54	(74)
East	0.9x	0.77	X	3.44	X	19.64	x	0.4	x	0.8	=	14.98	(76)
East	0.9x	0.77	X	5.36	X	19.64	x	0.4	X	0.8	=	23.35	(76)
East	0.9x	0.77	X	3.44	X	19.64	x	0.4	X	0.8	=	14.98	(76)
East	0.9x	0.77	X	3.44	X	38.42	x	0.4	X	0.8	=	29.31	(76)
East	0.9x	0.77	X	5.36	X	38.42	x	0.4	X	0.8	=	45.67	(76)
East	0.9x	0.77	X	3.44	X	38.42	X	0.4	X	0.8	=	29.31	(76)
East	0.9x	0.77	X	3.44	X	63.27	x	0.4	X	0.8	=	48.27	(76)
East	0.9x	0.77	X	5.36	X	63.27	x	0.4	X	0.8	=	75.21	(76)
East	0.9x	0.77	X	3.44	X	63.27	x	0.4	X	0.8	=	48.27	(76)
East	0.9x	0.77	x	3.44	X	92.28	x	0.4	x	0.8	=	70.4	(76)
East	0.9x	0.77	x	5.36	X	92.28	x	0.4	x	0.8	=	109.69	(76)
East	0.9x	0.77	X	3.44	X	92.28	x	0.4	X	0.8	=	70.4	(76)
East	0.9x	0.77	X	3.44	X	113.09	x	0.4	x	0.8	=	86.27	(76)
East	0.9x	0.77	X	5.36	X	113.09	x	0.4	x	0.8	=	134.43	(76)
East	0.9x	0.77	X	3.44	X	113.09	x	0.4	x	0.8	=	86.27	(76)
East	0.9x	0.77	X	3.44	X	115.77	x	0.4	x	0.8] =	88.32	(76)
East	0.9x	0.77	X	5.36	X	115.77	x	0.4	x	0.8	=	137.61	(76)
East	0.9x	0.77	X	3.44	x	115.77	x	0.4	x	0.8] =	88.32	(76)
East	0.9x	0.77	x	3.44	x	110.22	x	0.4	x	0.8	=	84.08	(76)
East	0.9x	0.77	x	5.36	X	110.22	x	0.4	x	0.8	=	131.01	(76)
	_												

	_		-										_
East	0.9x	0.77	X	3.44	X	110.22	X	0.4	X	0.8	=	84.08	(76)
East	0.9x	0.77	X	3.44	X	94.68	x	0.4	X	0.8	=	72.22	(76)
East	0.9x	0.77	X	5.36	X	94.68	x	0.4	X	0.8	=	112.53	(76)
East	0.9x	0.77	X	3.44	X	94.68	X	0.4	X	0.8	=	72.22	(76)
East	0.9x	0.77	X	3.44	x	73.59	X	0.4	X	0.8	=	56.14	(76)
East	0.9x	0.77	X	5.36	X	73.59	X	0.4	x	0.8	=	87.47	(76)
East	0.9x	0.77	X	3.44	x	73.59	X	0.4	x	0.8	=	56.14	(76)
East	0.9x	0.77	X	3.44	x	45.59	x	0.4	x	0.8	=	34.78	(76)
East	0.9x	0.77	X	5.36	x	45.59	X	0.4	x	0.8] =	54.19	(76)
East	0.9x	0.77	X	3.44	x	45.59	X	0.4	x	0.8	=	34.78	(76)
East	0.9x	0.77	X	3.44	x	24.49	X	0.4	x	0.8] =	18.68	(76)
East	0.9x	0.77	X	5.36	X	24.49	X	0.4	x	0.8] =	29.11	(76)
East	0.9x	0.77	X	3.44	x	24.49	x	0.4	x	0.8	=	18.68	(76)
East	0.9x	0.77	X	3.44	x	16.15	x	0.4	x	0.8	=	12.32	(76)
East	0.9x	0.77	X	5.36	x	16.15	x	0.4	x	0.8	=	19.2	(76)
East	0.9x	0.77	X	3.44	x	16.15	X	0.4	x	0.8	=	12.32	(76)
South	0.9x	0.77	X	3.44	x	46.75	x	0.4	x	0.8	=	35.67	(78)
South	0.9x	0.77	X	1.8	x	46.75	x	0.4	x	0.8	=	18.66	(78)
South	0.9x	0.77	X	4.91	x	46.75	x	0.4	x	0.8	=	50.91	(78)
South	0.9x	0.77	X	3.44	x	76.57	X	0.4	X	0.8] =	58.41	(78)
South	0.9x	0.77	X	1.8	x	76.57	X	0.4	x	0.8] =	30.56	(78)
South	0.9x	0.77	X	4.91	x	76.57	X	0.4	x	0.8	=	83.37	(78)
South	0.9x	0.77	X	3.44	x	97.53	x	0.4	x	0.8	=	74.4	(78)
South	0.9x	0.77	X	1.8	x	97.53	x	0.4	x	0.8	=	38.93	(78)
South	0.9x	0.77	X	4.91	x	97.53	x	0.4	x	0.8	=	106.2	(78)
South	0.9x	0.77	X	3.44	x	110.23	x	0.4	x	0.8] =	84.09	(78)
South	0.9x	0.77	X	1.8	x	110.23	x	0.4	x	0.8] =	44	(78)
South	0.9x	0.77	X	4.91	x	110.23	X	0.4	x	0.8	=	120.03	(78)
South	0.9x	0.77	X	3.44	x	114.87	x	0.4	x	0.8	=	87.63	(78)
South	0.9x	0.77	X	1.8	x	114.87	x	0.4	x	0.8] =	45.85	(78)
South	0.9x	0.77	X	4.91	x	114.87	X	0.4	x	0.8	=	125.08	(78)
South	0.9x	0.77	X	3.44	X	110.55	X	0.4	x	0.8	=	84.33	(78)
South	0.9x	0.77	X	1.8	x	110.55	X	0.4	x	0.8] =	44.13	(78)
South	0.9x	0.77	X	4.91	x	110.55	X	0.4	x	0.8	=	120.37	(78)
South	0.9x	0.77	X	3.44	x	108.01	x	0.4	x	0.8	=	82.4	(78)
South	0.9x	0.77	X	1.8	x	108.01	x	0.4	x	0.8] =	43.11	(78)
South	0.9x	0.77	x	4.91	x	108.01	x	0.4	x	0.8] =	117.61	(78)
South	0.9x	0.77	X	3.44	x	104.89	x	0.4	x	0.8] =	80.02	(78)
South	0.9x	0.77	x	1.8	x	104.89	x	0.4	x	0.8] =	41.87	(78)
South	0.9x	0.77	x	4.91	x	104.89	x	0.4	x	0.8	=	114.21	(78)
South	0.9x	0.77	X	3.44	x	101.89	x	0.4	x	0.8	=	77.72	(78)

South	0.9x	0.77	X	1.	8	X	10	01.89	x		0.4	X	0.8	=	40.67	(78)
South	0.9x	0.77	х	4.9	91	X	10	01.89	x		0.4	X	0.8	=	110.94	(78)
South	0.9x	0.77	X	3.4	14	x	8	2.59	x		0.4	X	0.8	=	63	(78)
South	0.9x	0.77	X	1.	8	X	8	2.59	x		0.4	X	0.8	=	32.97	(78)
South	0.9x	0.77	X	4.9	91	X	8	2.59	x		0.4	X	0.8	=	89.92	(78)
South	0.9x	0.77	X	3.4	14	X	5	5.42	x		0.4	x	0.8	=	42.28	(78)
South	0.9x	0.77	Х	1.	8	X	5	5.42	x		0.4	X	0.8	=	22.12	(78)
South	0.9x	0.77	X	4.9	91	x	5	5.42	x		0.4	x	0.8	=	60.34	(78)
South	0.9x	0.77	X	3.4	14	x	4	40.4	x		0.4	X	0.8	=	30.82	(78)
South	0.9x	0.77	х	1.	8	X		40.4	x		0.4	X	0.8	=	16.13	(78)
South	0.9x	0.77	x	4.9	91	x	4	40.4	x		0.4	X	0.8	=	43.99	(78)
									-							
Solar g	ains in y	watts, ca	alculated	for eac	h month	1			(83)m	n = Su	m(74)m .	(82)n	1		_	
(83)m=	190.4	337.51	494.73	664.77	789.38		302.7	766.02	670).59	553.46	382.	1 230.51	161.33		(83)
Total g	ains – ir	nternal a	nd sola	r (84)m =	= (73)m	+ (83)m	, watts							7	
(84)m=	655.17	800.12	942.47	1088.41	1188.35	11	78.02	1126.02	1036	6.86	932.16	785.	3 661.52	613.5		(84)
7. Me	an interr	nal temp	erature	(heating	seasor	1)										
Temp	erature	during h	eating p	eriods ir	n the livi	ng	area f	from Tab	ole 9	, Th1	(°C)				21	(85)
Utilisa	ation fac	tor for g	ains for	living are	ea, h1,m	า (ร	ee Ta	ble 9a)							-	
	Jan	Feb	Mar	Apr	May		Jun	Jul	Α	ug	Sep	Oc	t Nov	Dec		
(86)m=	1	0.99	0.97	0.9	0.76		0.57	0.42	0.4	47	0.73	0.95	0.99	1		(86)
Mean	internal	temper	ature in	living ar	ea T1 (f	ollo	w ste	ps 3 to 7	in T	Γable	9c)					
(87)m=	19.83	20.04	20.33	20.67	20.9	2	20.98	21	20.	.99	20.94	20.6	2 20.16	19.8]	(87)
Temp	erature	during h	eating p	eriods ir	n rest of	dw	elling/	from Ta	able 9	9, Th	2 (°C)					
(88)m=	19.96	19.96	19.96	19.97	19.97	1	9.98	19.98	19.	.98	19.98	19.9	7 19.97	19.96]	(88)
Utilisa	ation fac	tor for a	ains for	rest of d	wellina.	h2	m (se	e Table	9a)				•	•	-	
(89)m=	1	0.99	0.96	0.87	0.7	$\overline{}$	0.48	0.32	0.3	37	0.64	0.92	0.99	1	7	(89)
Moan	intornal	tompor	atura in	the rest	of dwall	ina	T2 (f	allow etc	ne 3	1 to 7	in Tabl	0 00)			_	
(90)m=	18.41	18.71	19.14	19.61	19.88	Ť	12 (10	19.98	19.		19.93	19.5	5 18.89	18.36	7	(90)
()						1		10.00					ving area ÷		0.36	(91)
							` .	A T 4								` ′
(92)m=	18.93	19.19	19.57	or the wh	20.25	$\overline{}$	g) = 11 20.34	_A × 11	+ (1		20.3	19.9	4 19.35	18.88	1	(92)
				l interna										10.00		(32)
(93)m=	18.93	19.19	19.57	19.99	20.25	_	20.34	20.35	20.		20.3	19.9		18.88	7	(93)
	ace heat															` '
					re obtaiı	ned	l at ste	ep 11 of	Tabl	le 9b	. so tha	t Ti.m	=(76)m ar	nd re-cal	culate	
				using Ta							,	,			_	
	Jan	Feb	Mar	Apr	May		Jun	Jul	A	ug	Sep	Oc	t Nov	Dec		
	ation fac			1	·	_					-				7	
(94)m=	0.99	0.98	0.95	0.87	0.72		0.51	0.36	0.	4	0.67	0.92	0.99	1		(94)
			· •	4)m x (8	r –	1	00 <i>i</i>	465 **		1	00- /- 1			1	7	(05)
(95)m=	650.83	786.49	899.58	951.19	851.48		604	400.41	419).77	627.18	723.0	651.67	610.49	_	(95)
Month (96)m=	nly avera	age exte	rnal tem 6.5	perature 8.9	11.7	_	e 8 14.6	16.6	16	. 1	14.1	10.6	7.1	4.2	7	(96)
(90)111=	4.3	4.9	0.5	0.9	11.7		14.0	10.0	10	0.4	14.1	10.0	7.1	4.2	J	(30)

Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(03/m_ (06);	n 1				
	22.29 666.7	-i	1330.84	1601.3		(97)
Space heating requirement for each month, kWh/month = 0.024 x	((97)m – (9	 95)m] x (4	1)m	<u> </u>		
(98)m= 712.04 525.19 395.52 181.31 54.78 0 0	0 0	213.99	489	737.16		_
	Total per year	ar (kWh/yea	r) = Sum(9	18)15,912 =	3308.98	(98)
Space heating requirement in kWh/m²/year					34.76	(99)
9b. Energy requirements – Community heating scheme						
This part is used for space heating, space cooling or water heating Fraction of space heat from secondary/supplementary heating (Tal	0	(301)				
Fraction of space heat from community system $1 - (301) =$	1	(302)				
The community scheme may obtain heat from several sources. The procedure allow includes boilers, heat pumps, geothermal and waste heat from power stations. See		⊐ ¬ \				
Fraction of heat from Community heat pump	1	(303a)				
Fraction of total space heat from Community heat pump			602) x (303	sa) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for communit	y heating sy	/stem			1	(305)
Distribution loss factor (Table 12c) for community heating system					1.1	(306)
Space heating Annual space heating requirement				[kWh/year 3308.98]
Space heat from Community heat pump	(98) x	(304a) x (30	5) x (306)	= [3639.88	(307a)
Efficiency of secondary/supplementary heating system in % (from	Table 4a or	Appendix	E)	[0	(308
Space heating requirement from secondary/supplementary system	(98) x	(301) x 100	÷ (308) =		0	(309)
Water heating Annual water heating requirement					2194.3	7
If DHW from community scheme: Water heat from Community heat pump	(64) x	(303a) x (30	5) x (306)	= [2413.73	(310a)
Electricity used for heat distribution	0.01 × [(307	a)(307e) +	- (310a)	(310e)] =	60.54	(313)
Cooling System Energy Efficiency Ratio				Ì	0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107	÷ (314) =		Ī	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from ou	tside				223.14	(330a)
warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year	=(330a	ı) + (330b) +	· (330a) =	L [223.14	(331)
Energy for lighting (calculated in Appendix L)	(2200	, (====, .	3/	L [390.97	(332)
Electricity generated by PVs (Appendix M) (negative quantity)				L T	-984.53	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity)	tity)			L T	-964.55	(334)
	y <i>)</i>			L		(334)
12b. CO2 Emissions – Community heating scheme						

Energy

kWh/year

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kg CO2/year

Emission factor Emissions

kg CO2/kWh

CO2 from other sources of space and v Efficiency of heat source 1 (%)		P) sing two fuels repeat (363) to (36	66) for the seco	nd fuel	319	(367a)
CO2 associated with heat source 1	[(307)	o)+(310b)] x 100 ÷ (367b) x	0.52] = [984.9	(367)
Electrical energy for heat distribution		[(313) x	0.52] = [31.42	(372)
Total CO2 associated with community	systems	(363)(366) + (368)(372)		= [1016.31	(373)
CO2 associated with space heating (se	econdary)	(309) x	0] = [0	(374)
CO2 associated with water from immer	sion heater or instanta	neous heater (312) x	0.52] = [0	(375)
Total CO2 associated with space and v	vater heating	(373) + (374) + (375) =		[1016.31	(376)
CO2 associated with electricity for pum	ps and fans within dwe	elling (331)) x	0.52] = [115.81	(378)
CO2 associated with electricity for light	ing	(332))) x	0.52] = [202.91	(379)
Energy saving/generation technologies Item 1	(333) to (334) as appl		52 x 0.	01 =	-510.97	(380)
Total CO2, kg/year	sum of (376)(382) =				824.07	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				8.66	(384)
El rating (section 14)					92.12	(385)

			User I	Details:						
Assessor Name: Software Name:	John Simpson Stroma FSAP 20	012		Strom Softwa					0006273 on: 1.0.4.26	
A 1 1	AC 044 Assau C			Address			·			
Address: 1. Overall dwelling dime	AC 011, Aspen Co	ourt, Maitia	and Par	k Estate,	London	, NVV3 2	'EH			
1. Overall dwelling diffi	611310113.		Δre	a(m²)		Δν Ηρ	ight(m)		Volume(m ³	3)
Ground floor					(1a) x		2.9	(2a) =	276.08	(3a)
Total floor area TFA = (1	(a)+(1b)+(1c)+(1d)+(1e)+(1r	۱)	95.2	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	276.08	(5)
2. Ventilation rate:										
Number of alrices are	heating	secondar heating	· –	other	- 	total		40 =	m³ per hou	_
Number of chimneys	0 +	0	╛╵	0	_ = [0			0	(6a)
Number of open flues	0 +	0	+	0	_ = _	0	X :	20 =	0	(6b)
Number of intermittent fa	ans					3	X	10 =	30	(7a)
Number of passive vents	S					0	X	10 =	0	(7b)
Number of flueless gas t	fires				Ī	0	x -	40 =	0	(7c)
								Air ch	nanges per ho	our
Infiltration due to chimne	eys, flues and fans =	(6a)+(6b)+(7	′a)+(7b)+	(7c) =	Г	30		÷ (5) =	0.11	(8)
If a pressurisation test has					continue fr			- (-)	0.11	
Number of storeys in t	the dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
	present, use the value corr				•	uction			0	(11)
deducting areas of open If suspended wooden	• / .	aled) or 0	.1 (seale	ed). else	enter 0				0	(12)
If no draught lobby, er	•	,	(000	ou), 0.00	00.				0	(13)
Percentage of window									0	(14)
Window infiltration	_			0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value	, q50, expressed in c	ubic metre	s per h	our per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeab	•								0.36	(18)
Air permeability value appli		nas been dor	ne or a de	gree air pe	rmeability	is being u	sed			7,40
Number of sides shelter Shelter factor	ea			(20) = 1 -	[0.075 x (1	19)] =			0.92	(19)
Infiltration rate incorpora	iting shelter factor			(21) = (18) x (20) =				0.33	(21)
Infiltration rate modified	-	ed		•					0.00	
Jan Feb	Mar Apr Ma		Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind s			•	<u>. </u>		•	•	•		
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	1	
Wind Factor (22a)m = (2	22\m · 4	1	•	1			•	•	_	
Wind Factor $(22a)m = (22a)m = 1.27$ 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18	1	
1.27	1.1 1.00	0.95	L 3.33	1 0.02	<u> </u>	L 1.00	1.12	1.10	J	

Calculate effective air change rate for the applicable case If mechanical ventilation: If exhaust air heat pump using Appendix N, $(23b) = (23a) \times Fmv$ (equation (N5)), otherwise $(23b) = (23a)$ If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = a) If balanced mechanical ventilation with heat recovery (MVHR) $(24a)m = (22b)m + (23b) \times [1 - (23c) \div 100]$ (24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0	Adjusted infiltra	ation rat	e (allowi	na for sh	elter an	d wind s	peed) =	(21a) x	(22a)m					
If each anical ventilation:			<u> </u>					`	ì ´	0.36	0.37	0.39]	
If sekneust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (NS)), otherwise (23b) = (23b) C3a) If balanced mechanical ventilation with heat recovery: (fflictheroy) in sallowing for in-use factor (from Table 44) =			-	rate for t	he appli	cable ca	se	!	<u> </u>	<u>!</u>	!	!	J	
a) It balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 - (23c) + 100] (24a)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				" 11 (0	(22	` - '	(1		. (00)	\			0	
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 - (23c) ÷ 100] (24a)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0) = (23a)			0	(23b)
24a m 0			-	-	_									(23c)
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) (24b)m = (22b)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	· · ·							- ´ ` -	í `	 		1 ` ´	i ÷ 100] I	(24-)
(24b)m	`	<u> </u>	<u> </u>						ļ			0		(24a)
c) If whole house extract ventilation or positive input ventilation from outside if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b) (24c)m		ı						- 	í `	r ´ `	- 	1 .	1	(0.45)
The properties of the proper		<u> </u>	<u> </u>			<u> </u>			ļ	0	0	0	J	(24b)
(24c)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	•				•					E v (22h	~)			
d) If natural ventilation or whole house positive input ventilation from loft if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]	<u>``</u>	ı —	<u> </u>	· ` ·	, ,	ŕ	· ` ·	ŕ	í 	<u> </u>	í 	Ι ο	1	(24c)
State Stat	(1/												J	(2.10)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) (25)me 0.59 0.59 0.59 0.58 0.57 0.56 0.55 0.55 0.56 0.56 0.57 0.58 (25) 3. Heat losses and heat loss parameter: ELEMENT Gross area (m²)	,									0.5]				
Case Case	(24d)m= 0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58]	(24d)
S. Heat losses and heat loss parameter.	Effective air	change	rate - er	iter (24a	or (24k	o) or (24	c) or (24	d) in bo	x (25)			1		
Part Part	(25)m= 0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58]	(25)
Part Part	2 Heat lease	م م الم م	at loss :										1	
A ,m2						Not Ar	00	Hyal		A V I I		k volu	<u> </u>	Λ V k
Windows Type 1 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 2 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 3 2.97 x1/[1/(1.4) + 0.04] = 3.94 (27) Windows Type 4 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 5 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 6 1.57 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 7 1.53 x1/[1/(1.4) + 0.04] = 2.03 (27) Windows Type 8 1.49 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 9 1 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 9 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (27) x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (28) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.98 (29) X1/[1/(1.4) + 0.04] = 1.98 (20)	ELEIVIENI		_											
Windows Type 2 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 3 2.97 x1/[1/(1.4) + 0.04] = 3.94 (27) Windows Type 4 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 5 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 6 1.57 x1/[1/(1.4) + 0.04] = 2.08 (27) Windows Type 7 1.53 x1/[1/(1.4) + 0.04] = 2.03 (27) Windows Type 8 1.49 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 9 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Walls 88.28 23.81 64.47 x 0.13 = 12.376 (28) Walls 88.28 23.81 64.47 x 0.18 = 11.6 (29) Total area of elements, m² 183.48 0 = 0 (32) ** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (Doors					3.89	х	1.2	=	4.668				(26)
Windows Type 3 2.97 x1/[1/(1.4) + 0.04] = 3.94 (27) Windows Type 4 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 5 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 6 1.57 x1/[1/(1.4) + 0.04] = 2.08 (27) Windows Type 7 1.53 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 8 1.49 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 9 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Walls 88.28 23.81 64.47 x 0.18 = 11.6 (29) Total area of elements, m² 183.48 x 0.18 = 11.6 (29) Total area of elements, m² 183.48 x 0 = 0 (32) ** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = [55.06] (33) Heat capacity Cm = S(A x k)	Windows Type	1				1.91	x1.	/[1/(1.4)+	0.04] =	2.53				(27)
Windows Type 4 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 5 1.91 x1/[1/(1.4) + 0.04] = 2.53 (27) Windows Type 6 1.57 x1/[1/(1.4) + 0.04] = 2.08 (27) Windows Type 7 1.53 x1/[1/(1.4) + 0.04] = 2.03 (27) Windows Type 8 1.49 x1/[1/(1.4) + 0.04] = 1.98 (27) Windows Type 9 1 x1/[1/(1.4) + 0.04] = 1.33 (27) Windows Type 10 1 x1/[1/(1.4) + 0.04] = 3.61 (27) Windows Type 11 2.72 x1/[1/(1.4) + 0.04] = 3.61 (27) Floor 95.2 x 0.13 = 12.376 (28) Walls 88.28 23.81 64.47 x 0.18 = 11.6 (29) Total area of elements, m² 183.48 (31) (27) ** for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 55.06 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 0 (34) Thermal	Windows Type	2				1.91	x1,	/[1/(1.4)+	0.04] =	2.53	=			(27)
Windows Type 5 1.91	Windows Type	3				2.97	x1.	/[1/(1.4)+	0.04] =	3.94				(27)
Windows Type 6 1.57 x1/[1/(1.4) + 0.04] = 2.08 (27)	Windows Type	e 4				1.91	x1.	/[1/(1.4)+	0.04] =	2.53				(27)
Windows Type 6 1.57 x1/[1/(1.4) + 0.04] = 2.08 (27)	Windows Type	e 5				1.91		/[1/(1.4)+	· 0.04] =	2.53	=			(27)
Windows Type 7 Windows Type 8 1.53 X1/[1/(1.4)+0.04] = 2.03 (27) Windows Type 8 1.49 X1/[1/(1.4)+0.04] = 1.98 (27) Windows Type 9 1 X1/[1/(1.4)+0.04] = 1.33 (27) Windows Type 10 1 X1/[1/(1.4)+0.04] = 1.33 (27) Windows Type 11 2.72 X1/[1/(1.4)+0.04] = 3.61 (27) Windows Type 10 (28) Walls 88.28 23.81 64.47 X 0.18 = 11.6 (29) Total area of elements, m² 183.48 (31) Party wall 24.88 X 0 = 0 (32) *for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 *** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 55.06 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 0 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)	• •						_				_			
Windows Type 8 1.49	• •										=			
Windows Type 9	• • • • • • • • • • • • • • • • • • • •						_				=			
Windows Type 10	• • • • • • • • • • • • • • • • • • • •						_				=			
Windows Type 11	• •										\exists			. ,
Floor $ 95.2 \times 0.13 = 12.376 $	•						_				<u>_</u>			. ,
Walls 88.28 23.81 $64.47 \times 0.18 = 11.6$ (29) Total area of elements, m² $183.48 \times 0 = 0$ (31) Party wall $24.88 \times 0 = 0$ (32) * for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 55.06 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 0 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)		; 11					=				亅 ,			
Total area of elements, m²						95.2	×	0.13	=	12.376			╡	
Party wall 24.88 \times 0 = 0 (32) * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 55.06 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 0 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)				23.8		64.47	<u>х</u>	0.18	=	11.6				(29)
* for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 55.06 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 0 (34) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m²K Indicative Value: Medium 250 (35)		lements	, m²			183.4	8							(31)
** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 55.06 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 0 (34) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m²K Indicative Value: Medium 250 (35)	•													(32)
Fabric heat loss, W/K = S (A x U) $(26)(30) + (32) =$ 55.06 (33) Heat capacity Cm = S(A x k) $((28)(30) + (32) + (32a)(32e) =$ 0 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35)							ated using	formula 1	1/[(1/U-valu	ıe)+0.04] a	as given in	paragraph	1 3.2	
Heat capacity Cm = S(A x k) $ ((28)(30) + (32) + (32a)(32e) = 0 $ (34) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m²K Indicative Value: Medium 250 (35)					s and pan	uuons		(26)(30) + (32) =				55.06	(33)
Thermal mass parameter (TMP = Cm \div TFA) in kJ/m ² K Indicative Value: Medium 250 (35)			•	-,				•		(30) + (32	2) + (32a).	(32e) =		
			,	P = Cm ÷	· TFA) ir	n kJ/m²K						· /		
		•	•		,			ecisely the				able 1f		()

can be used inste	ad of a de	tailed calcı	ulation										
Thermal bridge				using Ap	pendix l	K						12.99	(36)
if details of therma	,	•			•							1-100	` ′
Total fabric he	at loss							(33) +	(36) =			68.05	(37)
Ventilation hea	at loss ca	alculated	monthl	У				(38)m	= 0.33 × (25)m x (5)	-		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 53.7	53.39	53.08	51.62	51.35	50.08	50.08	49.84	50.57	51.35	51.9	52.48		(38)
Heat transfer of	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m= 121.75	121.43	121.12	119.67	119.39	118.12	118.12	117.89	118.61	119.39	119.94	120.52		_
Heat loss para	meter (F	HLP), W/	m²K						Average = = (39)m ÷		12 /12=	119.66	(39)
(40)m= 1.28	1.28	1.27	1.26	1.25	1.24	1.24	1.24	1.25	1.25	1.26	1.27		
No male an af day		-41- / T -1-1	l- 4-\						Average =	Sum(40) ₁	12 /12=	1.26	(40)
Number of day		<u> </u>		Mov	lun	1	Aug	Con	Oct	Nov	Doo		
(41)m= 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31		(41)
(41)1112 31	20	31	30	J1	- 50		J 31	30	J 31	30	J 1		(,
4 \\/\ctox b c ct	lina ana										14\A/b /24		
4. Water heat	ing ener	gy requi	rement:								kWh/ye	ear:	
Assumed occu if TFA > 13.9			[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.	9)	69		(42)
if TFA £ 13.9	•						(O.E. N.I)	00					
Annual averag Reduce the annua									se target o		3.1		(43)
not more that 125	litres per p	person per	day (all w	ater use, l	not and co	ld)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in	n litres per	day for ea	ach month	Vd,m = fa	ctor from 7	Table 1c x	(43)						
(44)m= 107.91	103.98	100.06	96.14	92.21	88.29	88.29	92.21	96.14	100.06	103.98	107.91		
Energy content of	hot water	used - cal	culated m	onthly = 4 .	190 x Vd,r	m x nm x D	OTm / 3600		Total = Su oth (see Ta		= c, 1d)	1177.17	(44)
(45)m= 160.02	139.96	144.42	125.91	120.82	104.25	96.61	110.86	112.18	130.74	142.71	154.97		
									Total = Su	m(45) ₁₁₂ =	=	1543.46	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)) to (61)					
(46)m= 24	20.99	21.66	18.89	18.12	15.64	14.49	16.63	16.83	19.61	21.41	23.25		(46)
Water storage Storage volum		includin	na anv so	olar or W	/WHRS	storane	within sa	ame ves	ല		150		(47)
If community h	` ,					_		arric ves	001		150		(47)
Otherwise if no	•			•			` '	ers) ente	er '0' in (47)			
Water storage	loss:		•					•	·	·			
a) If manufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(48)
Temperature fa	actor fro	m Table	2b							0.	54		(49)
Energy lost fro		-	-				(48) x (49)	=		0.	75		(50)
b) If manufactHot water stora			-								0		(E1)
If community h	-			C Z (KVVI	ii/iiti C /UZ	ау <i>)</i>					0		(51)
Volume factor	•		-								0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)

Energy lost from water		(47) x (51)) x (52) x (53) =		0		(54)				
Enter (50) or (54) in (5	55)								0.	75		(55)
Water storage loss cald	culated fo	or each	month			((56)m = ($(55) \times (41)$ r	m				
(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)
If cylinder contains dedicated	d solar stora	age, (57)r	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(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)
Primary circuit loss (an	nual) fror	m Table	3							0		(58)
Primary circuit loss cale	culated fo	or each	month (59)m = ((58) ÷ 36	55 × (41)	m					
(modified by factor fr	om Table	e H5 if t	here is s	olar wat	er heatir	ng and a	cylinde	r thermo	stat)		1	
(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 calculated	for each	month (61)m = ((60) ÷ 36	65 × (41))m						
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required for	water he	ating ca	alculated	for eacl	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 206.62 182.04	191.02	171	167.41	149.35	143.2	157.45	157.27	177.33	187.8	201.57		(62)
Solar DHW input calculated	using Appe	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additional lines if	FGHRS a	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water heat	ter						•				•	
(64)m= 206.62 182.04	191.02	171	167.41	149.35	143.2	157.45	157.27	177.33	187.8	201.57		
						Outp	out from wa	ater heate	r (annual)₁	12	2092.08	(64)
Heat gains from water	heating I	k\N/h/ma	onth 0 25	5 ′ [0 85	v (45)m	. (61)~	1.00.	. [/ 40\	. /E7\m	. (50)	1	
	noamig, i	IX A A I IV I I I I	JIIIII U.Z.	, [0.05	x (40)111	+ (61)11	ıj + U.O X	((46) m	+ (57)111	+ (59)111	j	
(65)m= 90.48 80.2	85.3	77.94	77.45	70.74	69.4	74.14	73.37	80.75	83.52	+ (59)m] 	(65)
	85.3	77.94	77.45	70.74	69.4	74.14	73.37	80.75	83.52	88.8		(65)
(65)m= 90.48 80.2	85.3 culation of	77.94 f (65)m	77.45 only if c	70.74	69.4	74.14	73.37	80.75	83.52	88.8		(65)
include (57)m in calc 5. Internal gains (see	85.3 culation of	77.94 f (65)m and 5a)	77.45 only if c	70.74	69.4	74.14	73.37	80.75	83.52	88.8		(65)
(65)m= 90.48 80.2 include (57)m in calc	85.3 culation of	77.94 If (65)m and 5a)	77.45 only if c	70.74	69.4	74.14 dwelling	73.37	80.75	83.52	88.8		(65)
(65)m= 90.48 80.2 include (57)m in calcomagnetic field of the second of	85.3 culation of Table 5 5), Watts Mar	77.94 f (65)m and 5a)	77.45 only if c	70.74 ylinder is	69.4	74.14	73.37 or hot w	80.75 ater is fr	83.52 om com	88.8 munity h		(65)
include (57)m in calcomagnetic forms in calco	85.3 culation of Table 5 5), Watts Mar 134.52	77.94 f (65)m and 5a) s Apr 134.52	77.45 only if c	70.74 ylinder is Jun 134.52	69.4 s in the c	74.14 dwelling Aug 134.52	73.37 or hot w Sep 134.52	80.75 ater is fr	83.52 om com	88.8 munity h		
include (57)m in calconomic (55)m= 90.48 80.2 include (57)m in calconomic (55)m in cal	85.3 culation of Table 5 5), Watts Mar 134.52	77.94 If (65)m and 5a) S Apr 134.52 pendix I	77.45 only if c	70.74 ylinder is Jun 134.52	69.4 s in the c	74.14 dwelling Aug 134.52	73.37 or hot w Sep 134.52	80.75 ater is fr	83.52 om com	88.8 munity h		
(65)m= 90.48 80.2 include (57)m in calc 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculated (67)m= 22.14 19.66	85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99	77.94 f (65)m and 5a) s Apr 134.52 pendix I 12.11	77.45 only if controls: May 134.52, equati 9.05	70.74 ylinder is Jun 134.52 on L9 or 7.64	Jul 134.52 r L9a), a	Aug 134.52 Iso see 10.73	73.37 or hot w Sep 134.52 Table 5	80.75 ater is fr Oct 134.52	83.52 om com Nov 134.52	88.8 munity h		(66)
include (57)m in calcomagnetic include (57)m in calcomagnetic	85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in	77.94 f (65)m and 5a) s Apr 134.52 pendix I 12.11 Append	77.45 only if control of the control	Jun 134.52 on L9 or 7.64	69.4 s in the o Jul 134.52 r L9a), a 8.26	74.14 dwelling Aug 134.52 lso see 10.73 3a), also	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal	80.75 ater is fr Oct 134.52	83.52 om com Nov 134.52	88.8 munity h		(66)
include (57)m in calcomagnetic forms of the first section (65)m= 90.48 80.2 include (57)m in calcomagnetic forms (5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculat (67)m= 22.14 19.66 Appliances gains (calcomagnetic forms (68)m= 248.33 250.9	85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41	77.94 If (65)m and 5a) S Apr 134.52 pendix I 12.11 Append 230.59	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73	Jul 134.52 r L9a), a 8.26 13 or L1: 185.78	74.14 dwelling Aug 134.52 lso see 10.73 3a), also	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69	80.75 ater is fr Oct 134.52 18.29 ble 5 203.52	83.52 om com Nov 134.52	88.8 munity h		(66) (67)
include (57)m in calculations (68)m= 90.48 80.2 include (57)m in calculations (5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 134.52 134.52 Lighting gains (calculations (67)m= 22.14 19.66 Appliances gains (calculations (68)m= 248.33 250.9 Cooking gains (calculations)	85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41 ted in App	77.94 of (65)m and 5a) s Apr 134.52 pendix I 12.11 Append 230.59 pendix	77.45 only if control is the second of the s	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73 ion L15	Jul 134.52 r L9a), a 8.26 13 or L1 185.78 or L15a)	74.14 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table	80.75 ater is fr Oct 134.52 18.29 ole 5 203.52 5	83.52 om com Nov 134.52 21.34	Dec 134.52 22.75		(66) (67) (68)
include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (58)m include (57)m in calcomagnetic include (56)m include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (58)m in calcomagnetic include (58)m in calcomagnetic include (58)m in calcomagnetic include (58)m in calcomagnetic include (57)m in calcom	85.3 culation or Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41 ted in Ap 36.45	77.94 of (65)m and 5a) s Apr 134.52 pendix I 12.11 Append 230.59 pendix 36.45	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73	Jul 134.52 r L9a), a 8.26 13 or L1: 185.78	74.14 dwelling Aug 134.52 lso see 10.73 3a), also	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69	80.75 ater is fr Oct 134.52 18.29 ble 5 203.52	83.52 om com Nov 134.52	88.8 munity h		(66) (67)
include (57)m in calcomagnetic forms and fans gains (calculate) [65]m= 90.48 80.2 include (57)m in calcomagnetic forms (50.2 forms) [5] Internal gains (see forms) [66]m= Jan Feb J	85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41 ted in Ap 36.45 (Table 56	77.94 If (65)m and 5a) S Apr 134.52 pendix I 12.11 Append 230.59 pendix 36.45 a)	77.45 only if control is the second of the s	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73 ion L15 36.45	Jul 134.52 r L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45	Aug 134.52 Iso see 10.73 3a), also 183.2 , also se 36.45	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table 36.45	80.75 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45	83.52 om com Nov 134.52 21.34 220.97	88.8 munity h Dec 134.52 22.75 237.37		(66) (67) (68) (69)
include (57)m in calculated (58)m= 90.48 80.2 include (57)m in calculated (57)m in calculated (58)m= 134.52 134.52 Lighting gains (calculated (67)m= 22.14 19.66 Appliances gains (calculated (68)m= 248.33 250.9 Cooking gains (calculated (69)m= 36.45 36.45 Pumps and fans gains (70)m= 3 3 3	85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41 ted in Ap 36.45 (Table 5a	77.94 of (65)m and 5a) s Apr 134.52 pendix I 12.11 Append 230.59 pendix 36.45 a) 3	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73 ion L15 36.45	Jul 134.52 r L9a), a 8.26 13 or L1 185.78 or L15a)	74.14 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table	80.75 ater is fr Oct 134.52 18.29 ole 5 203.52 5	83.52 om com Nov 134.52 21.34	Dec 134.52 22.75		(66) (67) (68)
include (57)m in calcomagnetic field in the field include (57)m in calcomagnetic field include (57)m in calcomagnetic field include (57)m in calcomagnetic field include (57)m in calcomagnetic field include (57)m in calcomagnetic field include (56)m include (57)m include (57)m include (57)m include (58)m include (58)m include (58)m include (58)m include (59)m include (57)m include (58)m inclu	85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41 ted in Ap 36.45 (Table 56) 3 n (negati	77.94 If (65)m and 5a) S Apr 134.52 pendix I 12.11 Append 230.59 pendix 36.45 a) 3	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73 ion L15 36.45 3	69.4 s in the c Jul 134.52 r L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45	74.14 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se 36.45	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table 36.45	80.75 ater is fr Oct 134.52 18.29 ole 5 203.52 5 36.45	83.52 om com Nov 134.52 21.34 220.97	88.8 munity h Dec 134.52 22.75 237.37 36.45		(66) (67) (68) (69) (70)
include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (58)m include (58)m include (57)m include (58)m include (58)m include (58)m include (58)m include (59)m include (57)m 85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41 ted in Ap 36.45 (Table 5a 3 n (negatir-107.62	77.94 If (65)m and 5a) S Apr 134.52 pendix I 12.11 Append 230.59 pendix 36.45 a) 3	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73 ion L15 36.45	69.4 s in the c Jul 134.52 r L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45	Aug 134.52 Iso see 10.73 3a), also 183.2 , also se 36.45	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table 36.45	80.75 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45	83.52 om com Nov 134.52 21.34 220.97	88.8 munity h Dec 134.52 22.75 237.37 36.45		(66) (67) (68) (69)	
include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m in calcomagnetic include (57)m include (58)m include (58)m include (58)m include (58)m include (59)m include (57)m 85.3 culation or Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41 ted in Ap 36.45 (Table 5a) (Table 5a) n (negation-107.62 cable 5)	77.94 If (65)m and 5a) S Apr 134.52 pendix I 12.11 Append 230.59 pendix 36.45 a) 3 ive value -107.62	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73 ion L15 36.45 3 le 5) -107.62	69.4 s in the of Jul 134.52 r L9a), a 8.26 13 or L15a) 36.45	74.14 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 , also se 36.45	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tall 189.69 ee Table 36.45 3	80.75 ater is fr Oct 134.52 18.29 ole 5 203.52 5 36.45	83.52 om com Nov 134.52 21.34 220.97 36.45	88.8 munity h Dec 134.52 22.75 237.37 36.45 3		(66) (67) (68) (69) (70)	
include (57)m in calcomagnetic (55)m= 90.48 80.2 include (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (58)m= 134.52 1	85.3 culation of Table 5 5), Watts Mar 134.52 ted in Apr 15.99 ulated in 244.41 ted in Apr 36.45 (Table 5a 3 n (negatir -107.62 fable 5) 114.65	77.94 If (65)m and 5a) S Apr 134.52 pendix I 12.11 Append 230.59 pendix 36.45 a) 3	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 of 7.64 uation L 196.73 ion L15 36.45 3 le 5) -107.62	69.4 s in the c Jul 134.52 r L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45 3 -107.62	74.14 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 1, also se 36.45 3 -107.62	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table 36.45 3 -107.62	80.75 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45 3 -107.62	83.52 om com Nov 134.52 21.34 220.97 36.45 3 -107.62	88.8 munity h Dec 134.52 22.75 237.37 36.45 3 -107.62		(66) (67) (68) (69) (70)
include (57)m in calcomagnetic (55)m= 90.48 80.2 include (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (57)m in calcomagnetic (58)m= 134.52	85.3 culation of Table 5 5), Watts Mar 134.52 ted in App 15.99 ulated in 244.41 ted in Ap 36.45 (Table 5a 3 n (negatir -107.62 fable 5) 114.65	77.94 If (65)m and 5a) S Apr 134.52 pendix I 12.11 Appendix 230.59 pendix 36.45 a) 3 Ive value -107.62	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 or 7.64 uation L 196.73 ion L15 36.45 3 le 5) -107.62 98.25 (66)	69.4 s in the control of the control	74.14 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 a, also se 36.45 3 -107.62 99.65 a + (68)m +	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tall 189.69 ee Table 36.45 3 -107.62 101.91 + (69)m + (80.75 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45 3 -107.62 108.53 70)m + (7	83.52 om com Nov 134.52 21.34 220.97 36.45 3 -107.62 116.01 1)m + (72)	88.8 munity h Dec 134.52 22.75 237.37 36.45 3 -107.62 119.36		(66) (67) (68) (69) (70) (71)
include (57)m in calcomagnetic forms and fans gains (68)m= 248.33 250.9 Cooking gains (calculat (69)m= 36.45 36.45 Pumps and fans gains (70)m= 3 3 Losses e.g. evaporatio (71)m= -107.62 -107.62 Water heating gains (Table Jan Feb Jan Fe	85.3 culation of Table 5 5), Watts Mar 134.52 ted in Apr 15.99 ulated in 244.41 ted in Apr 36.45 (Table 5a 3 n (negatir -107.62 fable 5) 114.65	77.94 If (65)m and 5a) S Apr 134.52 pendix I 12.11 Append 230.59 pendix 36.45 a) 3 ive value -107.62	77.45 only if control of the control	70.74 ylinder is Jun 134.52 on L9 of 7.64 uation L 196.73 ion L15 36.45 3 le 5) -107.62	69.4 s in the c Jul 134.52 r L9a), a 8.26 13 or L1: 185.78 or L15a) 36.45 3 -107.62	74.14 dwelling Aug 134.52 lso see 10.73 3a), also 183.2 1, also se 36.45 3 -107.62	73.37 or hot w Sep 134.52 Table 5 14.4 o see Tal 189.69 ee Table 36.45 3 -107.62	80.75 ater is fr Oct 134.52 18.29 ble 5 203.52 5 36.45 3 -107.62	83.52 om com Nov 134.52 21.34 220.97 36.45 3 -107.62	88.8 munity h Dec 134.52 22.75 237.37 36.45 3 -107.62		(66) (67) (68) (69) (70)

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

Orientati	on:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.91	x	10.63	x	0.63	x	0.7] =	6.21	(74)
North	0.9x	0.77	x	1.57	x	10.63	x	0.63	х	0.7	=	5.1	(74)
North	0.9x	0.77	х	1.53	x	10.63	х	0.63	х	0.7] =	4.97	(74)
North	0.9x	0.77	x	1.49	x	10.63	x	0.63	x	0.7	=	4.84	(74)
North	0.9x	0.77	х	1	x	10.63	х	0.63	x	0.7] =	3.25	(74)
North	0.9x	0.77	х	1.91	x	20.32	х	0.63	х	0.7] =	11.86	(74)
North	0.9x	0.77	х	1.57	x	20.32	x	0.63	х	0.7	=	9.75	(74)
North	0.9x	0.77	x	1.53	x	20.32	X	0.63	x	0.7	=	9.5	(74)
North	0.9x	0.77	x	1.49	x	20.32	x	0.63	х	0.7	=	9.25	(74)
North	0.9x	0.77	x	1	x	20.32	x	0.63	x	0.7	=	6.21	(74)
North	0.9x	0.77	x	1.91	x	34.53	x	0.63	x	0.7	=	20.16	(74)
North	0.9x	0.77	x	1.57	x	34.53	x	0.63	x	0.7	=	16.57	(74)
North	0.9x	0.77	x	1.53	x	34.53	X	0.63	x	0.7	=	16.15	(74)
North	0.9x	0.77	x	1.49	x	34.53	x	0.63	x	0.7	=	15.72	(74)
North	0.9x	0.77	x	1	x	34.53	x	0.63	х	0.7	=	10.55	(74)
North	0.9x	0.77	x	1.91	x	55.46	X	0.63	x	0.7	=	32.38	(74)
North	0.9x	0.77	x	1.57	x	55.46	X	0.63	x	0.7	=	26.61	(74)
North	0.9x	0.77	х	1.53	x	55.46	x	0.63	х	0.7	=	25.93	(74)
North	0.9x	0.77	x	1.49	x	55.46	X	0.63	х	0.7	=	25.26	(74)
North	0.9x	0.77	x	1	x	55.46	X	0.63	х	0.7	=	16.95	(74)
North	0.9x	0.77	x	1.91	x	74.72	x	0.63	х	0.7	=	43.61	(74)
North	0.9x	0.77	X	1.57	x	74.72	X	0.63	x	0.7	=	35.85	(74)
North	0.9x	0.77	x	1.53	x	74.72	x	0.63	x	0.7	=	34.94	(74)
North	0.9x	0.77	x	1.49	x	74.72	x	0.63	x	0.7	=	34.02	(74)
North	0.9x	0.77	x	1	x	74.72	x	0.63	x	0.7	=	22.83	(74)
North	0.9x	0.77	X	1.91	x	79.99	x	0.63	X	0.7	=	46.69	(74)
North	0.9x	0.77	x	1.57	x	79.99	x	0.63	x	0.7	=	38.38	(74)
North	0.9x	0.77	X	1.53	x	79.99	X	0.63	X	0.7	=	37.4	(74)
North	0.9x	0.77	X	1.49	x	79.99	X	0.63	x	0.7	=	36.42	(74)
North	0.9x	0.77	X	1	x	79.99	X	0.63	X	0.7	=	24.44	(74)
North	0.9x	0.77	X	1.91	x	74.68	X	0.63	x	0.7	=	43.59	(74)
North	0.9x	0.77	X	1.57	x	74.68	X	0.63	x	0.7	=	35.83	(74)
North	0.9x	0.77	x	1.53	x	74.68	x	0.63	x	0.7	=	34.92	(74)
North	0.9x	0.77	x	1.49	x	74.68	x	0.63	x	0.7	=	34	(74)
North	0.9x	0.77	x	1	x	74.68	x	0.63	x	0.7	=	22.82	(74)
North	0.9x	0.77	x	1.91	x	59.25	x	0.63	x	0.7] =	34.58	(74)
North	0.9x	0.77	x	1.57	x	59.25	x	0.63	x	0.7	=	28.43	(74)
North	0.9x	0.77	x	1.53	x	59.25	x	0.63	x	0.7	=	27.7	(74)
North	0.9x	0.77	x	1.49	x	59.25	x	0.63	x	0.7	=	26.98	(74)

North 0.9x 0.77 x 1 x 59.25 x 0.63 x 0.7 = North 0.9x 0.77 x 1.91 x 41.52 x 0.63 x 0.7 =	18.11 (74)
North novi need by land ly latent ly land no ly land ly land	
41.02	24.23 (74)
North 0.9x 0.77 x 1.57 x 41.52 x 0.63 x 0.7 =	19.92 (74)
North 0.9x 0.77 x 1.53 x 41.52 x 0.63 x 0.7 =	19.41 (74)
North 0.9x 0.77 x 1.49 x 41.52 x 0.63 x 0.7 =	18.91 (74)
North 0.9x 0.77 x 1 x 41.52 x 0.63 x 0.7 =	12.69 (74)
North 0.9x 0.77 x 1.91 x 24.19 x 0.63 x 0.7 =	14.12 (74)
North 0.9x 0.77 x 1.57 x 24.19 x 0.63 x 0.77 =	11.61 (74)
North 0.9x 0.77 x 1.53 x 24.19 x 0.63 x 0.77 =	11.31 (74)
North 0.9x 0.77 x 1.49 x 24.19 x 0.63 x 0.7 =	11.01 (74)
North 0.9x 0.77 x 1 x 24.19 x 0.63 x 0.77 =	7.39 (74)
North 0.9x 0.77 x 1.91 x 13.12 x 0.63 x 0.7 =	7.66 (74)
North 0.9x 0.77 x 1.57 x 13.12 x 0.63 x 0.7 =	6.29 (74)
North 0.9x 0.77 x 1.53 x 13.12 x 0.63 x 0.7 =	6.13 (74)
North 0.9x 0.77 x 1.49 x 13.12 x 0.63 x 0.7 =	5.97 (74)
North 0.9x 0.77 x 1 x 13.12 x 0.63 x 0.7 =	4.01 (74)
North 0.9x 0.77 x 1.91 x 8.86 x 0.63 x 0.77 =	5.17 (74)
North 0.9x 0.77 x 1.57 x 8.86 x 0.63 x 0.7 =	4.25 (74)
North 0.9x 0.77 x 1.53 x 8.86 x 0.63 x 0.7 =	4.14 (74)
North 0.9x 0.77 x 1.49 x 8.86 x 0.63 x 0.7 =	4.04 (74)
North 0.9x 0.77 x 1 x 8.86 x 0.63 x 0.77 =	2.71 (74)
East 0.9x 0.77 x 1.91 x 19.64 x 0.63 x 0.7 =	11.46 (76)
East 0.9x 0.77 x 2.97 x 19.64 x 0.63 x 0.7 =	17.83 (76)
East 0.9x 0.77 x 1.91 x 19.64 x 0.63 x 0.7 =	11.46 (76)
East 0.9x 0.77 x 1.91 x 38.42 x 0.63 x 0.7 =	22.43 (76)
East 0.9x 0.77 x 2.97 x 38.42 x 0.63 x 0.7 =	34.87 (76)
East 0.9x 0.77 x 1.91 x 38.42 x 0.63 x 0.7 =	22.43 (76)
East 0.9x 0.77 x 1.91 x 63.27 x 0.63 x 0.7 =	36.93 (76)
East 0.9x 0.77 x 2.97 x 63.27 x 0.63 x 0.7 =	57.43 (76)
East 0.9x 0.77 x 1.91 x 63.27 x 0.63 x 0.7 =	36.93 (76)
East 0.9x 0.77 x 1.91 x 92.28 x 0.63 x 0.7 =	53.87 (76)
East 0.9x 0.77 x 2.97 x 92.28 x 0.63 x 0.7 =	83.76 (76)
East 0.9x 0.77 x 1.91 x 92.28 x 0.63 x 0.7 =	53.87 (76)
East 0.9x 0.77 x 1.91 x 113.09 x 0.63 x 0.7 =	66.01 (76)
East 0.9x 0.77 x 2.97 x 113.09 x 0.63 x 0.7 =	102.65 (76)
East 0.9x 0.77 x 1.91 x 113.09 x 0.63 x 0.77 =	66.01 (76)
East 0.9x 0.77 x 1.91 x 115.77 x 0.63 x 0.7 =	67.58 (76)
East 0.9x 0.77 x 2.97 x 115.77 x 0.63 x 0.7 =	105.08 (76)
East 0.9x 0.77 x 1.91 x 115.77 x 0.63 x 0.7 =	67.58 (76)
East 0.9x 0.77 x 1.91 x 110.22 x 0.63 x 0.77 =	64.34 (76)
East 0.9x 0.77 x 2.97 x 110.22 x 0.63 x 0.7 =	100.04 (76)

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East	0.9x	0.77	X	1.91	X	110.22	X	0.63	X	0.7	=	64.34	(76)
East	0.9x	0.77	X	1.91	X	94.68	X	0.63	X	0.7	=	55.26	(76)
East	0.9x	0.77	X	2.97	X	94.68	X	0.63	X	0.7	=	85.93	(76)
East	0.9x	0.77	X	1.91	X	94.68	X	0.63	x	0.7	=	55.26	(76)
East	0.9x	0.77	X	1.91	X	73.59	X	0.63	X	0.7	=	42.96	(76)
East	0.9x	0.77	X	2.97	X	73.59	X	0.63	X	0.7	=	66.79	(76)
East	0.9x	0.77	X	1.91	x	73.59	X	0.63	X	0.7	=	42.96	(76)
East	0.9x	0.77	x	1.91	x	45.59	x	0.63	x	0.7	=	26.61	(76)
East	0.9x	0.77	x	2.97	x	45.59	x	0.63	x	0.7	=	41.38	(76)
East	0.9x	0.77	x	1.91	x	45.59	x	0.63	x	0.7	=	26.61	(76)
East	0.9x	0.77	x	1.91	x	24.49	X	0.63	x	0.7	=	14.29	(76)
East	0.9x	0.77	x	2.97	x	24.49	x	0.63	x	0.7	=	22.23	(76)
East	0.9x	0.77	x	1.91	x	24.49	X	0.63	x	0.7	=	14.29	(76)
East	0.9x	0.77	x	1.91	x	16.15	X	0.63	x	0.7	=	9.43	(76)
East	0.9x	0.77	x	2.97	x	16.15	x	0.63	x	0.7	=	14.66	(76)
East	0.9x	0.77	x	1.91	x	16.15	X	0.63	x	0.7	=	9.43	(76)
South	0.9x	0.77	x	1.91	x	46.75	x	0.63	x	0.7	=	27.29	(78)
South	0.9x	0.77	X	1	X	46.75	X	0.63	x	0.7	=	14.29	(78)
South	0.9x	0.77	x	2.72	x	46.75	x	0.63	x	0.7	=	38.86	(78)
South	0.9x	0.77	x	1.91	x	76.57	X	0.63	x	0.7	=	44.69	(78)
South	0.9x	0.77	X	1	X	76.57	X	0.63	X	0.7	=	23.4	(78)
South	0.9x	0.77	x	2.72	x	76.57	x	0.63	x	0.7	=	63.65	(78)
South	0.9x	0.77	x	1.91	x	97.53	X	0.63	x	0.7	=	56.93	(78)
South	0.9x	0.77	X	1	x	97.53	X	0.63	x	0.7	=	29.81	(78)
South	0.9x	0.77	x	2.72	x	97.53	x	0.63	x	0.7	=	81.08	(78)
South	0.9x	0.77	x	1.91	x	110.23	X	0.63	x	0.7	=	64.35	(78)
South	0.9x	0.77	X	1	x	110.23	X	0.63	X	0.7	=	33.69	(78)
South	0.9x	0.77	x	2.72	x	110.23	x	0.63	x	0.7	=	91.63	(78)
South	0.9x	0.77	X	1.91	x	114.87	X	0.63	X	0.7	=	67.05	(78)
South	0.9x	0.77	X	1	x	114.87	X	0.63	x	0.7	=	35.11	(78)
South	0.9x	0.77	x	2.72	x	114.87	X	0.63	x	0.7	=	95.49	(78)
South	0.9x	0.77	X	1.91	x	110.55	X	0.63	x	0.7	=	64.53	(78)
South	0.9x	0.77	X	1	x	110.55	X	0.63	x	0.7	=	33.78	(78)
South	0.9x	0.77	x	2.72	x	110.55	X	0.63	x	0.7	=	91.89	(78)
South	0.9x	0.77	x	1.91	x	108.01	x	0.63	x	0.7	=	63.05	(78)
South	0.9x	0.77	x	1	x	108.01	x	0.63	x	0.7	=	33.01	(78)
South	0.9x	0.77	x	2.72	x	108.01	x	0.63	x	0.7	=	89.79	(78)
South	0.9x	0.77	x	1.91	x	104.89	x	0.63	x	0.7	=	61.23	(78)
South	0.9x	0.77	x	1	x	104.89	x	0.63	x	0.7	=	32.06	(78)
South	0.9x	0.77	x	2.72	x	104.89	x	0.63	x	0.7	=	87.2	(78)
South	0.9x	0.77	X	1.91	x	101.89	x	0.63	X	0.7] =	59.47	(78)

South	0.9x	0.77	х	1		X	1	01.89	X		0.63	x	0.7	=	31.14	(78)
South	0.9x	0.77	X	2.7	72	X	1	01.89	x		0.63	x	0.7	=	84.69	(78)
South	0.9x	0.77	X	1.9	91	X	8	2.59	X		0.63	х	0.7	=	48.21	(78)
South	0.9x	0.77	X	1		X	8	2.59	X		0.63	х	0.7	=	25.24	(78)
South	0.9x	0.77	X	2.7	72	X	8	2.59	x		0.63	x	0.7	=	68.65	(78)
South	0.9x	0.77	X	1.9	91	x	5	5.42	x		0.63	x	0.7	=	32.35	(78)
South	0.9x	0.77	X	1		x	5	5.42	x		0.63	x	0.7		16.94	(78)
South	0.9x	0.77	x	2.7	72	X	5	5.42	x		0.63	x	0.7	=	46.07	(78)
South	0.9x	0.77	X	1.9	91	x		40.4	x		0.63	x	0.7	=	23.58	(78)
South	0.9x	0.77	X	1		X		10.4	x		0.63	x	0.7	=	12.35	(78)
South	0.9x	0.77	X	2.7	72	X		40.4	x		0.63	x	0.7	=	33.58	(78)
	_															
Solar g	ains in	watts, ca	alculated	d for eac	h month	1			(83)m	ı = Su	m(74)m .	(82)m			-	
(83)m=	145.57	258.05	378.26	508.29	603.58		13.78	585.73	512.	.74	423.17	292.14	176.24	123.34		(83)
Total g	ains – i	nternal a	ind sola	r (84)m =	= (73)m	, `		, watts						•	1	
(84)m=	604.01	714.32	819.67	925.59	996.22	9	82.76	939.39	872.	.68	795.53	688.84	600.91	569.18		(84)
7. Me	an inter	nal temp	erature	(heating	seasor	า)										
Temp	erature	during h	eating p	periods i	n the livi	ing	area	from Tab	ole 9,	, Th1	(°C)				21	(85)
Utilisa	ation fac	tor for g	ains for	living are	ea, h1,n	า (ร	ee Ta	ble 9a)								
	Jan	Feb	Mar	Apr	May	L	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.98	0.95	0.87		0.7	0.54	0.6	6	0.84	0.97	0.99	1		(86)
Mean	interna	l temper	ature in	living ar	ea T1 (f	ollo	w ste	ps 3 to 7	in T	able	9c)					
(87)m=	19.62	19.8	20.08	20.45	20.76	2	20.94	20.99	20.9	98	20.85	20.45	19.97	19.59		(87)
Temp	erature	during h	eating p	periods i	n rest of	dw	elling	from Ta	able 9	9, Th	2 (°C)					
(88)m=	19.86	19.86	19.86	19.87	19.88	1	9.89	19.89	19.8	89	19.88	19.88	19.87	19.87		(88)
Utilisa	ation fac	tor for a	ains for	rest of d	welling.	h2.	m (se	e Table	9a)				•	•	•	
(89)m=	1	0.99	0.98	0.93	0.82	$\overline{}$	0.61	0.41	0.4	16	0.76	0.96	0.99	1]	(89)
Mean	interna	l tampar	atura in	the rest	of dwell	lina	T2 (f	ollow sta	ne 3	to 7	in Tabl	a 9c)		!	J	
(90)m=	18.03	18.29	18.71	19.24	19.65	Ť	9.85	19.88	19.8		19.77	19.24	18.55	18]	(90)
` '		<u> </u>		ļ	<u> </u>	1			<u> </u>		f		_ ing area ÷ (<u>1</u> 4) =	0.36	(91)
N4			-t /f.		منام مام	. 11:	ـــ\ دا	Λ Τ4	. /4	£I /	1) . To					
(92)m=	18.61	18.84	19.21	or the wh	20.05	_	g) = 11 20.24	20.28	20.2	$\overline{}$	20.16	19.68	19.06	18.58	1	(92)
				n interna					L				10.00	10.00		(02)
(93)m=	18.61	18.84	19.21	19.68	20.05	_	20.24	20.28	20.2	_	20.16	19.68	19.06	18.58	1	(93)
		iting requ		t					<u> </u>							
		·			re obtai	ned	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-cal	culate	
				using Ta		_							· ,		,	
	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
		tor for g		1		_							-		1	4
(94)m=	1	0.99	0.97	0.93	0.82		0.64	0.46	0.5	51	0.78	0.95	0.99	1		(94)
		706.66	W = (9 798.46	4)m x (8 860.46	4)m 821.49	T 6	20 25	428.91	446.	<u>,, I</u>	624 40	656.45	594.89	567.04	1	(95)
(95)m= Month	601.05						28.25	420.91	446.	.00	621.18	000.45	394.89	307.04	J	(93)
(96)m=	11y aver	age exte	6.5	nperature 8.9	11.7	$\overline{}$	e 8 14.6	16.6	16.	<u>4</u> T	14.1	10.6	7.1	4.2	1	(96)
(50)111–	7.5	I 4.5	0.0	1 0.3	I ''''		. 4.0	10.0	L 10.	-	1-7.1	10.0	1 '.'	T.2	J	(55)

					F(00)	F(00)	(0.0)	,				
Heat loss rate for mea (97)m= 1742.26 1692.96	n intern 1539.27	ai tempe	996.97	Lm , VV =	=[(39)m : 435.11	x [(93)m _{457.33}	- (96)m 718.91	1083.9	1/3/18/	1732.87		(97)
Space heating require										1732.07		(01)
(98)m= 849.06 662.79	551.17	309.18	130.56	0	0	0	0	318.02	604.76	867.38		
						Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	4292.92	(98)
Space heating require	ment in	kWh/m²	/year								45.09	(99)
9a. Energy requiremen	ts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space heating:										,		_
Fraction of space hear	t from se	econdary	//supple	mentary	system						0	(201)
Fraction of space hear	t from m	ain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fraction of total heating	ig from i	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficiency of main spa	ce heati	ng syste	m 1								93.5	(206)
Efficiency of secondar	y/supple	ementar	y heating	g system	າ, %						0	(208)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space heating require	ment (c		d above))			I				· I	
849.06 662.79	551.17	309.18	130.56	0	0	0	0	318.02	604.76	867.38		
(211) m = { $[(98)$ m x (204)		·			·						ı	(211)
908.09 708.87	589.48	330.67	139.63	0	0	0 Tota	0 I (kWh/yea	340.13	646.8	927.68		٦٠٠٠
		\ 1\A/I /				Tota	ii (Kwii/yea	ar) =Surri(2	2 I I) _{15,1012}		4591.36	(211)
Space heating fuel (see $= \{[(98)m \times (201)]\} \times 10^{-1}$, , .	month									
(215)m =	0	0	0	0	0	0	0	0	0	0		
				<u> </u>	<u> </u>	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water heating												_
Output from water heat											ı	
206.62 182.04	191.02	171	167.41	149.35	143.2	157.45	157.27	177.33	187.8	201.57		7,040
Efficiency of water heat		00.00	04.40	70.0	70.0	70.0	70.0	00.05	07.74	00.07	79.8	(216) (217)
(217)m= 88.19 87.96	87.48	86.38	84.16	79.8	79.8	79.8	79.8	86.35	87.71	88.27		(217)
Fuel for water heating, $(219)m = (64)m \times 100$												
(219)m= 234.3 206.96	218.35	197.98	198.92	187.15	179.45	197.31	197.09	205.35	214.11	228.36		_
						Tota	I = Sum(2	19a) ₁₁₂ =			2465.34	(219)
Annual totals	مانممانم	a a.t. a.ma	4					k\	Wh/year	, 	kWh/year	٦
Space heating fuel use		system	I								4591.36	_
Water heating fuel used											2465.34	_
Electricity for pumps, fa	ins and	electric l	keep-ho	t								
central heating pump:										30		(230c)
boiler with a fan-assist	ted flue									45		(230e)
Total electricity for the	above, k	Wh/yea	r			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting											390.97	(232)
12a. CO2 emissions –	· Individ	ual heati	ng syste	ems inclu	uding mi	cro-CHP	•					

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	991.73 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216	532.51 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1524.25 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	202.91 (268)
Total CO2, kg/year	sum	of (265)(271) =	1766.09 (272)
TER =			27.36 (273)

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:37:37

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 75.1m² Site Reference: Plot Reference: Maitland Park Estate AC 106

AC 106, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 22.16 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 5.04 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 37.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 32.6 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.12 (max. 0.70) External wall 0.12 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK** Floor (no floor)

Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

Regulations Compliance Report

Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.53	
Maximum	1.5	ОК
MVHR efficiency:	90%	
Minimum	70%	ОК
Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
sed on:		
Overshading:	Average or unknown	
Windows facing: West	1.67m²	
Windows facing: East	1.66m²	
Windows facing: East	6.18m²	
Windows facing: West	2.24m²	
Windows facing: West	1.5m²	
Windows facing: East	4.1m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
) Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m ² K	
Party Walls U-value	0 W/m²K	
Community heating, heat from electric heat pump		
Photovoltaic array		

			User E	Notaile:						
			USELL					0.70.0	2222	
Assessor Name:	John Simps			Strom					006273	
Software Name:	Stroma FS		_	Softwa				Versic	n: 1.0.4.26	
			Property							
Address :		oen Court, Mait	land Par	k Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
			Are	a(m²)		Av. He	eight(m)	_	Volume(m ³	<u>-</u>
Ground floor				75.1	(1a) x	:	2.6	(2a) =	195.26	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	In)	75.1	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	195.26	(5)
2. Ventilation rate:										
	main heating	seconda heating		other		total			m³ per hou	ır
Number of chimneys	0	+ 0	+	0	7 = [0	х	40 =	0	(6a)
Number of open flues	0	+ 0	= +	0	-	0	×	20 =	0	(6b)
Number of intermittent fa	ans					0	x	10 =	0	(7a)
Number of passive vents	3				Ē	0	x	10 =	0	(7b)
Number of flueless gas f	ires				F	0	x	40 =	0	(7c)
					<u> </u>					
					_			Air ch	nanges per ho	our —
Infiltration due to chimne					L	0		÷ (5) =	0	(8)
If a pressurisation test has b			ed to (17),	otherwise (continue fr	om (9) to	(16)			– ,
Number of storeys in t	he dwelling (ns	5)							0	(9)
Additional infiltration							[(9))-1]x0.1 =	0	(10)
Structural infiltration: 0					•	ruction			0	(11)
if both types of wall are p deducting areas of openi			to the grea	ter wall are	a (atter					
If suspended wooden	floor, enter 0.2	(unsealed) or	0.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	nter 0.05, else e	enter 0							0	(13)
Percentage of window	s and doors dra	aught stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expresse	d in cubic metr	es per ho	our per s	quare m	etre of e	envelope	e area	2	(17)
If based on air permeabi	lity value, then	$(18) = [(17) \div 20] +$	-(8), otherw	ise (18) =	(16)				0.1	(18)
Air permeability value applie	es if a pressurisatio	on test has been de	one or a de	gree air pe	rmeability	is being u	ised			
Number of sides sheltered	ed								2	(19)
Shelter factor				(20) = 1 -	[0.075 x (²	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter fac	tor		(21) = (18) x (20) =				0.08	(21)
Infiltration rate modified	for monthly win	d speed							_	
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table	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									
(00)	,	1.00 0.05	0.05	1 0 00	Ι.,	1.00	1 440	T 440	1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

djusted infiltr		<u> </u>				` 	<u>` </u>	<u> </u>		1	1	1	
0.11 Calculate effe	0.11	0.1 change	0.09	0.09 he appli	0.08 Cable ca	0.08	0.08	0.08	0.09	0.1	0.1	J	
If mechanica		•	ate for t	пс арри	cabic ca	30						0.5	(
If exhaust air h	eat pump i	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0.5	(
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				76.5	
a) If balance	ed mecha	anical ve	ntilation	with hea	at recove	ery (MVI	HR) (24a	ı)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
4a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]	(
b) If balance	ed mech	anical ve	ntilation	without	heat rec	overy (N	ЛV) (24b)m = (22	2b)m + (23b)	•	•	
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	
c) If whole h				•	•				- (00)		•	_	
		<u> </u>		, ,	<u> </u>	· ` `	c) = (22b		<u>`</u>	í –	Ι ο	1	
1c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(
d) If natural if (22b)n					•		on from I 0.5 + [(2		0.51				
1d)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(
Effective air	change	rate - er	ter (24a	or (24h	o) or (24)	c) or (24	d) in box	(25)		!	ļ	J	
i)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22	1	
							<u> </u>					1	
. Heat losse					NI a t A a		11 -1	_	A 37.1.1		1 -1	_	A X/I
EMENT	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-		A X k kJ/K
ndows Type		()			1.67		/[1/(1.4)+		2.21	$\stackrel{\prime}{\Box}$			
ndows Type	e 2				1.66	x1.	/[1/(1.4)+	0.04] =	2.2	=			
indows Type					6.18	_	/[1/(1.4)+	l l	8.19	\dashv			
indows Type					2.24	_		l l	2.97	\dashv			
indows Type					1.5	_	/[1/(1.4)+		1.99	=			
indows Type							/[1/(1.4)+		5.44	=			
alls		<u> </u>	47.0		4.1	=		— ;		북 ,			
	47.9		17.3	2	30.57	=	0.12	=	3.67				
otal area of e	Herrierius	, 111-			47.92	_		_ ,					
arty wall					44.62		0	= [0				
or windows and include the area						atea using	i tormula 1	/[(1/ U- vail	ie)+0.04] a	as given in	paragrapi	1 3.2	
bric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				26.67	
eat capacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	
nermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	
r design assess				constructi	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
n be used inste iermal bridge				ısina An	nendiy k	<						7.43	
letails of therma	•	,		• .	•	`						7.43	
tal fabric he			- ()	()	,			(33) +	(36) =			34.1	
entilation hea	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
3)m= 14.55	14.42	14.28	13.6	13.46	12.77	12.77	12.64	13.05	13.46	13.73	14.01	1	
eat transfer o	coefficier	nt, W/K					-	(39)m	= (37) + (38)m	-	•	
9)m= 48.65	48.51	48.38	47.69	47.55	46.87	46.87	46.73	47.14	47.55	47.83	48.1]	
1						<u> </u>			L		<u> </u>		

Heat loss para	ameter (I	HLP), W/	m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.65	0.65	0.64	0.64	0.63	0.62	0.62	0.62	0.63	0.63	0.64	0.64		
									Average =	Sum(40) ₁ .	12 /12=	0.63	(40)
Number of day	<u> </u>		le 1a)							1			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requi	irement:								kWh/ye	ar:	
Assumed occu if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9))2)] + 0.0	0013 x (⁻	TFA -13		36		(42)
Annual average Reduce the annual not more that 125	ge hot wa al average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.33		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i							_	Годр	1 001	1404	200		
(44)m= 99.36	95.75	92.14	88.52	84.91	81.3	81.3	84.91	88.52	92.14	95.75	99.36		
	!	<u> </u>		ļ					I Total = Su	L m(44) ₁₁₂ =	=	1083.95	(44)
Energy content of	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x D)Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 147.35	128.87	132.99	115.94	111.25	96	88.96	102.08	103.3	120.38	131.41	142.7		
									Total = Su	m(45) ₁₁₂ =	-	1421.23	(45)
If instantaneous v	vater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)	i	i			
(46)m= 22.1	19.33	19.95	17.39	16.69	14.4	13.34	15.31	15.49	18.06	19.71	21.41		(46)
Water storage Storage volum		includin	na anv e	alar or M	/\/\HRS	storana	within es	ama vas	امء		0		(47)
If community h	` ,					_		arrio voo	001		0		(47)
Otherwise if no	_			_			, ,	ers) ente	er '0' in (47)			
Water storage	loss:		`					,	·	,			
a) If manufact	turer's d	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufact			-										(54)
Hot water stor If community h	-			ie z (KVV	n/iitre/ua	iy)				0.	02		(51)
Volume factor	•		011 1.0							1.	03		(52)
Temperature f	actor fro	m Table	2b							-	.6		(53)
Energy lost fro	om water	· storage	, 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 f	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 cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	x 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)
Primary circuit	· Hoss (ar	nual) fro	m Table					•	•		0		(58)
Primary circuit	•	,			59)m = ((58) ÷ 36	65 × (41)	m					. /
(modified by				,		. ,	, ,		r thermo	stat)			
(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)

0 1 - 1		((04)	(00)	05 (44)							
Combi loss				<u> </u>	` ,	· ` `	<u> </u>	Ι ,	Ι ,	Ι ,	Ι ,	1	(61)
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0	(50)	(01)
							<u> </u>		ì	ì ´	` ´ 	(59)m + (61)m	(00)
(62)m= 202.6		188.26	169.43	166.52	149.49	144.23	157.36	156.79	175.66	184.9	197.98		(62)
Solar DHW inp									r contribut	tion to wate	er heating)		
(add addition (63)m= 0	nai lines li	rgnks 0	and/or v	0	applies 0	, see Ap	pendix () 0	0	0	0	1	(63)
			U	U	U		0						(03)
Output from (64)m= 202.6		188.26	169.43	166.52	149.49	144.23	157.36	156.79	175.66	184.9	197.98]	
(01)111= [202.0	70.0	100.20	100.10	100.02	1 10.10	111.20	<u> </u>	<u> </u>	l	r (annual)₁	l	2072.07	(64)
Heat gains f	rom water	heating	k\/\/h/m/	onth () 24	5 ′ [0 85	v (45)m							J, ,
(65)m= 93.2		88.44	81.35	81.21	74.71	73.8	78.16	77.14	84.25	86.49	91.67]	(65)
` '	7)m in cal	LI				Ļ	<u> </u>	<u> </u>	<u> </u>	<u> </u>) Apating	(00)
·			. ,		yiii iu c i i	S III III C	aweiiiig	OI HOLW	alei is ii	OIII COIII	indinty i	leating	
5. Internal).									
Metabolic ga		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 118.1	+	118.17	118.17	118.17	118.17	118.17	118.17	118.17	118.17	118.17	118.17		(66)
Lighting gair	ns (calcula	ted in An	pendix	L. eguati	on L9 o	r L9a). a	lso see	Table 5				<u> </u>	
(67)m= 18.6	<u> </u>	13.45	10.18	7.61	6.43	6.94	9.03	12.12	15.38	17.96	19.14		(67)
Appliances	gains (calc	ulated in	Append	dix L, eq	uation L	13 or L1		see Ta	ble 5	!	!		
(68)m= 208.		205.6	193.97	179.29	165.5	156.28	154.11	159.57	171.2	185.88	199.68		(68)
Cooking gai	ns (calcula	ıted in Ar	ppendix	L. eguat	ion L15	or L15a	. also s	ee Table	5	!	!	ı	
(69)m= 34.8	`	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82	34.82		(69)
Pumps and	fans gains	(Table 5	ia)									I	
(70)m= 0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses e.g.	evaporatio	n (negat	ive valu	es) (Tab	le 5)	•	•	•	•	•	•	•	
(71)m= -94.5	3 -94.53	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53	-94.53		(71)
Water heating	ng gains (T	able 5)				•	•	•	•	•	•	•	
(72)m= 125.2	9 123.2	118.87	112.98	109.16	103.77	99.19	105.06	107.14	113.24	120.12	123.21		(72)
Total intern	al gains =	:			(66))m + (67)m	+ (68)m	+ (69)m +	(70)m + (7	'1)m + (72))m		
(73)m= 411.2	26 409.26	396.37	375.59	354.51	334.14	320.87	326.65	337.28	358.27	382.41	400.48		(73)
6. Solar ga	ins:							•	•	•	•		
Solar gains ar	e calculated	using solai	flux from	Table 6a	and assoc	iated equa	tions to co	onvert to th	ne applicat	ole orientat	tion.		
Orientation:			Area		Flu		_	g_ 	_	FF		Gains	
	Table 6d		m²			ble 6a	. <u>-</u>	able 6b	_ '	able 6c		(W)	_
East 0.9	× 0.77	X	1.6	66	x1	9.64	x	0.4	x	0.8	=	7.23	(76)
East 0.9		X	6.1	8	X 1	9.64	x	0.4	x	0.8	=	26.92	(76)
East 0.9	× 0.77	X	4.	1	x 1	9.64	x	0.4	x	0.8	=	17.86	(76)
East 0.9	× 0.77	X	1.6	66	x 3	88.42	x	0.4	x	0.8	=	14.14	(76)
East 0.9	× 0.77	X	6.1	8	x 3	38.42	х	0.4	х	0.8	=	52.65	(76)

			_		_		_		_		_		
East	0.9x	0.77	X	4.1	X	38.42	X	0.4	X	0.8	=	34.93	(76)
East	0.9x	0.77	X	1.66	x	63.27	X	0.4	X	0.8	=	23.29	(76)
East	0.9x	0.77	X	6.18	x	63.27	X	0.4	x	0.8	=	86.71	(76)
East	0.9x	0.77	X	4.1	X	63.27	X	0.4	X	0.8	=	57.53	(76)
East	0.9x	0.77	X	1.66	x	92.28	x	0.4	X	0.8	=	33.97	(76)
East	0.9x	0.77	X	6.18	X	92.28	X	0.4	X	0.8	=	126.47	(76)
East	0.9x	0.77	X	4.1	x	92.28	X	0.4	X	0.8	=	83.9	(76)
East	0.9x	0.77	X	1.66	x	113.09	x	0.4	X	0.8	=	41.63	(76)
East	0.9x	0.77	X	6.18	X	113.09	X	0.4	X	0.8	=	154.99	(76)
East	0.9x	0.77	X	4.1	x	113.09	x	0.4	X	0.8	=	102.83	(76)
East	0.9x	0.77	X	1.66	x	115.77	X	0.4	X	0.8	=	42.62	(76)
East	0.9x	0.77	X	6.18	x	115.77	X	0.4	X	0.8	=	158.66	(76)
East	0.9x	0.77	X	4.1	x	115.77	x	0.4	X	0.8	=	105.26	(76)
East	0.9x	0.77	X	1.66	x	110.22	x	0.4	X	0.8	=	40.57	(76)
East	0.9x	0.77	X	6.18	x	110.22	X	0.4	X	0.8	=	151.05	(76)
East	0.9x	0.77	X	4.1	x	110.22	x	0.4	X	0.8	=	100.21	(76)
East	0.9x	0.77	X	1.66	x	94.68	x	0.4	X	0.8	=	34.85	(76)
East	0.9x	0.77	X	6.18	x	94.68	X	0.4	X	0.8	=	129.75	(76)
East	0.9x	0.77	X	4.1	x	94.68	x	0.4	X	0.8	=	86.08	(76)
East	0.9x	0.77	X	1.66	X	73.59	X	0.4	X	0.8	=	27.09	(76)
East	0.9x	0.77	X	6.18	x	73.59	x	0.4	X	0.8	=	100.85	(76)
East	0.9x	0.77	X	4.1	x	73.59	X	0.4	X	0.8	=	66.91	(76)
East	0.9x	0.77	X	1.66	X	45.59	X	0.4	X	0.8	=	16.78	(76)
East	0.9x	0.77	X	6.18	x	45.59	x	0.4	X	0.8	=	62.48	(76)
East	0.9x	0.77	X	4.1	x	45.59	X	0.4	X	0.8	=	41.45	(76)
East	0.9x	0.77	X	1.66	x	24.49	X	0.4	X	0.8	=	9.01	(76)
East	0.9x	0.77	X	6.18	x	24.49	x	0.4	X	0.8	=	33.56	(76)
East	0.9x	0.77	X	4.1	x	24.49	x	0.4	X	0.8	=	22.27	(76)
East	0.9x	0.77	X	1.66	x	16.15	X	0.4	X	0.8	=	5.95	(76)
East	0.9x	0.77	X	6.18	x	16.15	X	0.4	X	0.8	=	22.13	(76)
East	0.9x	0.77	X	4.1	x	16.15	x	0.4	X	0.8	=	14.68	(76)
West	0.9x	0.77	X	1.67	x	19.64	X	0.4	X	0.8	=	7.27	(80)
West	0.9x	0.77	X	2.24	x	19.64	X	0.4	X	0.8] =	9.76	(80)
West	0.9x	0.77	X	1.5	x	19.64	x	0.4	X	0.8	=	6.53	(80)
West	0.9x	0.77	X	1.67	x	38.42	X	0.4	x	0.8	=	14.23	(80)
West	0.9x	0.77	x	2.24	x	38.42	x	0.4	x	0.8	=	19.09	(80)
West	0.9x	0.77	X	1.5	x	38.42	x	0.4	X	0.8	=	12.78	(80)
West	0.9x	0.77	X	1.67	x	63.27	X	0.4	x	0.8	=	23.43	(80)
West	0.9x	0.77	X	2.24	x	63.27	x	0.4	x	0.8	=	31.43	(80)
West	0.9x	0.77	X	1.5	x	63.27	x	0.4	x	0.8	=	21.05	(80)
West	0.9x	0.77	X	1.67	x	92.28	x	0.4	X	0.8] =	34.17	(80)

	_									_									
West	0.9x	0.77		(2.24		X	9	2.28	X		0.4		x	0.8		=	45.84	(80)
West	0.9x	0.77		(1.5		X	9	2.28	x		0.4		x	0.8		=	30.7	(80)
West	0.9x	0.77		(1.67		X	11	13.09	x		0.4		x	0.8		=	41.88	(80)
West	0.9x	0.77		(2.24		X	11	13.09	x		0.4		x	0.8		=	56.18	(80)
West	0.9x	0.77		(1.5		x	11	13.09	x		0.4		x	0.8		=	37.62	(80)
West	0.9x	0.77		(1.67		x	11	15.77	x		0.4		x	0.8		=	42.87	(80)
West	0.9x	0.77		(2.24		x	11	15.77	x		0.4		x	0.8		=	57.51	(80)
West	0.9x	0.77		(1.5		x	11	15.77	x		0.4		x	0.8		=	38.51	(80)
West	0.9x	0.77		(1.67		X	11	10.22	x		0.4		x	0.8		=	40.82	(80)
West	0.9x	0.77		(2.24		X	11	10.22	x		0.4		x	0.8		=	54.75	(80)
West	0.9x	0.77		(1.5		X	11	10.22	x		0.4		x	0.8		=	36.66	(80)
West	0.9x	0.77		(1.67		X	9	4.68	x		0.4		x	0.8		=	35.06	(80)
West	0.9x	0.77	;	(2.24		x	9	4.68	x		0.4		x	0.8		=	47.03	(80)
West	0.9x	0.77		(1.5		X	9	4.68	x		0.4		x	0.8		=	31.49	(80)
West	0.9x	0.77		(1.67		X	7	3.59	x		0.4		x	0.8		=	27.25	(80)
West	0.9x	0.77		(2.24		X	7	3.59	x		0.4		x	0.8		=	36.55	(80)
West	0.9x	0.77		(1.5		X	7	3.59	×		0.4		x	0.8		=	24.48	(80)
West	0.9x	0.77		(1.67		X	4	5.59	X		0.4		x	0.8		=	16.88	(80)
West	0.9x	0.77		(2.24		X	4	5.59	×		0.4		x	0.8		=	22.65	(80)
West	0.9x	0.77		(1.5		X	4	5.59	×		0.4		x	0.8		=	15.16	(80)
West	0.9x	0.77		(1.67		X	2	4.49	X		0.4		x	0.8		=	9.07	(80)
West	0.9x	0.77		(2.24		X	2	4.49	×		0.4		x	0.8		=	12.16	(80)
West	0.9x	0.77		(1.5		X	2	4.49	×		0.4		x	0.8		=	8.15	(80)
West	0.9x	0.77		(1.67		X	1	6.15	x		0.4		x	0.8		=	5.98	(80)
West	0.9x	0.77		(2.24		X	1	6.15	×		0.4		x	0.8		=	8.02	(80)
West	0.9x	0.77		(1.5		X	1	6.15	×		0.4		x	0.8		=	5.37	(80)
7				_	for each me		$\overline{}$			i i		um(74)m .	(82	2)m				1	
(83)m=	75.57	147.82	243.45	┸		5.13	_	45.43	424.07	36	4.27	283.14	17	5.41	94.22	62	.14		(83)
				_	(84)m = (73)		·			Ι		l l			T			1	(0.4)
(84)m=	486.83	557.08	639.82		730.64 789	9.64	7	79.57	744.94	69	0.91	620.42	53	3.68	476.63	462	2.62		(84)
7. Me	an inter	nal temp	erature) (heating sea	ason)												
Temp	erature	during h	eating	pe	eriods in the	e livi	ng	area f	rom Tal	ble 9), Th	11 (°C)						21	(85)
Utilisa	ation fac	tor for ga	ains for	liv	ving area, h	ո1,m	ı (s	ee Ta	ble 9a)									1	
	Jan	Feb	Mar	1	Apr N	Лау		Jun	Jul	1	lug	Sep	(Oct	Nov		ec_		
(86)m=	0.99	0.98	0.93		0.76 0.	56	_ (0.38	0.28	0	.31	0.52	0.	.86	0.98		1		(86)
Mean	interna	l tempera	ature ir	ı li	ving area T	1 (f	ollo	w ste	ps 3 to 7	7 in	Tabl	e 9c)						_	
(87)m=	20.55	20.68	20.85		20.97	21		21	21] :	21	21	20).95	20.73	20	.52		(87)
Temp	erature	during h	eating	рє	eriods in res	st of	dw	elling	from Ta	able	9, T	h2 (°C)							
(88)m=	20.39	20.39	20.39		20.4 20	0.4	2	20.41	20.41	20).41	20.41	2	0.4	20.4	20	.39]	(88)
Utilisa	ation fac	tor for a	ains for	re	est of dwell	ina.	h2.	m (se	e Table	9a)								=	
(89)m=	0.99	0.98	0.91	T		52	_	0.35	0.24	'	.27	0.48	0.	.82	0.98	0.	99]	(89)
	<u> </u>			_			_		<u> </u>						1			1	

Mean intern	al temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to 7	7 in Tab	le 9c)				
(90)m= 19.78	19.97	20.21	20.37	20.4	20.41	20.41	20.41	20.4	20.35	20.05	19.75		(90)
								1	fLA = Livin	g area ÷ (4	4) =	0.35	(91)
Mean intern	al temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m= 20.05	20.22	20.44	20.58	20.61	20.62	20.62	20.62	20.61	20.56	20.29	20.02		(92)
Apply adjust	ment to t	he mear	internal	temper	ature fro	m Table	4e, whe	re appr	opriate				
(93)m= 20.05	20.22	20.44	20.58	20.61	20.62	20.62	20.62	20.61	20.56	20.29	20.02		(93)
8. Space he													
Set Ti to the the utilisatio			•		ed at ste	ep 11 of	Table 9b	o, so tha	it Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa	ctor for g	ains, hm):										
(94)m= 0.99	0.97	0.91	0.74	0.54	0.36	0.25	0.29	0.49	0.83	0.97	0.99		(94)
Useful gains	, hmGm	, W = (94	4)m x (84	4)m	•					•			
(95)m= 482.35	542.81	584.12	541.93	422.52	281.91	188.21	197.05	306.6	444.09	464.23	459.57		(95)
Monthly ave	 	1	i –						1	1			4
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra (97)m= 766.28		an intern 674.15	557.13	423.63	Lm , W = 281.95	=[(39)m : 188.21	x [(93)m- 197.06	- (96)m 307.03	473.49	630.77	760.97		(97)
` '	1	l			l .						760.97		(97)
Space heati (98)m= 211.24		66.98	10.95	0.83	0	0.02	0	0	21.88	119.91	224.24		
()	1						Tota	l per year	(kWh/year		L	790.63	(98)
Space heati	na reauir	ement in	kWh/m²	:/vear				. ,		, ,	, I	10.53	(99)
·	• •			•	aahama							. 0.00	
9b. Energy re This part is us							ing prov	ided by	a comm	unity sch	nomo		
Fraction of sp			• .		_		.	•		urnity Sci	ieilie.	0	(301)
Fraction of sp	ace heat	from co	mmunity	system	1 – (30	1) =					[1	(302)
The community			•	-	,	,	allows for	CHP and	up to four	other heat	sources: tl	he latter	
includes boilers,		-			•				ap to rour	ou.ro. rroat			
Fraction of he	eat from (Commun	ity heat _l	oump								1	(303a
Fraction of to	tal space	heat fro	m Comn	nunity he	eat pump)			(3	02) x (303	a) =	1	(304a
Factor for cor	ntrol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	iting sys	tem			1	(305)
Distribution lo	ss factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m					1.1	(306)
Space heating	ng											kWh/yea	ur_
Annual space	heating	requiren	nent									790.63	
Space heat fr	om Com	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306)	=	869.69	(307a
Efficiency of	secondar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heatin	g require	ment fro	m secon	dary/sur	plemen	tary syst	em	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heating	g										•		
Annual water	_	requirem	ent									2072.07	
If DHW from	communi	ty schem	ne:										

						,
Water heat from Community heat pump		(64) x (303a) x	$(305) \times (306) =$	2	2279.27	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	'e) + (310a)(310e)] =		31.49	(313)
Cooling System Energy Efficiency Ratio					0	(314)
Space cooling (if there is a fixed cooling s	system, if not enter 0)	$=(107) \div (314)$	=		0	(315)
Electricity for pumps and fans within dwe mechanical ventilation - balanced, extrac	- ,	n outside			157.82	(330a)
warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330	b) + (330g) =		157.82	(331)
Energy for lighting (calculated in Appendi	x L)			;	328.89	(332)
Electricity generated by PVs (Appendix M	(negative quantity)			-	776.39	(333)
Electricity generated by wind turbine (App	pendix M) (negative q	uantity)			0	(334)
12b. CO2 Emissions – Community heating	ng scheme					
		Energy kWh/year	Emission factor kg CO2/kWh		sions O2/year	
CO2 from other sources of space and wa Efficiency of heat source 1 (%)	• ,	-	•	_	319	(367a)
CO2 associated with heat source 1	[(307b)	+(310b)] x 100 ÷ (367b) x	0.52	-	512.32	(367)
Electrical energy for heat distribution		[(313) x	0.52	- 🗀	16.34	(372)
Total CO2 associated with community sy	stems	(363)(366) + (368)(372	2)	-	528.67	(373)
CO2 associated with space heating (seco	ondary)	(309) x	0	=	0	(374)
CO2 associated with water from immersion	on heater or instantan	eous heater (312) x	0.52	- 🗀	0	(375)
Total CO2 associated with space and wa	ter heating	(373) + (374) + (375) =			528.67	(376)
CO2 associated with electricity for pumps	s and fans within dwel	ling (331)) x	0.52	- 🗀	81.91	(378)
CO2 associated with electricity for lighting	g	(332))) x	0.52	- 🗀	170.7	(379)
Energy saving/generation technologies (3 Item 1	333) to (334) as applic	cable	0.52 x 0.01 =		-402.95] (380)
Total CO2, kg/year	sum of (376)(382) =				378.32	(383)
, 0,	(383) ÷ (4) =				5.04	(384)

El rating (section 14)

(385)

95.78

			User D	Notoile:						
Assessor Name: Software Name:	John Simpson Stroma FSAP 20			Strom Softwa	are Vei	rsion:			0006273 on: 1.0.4.26	
Address :	AC 106, Aspen Co			Address k Estate			PFH			
1. Overall dwelling din		Jart, Martie	and r dii	t Lotato,	London	, 14000 2	· ·			
and an emily and			Are	a(m²)		Av. He	ight(m)	_	Volume(m ³	<u>")</u>
Ground floor				75.1	(1a) x	2	2.6	(2a) =	195.26	(3a)
Total floor area TFA = ((1a)+(1b)+(1c)+(1d)+(1e)+(1r	۱) 🗀	75.1	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	(3n) =	195.26	(5)
2. Ventilation rate:										
N 1 6 1:	heating	secondar heating	· -	other	, –	total		40	m³ per hou	_
Number of chimneys	0 +	0	<u></u>	0] = [0		40 =	0	(6a)
Number of open flues	0 +	0	_	0] = [0	X :	20 =	0	(6b)
Number of intermittent	fans					3	X	10 =	30	(7a)
Number of passive ven	ts					0	X	10 =	0	(7b)
Number of flueless gas	fires				Ī	0	x	40 =	0	(7c)
					_			A : I		_
Letter Constitute to the state of		(C-) · (Ch) · (7-)./7 -)./	(7-)	_				nanges per ho	_
Infiltration due to chimn	ieys, flues and fans = s been carried out or is inter				continue fr	30		÷ (5) =	0.15	(8)
Number of storeys in		iaca, procee	a to (11),	ourier wise (orianac m	om (3) to	(10)		0	(9)
Additional infiltration	3 ()						[(9)	-1]x0.1 =	0	(10)
Structural infiltration:	0.25 for steel or timbe	r frame or	0.35 fo	r masoni	y constr	ruction			0	(11)
	present, use the value corr	esponding to	the great	ter wall are	a (after					
•	nings); if equal user 0.35 n floor, enter 0.2 (unse	aled) or 0	1 (seale	ed) else	enter 0				0	(12)
•	enter 0.05, else enter 0	,	. 1 (300010	<i>Ju)</i> , 0100	Cittor o				0	(13)
•	ws and doors draught								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	e, q50, expressed in co	ubic metre	s per ho	our per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeal	•								0.4	(18)
	lies if a pressurisation test h	as been dor	ne or a de	gree air pe	rmeability	is being u	sed			740
Number of sides shelte Shelter factor	rea			(20) = 1 -	[0.075 x (1	[9)] =			0.85	(19) (20)
Infiltration rate incorpor	ating shelter factor			(21) = (18					0.34	(21)
Infiltration rate modified	-	ed							0.04	(= : /
Jan Feb	Mar Apr May	1	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind	speed from Table 7								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 (CC.)	(20) 4			•			•	•	•	
Wind Factor (22a)m = (· · · · · · · · · · · · · · · · · · ·	0.05	0.05	0.00	4	1.00	1 10	1 40	1	
(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	J	

Adjusted infiltr	ation rate	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.34	0.37	0.39	0.4		
Calculate effec		•	rate for t	he appli	cable ca	se			!			·	
If mechanica			om alive NL (O	0h) (00-	·		IT\\ atha	: (00h	\ (00-\			0	(23
If exhaust air h) = (23a)			0	(23
If balanced with		-	•	_								0	(23
a) If balance						- 	- ^ ` `	<u> </u>	 	, 	' ' '	· ÷ 100] I	(24
(24a)m= 0	0	0	0	0	0	0 (1	0	0	0	0	0		(24
b) If balance					ı		- ^ `	<u> </u>	r Ó - Ò	'	<u> </u>	1	(0.4
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)n	n < 0.5 ×			•	•				5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)n	ventilation = 1, the								0.5]				
(24d)m= 0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(24
Effective air	change i	rate - en	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)				•	
(25)m= 0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(25
3. Heat losse	s and he	at loss r	naramete	or.									
ELEMENT	Gros area	S	Openin m	gs	Net Ar A ,n		U-valı W/m2		A X U (W/I		k-value		A X k kJ/K
Windows Type		` ,			1.67		/[1/(1.4)+	0.04] =	2.21	$\stackrel{\prime}{\Box}$			(27
Windows Type	e 2				1.66		/[1/(1.4)+	0.04] =	2.2	=			(27
Windows Type					6.18	=	/[1/(1.4)+	l l	8.19	=			(27
Windows Type					2.24	_	/[1/(1.4)+	l.	2.97	=			(27
Windows Type					1.5	_	· /[1/(1.4)+		1.99	=			(27
Windows Type					4.1				5.44	=			(27
Walls	47.92		17.3	-		=	0.18	— ;	5.5	╡ ,			(29
Total area of e			17.3	2	30.57	_	0.18	= [5.5				
	dements,	111-			47.92	=							(31
* for windows and	l roof windo		effootivo wi	ndow II ve	44.62		0 formula 1	/[/1/ volu	0		norograni		(32
** include the area						ateu usiriy	TOTTIUIA I	/[(1/ U- vaic	1 0)+0.04] a	is giveri iii	parayrapi	1 3.2	
Fabric heat los	ss, W/K =	S (A x	U)				(26)(30)	+ (32) =				28.5	(33
Heat capacity	Cm = S(A)	Axk)						((28)	(30) + (32	2) + (32a).	(32e) =	0	(34
Thermal mass	paramet	ter (TMF	P = Cm -	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(35
For design assess can be used inste				constructi	ion are not	t known pr	ecisely the	indicative	e values of	TMP in Ta	able 1f		
Thermal bridge	es : S (L :	x Y) cal	culated (using Ap	pendix ł	<						5.2	(36
if details of therma Total fabric he		are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			33.7	(37
Ventilation hea	at loss ca	lculated	monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 38.38	38.14	37.91	36.81	36.6	35.64	35.64	35.46	36.01	36.6	37.02	37.45		(38
Heat transfer of	coefficien	it, W/K						(39)m	= (37) + (37)	38)m			
(39)m= 72.09	71.85	71.62	70.51	70.31	69.35	69.35	69.17	69.72	70.31	70.73	71.16		
O1 FOAD 004	12 Version	1.0.4.26 (SAP 9.92	- http://wv	ww.stroma	.com			Average =	Sum(39) ₁	12 /12=	70.5	Page 2 of 39

Heat loss para	meter (I	HLP), W/	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.96	0.96	0.95	0.94	0.94	0.92	0.92	0.92	0.93	0.94	0.94	0.95		
								,	Average =	Sum(40) ₁ .	12 /12=	0.94	(40)
Number of day		· ` ·		Movi	lun	11	۸۰۰۵	Con	Oct	Nov	Doo		
(41)m= 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31		(41)
(41)111= 31	20	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ting ene	rgy requi	rement:								kWh/ye	ear:	
													(40)
if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	ΓFA -13.		36		(42)
Annual averag											.33		(43)
Reduce the annua not more that 125	_		•		-	-	o acnieve	a water us	se target o	T			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in	n litres pe	r day for ea		Vd,m = fa	ctor from 7	Table 1c x							
(44)m= 99.36	95.75	92.14	88.52	84.91	81.3	81.3	84.91	88.52	92.14	95.75	99.36		
Energy content of	hot water	used - cal	culated m	onthly – 4	190 x Vd r	пуптуГ	Tm / 3600			m(44) ₁₁₂ =	L	1083.95	(44)
(45)m= 147.35	128.87	132.99	115.94	111.25	96	88.96	102.08	103.3	120.38	131.41	142.7		
(40)111= 147.33	120.07	102.00	110.04	111.20		00.50	102.00			m(45) ₁₁₂ =		1421.23	(45)
If instantaneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46			(- /	L		`
(46)m= 22.1	19.33	19.95	17.39	16.69	14.4	13.34	15.31	15.49	18.06	19.71	21.41		(46)
Water storage Storage volum		\ includin	na anv eo	alar or M	/\//HRS	storage	within es	ama vas	امء		450		(47)
If community h	` '					•		ATTIC VOO.	001		150		(47)
Otherwise if no	•			•			` '	ers) ente	er '0' in (47)			
Water storage													
a) If manufact				or is kno	wn (kWh	n/day):				1.	39		(48)
Temperature fa										0.	54		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)) =		0.	75		(50)
Hot water stora			-								0		(51)
If community h	_		on 4.3										
Volume factor Temperature fa			2h							—	0		(52)
Energy lost fro				oor			(47) v (51)) x (52) x (53) -		0		(53)
Enter (50) or (_	, KVVII/y	zai			(47) X (31)) X (32) X (JJ) =		0 75		(54) (55)
Water storage	. , .	,	or each	month			((56)m = (55) × (41)ı	m				, ,
(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)
If cylinder contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	ix H	
(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)
Primary circuit	loss (ar	nnual) fro	m Table	e 3							0		(58)
Primary circuit				,	•	. ,	, ,						
(modified by					ı —	ı —			ı —	<u> </u>	00.00		(50)
(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)

0		المعاميما	£			(24)	(00)	۱ . ۵	25 (44)	١							
(61)m=	OSS Ca	lculated 0	or ead	n n	nonth (0	È) ÷ 30 0	0 × (41))m o		0	0	Ιο	0	1	(61)
L				<u> </u>			<u> </u>			<u> </u>			<u> </u>	ļ.		(F0)m + (61)m	(01)
	193.95	170.96	179.58	_	161.03	157.84	_	1.09	135.55	148		148.39	166.98	176.5	189.3	(59)m + (61)m]	(62)
` ′ L		calculated														J	(02)
		al lines if						-					CONTINU	iioii io wale	er rieatiriy)		
(63)m=	0	0	0	T	0	0	ı i	0	0	0		0	0	0	0	1	(63)
L	from w	ater hea	L ter				<u> </u>		<u> </u>	<u> </u>			<u> </u>	ļ		J	, ,
	193.95		179.58	3	161.03	157.84	14	1.09	135.55	148	.67	148.39	166.98	176.5	189.3]	
` ' L		Į								<u> </u>	Outp	out from wa	ter heate	ır (annual)₁	12	1969.84	(64)
Heat ga	ins fro	m water	heatin	a, k	ςWh/mα	onth 0.2	5 ′ [0.85	× (45)m	+ (6	1)m	1] + 0.8 >	c [(46)m	+ (57)m	+ (59)m	1	-
(65)m=	86.27	76.52	81.49	_	74.62	74.27		7.99	66.85	71.		70.42	77.3	79.77	84.72	ĺ	(65)
includ	de (57)	m in calc	culation	n of	 f (65)m	only if c	ylin	der i	s in the o	dwell	ing	or hot w	ater is f	rom com	munity h	ı neating	
		ains (see			` ,		,								,	<u> </u>	
		ns (Table			ĺ												
	Jan	Feb	Maı	\neg	Apr	May	,	Jun	Jul	А	ug	Sep	Oct	Nov	Dec]	
(66)m=	118.17	118.17	118.17	7	118.17	118.17	- 		118.17	118	.17	118.17	118.17	118.17	118.17	1	(66)
Lighting	gains	(calculat	ted in <i>i</i>	Д рр	endix I	_, equat	ion	L9 o	r L9a), a	lso s	ee -	Table 5		1	•	•	
(67)m=	18.62	16.54	13.45		10.18	7.61	6	5.43	6.94	9.0)3	12.12	15.38	17.96	19.14]	(67)
Applian	ces ga	ins (calc	ulated	in A	Append	lix L, eq	uati	ion L	13 or L1:	3a),	also	see Ta	ble 5			•	
(68)m=	208.9	211.06	205.6		193.97	179.29	16	65.5	156.28	154	.11	159.57	171.2	185.88	199.68]	(68)
Cooking	g gains	(calcula	ted in	App	pendix	L, equat	ion	L15	or L15a)	, als	0 SE	e Table	5	•	•	•	
(69)m=	34.82	34.82	34.82		34.82	34.82	34	4.82	34.82	34.	82	34.82	34.82	34.82	34.82]	(69)
Pumps	and fa	ns gains	(Table	5a	a)											•	
(70)m=	3	3	3		3	3		3	3	3		3	3	3	3		(70)
Losses	e.g. ev	vaporatio	n (neg	ativ	ve valu	es) (Tab	le 5	5)	-				=	-		-	
(71)m=	-94.53	-94.53	-94.53	3	-94.53	-94.53	-9	4.53	-94.53	-94	.53	-94.53	-94.53	-94.53	-94.53		(71)
Water h	eating	gains (T	able 5)	-				-				-	-	-	-	
(72)m=	115.95	113.87	109.53	3	103.64	99.82	94	4.43	89.86	95.	72	97.81	103.9	110.79	113.88		(72)
Total in	ternal	gains =						(66)	m + (67)m	1 + (68	3)m +	+ (69)m + ((70)m + (7	'1)m + (72))m		
(73)m=	404.92	402.92	390.04	;	369.25	348.18	32	7.81	314.53	320	.31	330.95	351.94	376.08	394.15		(73)
6. Sola	ar gain	s:															
•		calculated	•	lar f		Table 6a	and a		•	tions	to co	nvert to th	e applical		tion.		
Orienta		Access F Table 6d	actor		Area m²			Flu	x ble 6a		т	g_ able 6b	т	FF able 6c		Gains (W)	
				_			_			1						. ,	,
East	0.9x	0.77		x [1.6	6	X	1	9.64	X		0.63	_ x	0.7	=	9.96	(76)
East	0.9x	0.77		x [6.1		X L		9.64	X		0.63	x	0.7	=	37.09	(76)
East	0.9x	0.77		X L	4.		X		9.64	X		0.63	_ ×	0.7	=	24.61	(76)
East	0.9x	0.77	_	x [1.6		X [3	88.42	X		0.63	x	0.7	=	19.49	(76)
East	0.9x	0.77		X	6.1	8	X	3	88.42	X		0.63	X	0.7	=	72.56	(76)

	_		_										_
East	0.9x	0.77	X	4.1	X	38.42	X	0.63	X	0.7	=	48.14	(76)
East	0.9x	0.77	X	1.66	X	63.27	X	0.63	X	0.7	=	32.1	(76)
East	0.9x	0.77	X	6.18	x	63.27	x	0.63	x	0.7	=	119.5	(76)
East	0.9x	0.77	X	4.1	X	63.27	X	0.63	x	0.7	=	79.28	(76)
East	0.9x	0.77	X	1.66	x	92.28	X	0.63	X	0.7	=	46.82	(76)
East	0.9x	0.77	X	6.18	x	92.28	X	0.63	X	0.7	=	174.29	(76)
East	0.9x	0.77	X	4.1	x	92.28	X	0.63	X	0.7	=	115.63	(76)
East	0.9x	0.77	X	1.66	x	113.09	X	0.63	x	0.7	=	57.37	(76)
East	0.9x	0.77	X	6.18	X	113.09	X	0.63	X	0.7	=	213.6	(76)
East	0.9x	0.77	X	4.1	x	113.09	X	0.63	X	0.7	=	141.71	(76)
East	0.9x	0.77	X	1.66	x	115.77	X	0.63	X	0.7	=	58.73	(76)
East	0.9x	0.77	X	6.18	X	115.77	X	0.63	X	0.7	=	218.65	(76)
East	0.9x	0.77	X	4.1	x	115.77	X	0.63	x	0.7	=	145.06	(76)
East	0.9x	0.77	X	1.66	x	110.22	X	0.63	x	0.7	=	55.92	(76)
East	0.9x	0.77	X	6.18	x	110.22	X	0.63	x	0.7	=	208.17	(76)
East	0.9x	0.77	X	4.1	x	110.22	X	0.63	x	0.7	=	138.1	(76)
East	0.9x	0.77	X	1.66	X	94.68	X	0.63	X	0.7	=	48.03	(76)
East	0.9x	0.77	X	6.18	x	94.68	X	0.63	X	0.7	=	178.81	(76)
East	0.9x	0.77	X	4.1	x	94.68	X	0.63	X	0.7	=	118.63	(76)
East	0.9x	0.77	X	1.66	x	73.59	X	0.63	X	0.7	=	37.33	(76)
East	0.9x	0.77	X	6.18	x	73.59	X	0.63	X	0.7	=	138.99	(76)
East	0.9x	0.77	X	4.1	x	73.59	x	0.63	x	0.7	=	92.21	(76)
East	0.9x	0.77	X	1.66	x	45.59	x	0.63	x	0.7	=	23.13	(76)
East	0.9x	0.77	X	6.18	x	45.59	X	0.63	x	0.7] =	86.1	(76)
East	0.9x	0.77	X	4.1	x	45.59	X	0.63	x	0.7	=	57.12	(76)
East	0.9x	0.77	X	1.66	x	24.49	X	0.63	X	0.7	=	12.42	(76)
East	0.9x	0.77	X	6.18	x	24.49	X	0.63	X	0.7	=	46.25	(76)
East	0.9x	0.77	X	4.1	x	24.49	X	0.63	X	0.7	=	30.69	(76)
East	0.9x	0.77	X	1.66	x	16.15	X	0.63	x	0.7	=	8.19	(76)
East	0.9x	0.77	X	6.18	x	16.15	X	0.63	X	0.7	=	30.5	(76)
East	0.9x	0.77	X	4.1	x	16.15	X	0.63	x	0.7	=	20.24	(76)
West	0.9x	0.77	X	1.67	x	19.64	X	0.63	x	0.7	=	10.02	(80)
West	0.9x	0.77	X	2.24	x	19.64	X	0.63	x	0.7] =	13.45	(80)
West	0.9x	0.77	X	1.5	x	19.64	x	0.63	x	0.7	=	9	(80)
West	0.9x	0.77	X	1.67	x	38.42	x	0.63	x	0.7	=	19.61	(80)
West	0.9x	0.77	X	2.24	x	38.42	x	0.63	x	0.7	=	26.3	(80)
West	0.9x	0.77	x	1.5	x	38.42	x	0.63	x	0.7] =	17.61	(80)
West	0.9x	0.77	x	1.67	x	63.27	x	0.63	x	0.7] =	32.29	(80)
West	0.9x	0.77	x	2.24	x	63.27	×	0.63	x	0.7] =	43.32	(80)
West	0.9x	0.77	x	1.5	x	63.27	X	0.63	x	0.7] =	29.01	(80)
West	0.9x	0.77	x	1.67	x	92.28	x	0.63	x	0.7] =	47.1	(80)

\A/4	_						1			,			_	_		_			– , .
West	0.9x	0.77		X	2.2	4	X	9	2.28	X		0.63	X		0.7	_	=	63.17	(80)
West	0.9x	0.77		X	1.5	5	X	9	2.28	X		0.63	X		0.7	_	=	42.3	(80)
West	0.9x	0.77		X	1.6	7	X	1	13.09	X		0.63	X		0.7		=	57.72	(80)
West	0.9x	0.77		X	2.2	4	X	1	13.09	X		0.63	X		0.7		=	77.42	(80)
West	0.9x	0.77		X	1.5	5	X	1	13.09	X		0.63	X		0.7		=	51.84	(80)
West	0.9x	0.77		X	1.6	7	X	1	15.77	X		0.63	X		0.7		=	59.09	(80)
West	0.9x	0.77		X	2.2	4	X	1	15.77	X		0.63	X		0.7		=	79.25	(80)
West	0.9x	0.77		X	1.5	5	x	1	15.77	X		0.63	X		0.7		=	53.07	(80)
West	0.9x	0.77		X	1.6	7	x	1	10.22	x		0.63	X		0.7		=	56.25	(80)
West	0.9x	0.77		X	2.2	4	x	1	10.22	x		0.63	X		0.7		=	75.45	(80)
West	0.9x	0.77		X	1.5	5	x	1	10.22	x		0.63	X		0.7		=	50.53	(80)
West	0.9x	0.77		X	1.6	7	x	9	4.68	X		0.63	X		0.7		=	48.32	(80)
West	0.9x	0.77		X	2.2	4	x	9	4.68	x		0.63	X		0.7		=	64.81	(80)
West	0.9x	0.77		X	1.5	5	x	9	4.68	x		0.63	X		0.7		=	43.4	(80)
West	0.9x	0.77		X	1.6	7	x	7	3.59	x		0.63	X		0.7		=	37.56	(80)
West	0.9x	0.77		X	2.2	4	x	7	3.59	x		0.63	X		0.7		=	50.38	(80)
West	0.9x	0.77		X	1.5	5	x	7	3.59	x		0.63	X		0.7		=	33.73	(80)
West	0.9x	0.77		X	1.6	7	x	4	5.59	x		0.63	X		0.7		=	23.27	(80)
West	0.9x	0.77		X	2.2	4	x	4	5.59	x		0.63	x		0.7		=	31.21	(80)
West	0.9x	0.77		X	1.5	5	x	4	5.59	x		0.63	X		0.7	司	=	20.9	(80)
West	0.9x	0.77		X	1.6	7	x	2	4.49	X		0.63	X		0.7		=	12.5	(80)
West	0.9x	0.77		X	2.2	4	x	2	4.49	x		0.63	X		0.7		=	16.76	(80)
West	0.9x	0.77		X	1.5	5	x	2	4.49	X		0.63	X		0.7		=	11.23	(80)
West	0.9x	0.77		X	1.6	7	х	1	6.15	X		0.63	X		0.7	一	=	8.24	(80)
West	0.9x	0.77		X	2.2	4	x	1	6.15	X		0.63	X		0.7	一	=	11.06	(80)
West	0.9x	0.77		X	1.5	5	x	1	6.15	X		0.63	X		0.7	〓	=	7.4	(80)
	<u>L</u>									J									
Solar g	ains in	watts, ca	alculate	ed	for each	n mont	th			(83)m	n = Su	ım(74)m .	(82)n	า					
(83)m=	104.14	203.72	335.5		489.3	599.66	6	13.86	584.42	502	.01	390.2	241.7	73	129.85	85.	64		(83)
Total g	ains – ir	nternal a	nd sol	ar	(84)m =	(73)m	า + (83)m	, watts									'	
(84)m=	509.06	606.64	725.5	4	858.56	947.84	4 9	41.67	898.95	822	.32	721.14	593.6	67	505.93	479	.79		(84)
7. Me	an inter	nal temp	eratur	e (heating	seaso	n)												
Temp	erature	during h	eating	ре	eriods ir	the liv	ving	area	from Tal	ble 9	, Th1	(°C)						21	(85)
Utilisa	ation fac	tor for ga	ains fo	r li	ving are	a, h1,	m (s	ee Ta	ble 9a)										
ſ	Jan	Feb	Mai	r	Apr	May	7	Jun	Jul	Α	ug	Sep	Oc	t	Nov	D	ес		
(86)m=	1	0.99	0.96	1	0.85	0.66		0.47	0.34	0.3		0.65	0.93	3	0.99	1			(86)
Mean	interna	l tempera	ature i	n li	iving are	2a T1	follo	nw ste	ns 3 to 7	7 in T	ahle	90)		•				l	
(87)m=	20.1	20.28	20.56	$\overline{}$	20.84	20.97	`	21	21	2	$\overline{}$	20.98	20.7	7	20.37	20.	07		(87)
	oroturo	طيية مام							from To	hla (
1 emp (88)m=	erature 20.12	during h	20.12	÷	20.13	20.14	$\overline{}$	veiling 20.15	20.15	20.		20.14	20.1	<u>4</u> T	20.13	20.	13		(88)
(00)111=				!_						<u> </u>		20.17		<u>. </u>	_0.10				(50)
1 14																			
Utilisa (89)m=	ation fac	tor for ga	ains fo 0.95	r r	0.82	velling 0.61	$\overline{}$	<u>,m (se</u> 0.41	e Lable	9a) 0.3	, 1	0.57	0.9		0.99	1		I	(89)

Mean ir	nternal	temper	ature in t	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to 7	7 in Tabl	e 9c)				
(90)m=	18.91	19.18	19.58	19.97	20.11	20.15	20.15	20.15	20.13	19.88	19.33	18.88		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.35	(91)
Mean ir	ntornal	tompor	ature (fo	r the wh	olo dwel	lling) – f	ΙΛ ν Τ1	⊥ (1 _ fl	۸) ی T2			·		_
	19.33	19.56	19.92	20.27	20.41	20.44	20.45	20.45	20.43	20.19	19.69	19.3		(92)
` ′ _			he mean				m Table							` ,
····-	19.33	19.56	19.92	20.27	20.41	20.44	20.45	20.45	20.43	20.19	19.69	19.3		(93)
_			uirement											
Set Ti to	o the m	nean inte	ernal ten or gains u	nperatur		ed at st	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisati	on fact	or for ga	ains, hm	:										
94)m=	0.99	0.98	0.94	0.82	0.63	0.43	0.3	0.34	0.6	0.9	0.98	1		(94)
Useful (gains, ł	nmGm ,	W = (94)	1)m x (8	4)m									
(95)m= 5	505.73	596.15	685.4	708.27	595.45	403.8	266.58	279.65	431.82	536.95	498.07	477.47		(95)
Monthly	y avera	ge exte	rnal tem	perature	from Ta	able 8	!		!					
96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat los	ss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
97)m= 1	083.43	1053.6	961.01	801.93	612.42	405.25	266.71	279.93	441.15	674.28	890.72	1074.32		(97)
Space I	heating	require	ement fo	r each n	nonth, k\	/Vh/mon	th = 0.02	24 x [(97))m – (95)m] x (4 ²	1)m			
98)m= 4	429.81	307.4	205.06	67.43	12.62	0	0	0	0	102.17	282.71	444.06		
<u> </u>						<u>. </u>	!	Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	1851.27	(98)
Snace k	heating	ı roquire	ement in	k\Mh/mã	2/vear								24.65	<u> </u>
•		•			•								24.00	
			nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space		_	it from se	ocondor	v/cupple	montory	cyctom						0	(201
	•			-		memary	•	(202) 1	(201)				0	╡`
	•		it from m	•	` '			(202) = 1 -					<u> </u>	(202
Fraction	n of tota	al heatir	ng from r	main sys	stem 1			(204) = (204)	02) x [1 –	(203)] =			1	(204
Efficien	icy of m	ıain spa	ace heati	ng syste	em 1								93.5	(206
Efficien	icy of s	econda	ry/supple	ementar	y heating	g systen	ո, %						0	(208
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊐ ar
Space I			ement (c		<u> </u>	L		7.09	000				,	.
· —	429.81	307.4	205.06	67.43	12.62	0	0	0	0	102.17	282.71	444.06		
L		l	4)1 1 v 1		l	l	<u> </u>		l .					(214
`		328.77	4)] } x 1 219.31	72.12	13.5	0	0	0	0	109.28	302.36	474.93		(211
_4	+59.69	320.77	219.31	72.12	13.5	0			l (kWh/yea				4070.07	7,044
								Tota	ii (KVVII/yea	ar) =3um(2	- 1 1,5,1012	-	1979.97	(211
Snacak	•	,	econdary	• , .	month									
•	n x (201													
= {[(98 <u>)</u> m			0	0	0	0	0	0	0	0	0	0		_
- = {[(98 <u>)</u> m	0	0			<u> </u>			T-1)4 <i>E</i> \			
- = {[(98)m 215)m=	0							Tota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	F	0	(215
= {[(98)m (215)m= Water he	0 eating							Tota	il (kWh/yea	ar) =Sum(2	215) _{15,1012}	F	0	(215
= {[(98)m 215)m= Water h c	eating	iter heat	ter (calcu	ulated al		444.00	405.55						0	(215
= {[(98)m 215)m= Water h o	eating rom wa	iter heat 170.96	ter (calcu		bove) 157.84	141.09	135.55	Tota	148.39	166.98	215) _{15,1012}	189.3	79.8	(215

	-					1				1	
()	.17 82.69	80.5	79.8	79.8	79.8	79.8	83.55	86.06	87.01		(217)
Fuel for water heating, kW $(219)m = (64)m \times 100 \div (64)m$											
$ \frac{(219)m}{(219)m} = 223.24 197.96 210 $		196.07	176.8	169.86	186.31	185.95	199.86	205.08	217.55]	
	•				Tota	l = Sum(2	19a) ₁₁₂ =		•	2364.29	(219)
Annual totals							k\	Wh/yea	•	kWh/yea	<u></u>
Space heating fuel used, n	nain system	1								1979.97	
Water heating fuel used										2364.29	
Electricity for pumps, fans	and electric	keep-ho	t								
central heating pump:									30]	(230c)
boiler with a fan-assisted	flue								45	j	(230e)
Total electricity for the abo	ve, kWh/yea	ır			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting										328.89	(232)
12a. CO2 emissions – Inc	lividual heat	ing syste	ms inclu	uding mi	cro-CHF						
12a. CO2 emissions – Inc	lividual heat	ing syste			cro-CHF)	F		1	Finite	
12a. CO2 emissions – Inc	lividual heat	ing syste	En	uding mi ergy /h/year	cro-CHF		Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/ye	
12a. CO2 emissions – Inc		ing syste	En kW	ergy	cro-CHF			2/kWh	tor =		
	m 1)	ing syste	En kW (21	ergy /h/year	cro-CHF)	kg CO	2/kWh		kg CO2/ye	ar
Space heating (main syste	m 1)	ing syste	En kW (21	ergy /h/year	cro-CHF		kg CO	2/kWh	=	kg CO2/ye	ar (261)
Space heating (main syste	m 1)	ing syste	En kW (211 (218	ergy /h/year 1) x 5) x			0.2°	2/kWh	=	kg CO2/ye	ar (261) (263)
Space heating (main syste Space heating (secondary) Water heating	m 1)		En kW (211 (218 (267	hergy /h/year 1) x 5) x			0.2°	2/kWh 16 19	=	kg CO2/ye 427.67 0 510.69	(261) (263) (264)
Space heating (main syste Space heating (secondary) Water heating Space and water heating	m 1)		(21s) (26s) (23s)	nergy /h/year 1) x 5) x 9) x			0.2°	16 19 16	= = =	kg CO2/ye 427.67 0 510.69 938.36	(261) (263) (264) (265)
Space heating (main syste Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans	m 1)		(21s) (26s) (23s)	hergy /h/year 1) x 5) x 9) x 1) + (262)		(264) =	0.2° 0.5° 0.5°	2/kWh 16 19 16	= = =	kg CO2/ye 427.67 0 510.69 938.36 38.93	(261) (263) (264) (265) (267)
Space heating (main system Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans Electricity for lighting	m 1)		(21s) (26s) (23s)	hergy /h/year 1) x 5) x 9) x 1) + (262)		(264) =	0.2° 0.5° 0.5° 0.5°	2/kWh 16 19 16	= = =	kg CO2/ye 427.67 0 510.69 938.36 38.93 170.7	(261) (263) (264) (265) (267) (268)

TER =

(273)

22.16

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:37:47

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 80m² Site Reference: Plot Reference: Maitland Park Estate AC 107

AC 107, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

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

Dwelling Carbon Dioxide Emission Rate (DER) 5.23 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 40.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 35.4 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.12 (max. 0.70) External wall 0.12 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK** (no floor) Floor

Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

Regulations Compliance Report

_ow energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.53	
Maximum	1.5	ОК
MVHR efficiency:	90%	
Minimum	70%	ОК
Summertime temperature		
Overheating risk (Thames valley):	Medium	ок
sed on:		
Overshading:	Average or unknown	
Windows facing: West	1.87m²	
Windows facing: North	2.24m²	
Windows facing: North	9.83m²	
Windows facing: West	1.5m²	
Windows facing: West	1.5m²	
Windows facing: West	2.71m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
Key features		
Air permeablility	2.0 m ³ /m ² h	
External Walls U-value	0.12 W/m ² K	
Party Walls U-value	0 W/m²K	
Community heating, heat from electric heat pump Photovoltaic array		

			11	lear D	etails:						
Access Names	John Circ	200				. NI	b		CTDA	000072	
Assessor Name:	John Simps				Stroma					0006273	
Software Name:	Stroma FS	AP 2012			Softwa				versic	n: 1.0.4.26	
		•	•	ĺ	Address:						
Address :	AC 107, Asp	pen Court, N	1aitland	d Park	Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:										
				Area			Av. He	ight(m)	_	Volume(m	<u>-</u>
Ground floor					80	(1a) x	2	2.6	(2a) =	208	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n)		80	(4)					
Dwelling volume			_			(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	208	(5)
2. Ventilation rate:											
	main heating	seco heat		•	other		total			m³ per hou	ır
Number of chimneys	0	+)	+	0] = [0	X	40 =	0	(6a)
Number of open flues	0	Ī + 🗔		+ 🗀	0] = [0	×	20 =	0	(6b)
Number of intermittent fa	ans					, <u> </u>	0	×	10 =	0	(7a)
Number of passive vents	3					F	0	×	10 =	0	(7b)
Number of flueless gas f	ires					F	0	×	40 =	0	(7c)
						L					
									Air ch	nanges per h	our
Infiltration due to chimne	ys, flues and fa	ans = (6a) + (6a)	b)+(7a)+	+(7b)+(7	7c) =		0		÷ (5) =	0	(8)
If a pressurisation test has b			oceed to	(17), o	otherwise o	ontinue fr	om (9) to	(16)			_
Number of storeys in t	he dwelling (ns	s)								0	(9)
Additional infiltration								[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0						•	ruction			0	(11)
if both types of wall are p deducting areas of openi			ing to the	e greate	er wall area	a (after					
If suspended wooden	floor, enter 0.2	(unsealed)	or 0.1 ((seale	d), else	enter 0				0	(12)
If no draught lobby, en	iter 0.05, else e	enter 0								0	(13)
Percentage of window	s and doors dr	aught stripp	ed							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,	q50, expresse	d in cubic m	etres p	er ho	ur per so	quare m	etre of e	envelope	area	2	(17)
If based on air permeabi			-		•	•		•		0.1	(18)
Air permeability value applie	,						is being u	sed		V	(` -/
Number of sides sheltered	ed									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) =				0.08	(21)
Infiltration rate modified	for monthly win	d speed									
Jan Feb	Mar Apr	May J	un -	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table	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					_					
vviilu i aciti (22a)iii = (2		1.00		0.05	0.00			T		1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

djusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m			_			
0.11	0.11	0.1	0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.1	0.1			
Calculate effect If mechanica		•	rate for t	пе арріі	саріе са	se						0.5	<u> </u>	7
If exhaust air h			endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5		`
If balanced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				76.		`` (;
a) If balance	ed mecha	anical ve	entilation	with hea	at recove	erv (MV	HR) (24a	a)m = (2:	2b)m + (23b) x [1 – (23c)			٧,
4a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]		(
b) If balance	ed mecha	ı anical ve	entilation	without	heat rec	overv (ľ	л МV) (24b)m = (2:	2b)m + (23b)	Į	J		
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1		(
c) If whole h	ouse ex	tract ver	tilation o	or positiv	re input v	rentilatio	on from o	utside				J		
,				•	•		c) = (22b		.5 × (23b	o)				
1c)m= 0	0	0	0	0	0	0	0	0	0	0	0]		(
d) If natural	ventilatio	on or wh	ole hous	e positiv	e input	ventilati	on from I	oft		!		•		
if (22b)n	n = 1, the	en (24d)	m = (221))m othe	rwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]					
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0			
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	ld) in box	(25)		,	,			
5)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22			(
. Heat losse	s and he	eat loss r	paramete	er:										
LEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/		k-value kJ/m²-l		A X kJ/ŀ	
indows Type		(111-)	11	<u></u>	1.87		/[1/(1.4)+		2.48		KJ/III-•I		KJ/T	`
						_				=				
indows Type					2.24	_	/[1/(1.4)+		2.97	=				(
indows Type					9.83		/[1/(1.4)+		13.03	=				
indows Type					1.5		/[1/(1.4)+		1.99	_				
indows Type					1.5		/[1/(1.4)+		1.99					(
indows Type	6				2.71	x1	/[1/(1.4)+	0.04] =	3.59					(
alls	48.8	35	19.6	5	29.2	Х	0.12	=	3.5					
otal area of e	lements	, m²			48.85	5								
arty wall					44.62	<u>x</u>	0	=	0					
or windows and						ated using	g formula 1	/[(1/U-valu	ıe)+0.04] á	as given in	paragraph	n 3.2		_
include the area				ls and part	titions		(00) (00)	(22)						_
bric heat los		•	U)				(26)(30)		(2.2)	-) ()	(22.)	29.5	56	<u> </u>
eat capacity	,	,							(30) + (32	, , ,	(32e) =	0		┙
nermal mass	•	•		•					tive Value			250)	_](
r design assess n be used inste				constructi	ion are not	known pi	recisely the	indicative	values of	IMPINI	able 1f			
nermal bridge				using Ap	pendix ł	<						7.6	 2	٦
letails of therma	•	,			•								<u>-</u>	
otal fabric he	at loss							(33) +	(36) =			37.1	8	
entilation hea	at loss ca	alculated	monthly	/				(38)m	= 0.33 × ((25)m x (5))			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
3)m= 15.5	15.36	15.21	14.48	14.34	13.61	13.61	13.46	13.9	14.34	14.63	14.92			(
eat transfer o	coefficier	nt, W/K						(39)m	= (37) + (38)m				
9)m= 52.68	52.53	52.39	51.66	51.51	50.78	50.78	50.64	51.08	51.51	51.8	52.1]		
						L		<u> </u>						7

Momber of days in month (Table 1a) May Jun Jul Aug Sep Oct Nov Dec	Heat loss para	ımeter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 0.66	0.66	0.65	0.65	0.64	0.63	0.63	0.63	0.64	0.64	0.65	0.65		
A		!	!							Average =	Sum(40) ₁	12 /12=	0.65	(40)
4. Water heating energy requirement: **RWh/year** Assumed occupancy, N		1	<u> </u>	· ·										
### A Water heating energy requirement: **RSSUMED COCUPATION, No. 14 1 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2]) + 0.0013 x (TFA -13.9) = (42) (17A - 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2]) + 0.0013 x (TFA -13.9) = (42) (17A - 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2]) + 0.0013 x (TFA -13.9) = (43) (43) (44) (47) x (15) x		_	 		– –		-	Ť		 	 	 		()
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA E 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per per flow for each month Vd.m = factor from Table 1c x (43) [44]m= [101.96] [32.96] [43] [44]m= [101.96] [39.82.5] [44]m= [101.96] [39.82.5] [45] [44]m= [101.96] [39.82.5] [45] [46]m= [201.96] [47] [46]m= [201.96] [48] [48] [49] [49] [40]	(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA E 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per per flow for each month Vd.m = factor from Table 1c x (43) [44]m= [101.96] [32.96] [43] [44]m= [101.96] [39.82.5] [44]m= [101.96] [39.82.5] [45] [44]m= [101.96] [39.82.5] [45] [46]m= [201.96] [47] [46]m= [201.96] [48] [48] [49] [49] [40]														
if TFA > 13.9, N = 1 * 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use larget or not more that 125 times per persona per day (all water use, hot and cold) Jan	4. Water hea	ting ene	rgy requi	irement:								kWh/ye	ear:	
Transmit an animal average hot water uses by 5% if the divelling is designed to achieve a water use target or animal average hot water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	if TFA > 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		46		(42)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)	Reduce the annua	al average	hot water	usage by	5% if the a	lwelling is	designed i			se target c		2.69		(43)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Total = Sum(44)									- 1					
Energy content of hot water used - calculated monthly = 4.190 x Vd.m x mm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) Total = Sum(45)_{1.21} 132.25 136.47 118.97 114.16 98.51 91.28 104.75 106 123.53 134.85 146.44 Total = Sum(45)_{1.21} 1458.42 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)ms 22.68 19.84 20.47 17.85 17.12 14.78 13.69 15.71 15.9 18.53 20.23 21.97 (46)ms 22.68 19.84 20.47 17.85 17.12 14.78 13.69 15.71 15.9 18.53 20.23 21.97 (47) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0	(44)m= 101.96	98.25	94.55	90.84	87.13	83.42	83.42	87.13	90.84	94.55	98.25	101.96		
(45)m= 151.21 132.25 136.47 118.97 114.16 98.51 91.28 104.75 106 123.53 134.85 146.44			!	<u> </u>	ļ	<u> </u>	<u> </u>	<u> </u>		Total = Su	ım(44) ₁₁₂ =	<u>-</u>	1112.32	(44)
## Total = Sum(45)	Energy content of	hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	n x nm x E	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
## instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### (46)ms ## 22.68	(45)m= 151.21	132.25	136.47	118.97	114.16	98.51	91.28	104.75	106	123.53	134.85	146.44		
(46)m= 22.68 19.84 20.47 17.85 17.12 14.78 13.69 15.71 15.9 18.53 20.23 21.97 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost from Table 2	16 100 100 100 100 100 100 100 100 100 1					()		h (40		Total = Su	ım(45) ₁₁₂ =	=	1458.42	(45)
Water storage loss: 0 (47) Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) (47) Water storage loss: 0 (48) a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: 110 0.02 (51) Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 0.02 (51) Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Enter (50) or (54) in (55) 1.03 (54) (54) Enter (50) or (54) in (55) 1.03 (55) (56) Water storage loss calculated for each month ((56)m = (55) x				·	not water	r storage), r		DOXES (46)	, , , -					
Storage volume (litres) including any solar or WWHRS storage within same vessel	· · ·	l	20.47	17.85	17.12	14.78	13.69	15.71	15.9	18.53	20.23	21.97		(46)
If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Cemperature factor from Table 2b Energy lost from water storage, kWh/year Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 1.03 (54) Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = (55) × (41)m) (56)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 If cylinder contains dedicated solar storage, (57)m = (56)m × ((50) – (H11)) ÷ (50), else (57)m = (56)m where (H11) is from Appendix H (57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	=) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = Enter (50) or (54) in (55) Water storage loss calculated for each month ((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 If cylinder contains dedicated solar storage, (57)m = (56)m × ((50) - (H11)] + (50), else (57)m = (56)m where (H11) is from Appendix H (57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) + 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	•	` '					•					<u> </u>		(,
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = (32.01) 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) - (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H (57)m = (32.01) 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	-	-			-			, ,	ers) ente	er '0' in ((47)			
Temperature factor from Table 2b	Water storage	loss:												
Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) = 1.03$ (54) Enter (50) or (54) in (55) 1.03 (55) Water storage loss calculated for each month $((56)m = (55) \times (41)m)$ (56) $m = (55) \times (41)m$ (56) $m = (56)m \times (57)m = (56)m \times $	a) If manufact	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = (53)) Water storage loss calculated for each month ((56)m = (55)) × (41)m (56)m = (55)) × (41)m (56)m = (55)) × (41)m (57)m = (55)) × (57)m = (56) m × (50) – (111)] ÷ (50), else (57)m = (56) m where (H11) is from Appendix H (57)m = (57)) × (58) × (41)m (59)m = (55)) × (41)m	Temperature f	actor fro	m Table	2b								0		(49)
Hot water storage loss factor from Table 2 (kWh/litre/day) $0.02 \qquad (51)$ If community heating see section 4.3 $ \text{Volume factor from Table 2a} \qquad 1.03 \qquad (52) \\ \text{Temperature factor from Table 2b} \qquad 0.6 \qquad (53) \\ \text{Energy lost from water storage, kWh/year} \qquad (47) \times (51) \times (52) \times (53) = \qquad 1.03 \qquad (54) \\ \text{Enter (50) or (54) in (55)} \qquad (1.03) \qquad (55) \\ \text{Water storage loss calculated for each month} \qquad ((56)m = (55) \times (41)m) \\ (56)m = 32.01 28.92 32.01 30.98 $	0,		•					(48) x (49)) =		1	10		(50)
If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = $(55) \times (41)$ m (56)m = $(52) \times (53) = (53)$ Water storage loss calculated for each month ((56)m = $(55) \times (41)$ m (56)m = $(55) \times (41)$ m (56)m = $(55) \times (41)$ m (57)m = $(57) \times (51) \times (52) \times (53) = (56)$ m where (H11) is from Appendix H (57)m = $(57) \times (57)	•			-										(54)
Volume factor from Table 2a		-			e z (KVV	n/iitre/ua	iy)				0.	.02		(51)
Temperature factor from Table 2b	•	•		011 4.0							1.	.03		(52)
Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (56) If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) - (H11)] \div (50), else (57)m = (56)m where (H11) is from Appendix H (57)m = 32.01 28.92 32.01 30.98 32.0	Temperature f	actor fro	m Table	2b							-			
Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (56) If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) - (H11)] \div (50), else (57)m = (56)m where (H11) is from Appendix H (57)m = 32.01 28.92 32.01 30.98 32.0	Energy lost fro	m watei	rstorage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	.03		(54)
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (56) If cylinder contains dedicated solar storage, $(57)m = (56)m \times [(50) - (H11)] \div (50)$, else $(57)m = (56)m \text{ where (H11)}$ is from Appendix H (57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57) Primary circuit loss (annual) from Table 3 0 (58) Primary circuit loss calculated for each month $(59)m = (58) \div 365 \times (41)m$ (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	••		_								-			
If cylinder contains dedicated solar storage, $(57)m = (56)m \times [(50) - (H11)] \div (50)$, else $(57)m = (56)m$ where $(H11)$ is from Appendix H $(57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)$ Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month $(59)m = (58) \div 365 \times (41)m$ (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	Water storage	loss cal	culated t	for each	month			((56)m = ((55) × (41)	m				
If cylinder contains dedicated solar storage, $(57)m = (56)m \times [(50) - (H11)] \div (50)$, else $(57)m = (56)m$ where $(H11)$ is from Appendix H $(57)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)$ Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month $(59)m = (58) \div 365 \times (41)m$ (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	(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)
Primary circuit loss (annual) from Table 3 O (58) Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	` '												ix H	. ,
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	(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)
Primary circuit loss calculated for each month (59)m = (58) ÷ 365 × (41)m (modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)		loos (s:	nuol\ f==	m Table	. 2		!	ļ	!		\vdash			(58)
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	•	`	,			59)m = 4	(58) ± 36	35 × (41)	ım			•		(30)
	•				,	•	` '	, ,		r thermo	stat)			
	· ·			ı —	ı —	ı —			<u> </u>	1	- 	23.26		(59)

O			.	-1-		(04)	/ 00	·\	OF (44)	١									
r		alculated		cn I	i		(6C		· ` `		. 1			1		Ι.		1	(64)
(61)m=	0	0	0	ᆜ	0	0	Ļ	0	0	(2.2)		0	0		0	(==)			(61)
r		. 		_			_			È É	_		` ´	`		Èή		(59)m + (61)m 1	(00)
(62)m=	206.48		191.7		172.47	169.44	<u> </u>	152	146.56	160		159.5	178.8		88.34	201			(62)
		calculated	_										r contrib	oution	to wate	er hea	ting)		
` r		al lines if		3 6			ap		·	-						-		1	(00)
(63)m=	0	0	0		0	0		0	0	0)	0	0		0	0)		(63)
· r		vater hea		.			_			l				. 1 .		T		1	
(64)m=	206.48	182.17	191.7	4	172.47	169.44		152	146.56	160		159.5	178.8		88.34	201	./1	0400.00	1(64)
												ut from wa						2109.26	(64)
		om water	r —	Ť			_			<u> </u>	_			_		r i		[] 1	
(65)m=	94.5	83.91	89.6		82.35	82.18	<u> </u>	5.55	74.57	79.		78.04	85.3		7.63	92.			(65)
inclu	de (57)m in cald	culatio	n o	f (65)m	only if o	ylir	nder i	s in the o	dwell	ing	or hot w	ater is	from	com	mun	ity ł	neating	
5. Into	ernal g	ains (see	Table	e 5	and 5a)):													
Metabo	olic gai	ns (Table	5), W	atts	s														
	Jan	Feb	Ma	r	Apr	May		Jun	Jul	Α	ug	Sep	Oc	t	Nov	D	ес		
(66)m=	123.14	123.14	123.1	4	123.14	123.14	12	23.14	123.14	123	.14	123.14	123.1	4 12	23.14	123	.14		(66)
Lighting	g gains	s (calcula	ted in	Apı	pendix I	L, equat	ion	L9 o	r L9a), a	lso s	ee ⁻	Table 5							
(67)m=	19.56	17.38	14.13	3	10.7	8	(6.75	7.3	9.4	18	12.73	16.16	3 1	8.86	20.	11		(67)
Appliar	nces ga	ains (calc	ulated	in	Append	dix L, eq	uat	ion L	13 or L1	3a),	also	see Ta	ble 5	-					
(68)m=	219.44	221.72	215.9	8	203.76	188.34	1	73.85	164.17	161	.89	167.63	179.8	4 19	95.27	209	.76		(68)
Cookin	g gain	s (calcula	ted in	Аp	pendix	L, equa	tior	L15	or L15a)	, als	o se	e Table	5	•		•		•	
(69)m=	35.31	35.31	35.31	П	35.31	35.31	3	5.31	35.31	35.	31	35.31	35.3	1 3	5.31	35.	31]	(69)
Pumps	and fa	ans gains	(Table	e 5a	 a)		•		•	•				•		•		•	
(70)m=	0	0	0	T	0	0		0	0	0)	0	0		0	0)]	(70)
Losses	e.g. e	vaporatio	n (neg	gati	ve valu	es) (Tab	le :	5)	•									•	
(71)m=	-98.51	-98.51	-98.5	1	-98.51	-98.51	-6	98.51	-98.51	-98	.51	-98.51	-98.5	1 -9	98.51	-98	.51]	(71)
Water I	heating	gains (T	able 5	 5)			_		•									•	
(72)m=	127.01	124.87	120.4	3	114.38	110.46	10	04.93	100.23	106	.25	108.39	114.6	5 1:	21.71	124	.88]	(72)
Total ii	nterna	l gains =					_	(66))m + (67)m	ı + (68	3)m +	- (69)m + ((70)m +	(71)m	+ (72))m		1	
(73)m=	425.96	, 	410.4	8	388.79	366.74	34	45.47	331.64	337	.57	348.69	370.5	9 39	95.78	414	.69]	(73)
6. Sol	ar gair	ns:												-					
Solar g	ains are	calculated	using so	olar	flux from	Table 6a	and	assoc	iated equa	tions	to co	nvert to th	e appli	able o	rientat	tion.			
Orienta	ation:	Access F			Area			Flu				g_			FF			Gains	
		Table 6d			m²			Tal	ble 6a		Т	able 6b		Tabl	e 6c			(W)	
North	0.9x	0.77		x	2.2	24	x	1	0.63	X		0.4	×		0.8		=	5.28	(74)
North	0.9x	0.77		x	9.8	3	x	1	0.63	x		0.4	×		0.8		=	23.18	(74)
North	0.9x	0.77		x	2.2	24	x		20.32	x		0.4	x		0.8		=	10.09	(74)
North	0.9x	0.77		x	9.8	3	x	2	20.32	x		0.4	×		0.8	一	=	44.3	(74)
North	0.9x	0.77		x	2.2	24	x	3	34.53	x		0.4	x		0.8		=	17.15	(74)

	_		_		_								
North	0.9x	0.77	X	9.83	X	34.53	X	0.4	X	0.8	=	75.27	(74)
North	0.9x	0.77	X	2.24	X	55.46	x	0.4	X	0.8	=	27.55	(74)
North	0.9x	0.77	X	9.83	X	55.46	X	0.4	x	0.8	=	120.91	(74)
North	0.9x	0.77	X	2.24	X	74.72	X	0.4	x	0.8	=	37.11	(74)
North	0.9x	0.77	X	9.83	X	74.72	X	0.4	X	0.8	=	162.87	(74)
North	0.9x	0.77	X	2.24	X	79.99	X	0.4	X	0.8	=	39.73	(74)
North	0.9x	0.77	X	9.83	X	79.99	X	0.4	X	0.8	=	174.36	(74)
North	0.9x	0.77	X	2.24	X	74.68	X	0.4	X	0.8	=	37.1	(74)
North	0.9x	0.77	X	9.83	X	74.68	X	0.4	x	0.8	=	162.79	(74)
North	0.9x	0.77	X	2.24	X	59.25	X	0.4	X	0.8	=	29.43	(74)
North	0.9x	0.77	X	9.83	X	59.25	X	0.4	x	0.8	=	129.15	(74)
North	0.9x	0.77	X	2.24	X	41.52	X	0.4	x	0.8	=	20.62	(74)
North	0.9x	0.77	X	9.83	X	41.52	X	0.4	X	0.8	=	90.5	(74)
North	0.9x	0.77	X	2.24	X	24.19	x	0.4	x	0.8	=	12.02	(74)
North	0.9x	0.77	X	9.83	X	24.19	X	0.4	x	0.8	=	52.73	(74)
North	0.9x	0.77	X	2.24	X	13.12	X	0.4	X	0.8	=	6.52	(74)
North	0.9x	0.77	X	9.83	X	13.12	x	0.4	x	0.8	=	28.6	(74)
North	0.9x	0.77	X	2.24	X	8.86	X	0.4	x	0.8	=	4.4	(74)
North	0.9x	0.77	X	9.83	X	8.86	X	0.4	X	0.8	=	19.32	(74)
West	0.9x	0.77	X	1.87	X	19.64	x	0.4	X	0.8	=	8.14	(80)
West	0.9x	0.77	X	1.5	X	19.64	X	0.4	x	0.8	=	6.53	(80)
West	0.9x	0.77	X	1.5	X	19.64	x	0.4	x	0.8	=	6.53	(80)
West	0.9x	0.77	X	2.71	X	19.64	X	0.4	X	0.8	=	11.8	(80)
West	0.9x	0.77	X	1.87	X	38.42	X	0.4	X	0.8	=	15.93	(80)
West	0.9x	0.77	X	1.5	X	38.42	x	0.4	X	0.8	=	12.78	(80)
West	0.9x	0.77	X	1.5	X	38.42	X	0.4	X	0.8	=	12.78	(80)
West	0.9x	0.77	X	2.71	X	38.42	X	0.4	X	0.8	=	23.09	(80)
West	0.9x	0.77	X	1.87	X	63.27	X	0.4	X	0.8	=	26.24	(80)
West	0.9x	0.77	X	1.5	X	63.27	X	0.4	X	0.8	=	21.05	(80)
West	0.9x	0.77	X	1.5	X	63.27	X	0.4	X	0.8	=	21.05	(80)
West	0.9x	0.77	X	2.71	X	63.27	X	0.4	X	0.8	=	38.03	(80)
West	0.9x	0.77	X	1.87	X	92.28	X	0.4	X	0.8	=	38.27	(80)
West	0.9x	0.77	X	1.5	X	92.28	X	0.4	X	0.8	=	30.7	(80)
West	0.9x	0.77	X	1.5	X	92.28	X	0.4	X	0.8	=	30.7	(80)
West	0.9x	0.77	X	2.71	X	92.28	X	0.4	X	0.8	=	55.46	(80)
West	0.9x	0.77	X	1.87	x	113.09	x	0.4	x	0.8] =	46.9	(80)
West	0.9x	0.77	X	1.5	x	113.09	x	0.4	x	0.8	=	37.62	(80)
West	0.9x	0.77	X	1.5	x	113.09	x	0.4	x	0.8	=	37.62	(80)
West	0.9x	0.77	X	2.71	x	113.09	x	0.4	x	0.8	=	67.97	(80)
West	0.9x	0.77	x	1.87	×	115.77	x	0.4	x	0.8	=	48.01	(80)
West	0.9x	0.77	X	1.5	×	115.77	X	0.4	X	0.8	=	38.51	(80)

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West	0.9x	0.77)	Ļ	1.5		X	1	15.77	X		0.4	×	0.8	-	= 3	8.51	(80)
West	0.9x	0.77)		2.71		X	1	15.77	X		0.4	X	0.8	=	= 6	9.57	(80)
West	0.9x	0.77)		1.87		X	1	10.22	X		0.4	X	0.8	=	= 4	5.71	(80)
West	0.9x	0.77	>		1.5		X	1	10.22	X		0.4	X	0.8	=	= 3	6.66	(80)
West	0.9x	0.77)		1.5		X	1	10.22	X		0.4	X	0.8	-	3	6.66	(80)
West	0.9x	0.77	>		2.71		X	1	10.22	X		0.4	X	0.8	=	= 6	6.24	(80)
West	0.9x	0.77)		1.87		x	9	4.68	X		0.4	X	0.8		= 3	9.26	(80)
West	0.9x	0.77)		1.5		x	9	4.68	X		0.4	X	0.8	=	3	1.49	(80)
West	0.9x	0.77)		1.5		x	9	4.68	X		0.4	X	0.8	-	3	1.49	(80)
West	0.9x	0.77)		2.71		x	9	4.68	X		0.4	X	0.8		=	56.9	(80)
West	0.9x	0.77)		1.87		x	7	3.59	X		0.4	X	0.8	-	= 3	0.52	(80)
West	0.9x	0.77)		1.5		X	7	3.59	X		0.4	X	0.8	=	= 2	4.48	(80)
West	0.9x	0.77)		1.5		x	7	3.59	x		0.4	X	0.8		2	4.48	(80)
West	0.9x	0.77)		2.71		x	7	3.59	x		0.4	X	0.8		= 4	4.22	(80)
West	0.9x	0.77)		1.87		x	4	5.59	X		0.4	X	0.8		1	8.91	(80)
West	0.9x	0.77	<u> </u>		1.5		x	4	5.59	x		0.4	×	0.8	╡:	· 1	5.16	(80)
West	0.9x	0.77	<u> </u>		1.5		x	4	5.59	x		0.4	x	0.8	<u> </u>	1	5.16	(80)
West	0.9x	0.77)		2.71		x	4	5.59	x		0.4	x	0.8	<u> </u>	= 2	27.4	(80)
West	0.9x	0.77)		1.87		x	2	4.49	x		0.4	x	0.8		· 1	0.16	(80)
West	0.9x	0.77)	F	1.5		x	2	4.49	x		0.4	X	0.8		= {	3.15	(80)
West	0.9x	0.77	,		1.5		x	2	4.49	x		0.4	X	0.8	一 .	= = {	3.15	(80)
West	0.9x	0.77	,		2.71		X	2	4.49	x		0.4	×	0.8	一 .	1	4.72	(80)
West	0.9x	0.77	,		1.87		X	1	6.15	X		0.4	x	0.8	〒.		6.7	(80)
West	0.9x	0.77)		1.5		x	1	6.15	x		0.4	×	0.8	一 -	- <u> </u>	5.37	(80)
West	0.9x	0.77	,		1.5		X	1	6.15	X		0.4	×	0.8	一 .	: ;	5.37	(80)
West	0.9x	0.77	,		2.71		X	1	6.15	X		0.4	x	0.8	〒.	= (9.71	(80)
	L									•								_
Solar ç	gains in	watts, ca	lculate	d for	each r	mont	h			(83)n	n = Sı	um(74)m	.(82)m					
(83)m=	61.48	118.97	198.78	303	.58 3	90.09) 4	108.7	385.15	317	7.73	234.82	141.3	8 76.28	50.88			(83)
Total g	ains – i	nternal a	nd sola	r (84)m = (73)m) + (83)m	, watts							_		
(84)m=	487.44	542.88	609.26	692	.36 7	756.83	3 7	54.17	716.79	655	.29	583.51	511.9	7 472.06	465.5	7		(84)
7. Me	an inter	nal temp	erature	(hea	iting s	easo	n)											
Temp	erature	during h	eating	oerio	ds in t	he liv	/ing	area 1	rom Tab	ole 9	, Th	1 (°C)					21	(85)
Utilisa	ation fac	ctor for ga	ains for	living	area	, h1,ı	m (s	ee Ta	ble 9a)									
ļ	Jan	Feb	Mar	A	pr	May	/	Jun	Jul	А	ug	Sep	Oc	Nov	Dec	;		
(86)m=	1	0.99	0.96	0.8	34	0.63		0.43	0.31	0.3	36	0.6	0.91	0.99	1			(86)
Mean	interna	l tempera	ature in	livin	area	T1 (follo	w ste	ns 3 to 7	7 in 1	 Table	9c)		•	•			
(87)m=	20.49	20.6	20.78	20		20.99		21	21	2	$\overline{}$	21	20.9	20.67	20.47			(87)
Tomn	oraturo	during h	oating	orio	de in r	oct c	of du	ellina	from Ta	hla	a Th	I >2 (°C)			<u> </u>			
(88)m=	20.38	20.38	20.38	20.		20.39	_	20.4	20.4	20		20.4	20.39	20.39	20.38			(88)
		<u> </u>								I	I	- '		1				. ,
Utilisa (89)m=	0.99	tor for ga	0.95	rest 0.8		0.59	$\overline{}$, m (se 0.39	e Table 0.27	9a) 0.:	3 ₁	0.55	0.88	0.98	1	\neg		(89)
(09)111=	0.55	0.99	0.30	1 0.0	′'	5.58		0.09	0.21	L 0	′']	0.00	0.00	0.90	<u> </u>			(00)

Mean interna	ıl temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	ps 3 to 7	7 in Tabl	le 9c)				
(90)m= 19.69	19.86	20.1	20.33	20.39	20.4	20.4	20.4	20.39	20.29	19.96	19.67		(90)
								1	fLA = Livin	g area ÷ (4) =	0.43	(91)
Mean interna	ıl temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
(92)m= 20.03	20.17	20.39	20.59	20.65	20.65	20.66	20.66	20.65	20.56	20.27	20.01		(92)
Apply adjustr	nent to t	he mear	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m= 20.03	20.17	20.39	20.59	20.65	20.65	20.66	20.66	20.65	20.56	20.27	20.01		(93)
8. Space hea	ating requ	uirement											
Set Ti to the the utilisation			•		ed at ste	ep 11 of	Table 9b	o, so tha	it Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:										
(94)m= 0.99	0.99	0.95	0.82	0.6	0.41	0.29	0.33	0.57	0.89	0.98	1		(94)
Useful gains,	hmGm	, W = (94	4)m x (84	4)m	r			r	ī	ī			
(95)m= 484.59	535.1	579.7	568.58	457.67	307.38	205.92	215.5	333.12	456.66	464.56	463.57		(95)
Monthly aver			i –										(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)
Heat loss rate	e for me:	an intern	603.94	erature,	Lm , VV =	=[(39)m 2 205.93	x [(93)m 215.51	- (96)m 334.58		682.08	823.58		(97)
(97)m= 828.86 Space heating	l		l .		l				512.86		623.56		(91)
(98)m= 256.14	179.61	110.05	25.46	2.33	0	0.02	0	0	41.81	156.62	267.85		
(00)	1.0.0.	1.0.00	201.10						(kWh/year		Ь Н	1039.87	(98)
Space heating	a requir	ement in	k\/\/h/m²	:/vear					(,(-	[13	(99)
•	•			•	م داد د داد د						l	10	
9b. Energy red This part is us							ing prov	idad by	a comm	unity ook	nomo		
Fraction of spa			• .		_		.	•		urilly Sci	ierrie.	0	(301)
Fraction of spa			•	• •	•			,			[1	(302)
The community s			•	-	,	,	allows for	CHP and i	un to four	other heat	sources: th	ne latter	`
includes boilers, I					•				up to rour	ouror riout	dodroco, u	io iditor	
Fraction of he	at from C	Commun	ity heat	oump								1	(303a)
Fraction of tot	al space	heat fro	m Comn	nunity he	eat pump)			(3	02) x (303	a) =	1	(304a
Factor for con	trol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distribution los	ss factor	(Table 1	2c) for c	commun	ity heatii	ng syste	m				ĺ	1.1	(306)
Space heatin	g											kWh/yea	 r
Annual space	heating	requiren	nent									1039.87	
Space heat fro	om Comi	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306)	= [1143.86	(307a)
Efficiency of s	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heating	require	ment fro	m secon	dary/sur	oplemen	tary syst	em	(98) x (30	01) x 100 -	÷ (308) =	j	0	(309)
Water heating	g										<u>.</u>		
Annual water	heating i	•										2109.26	
If DHW from o	ommuni	ty schem	ne:										

						-
Water heat from Community heat pum	p	(64) x (303a) x	(305) x (306) =		2320.19	(310a)
Electricity used for heat distribution		0.01 × [(307a)(307	7e) + (310a)(310e)] =		34.64	(313)
Cooling System Energy Efficiency Rati	0				0	(314)
Space cooling (if there is a fixed cooling	g system, if not enter 0	$= (107) \div (314)$) =		0	(315)
Electricity for pumps and fans within demechanical ventilation - balanced, extr	• · · · · ·	m outside			168.12	(330a)
warm air heating system fans					0	(330b)
pump for solar water heating					0	(330g)
Total electricity for the above, kWh/yea	ar	=(330a) + (330	0b) + (330g) =		168.12	(331)
Energy for lighting (calculated in Appel	ndix L)				345.49	(332)
Electricity generated by PVs (Appendix	KM) (negative quantity))			-827.35	(333)
Electricity generated by wind turbine (A	Appendix M) (negative	quantity)			0	(334)
12b. CO2 Emissions – Community hea	ating scheme					
		Energy	Emission factor			
		KVVII/Vear	ka CO2/kWh	Kat	JUZIVEAL	
CO2 from other sources of space and Efficiency of heat source 1 (%)	- ,	kWh/year P) sing two fuels repeat (363) to	kg CO2/kWh (366) for the second fu	_	CO2/year 	(367a)
·	If there is CHP us	· P)	(366) for the second fu	_	319	(367a)
Efficiency of heat source 1 (%)	If there is CHP us	P) sing two fuels repeat (363) to	(366) for the second fu	el [(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1	If there is CHP us	P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x	0.52 0.52	el	319 563.59	⊒ ` ¬
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	If there is CHP us [(307b	P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x [(313) x	0.52 0.52	el	319 563.59 17.98	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community	If there is CHP us [(307b) systems econdary)	(309) x Sing two fuels repeat (363) to (367b) x (367b) x (367b) x (367b) x (367b) x	0.52 0.52 2)	el	319 563.59 17.98 581.56	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see	If there is CHP us [(307th systems econdary) rsion heater or instanta	(309) x Sing two fuels repeat (363) to (367b) x (367b) x (367b) x (367b) x (367b) x	0.52 0.52 2)	el	319 563.59 17.98 581.56	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see	If there is CHP us [(307th systems econdary) rsion heater or instanta water heating	P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x neous heater (312) x (373) + (374) + (375) =	0.52 0.52 2)	el	319 563.59 17.98 581.56 0	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediately contained to the contained with space and contained contained to the contained con	If there is CHP us [(307th systems econdary) rsion heater or instanta water heating hps and fans within dwe	P) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x neous heater (312) x (373) + (374) + (375) =	0.52 0.52 0.52 0.52 0.52	el	319 563.59 17.98 581.56 0	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediately Total CO2 associated with space and with space	If there is CHP us [(307th systems econdary) rsion heater or instanta water heating hps and fans within dwe ting	p) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x neous heater (312) x (373) + (374) + (375) = elling (331)) x (332))) x	0.52 0.52 0.52 0.52 0.52 0.52	el	319 563.59 17.98 581.56 0 0 581.56 87.25 179.31	(367) (372) (373) (374) (375) (376) (378) (379)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediately Total CO2 associated with space and with electricity for pure CO2 associated with electricity for light Energy saving/generation technologies litem 1	If there is CHP us [(307th systems econdary) rsion heater or instanta water heating hps and fans within dwe ting s (333) to (334) as appl	p) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x neous heater (312) x (373) + (374) + (375) = elling (331)) x (332))) x	0.52 0.52 0.52 0.52 0.52	el	319 563.59 17.98 581.56 0 0 581.56 87.25 179.31	(367) (372) (373) (374) (375) (376) (378) (379) (380)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediately Total CO2 associated with space and with space	If there is CHP us [(307th systems econdary) rsion heater or instanta water heating hps and fans within dwe ting	p) sing two fuels repeat (363) to p)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(373) (309) x neous heater (312) x (373) + (374) + (375) = elling (331)) x (332))) x	0.52 0.52 0.52 0.52 0.52 0.52	el	319 563.59 17.98 581.56 0 0 581.56 87.25 179.31	(367) (372) (373) (374) (375) (376) (378) (379)

El rating (section 14)

(385)

95.51

		Llear-	Details:						
Assessor Name:	John Simpson	— 030 11	Strom	a Num	her:		STRO	0006273	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.4.26	
	F	Property	Address	: AC 107	7				
Address:	AC 107, Aspen Court, Mait	and Par	k Estate,	London	, NW3 2	EH.			
1. Overall dwelling dime	ensions:	Δre	ea(m²)		Δν Ηρ	ight(m)		Volume(m	3)
Ground floor			80	(1a) x		2.6	(2a) =	208	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	80	(4)	<u> </u>		J		
Dwelling volume		´ L)+(3c)+(3c	d)+(3e)+	.(3n) =	208	(5)
2. Ventilation rate:								200	
2. Verillation rate.	main seconda	ry	other		total			m³ per hou	ır
Number of chimneys	heating heating + 0	- + [0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 + 0	-	0	_ 	0	x	20 =	0	(6b)
Number of intermittent fa	uns				3	x	10 =	30	(7a)
Number of passive vents	3			L	0	x	10 =	0	(7b)
Number of flueless gas fi				L	0	X	40 =	0	(7c)
Training of macrosco gas in				L				Ů	(10)
							Air ch	nanges per h	our
	ys, flues and fans = $(6a)+(6b)+(6b)+(6b)$				30		÷ (5) =	0.14	(8)
	peen carried out or is intended, proced	ed to (17),	otherwise (continue fr	rom (9) to	(16)			— (0)
Number of storeys in the Additional infiltration	ne dwelling (ns)					[(9)	-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame o	r 0.35 fc	r mason	ry consti	ruction	[(0)	.,	0	(11)
	resent, use the value corresponding t	o the grea	iter wall are	a (after					
deducting areas of openii	^{ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or (}) 1 (seal	ed) else	enter 0				0	(12)
If no draught lobby, en	,	,,, (ooa.	ou), 0.00	011101 0				0	(13)
	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	2 x (14) ÷ 1	100] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
•	q50, expressed in cubic metr	-		•	etre of e	envelope	area	5	(17)
•	lity value, then $(18) = [(17) \div 20] +$. , .	,		0.39	(18)
Number of sides sheltere	es if a pressurisation test has been do ad	ne or a de	egree air pe	rmeability	is being u	sed		2	(19)
Shelter factor	, ,		(20) = 1 -	[0.075 x (19)] =			0.85	(20)
Infiltration rate incorporate	ting shelter factor		(21) = (18) x (20) =				0.34	(21)
Infiltration rate modified f	or monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed 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 = (2.	2)m ∸ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	
,	1 1 1 1 1 1 1 1 1 1	1	1					J	

Adjusted infiltr	ation rate	(allowi	ng for sh	elter an	d wind s	peed) =	(21a) x	(22a)m						
0.43	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.34	0.36	0.38	0.39			
Calculate effect		_	ate for t	he appli	cable ca	se	•		•	•	•	· 		7,
If mechanical			ndiv N (2	2h) _ (22c) v Emy (c	auation (N	JEN otho	auioo (22h) - (220)				0	(23a
If exhaust air h) = (23a)				0	(23b
If balanced with		-		_					21.) (001) [4 (00.)		0	(230
a) If balance						<u> </u>	- ^ ` `	<u> </u>	 	, 	' ' '	· ÷ 100] I		(246
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0			(24a
b) If balance					ı		- ^ `	<u> </u>	r Ó - Ò	'	Ι ,	1		(24h
(24b)m= 0	0	0	0	0	. ,	0	0	0	0	0	0			(24b
c) If whole h if (22b)r	n < 0.5 × (•	•				5 × (23b	o)	_			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0			(240
d) If natural if (22b)r	ventilation $n = 1$, then								0.5]					
(24d)m= 0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58			(240
Effective air	change ra	ate - en	ter (24a	or (24b	o) or (24d	c) or (24	d) in box	(25)	-	-	-			
(25)m= 0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.56	0.56	0.57	0.58			(25)
3. Heat losse	s and hea	t loss r	paramete	ār.										
ELEMENT	Gross area (r	İ	Openin m	gs	Net Ar A ,n		U-valı W/m2		A X U (W/l		k-value kJ/m²-l		A X	
Windows Type	•	,			1.87	x1/	/[1/(1.4)+	0.04] =	2.48	,				(27)
Windows Type	e 2				2.24		/[1/(1.4)+	0.04] =	2.97	Ħ				(27)
Windows Type					9.83	x1/	/[1/(1.4)+	0.04] =	13.03	=				(27)
Windows Type					1.5	=	/[1/(1.4)+	l l	1.99	=				(27)
Windows Type					1.5	_			1.99	=				(27)
Windows Type							/[1/(1.4)+			=				
Walls		_	40.0		2.71	=		— ;	3.59	,		— r		(27)
	48.85		19.6	<u> </u>	29.2	x	0.18	= [5.26					(29)
Total area of e	elements, i	11-			48.85	_		_ ,				r		(31) ¬
Party wall			<i>(((</i>		44.62		0	= [0					(32)
* for windows and ** include the area						atea using	Tormula 1	/[(1/ U- vail	ie)+0.04] a	as given in	paragrapr	1 3.2		
Fabric heat los	ss, W/K = \$	S (A x	U)				(26)(30)	+ (32) =				3′	1.31	(33)
Heat capacity	Cm = S(A	xk)						((28)	(30) + (32	2) + (32a).	(32e) =		0	(34)
Thermal mass	paramete	r (TMF	e Cm -	· TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		2	50	(35)
For design assess				construct	ion are not	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f			
Thermal bridge	es : S (L x	Y) cal	culated u	ısing Ap	pendix k	<						5	.24	(36)
if details of therma Total fabric he		e not kn	own (36) =	: 0.05 x (3	1)			(33) +	(36) =			36	3.55	(37)
Ventilation hea	at loss cald	culated	monthly	/				(38)m	= 0.33 × ((25)m x (5))			_
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
(38)m= 40.58	40.34	40.1	38.98	38.77	37.8	37.8	37.62	38.17	38.77	39.2	39.64			(38)
Heat transfer of	coefficient.	W/K						(39)m	= (37) + (37)	38)m		-		
(39)m= 77.13	 	76.65	75.53	75.32	74.35	74.35	74.17	74.72	75.32	75.75	76.19			
1							1							

Heat loss para	meter (H	HLP), W/	m²K					(40)m	= (39)m ÷	· (4)			
(40)m= 0.96	0.96	0.96	0.94	0.94	0.93	0.93	0.93	0.93	0.94	0.95	0.95		
								,	Average =	Sum(40) ₁ .	12 /12=	0.94	(40)
Number of day	s in mo	nth (Tabl	le 1a)										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ing ene	rgy requi	rement:								kWh/ye	ear:	
A 1													
Assumed occu if TFA > 13.9 if TFA £ 13.9	N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		46		(42)
Annual averag	e hot wa										69		(43)
Reduce the annua	-				-	-	to achieve	a water us	se target o	r			
not more that 125	litres per _l	person per	aay (ali w	ater use, r	not and co	ıa) 				,			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in	i litres pei	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m= 101.96	98.25	94.55	90.84	87.13	83.42	83.42	87.13	90.84	94.55	98.25	101.96		
Energy content of	hot water	used - cal	culated mo	onthly = 4	190 x Vd r	n x nm x F)Tm / 3600			m(44) ₁₁₂ =		1112.32	(44)
(45)m= 151.21	132.25	136.47	118.97	114.16	98.51	91.28	104.75	106	123.53	134.85	146.44		
(43)111= 131.21	102.20	130.47	110.31	114.10	90.51	91.20	104.73			m(45) ₁₁₂ =	l l	1458.42	(45)
If instantaneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)		rotar = Su	III(43) ₁₁₂ =	- I	1430.42	(40)
(46)m= 22.68	19.84	20.47	17.85	17.12	14.78	13.69	15.71	15.9	18.53	20.23	21.97		(46)
Water storage													` '
Storage volum	e (litres)	includin	g any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
If community h	eating a	nd no ta	nk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if no	stored	hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage													
a) If manufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(48)
Temperature fa	actor fro	m Table	2b							0.	54		(49)
Energy lost fro		_	-				(48) x (49)) =		0.	75		(50)
b) If manufact			-										
Hot water stora	-			e 2 (kW	h/litre/da	ıy)					0		(51)
If community h	•		JN 4.3										(52)
Temperature fa			2h							—	0		(52) (53)
•							(47) x (51)) v (E2) v (I	E2\ _				, ,
Energy lost fro Enter (50) or (_	, KVVII/yt	zai			(47) X (31)) X (32) X (JJ) =		0 75		(54) (55)
Water storage	, ,	,	or each	month			((56)m = (55) v (41):	m	0.	75		(55)
						i	,, , ,	, , ,	ı		- 1		(==)
(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	511	(56)
If cylinder contains	dedicate	a solar sto	rage, (57)i	m = (56)m	x [(50) – (H11)] ÷ (5	0), eise (5	/)m = (56)	m wnere (H11) IS Tro	m Appena	IX H	
(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)
Primary circuit	loss (ar	nual) fro	m Table	e 3							0		(58)
Primary circuit				•	•	. ,	, ,						
(modified by	factor f	rom Tabl	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(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 cr	alculated	for eac	h manth	(61)m –	(60) · '	265 v (41	\m							
(61)m=	0	0	0	0	0	00) - \	0 000 0)III 0		0	0	0	0]	(61)
				<u> </u>	<u> </u>		<u> </u>	<u>!</u>				<u>. </u>	<u> </u>	J (59)m + (61)m	
(62)m=	197.8	174.33	183.06		160.75	143.6	137.88	151.	_	151.09	170.13	179.94	193.03]	(62)
		calculated			<u> </u>		 tive quantit			if no sola		tion to wate	r heating)	l	
		al lines if											0,		
(63)m=	0	0	0	0	0	0	0	0		0	0	0	0		(63)
Output	from v	vater hea	ter	•	•							•	•	•	
(64)m=	197.8	174.33	183.06	164.07	160.75	143.6	137.88	151.	.35	151.09	170.13	179.94	193.03		
'									Outp	out from w	ater heate	r (annual)	112	2007.04	(64)
Heat g	ains fro	om water	heating	g, kWh/m	onth 0.2	5 ´ [0.8	5 × (45)m	า + (6	1)m	n] + 0.8 x	د [(46)m	+ (57)m	+ (59)m]	
(65)m=	87.55	77.64	82.65	75.63	75.23	68.83	67.63	72.	11	71.32	78.35	80.91	85.97		(65)
inclu	de (57	m in calc	culation	of (65)m	only if c	ylinder	is in the	dwell	ing	or hot w	ater is f	rom com	munity h	neating	
5. Int	ernal g	ains (see	Table	5 and 5a	ı):										
Metabo	olic gai	ns (Table	5), Wa	atts											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(66)m=	123.14	123.14	123.14	123.14	123.14	123.14	123.14	123.	.14	123.14	123.14	123.14	123.14		(66)
Lightin	g gains	(calcula	ted in A	ppendix	L, equat	ion L9	or L9a), a	also s	ee -	Table 5					
(67)m=	19.56	17.38	14.13	10.7	8	6.75	7.3	9.4	8	12.73	16.16	18.86	20.11		(67)
Appliar	nces ga	ains (calc	ulated	in Appen	dix L, eq	uation	_13 or L1	3a), a	also	see Ta	ble 5				
(68)m=	219.44	221.72	215.98	203.76	188.34	173.85	164.17	161.	.89	167.63	179.84	195.27	209.76		(68)
Cookin	g gain:	s (calcula	ted in A	Appendix	L, equa	tion L1	or L15a), als	o se	ee Table	5	-	-		
(69)m=	35.31	35.31	35.31	35.31	35.31	35.31	35.31	35.3	31	35.31	35.31	35.31	35.31		(69)
Pumps	and fa	ans gains	(Table	5a)											
(70)m=	3	3	3	3	3	3	3	3		3	3	3	3		(70)
Losses	e.g. e	vaporatio	n (neg	ative valu	ies) (Tab	le 5)									
(71)m=	-98.51	-98.51	-98.51	-98.51	-98.51	-98.51	-98.51	-98.	51	-98.51	-98.51	-98.51	-98.51		(71)
Water	heating	g gains (T	able 5											_	
(72)m=	117.68	115.54	111.09	105.05	101.12	95.59	90.9	96.9	92	99.05	105.31	112.38	115.55		(72)
Total i	nterna	l gains =				(6	6)m + (67)n	n + (68	8)m +	+ (69)m +	(70)m + (7	71)m + (72))m	_	
(73)m=	419.62	417.57	404.14	382.45	360.4	339.14	325.3	331.	.23	342.35	364.26	389.44	408.35		(73)
	ar gair														
_		calculated	_					ations t	to co	nvert to th	e applical		tion.		
Orienta		Access F Table 6d		Area m²	l		ux able 6a		т	g_ able 6b	т	FF able 6c		Gains (W)	
NI d								, i						. ,	,
North	0.9x		_	-	24	×	10.63] X		0.63	X	0.7	=	7.28	<u> </u> (74)
North	0.9x	0.77	_	—	83	X	10.63] X		0.63	×	0.7	_ =	31.94	」 (74)
North	0.9x	0.77	_		24	X	20.32] X		0.63	×	0.7	=	13.91	」 (74)
North	0.9x	0.77	_		83	X _	20.32] X		0.63	X	0.7	=	61.05	 1 (74)
North	0.9x	0.77		2.	24	х	34.53	X		0.63	X	0.7	=	23.64	(74)

N l o wile	г		1		ı		1 1		1		1		¬
North	0.9x	0.77	X	9.83	X	34.53	X	0.63	X	0.7	=	103.73	<u> </u> (74)
North	0.9x	0.77	X	2.24	Х	55.46	X	0.63	X	0.7	=	37.97] (74)
North	0.9x	0.77	X	9.83	X	55.46	X	0.63	X	0.7	=	166.62	(74)
North	0.9x	0.77	X	2.24	X	74.72	X	0.63	X	0.7	=	51.15	(74)
North	0.9x	0.77	X	9.83	X	74.72	X	0.63	X	0.7	=	224.46	(74)
North	0.9x	0.77	X	2.24	X	79.99	X	0.63	X	0.7	=	54.76	(74)
North	0.9x	0.77	X	9.83	X	79.99	X	0.63	X	0.7	=	240.29	(74)
North	0.9x	0.77	X	2.24	X	74.68	X	0.63	X	0.7	=	51.12	(74)
North	0.9x	0.77	X	9.83	X	74.68	X	0.63	X	0.7	=	224.34	(74)
North	0.9x	0.77	X	2.24	x	59.25	X	0.63	X	0.7	=	40.56	(74)
North	0.9x	0.77	X	9.83	X	59.25	X	0.63	X	0.7	=	177.99	(74)
North	0.9x	0.77	X	2.24	x	41.52	X	0.63	x	0.7	=	28.42	(74)
North	0.9x	0.77	X	9.83	x	41.52	X	0.63	x	0.7	=	124.72	(74)
North	0.9x	0.77	X	2.24	x	24.19	X	0.63	x	0.7	=	16.56	(74)
North	0.9x	0.77	X	9.83	x	24.19	X	0.63	x	0.7	=	72.67	(74)
North	0.9x	0.77	X	2.24	x	13.12	X	0.63	x	0.7	=	8.98	(74)
North	0.9x	0.77	X	9.83	x	13.12	X	0.63	x	0.7	=	39.41	(74)
North	0.9x	0.77	X	2.24	x	8.86	X	0.63	x	0.7	=	6.07	(74)
North	0.9x	0.77	X	9.83	x	8.86	x	0.63	x	0.7	=	26.63	(74)
West	0.9x	0.77	X	1.87	x	19.64	X	0.63	x	0.7	=	11.22	(80)
West	0.9x	0.77	X	1.5	x	19.64	X	0.63	x	0.7	=	9	(80)
West	0.9x	0.77	X	1.5	x	19.64	X	0.63	x	0.7	=	9	(80)
West	0.9x	0.77	X	2.71	x	19.64	X	0.63	X	0.7	=	16.27	(80)
West	0.9x	0.77	X	1.87	x	38.42	X	0.63	x	0.7	=	21.96	(80)
West	0.9x	0.77	X	1.5	x	38.42	x	0.63	x	0.7	=	17.61	(80)
West	0.9x	0.77	X	1.5	X	38.42	X	0.63	x	0.7	=	17.61	(80)
West	0.9x	0.77	X	2.71	x	38.42	X	0.63	x	0.7	=	31.82	(80)
West	0.9x	0.77	X	1.87	x	63.27	X	0.63	x	0.7	=	36.16	(80)
West	0.9x	0.77	X	1.5	x	63.27	X	0.63	X	0.7	=	29.01	(80)
West	0.9x	0.77	X	1.5	x	63.27	X	0.63	x	0.7	=	29.01	(80)
West	0.9x	0.77	X	2.71	x	63.27	X	0.63	x	0.7	=	52.4	(80)
West	0.9x	0.77	X	1.87	x	92.28	X	0.63	x	0.7	=	52.74	(80)
West	0.9x	0.77	X	1.5	x	92.28	X	0.63	x	0.7	=	42.3	(80)
West	0.9x	0.77	X	1.5	x	92.28	X	0.63	x	0.7	=	42.3	(80)
West	0.9x	0.77	X	2.71	х	92.28	X	0.63	x	0.7	=	76.43	(80)
West	0.9x	0.77	x	1.87	x	113.09	x	0.63	x	0.7	=	64.63	(80)
West	0.9x	0.77	x	1.5	x	113.09	x	0.63	x	0.7	=	51.84	(80)
West	0.9x	0.77	x	1.5	х	113.09	x	0.63	x	0.7	j =	51.84	(80)
West	0.9x	0.77	x	2.71	x	113.09	x	0.63	x	0.7	=	93.66	(80)
West	0.9x	0.77	x	1.87	x	115.77	x	0.63	x	0.7	=	66.16	(80)
West	0.9x	0.77	X	1.5	x	115.77	x	0.63	x	0.7	=	53.07	(80)
	_												-

													_			_		
West	0.9x	0.77		X	1.	5	X	1	15.77	X		0.63	X	0.7		= [53.07	(80)
West	0.9x	0.77		X	2.7	1	X	1	15.77	X		0.63	X	0.7		= [95.88	(80)
West	0.9x	0.77		X	1.8	7	x	1	10.22	X		0.63	X	0.7	:	= [62.99	(80)
West	0.9x	0.77		X	1.5	5	x	1	10.22	X		0.63	X	0.7	:	= [50.53	(80)
West	0.9x	0.77		X	1.5	5	x	1	10.22	X		0.63	X	0.7		= [50.53	(80)
West	0.9x	0.77		X	2.7	1	x	1	10.22	X		0.63	X	0.7		= [91.28	(80)
West	0.9x	0.77		X	1.8	7	x	9	4.68	X		0.63	X	0.7		= [54.11	(80)
West	0.9x	0.77		X	1.5	5	x	9	4.68	x		0.63	X	0.7		= [43.4	(80)
West	0.9x	0.77		X	1.5	5	x	9	4.68	x		0.63	X	0.7		= [43.4	(80)
West	0.9x	0.77		X	2.7	1	x	9	4.68	X		0.63	X	0.7		= [78.41	(80)
West	0.9x	0.77		X	1.8	7	x	7	3.59	x		0.63	X	0.7		= [42.06	(80)
West	0.9x	0.77		X	1.5	5	x	7	3.59	x		0.63	X	0.7		= [33.73	(80)
West	0.9x	0.77		X	1.5	5	x	7	3.59	x		0.63	X	0.7		= [33.73	(80)
West	0.9x	0.77		X	2.7	1	x	7	3.59	x		0.63	X	0.7		= [60.95	(80)
West	0.9x	0.77		X	1.8	7	x	4	5.59	x		0.63	X	0.7		- [26.05	(80)
West	0.9x	0.77		X	1.5	5	x	4	5.59	x		0.63	X	0.7	-	= [20.9	(80)
West	0.9x	0.77		X	1.5	5	x	4	5.59	×		0.63	X	0.7		- ┌	20.9	(80)
West	0.9x	0.77		X	2.7	1	x	4	5.59	x		0.63	X	0.7		= [37.76	(80)
West	0.9x	0.77		X	1.8	7	x	2	4.49	x		0.63	X	0.7	<u> </u>	- ┌	14	(80)
West	0.9x	0.77		X	1.5	5	x	2	4.49	x		0.63	X	0.7	<u> </u>	- ┌	11.23	(80)
West	0.9x	0.77		X	1.5	5	x	2	4.49	x		0.63	X	0.7	-	- [11.23	(80)
West	0.9x	0.77		X	2.7	1	x	2	4.49	x		0.63	x	0.7		- Ī	20.28	(80)
West	0.9x	0.77		X	1.8	7	x	1	6.15	x		0.63	X	0.7		- Ī	9.23	(80)
West	0.9x	0.77		X	1.5	5	x	1	6.15	x		0.63	×	0.7		- Ī	7.4	(80)
West	0.9x	0.77		X	1.5	5	x	1	6.15	x		0.63	= x	0.7		- ┌	7.4	(80)
West	0.9x	0.77		X	2.7	1	x	1	6.15	x		0.63	X	0.7		- Ī	13.38	(80)
	•															_		_
Solar o	ains in	watts, ca	alculat	ed	for eacl	n mont	h			(83)m	า = Sเ	um(74)m	(82)m					
(83)m=	84.72	163.96	273.9	5	418.37	537.59	5	63.23	530.79	437	'.87	323.62	194.8	4 105.12	70.11			(83)
Total g	ains – i	internal a	nd so	ar	(84)m =	: (73)m	1 + (83)m	, watts		•	•		•				
(84)m=	504.35	581.53	678.0	9	800.82	898	9	02.37	856.09	769	9.1	665.97	559.	1 494.56	478.4	7		(84)
7. Me	an inte	rnal temp	eratu	е ((heating	seaso	n)											
		during h						area f	from Tab	ole 9	, Th	1 (°C)				Г	21	(85)
		ctor for ga		•			_					` ,				L		
	Jan	Feb	Ма	\neg	Apr	May	T	Jun	Jul	Α	ug	Sep	Oc	t Nov	De	С		
(86)m=	1	0.99	0.98	+	0.91	0.73	$\overline{}$	0.52	0.38	0.4	-	0.73	0.96	+	1	Ì		(86)
Moon	intorna	al tempera	oturo i	n li	ivina or	no T1 /	follo	w cto	nc 2 to 7		I	. 00)		!	<u> </u>			
(87)m=	20.05	20.2	20.45	\neg	20.77	20.95	`	20.99	21	2		20.96	20.7	20.32	20.02	$\overline{}$		(87)
										l								` '
- 1	20.11	during h	20.12	<u> </u>	20.13	20.13	_	/eiiing 20.14	20.14	20.		20.14	20.1	3 20.13	20.12	$\overline{}$		(88)
(88)m=										l	. 1 +	20.14	20.1.	20.13	20.12			(00)
		ctor for ga		rr			_					0.05		1	<u> </u>	_		(00)
(89)m=	1	0.99	0.97		0.88	0.68		0.45	0.31	0.3	36	0.65	0.94	0.99	1			(89)

0)m= 18.84	19.06	19.43	19.87	of dwelli 20.09	20.14	20.14	20.14	20.11	19.79	19.24	18.81		(90
	1 .0.00	101.10		20.00						g area ÷ (4		0.43) (9 [,]
4	-1.6		. ()	.11 .1	W \ (1		. (4 (1	A) TO					
Mean intern		· `		1	– –	r	<u> </u>		20.47	40.7	40.22		(0)
2)m= 19.35	19.54	19.87	20.25	20.45	20.5	20.51	20.51	20.47	20.17	19.7	19.33		(92
Apply adjust		1			i —	i —			•	40.7	40.00	1	(93
3)m= 19.35		19.87	20.25	20.45	20.5	20.51	20.51	20.47	20.17	19.7	19.33		(9,
3. Space he													
Set Ti to the he utilisatio			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(T	76)m an	d re-calc	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Jtilisation fa				Iviay	Juli	Jui	Aug	Sep	Oct	NOV	Dec		
4)m= 1	0.99	0.97	0.88	0.7	0.48	0.34	0.4	0.68	0.94	0.99	1		(9
Jseful gains		<u> </u>		l	0.10	0.01	0.1	0.00	0.01	0.00	'		(-
5)m= 502.08	1	656.13	706.92	627.36	435.85	290.22	303.96	455.9	525.46	489.55	476.85		(9
Monthly ave					<u> </u>	250.22	303.30	400.0	323.40	400.00	470.00		(0
6)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		(9
		oxdot								7.1	4.2		(0
Heat loss ra	1	1024.6	857.62	659.28	438.9	290.52	304.68	476.3	J 721.21	954.35	1152.54		(9
·					l						1132.34		(0
Space heati 8)m= 490.27		274.14	108.5	23.75	0	0.02	0	0 0	145.64	334.66	502.72		
5)m= 490.27	309.90	274.14	106.5	23.75	0	0					<u> </u>		-
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2249.66	(9
Space heati	ng require	ement in	kWh/m²	²/year			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2249.66	닠`
Space heati				•	ystems i	ncluding			(kWh/year) = Sum(9	8) _{15,912} =		(9
a. Energy re	equiremer			•	ystems i	ncluding			(kWh/year) = Sum(9	8) _{15,912} =		닠`
a. Energy re Space heat	equiremer ing:	nts – Indi	vidual h	eating sy					(kWh/year) = Sum(9	8) _{15,912} =		(9
a. Energy re Space heat Fraction of s	equiremer ing: space hea	nts – Indi at from se	vidual h	eating sy		system		CHP)	(kWh/year) = Sum(9	8)15,912 =	28.12	(9
a. Energy respectively. Space heat Fraction of services.	equiremer ing: space hea space hea	nts – Indi at from se at from m	vidual h econdar ain syst	eating sy y/supple em(s)		system	micro-C (202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	28.12 0 1	(9)
a. Energy reaction of services of the control of th	equirement ing: space heat space heat otal heati	nts – Indi at from se at from m ng from i	vidual h econdary ain syst main sys	eating sy y/supple tem(s) stem 1		system	micro-C (202) = 1	CHP)) = Sum(9	8)15,912 =	28.12 0 1	(9)
a. Energy reaction of seriod of the Efficiency of	equirementing: space head space head otal heatiful main spa	nts – Indi at from se at from m ng from i ace heati	vidual h econdary ain syst main systeng syste	eating sy y/supple tem(s) stem 1	mentary	system	micro-C (202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	28.12 0 1	(9)
a. Energy reaction of serior of terraction o	equirementing: space head space head otal heatiful main spa	nts – Indi at from se at from m ng from i ace heati	vidual h econdary ain syst main systeng syste	eating sy y/supple tem(s) stem 1	mentary	system	micro-C (202) = 1	CHP) - (201) =) = Sum(9	8)15,912 =	28.12 0 1	닠`
a. Energy reaction of seriod of the Efficiency of	equirement ing: space head space head otal heatiful main space seconda	nts – Indi at from se at from m ng from i ace heati	vidual h econdary ain syst main systeng syste	eating sy y/supple tem(s) stem 1	mentary	system	micro-C (202) = 1	CHP) - (201) =) = Sum(9	8) _{15,912} =	28.12 0 1 1 93.5	(9)
a. Energy respectively. Expression of section of the efficiency o	equirement ing: space heat space heat otal heat if main space seconda	nts – Indi at from se at from m ng from i ace heati ary/supple Mar	vidual h econdary nain syst main sys ng syste ementar Apr	eating sy y/supple rem(s) stem 1 em 1 y heating	mentary g system Jun	system	micro-C (202) = 1 - (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 93.5	(9)
Energy respectively. Energy respectively.	equirement ing: space heat space heat otal heat if main spate seconda Feb ng require	nts – Indi at from se at from m ng from i ace heati ary/supple Mar	vidual h econdary nain syst main sys ng syste ementar Apr	eating sy y/supple rem(s) stem 1 em 1 y heating	mentary g system Jun	system	micro-C (202) = 1 - (204) = (2	CHP) - (201) = 02) × [1 -	(203)] =			0 1 1 93.5	
Energy respectively. Energy respectively.	equirement ing: space heat space heat otal heat if main space seconda Feb ng require 369.98	at from seat from mace heating/supplement (c	vidual hecondary nain systemain systementar Apr alculated	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun	system 1, % Jul	micro-C (202) = 1 - (204) = (2	CHP) - (201) = 02) × [1 - ((203)] =	Nov	Dec	0 1 1 93.5	(9 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
Energy respectively. Energy respectively.	equirement ing: space heat otal heat if main space feed and require ing require ing require in space in second and require in second	at from seat from mace heating/supplement (c	vidual hecondary nain systemain systementar Apr alculated 108.5	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 23.75	mentary g system Jun	system 1, % Jul	micro-C (202) = 1 - (204) = (2	CHP) - (201) = 02) × [1 - ((203)] =	Nov 334.66	Dec	0 1 1 93.5	(9 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
Energy respectively. Energy respectively.	equirement ing: space heat otal heat if main space feed and require ing require ing require in space in second and require in second	at from set from marger heating mar lement (c 274.14	vidual hecondary nain systemain systementar Apr alculated	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	mentary g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	Sep 0	Oct 145.64	Nov 334.66 357.92	Dec 502.72	0 1 1 93.5 0 kWh/ye	(9) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Energy respectively. Energy respectively. Energy respectively. Energy respectively. Fraction of seriaction of the energy of the energy of the energy. Energy respectively. January 190.27 11)m = {[(9)	equirement ing: space heat space heat otal heat if main space feed and require in space in sp	at from seat from mace heating/supplement (c 274.14) } x 1 293.2	vidual hecondary nain systemain systementar Apr alculatee 108.5 00 ÷ (20 116.05	eating sy y/supple rem(s) stem 1 em 1 y heating May d above) 23.75	mentary g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	CHP) - (201) = 02) × [1 - 6	Oct 145.64	Nov 334.66 357.92	Dec 502.72	0 1 1 93.5	(9) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
Energy respectively. Energy respectively. Energy respectively. Energy respectively. Fraction of seriaction of seriaction of the Efficiency of Efficiency	equirement ing: space heat space heat otal heat if seconda Feb ng require 369.98 8)m x (20 6 395.7	at from seat from mace heating/supplement (corrected at 293.2	vidual hecondary nain systemain systemantar Apr alculated 108.5 00 ÷ (20 116.05	eating sy y/supple rem(s) stem 1 em 1 y heating May d above) 23.75	mentary g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (204) = (204) = 0	Sep 0	Oct 145.64	Nov 334.66 357.92	Dec 502.72	0 1 1 93.5 0 kWh/ye	(g) (g) (g) (g) (g) (g) (g) (g) (g) (g)
Energy respectively. Energy respectively. Energy respectively. Fraction of services of the energy	equirement ing: space heat space heat otal heat if main space feed and require in the space heat in th	at from set from many from the ace heating from the	vidual hecondary nain systemain systematar Apr alculater 108.5 00 ÷ (20 116.05	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 23.75 06) 25.4	g system Jun 0	system n, % Jul 0	micro-C (202) = 1 - (204) = (204) Aug 0 Tota	Sep 0 0 0 0 0 0 0 0 0 0 0 0 0	Oct 145.64 155.76 arr) = Sum(2	Nov 334.66 357.92 211) _{15,1012}	Dec 502.72 537.67	0 1 1 93.5 0 kWh/ye	(9 (2 (2 (2 (2 (2
Energy respectively. Space heat Fraction of services of the Efficiency of Efficiency	equirement ing: space heat space heat otal heat if seconda Feb ng require 369.98 8)m x (20 6 395.7	at from seat from mace heating/supplement (corrected at 293.2	vidual hecondary nain systemain systemantar Apr alculated 108.5 00 ÷ (20 116.05	eating sy y/supple rem(s) stem 1 em 1 y heating May d above) 23.75	mentary g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	Sep 0 0 0 0 0 0 0 0 0 0 0 0 0	Oct 145.64 155.76 ar) = Sum(2	Nov 334.66 357.92 211) _{15,1012}	502.72 537.67	0 1 1 93.5 0 kWh/yd	(9 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
Energy respectively. Energy respectively. Energy respectively. Energy respectively. Fraction of section of the energy of the energy of the energy of the energy. Energy respectively. Energy respectively. January 190.27 11)m = {[(9) 524.36 Expace heating {[(98)m x (20) 15)m=0	equirement ing: space heat space heat otal heat if main space feet seconda Feb ng require 7 369.98 8)m x (20 395.7 ng fuel (second) x 1 0	at from set from many from the ace heating from the	vidual hecondary nain systemain systematar Apr alculater 108.5 00 ÷ (20 116.05	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 23.75 06) 25.4	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	Sep 0 0 0 0 0 0 0 0 0 0 0 0 0	Oct 145.64 155.76 ar) = Sum(2	Nov 334.66 357.92 211) _{15,1012}	502.72 537.67	0 1 1 93.5 0 kWh/ye	(9 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2 (2
Energy respectively. Energy respectively.	equirement ing: space heat space heat otal heat if main space if secondary in the secondary	at from seat from mace heating/supplement (compared 274.14 (compared 293.2 (compared 293.2 (compared 290.2 (co	vidual hecondary nain systemain systeman systementar Apr alculated 108.5 00 ÷ (20 116.05	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 23.75 06) 25.4	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	Sep 0 0 0 0 0 0 0 0 0 0 0 0 0	Oct 145.64 155.76 ar) = Sum(2	Nov 334.66 357.92 211) _{15,1012}	502.72 537.67	0 1 1 93.5 0 kWh/yd	(g) (g) (g) (g) (g) (g) (g) (g) (g) (g)
Energy respectively. Energy respectively. Energy respectively. Energy respectively. Fraction of seriaction of the energy of the energy of the energy. Energy respectively. Energy respectively. Fraction of seriaction of seriaction of seriaction of seriaction of seriaction. Energy respectively. Jan. Espace heatiful (190.27) Espace heatiful (198) m x (200.27) Espace heatiful (198	equirement ing: space heat space heat otal heat if main spate seconda Feb ng require 369.98 8)m x (20 6 395.7 ng fuel (second)] } x 1 0 ng water heat	at from seat from mace heating/supplement (compared 274.14 (compared 293.2 (compared 293.2 (compared 290.2 (co	vidual hecondary nain systemain systeman systementar Apr alculated 108.5 00 ÷ (20 116.05	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 23.75 06) 25.4	g system Jun 0	system n, % Jul 0	(202) = 1 - (204) = (2	Sep 0 0 0 0 0 0 0 0 0 0 0 0 0	Oct 145.64 155.76 ar) = Sum(2	Nov 334.66 357.92 211) _{15,1012}	502.72 537.67	0 1 1 93.5 0 kWh/yd	(g) (g) (g) (g) (g) (g) (g) (g) (g) (g)

(217)m= 87.14 86.77 85.89	83.74 81.03	79.8	70.0	79.8	70.0	84.4	86.45	07.05	1	(217)
` '		79.6	79.8	79.0	79.8	04.4	66.45	87.25		(217)
Fuel for water heating, kWh/mo (219) m = (64) m x $100 \div (217)$ r										
(219)m= 226.99 200.91 213.14	195.92 198.38	179.95	172.78	189.66	189.34	201.57	208.15	221.23		
				Tota	I = Sum(2	19a) ₁₁₂ =		-	2398.01	(219)
Annual totals						k\	Wh/yeaı	r	kWh/yea	<u></u>
Space heating fuel used, main s	system 1								2406.05	
Water heating fuel used									2398.01	
Electricity for pumps, fans and e	electric keep-ho	t								
central heating pump:								30]	(230c)
boiler with a fan-assisted flue								45]	(230e)
Total electricity for the above, k	Wh/year			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting									345.49	(232)
12a. CO2 emissions – Individu	ual heating syste	ems inclu	uding mi	cro-CHP						
12a. CO2 emissions – Individu	ual heating syste			cro-CHP		Fmiss	ion fac	tor	Emission	
12a. CO2 emissions – Individu	ual heating syste	En	uding mi ergy /h/year	cro-CHP		Emiss kg CO	ion fac 2/kWh	tor	Emissions	-
12a. CO2 emissions – Individu Space heating (main system 1)		En kW	ergy	cro-CHP			2/kWh	tor =		-
		En kW (211	ergy /h/year	cro-CHP		kg CO	2/kWh		kg CO2/ye	ar
Space heating (main system 1)		En kW (211	ergy /h/year	cro-CHP		kg CO:	2/kWh	=	kg CO2/ye	ar (261)
Space heating (main system 1) Space heating (secondary)		En kW (211 (215	ergy /h/year i) x 5) x	cro-CHP + (263) + (0.2°	2/kWh	=	kg CO2/ye	ar (261) (263)
Space heating (main system 1) Space heating (secondary) Water heating		En kW (211 (215 (219 (261	ergy /h/year i) x 5) x			0.2°	2/kWh 16 19	=	kg CO2/ye 519.71 0 517.97	(261) (263) (264)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating		En kW (211 (215 (219 (261 t (231	ergy /h/year 1) x 5) x 9) x			0.2°	2/kWh 16 19 16	= = =	kg CO2/ye 519.71 0 517.97 1037.68	(261) (263) (264) (265)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and e		En kW (211 (215 (219 (261 t (231	ergy /h/year 1) x 5) x 9) x 1) + (262)		264) =	0.2° 0.5° 0.5°	2/kWh 16 19 16	= = =	kg CO2/ye 519.71 0 517.97 1037.68 38.93	(261) (263) (264) (265) (267)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electricity for lighting		En kW (211 (215 (219 (261 t (231	ergy /h/year 1) x 5) x 9) x 1) + (262)		264) =	0.2° 0.5° 0.5° 0.5°	2/kWh 16 19 16	= = =	kg CO2/ye 519.71 0 517.97 1037.68 38.93 179.31	(261) (263) (264) (265) (267) (268)

TER =

(273)

22.83

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:37:59

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 52.1m² Site Reference: Plot Reference: AC 108 Maitland Park Estate

AC 108, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

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

Dwelling Carbon Dioxide Emission Rate (DER) 6.24 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 35.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 31.9 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.12 (max. 0.70) External wall 0.12 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK**

(no floor) Floor Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

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:	0.5	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ок
Based on:		
Overshading:	Average or unknown	
Windows facing: South	4.1m²	
Windows facing: North	1.71m²	
Windows facing: North	6.18m²	
Windows facing: South	1.67m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	2.0 m ³ /m ² h	
External Walls U-value	0.12 W/m ² K	
Party Walls U-value	0 W/m²K	
Windows facing: South Windows facing: North Windows facing: North Windows facing: South Ventilation rate: Blinds/curtains: 10 Key features Air permeablility External Walls U-value	4.1m ² 1.71m ² 6.18m ² 1.67m ² 3.00 None	

Community heating, heat from electric heat pump

Photovoltaic array

		Llsor-I	Details:						
Assessor Name:	John Simpson	– USEFI	Strom	o Nive	ber		QTP()	0006273	
Software Name:	John Simpson Stroma FSAP 2012		Softwa					on: 1.0.4.26	
	F	Property	Address						
Address :	AC 108, Aspen Court, Mait	and Par	k Estate,	London	, NW3 2	EH.			
Overall dwelling dime	ensions:	A	- (2)		A 11a	: l- 4/ \		V = l+ = (2	· \
Ground floor			ea(m²) 52.1	(1a) x		ight(m) 2.6	(2a) =	Volume(m³	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(1		52.1	(4)]()	100.40	(,
	a)1(1b)1(1c)1(1d)1(1c)1(1	'''	52.1	J) + (3c)+(3c	d)+(3e)+	(3n) -		7 (5)
Dwelling volume				(34)1(35	71 (30) 1 (30	a)	.(31) =	135.46	(5)
2. Ventilation rate:	main seconda	ry	other		total			m³ per hou	ır
Number of chimneys	heating heating 0 + 0	П + Г	0	п = Г	0	x	40 =	0	(6a)
Number of open flues	0 + 0	╡╻╞	0	」	0	x	20 =	0	(6b)
Number of intermittent fa			<u> </u>			x	10 =		(7a)
Number of passive vents				L	0		10 =	0	= ' '
·				L	0		40 =	0	(7b)
Number of flueless gas fi	iles				0	^	10 -	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fans = $(6a)+(6b)+(6b)$	7a)+(7b)+	(7c) =		0		÷ (5) =	0	(8)
	peen carried out or is intended, proceed	ed to (17),	otherwise o	continue fr	rom (9) to	(16)	'		_
Number of storeys in the Additional infiltration	ne aweiling (ns)					[(9)	-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame o	r 0.35 fc	r masoni	ry consti	ruction	[(0)	1]XO.1 =	0	(11)
	resent, use the value corresponding t	o the grea	iter wall are	a (after			!		
deducting areas of openia	ngs);).1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	,	(,,					0	(13)
Percentage of windows	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-			0	(15)
Infiltration rate	50				12) + (13)			0	(16)
•	q50, expressed in cubic metrically value, then $(18) = [(17) \div 20] +$	-		•	etre of e	envelope	area	2	(17)
•	es if a pressurisation test has been do				is being u	sed		0.1	(18)
Number of sides sheltered	ed							2	(19)
Shelter factor			(20) = 1 -		19)] =			0.85	(20)
Infiltration rate incorporate	•		(21) = (18	s) x (20) =				0.08	(21)
Infiltration rate modified f	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp	1 ' 1 ' 1	1 Jui	Aug	Тоер	1 001	INOV	Dec		
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
		1	1	1	I	ı	1	1	
Wind Factor (22a)m = (2.23a)m = $\frac{1}{4}$		0.05	1 0.00	Ι 4	1 4 00	4.40	1.40	1	
(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		

0.11	0.11	0.1	0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.1	0.1		
Calculate effec		-	rate for t	he appli	cable ca	se	!	!	!		!	_	——] <i>"</i>
If mechanica			andiv N (2	3h) - (23s	a) × Fmv (e	aguation (1	NSN othe	rwisa (23h) <i>- (</i> 23a)			0.5	(2
If balanced with) = (25a)			0.5	(2
a) If balance		•		_					2h\m + /:	22h) v [4	1 (226)	76.5	(2
24a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22) - 100]]	(2
b) If balance		L				<u> </u>	L					J	
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(2
c) If whole h												J	`
if (22b)n					•				5 × (23b	o)			
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
d) If natural	ventilatio	on or wh	ole hous	e positiv	ve input	ventilatio	on from I	oft				J	
if (22b)n				•	•				0.5]				
4d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(:
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)					
5)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(:
B. Heat losse	e and he	at lose r	aramoto	or.								_	
. Heat losse LEMENT	Gros	·	Openin		Net Ar	22	U-valı	IΩ	AXU		k-valu	Δ	ΑΧk
LEWIENI	area	_	r	_	A,r		W/m2		(W/I	〈)	kJ/m ² ·		kJ/K
indows Type	: 1				4.1	x1.	/[1/(1.4)+	0.04] =	5.44				(
indows Type	2				1.71	x1,	/[1/(1.4)+	0.04] =	2.27				(
indows Type	3				6.18	x1	/[1/(1.4)+	0.04] =	8.19				(
indows Type	4				1.67	x1.	/[1/(1.4)+	0.04] =	2.21	=			(
alls	31.	1	13.60	3	17.44	_	0.12	L	2.09	=		$\neg \vdash$	(
otal area of e		i	10.0			=	0.12		2.00				(;
arty wall	iomonto	,			31.1	= ,				— г			
or windows and	roof wind	owe use a	ffective wi	ndow H-vs	44.62		o formula 1	= [/[(1/ -valu	0		naragrani		(
include the area						atou using	j ioimula i	/[(ic)+0.0+j c	is giveir iii	paragrapi	1 5.2	
bric heat los	s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				20.2	(
eat capacity	Cm = S((Axk)						((28)	(30) + (32	2) + (32a).	(32e) =	0	(
nermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	Medium		250	(
or design assess	ments wh	ere the de	tails of the	construct	ion are no	t known pr	ecisely the	e indicative	values of	TMP in Ta	able 1f		
n be used inste													
nermal bridge	•	,		• .	-	<						5.43	(
letails of therma Ital fabric he		are not kn	own (36) =	= 0.05 x (3	11)			(33) ±	(36) =			05.00	· (
entilation hea		alculator	l monthly	,					$= 0.33 \times ($	25\m v (5)		25.63	(
	Feb	Mar			lun	lul	۸۱۱۵		•	- 		1	
Jan 3)m= 10.1	10	9.91	Apr 9.43	9.34	Jun 8.86	Jul 8.86	Aug 8.77	Sep 9.05	Oct 9.34	9.53	9.72	1	(:
		<u> </u>	0.40	0.04	1 0.00	1 0.00	0.77	<u> </u>	<u> </u>	<u> </u>	0.12	J	(
eat transfer of 35.73			a	a : -			l	· · ·	= (37) + (3			7	
35.73 (a)	35.63	35.54	35.06	34.97	34.49	34.49	34.4	34.68	34.97	35.16	35.35		

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.69	0.68	0.68	0.67	0.67	0.66	0.66	0.66	0.67	0.67	0.67	0.68		
		!							Average =	Sum(40) ₁	12 /12=	0.67	(40)
Number of da	·												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	iting ene	rgy requi	rement:								kWh/ye	ar:	
Assumed occ if TFA > 13. if TFA £ 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		75		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed t			se target c		.81		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage							_	<u> - 15 </u>					
(44)m= 83.39	80.36	77.33	74.29	71.26	68.23	68.23	71.26	74.29	77.33	80.36	83.39		
	·!	ļ.							Total = Su	m(44) ₁₁₂ =		909.73	(44)
Energy content o	f hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x C	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 123.67	108.16	111.61	97.31	93.37	80.57	74.66	85.67	86.7	101.03	110.29	119.77		
If in a to into in a const			-f (t O :	havea (40		Total = Su	m(45) ₁₁₂ =	= [1192.79	(45)
If instantaneous			,	not water	r storage), r	·	DOXES (46)) tO (61)					
(46)m= 18.55 Water storage	16.22	16.74	14.6	14.01	12.09	11.2	12.85	13	15.16	16.54	17.96		(46)
Storage volun) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community I	` ′		•			Ū					<u> </u>		()
Otherwise if n	_			-			' '	ers) ente	er '0' in ((47)			
Water storage	e loss:												
a) If manufac	turer's d	eclared I	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature	factor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufactHot water stor			-								20		(E1)
If community I	•			G Z (KVV	11/11116/06	iy <i>)</i>				0.	02		(51)
Volume factor	_									1.	03		(52)
Temperature	factor fro	m Table	2b							0	.6		(53)
Energy lost fro	om watei	storage	, 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 t	or 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 cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хH	
(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)
Primary circui	t loss (ar	nual) fro	m Tahla	·	•	•	•	•	•		0		(58)
Primary circui	`	,			59)m = ((58) ÷ 36	65 × (41)	m					. ,
(modified by				,	•	. ,	, ,		r thermo	stat)			
(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)

O b :			£	. I		04)	(00	·\	25 (44)	١									
İ		alculated		n r	i		(60 T		· ` `			0				Ι.,		1	(61)
(61)m=	0	0	0		0	0	Ļ	0	0	(2.2)		0	0		0	(==)		<u> </u>	(61)
1		`		_			_			È É			`	ì		`		(59)m + (61)m 1	(00)
(62)m=	178.94	ı	166.89		150.8	148.64	<u> </u>	34.06	129.94	140		140.19	156.3		63.78	175			(62)
		calculated											r contril	oution	to wate	er hea	iting)		
`		al lines if		Sa			ap		· ·	-	_	_		_		<u> </u>		1	(00)
(63)m=	0	0	0		0	0		0	0	0)	0	0		0	C)	J	(63)
		vater hea		_										. 1 .		T		1	
(64)m=	178.94	158.09	166.89	<u>'</u>	150.8	148.64	13	34.06	129.94	140		140.19	156.3		63.78	175	.04	40.40.00	1(64)
												out from wa						1843.63	(64)
		om water		_			_		`	r È	<u> </u>		-``		` '	`	<u> </u>	i] 1	
(65)m=	85.34		81.33		75.15	75.27	<u> </u>	9.58	69.05	72.		71.62	77.82		79.47	84.]	(65)
inclu	de (57)m in cald	culation	of	f (65)m	only if c	ylir	nder i	s in the o	dwell	ing	or hot w	ater is	fron	n com	mun	ity ł	neating	
5. Int	ernal g	jains (see	Table	5 a	and 5a)):													
Metabo	olic gai	ns (Table	5), W	atts	3													,	
	Jan	Feb	Mar	<u> </u>	Apr	May		Jun	Jul	Α	ug	Sep	Ос	t	Nov	D	ес		
(66)m=	87.6	87.6	87.6		87.6	87.6	8	37.6	87.6	87	.6	87.6	87.6		87.6	87	.6		(66)
Lightin	g gains	s (calcula	ted in /	٩рр	endix I	_, equat	ion	L9 o	r L9a), a	lso s	ee ⁻	Table 5							
(67)m=	13.61	12.09	9.83		7.44	5.56		4.7	5.08	6.	6	8.86	11.2	1	13.12	13.	99		(67)
Appliar	nces g	ains (calc	ulated	in /	Append	lix L, eq	uat	ion L	13 or L1	3a),	also	see Tal	ble 5	-					
(68)m=	152.69	154.27	150.28	3	141.78	131.05	12	20.96	114.23	112	.64	116.63	125.1	3 1	35.86	145	.95]	(68)
Cookin	g gain	s (calcula	ted in	App	pendix	L, equa	tior	L15	or L15a)	, als	o se	e Table	5					•	
(69)m=	31.76	31.76	31.76	Т	31.76	31.76	3	1.76	31.76	31.	76	31.76	31.70	3 ;	31.76	31.	76]	(69)
Pumps	and fa	ans gains	(Table	5a	 a)				•	•				•				•	
(70)m=	0	0	0	T	0	0		0	0	0)	0	0		0	C)]	(70)
Losses	e.g. e	vaporatio	n (neg	ati\	ve valu	es) (Tab	le :	5)										•	
(71)m=	-70.08	-70.08	-70.08	<u> </u>	-70.08	-70.08	-7	70.08	-70.08	-70	.08	-70.08	-70.0	8 -	70.08	-70	.08]	(71)
Water	heating	g gains (T	able 5)			_		•									•	
(72)m=	114.71		109.32	_	104.37	101.16	9	6.64	92.8	97.	72	99.47	104.5	9 1	10.37	112	.96]	(72)
Total i	nterna	l gains =		-			•	(66)	m + (67)m	1 + (68	3)m +	- (69)m + ((70)m +	(71)r	n + (72))m		•	
(73)m=	330.28	_	318.71	Т	302.87	287.06	27	71.59	261.39	266	.25	274.24	290.2	5 3	308.64	322	.18	1	(73)
6. Sol	ar gair	ns:																	
Solar g	ains are	calculated	using so	lar f	flux from	Table 6a	and	assoc	iated equa	tions	to co	nvert to th	e appli	cable	orientat	tion.			
Orienta	ation:	Access F	actor		Area			Flu				g_			FF			Gains	
		Table 6d			m²			Tal	ble 6a		Т	able 6b		Tab	le 6c			(W)	
North	0.9x	0.77		x [1.7	1	x	1	0.63	x		0.4	x		0.8		=	4.03	(74)
North	0.9x	0.77		x [6.1	8	x	1	0.63	X		0.4	×		0.8		=	14.57	(74)
North	0.9x	0.77		x [1.7	1	x	2	20.32	x		0.4	×		0.8		=	7.71	(74)
North	0.9x	0.77	Ī	x [6.1	8	x	2	20.32	x		0.4	×		0.8		=	27.85	(74)
North	0.9x	0.77		x [1.7	1	x	3	34.53	x		0.4	X		0.8		=	13.09	(74)

	_		_										_
North	0.9x	0.77	X	6.18	X	34.53	X	0.4	X	0.8	=	47.32	(74)
North	0.9x	0.77	X	1.71	X	55.46	X	0.4	X	0.8	=	21.03	(74)
North	0.9x	0.77	X	6.18	X	55.46	x	0.4	X	0.8	=	76.01	(74)
North	0.9x	0.77	X	1.71	X	74.72	X	0.4	x	0.8	=	28.33	(74)
North	0.9x	0.77	X	6.18	x	74.72	X	0.4	X	0.8	=	102.4	(74)
North	0.9x	0.77	X	1.71	X	79.99	X	0.4	X	0.8	=	30.33	(74)
North	0.9x	0.77	X	6.18	x	79.99	X	0.4	X	0.8	=	109.62	(74)
North	0.9x	0.77	X	1.71	x	74.68	x	0.4	x	0.8	=	28.32	(74)
North	0.9x	0.77	X	6.18	X	74.68	X	0.4	X	0.8	=	102.34	(74)
North	0.9x	0.77	X	1.71	x	59.25	X	0.4	X	0.8	=	22.47	(74)
North	0.9x	0.77	X	6.18	X	59.25	X	0.4	X	0.8	=	81.2	(74)
North	0.9x	0.77	X	1.71	X	41.52	X	0.4	X	0.8	=	15.74	(74)
North	0.9x	0.77	X	6.18	x	41.52	x	0.4	x	0.8	=	56.9	(74)
North	0.9x	0.77	X	1.71	X	24.19	x	0.4	x	0.8	=	9.17	(74)
North	0.9x	0.77	X	6.18	X	24.19	x	0.4	x	0.8	=	33.15	(74)
North	0.9x	0.77	X	1.71	x	13.12	x	0.4	x	0.8	=	4.97	(74)
North	0.9x	0.77	X	6.18	X	13.12	x	0.4	x	0.8	=	17.98	(74)
North	0.9x	0.77	X	1.71	x	8.86	X	0.4	X	0.8	=	3.36	(74)
North	0.9x	0.77	X	6.18	x	8.86	x	0.4	x	0.8	=	12.15	(74)
South	0.9x	0.77	X	4.1	x	46.75	x	0.4	x	0.8	=	42.51	(78)
South	0.9x	0.77	X	1.67	x	46.75	x	0.4	x	0.8	=	17.31	(78)
South	0.9x	0.77	X	4.1	x	76.57	X	0.4	x	0.8	=	69.62	(78)
South	0.9x	0.77	X	1.67	x	76.57	X	0.4	X	0.8	=	28.36	(78)
South	0.9x	0.77	X	4.1	x	97.53	x	0.4	x	0.8	=	88.68	(78)
South	0.9x	0.77	X	1.67	x	97.53	x	0.4	x	0.8	=	36.12	(78)
South	0.9x	0.77	X	4.1	x	110.23	x	0.4	x	0.8	=	100.23	(78)
South	0.9x	0.77	X	1.67	x	110.23	x	0.4	x	0.8	=	40.82	(78)
South	0.9x	0.77	X	4.1	x	114.87	x	0.4	x	0.8	=	104.44	(78)
South	0.9x	0.77	X	1.67	x	114.87	x	0.4	x	0.8	=	42.54	(78)
South	0.9x	0.77	X	4.1	x	110.55	x	0.4	x	0.8	=	100.51	(78)
South	0.9x	0.77	X	1.67	x	110.55	X	0.4	x	0.8	=	40.94	(78)
South	0.9x	0.77	X	4.1	x	108.01	X	0.4	x	0.8	=	98.21	(78)
South	0.9x	0.77	X	1.67	x	108.01	x	0.4	x	0.8	=	40	(78)
South	0.9x	0.77	X	4.1	x	104.89	x	0.4	x	0.8	=	95.37	(78)
South	0.9x	0.77	X	1.67	х	104.89	x	0.4	x	0.8	=	38.85	(78)
South	0.9x	0.77	x	4.1	x	101.89	x	0.4	x	0.8] =	92.64	(78)
South	0.9x	0.77	X	1.67	x	101.89	x	0.4	x	0.8	=	37.73	(78)
South	0.9x	0.77	X	4.1	x	82.59	X	0.4	x	0.8	=	75.09	(78)
South	0.9x	0.77	x	1.67	x	82.59	x	0.4	x	0.8] =	30.58	(78)
South	0.9x	0.77	x	4.1	х	55.42	x	0.4	x	0.8	j =	50.39	(78)
South	0.9x	0.77	x	1.67	х	55.42	x	0.4	x	0.8	j =	20.52	(78)
	_		-		•		•		•		•		_

South 0.93	0.77	x	4.	1	x		40.4	x		0.4		х	0.8		36.73	(78)
South 0.9	0.77	x	1.6	7	x		40.4	X		0.4	Ħ	x F	0.8		14.96	(78)
												_				
Solar gains i	n watts, c	alculated	for eacl	n month				(83)m	= St	um(74)m .	(82	?)m				
(83)m= 78.43		185.22	238.1	277.71		281.4	268.87	237	.88	203.01	1.	48	93.86	67.2	7	(83)
Total gains -	- internal a	and solar	(84)m =	: (73)m -	+ (8	83)m	, watts	!						!	_	
(84)m= 408.7	1 462.12	503.92	540.97	564.77	5	52.99	530.25	504	.13	477.25	438	8.25	402.5	389.38		(84)
7. Mean int	ernal tem	perature	(heating	season)											
Temperatu	e during h	neating p	eriods ir	the livi	ng	area f	from Tab	ole 9,	Th	1 (°C)					21	(85)
Utilisation fa	actor for g	ains for I	iving are	a, h1,m	(s	ee Ta	ble 9a)									
Jan		Mar	Apr	May	È	Jun	Jul	Αι	Jg	Sep		Oct	Nov	Dec		
(86)m= 0.98	0.96	0.9	0.76	0.57		0.4	0.29	0.3	-	0.5	0.	.79	0.95	0.99	1	(86)
Maan intarr			li da a au	T4 /5	<u></u>	010	no 2 to 7		ا مام	. 00)	!				_	
Mean interr		20.87	20.97	21 (TC	DIIO		i	' IN I				0.97	20.70	20.50	٦	(87)
(87)m= 20.62	20.74	20.67	20.97	21		21	21		<u>'</u>	21		1.97	20.79	20.59	J	(07)
Temperatu	e during h	neating p	eriods ir	rest of	dw	elling	from Ta	ble 9), Th	12 (°C)				•	_	
(88)m= 20.35	20.36	20.36	20.36	20.37	2	20.37	20.37	20.	38	20.37	20	.37	20.36	20.36		(88)
Utilisation f	actor for g	ains for i	est of d	welling,	h2,	,m (se	e Table	9a)								
(89)m= 0.98	 	0.88	0.72	0.53	$\overline{}$	0.36	0.25	0.2	7	0.46	0.	.75	0.94	0.98	7	(89)
Mean interr	al tompo	ratura in i	the rest	of dwalli	na.	T2 (f	ollow sto	nc 2	+o 7	in Tabl		-)		!	_	
(90)m= 19.85		20.21	20.33	20.36	Ť	20.37	20.37	20.:		20.37)).33	20.11	19.82	٦	(90)
(50)111= 15.60	20.00	20.21	20.00	20.00	<u>_</u>	0.01	20.01	20.					g area ÷ (4	<u> </u>	0.51	(91)
											_,		g aroa . (., –	0.51	(91)
Mean interr		rature (fo	r the wh	ole dwe	llin	g) = fl	LA × T1	+ (1	– fL	A) × T2					_	
(92)m= 20.24	20.39	20.55	20.66	20.69	2	20.69	20.69	20.0	69	20.69	20).65	20.46	20.21		(92)
Apply adjus			interna	temper	atu	re fro	m Table	4e,	whe	re appro	opria	ate		1	_	
(93)m= 20.24	20.39	20.55	20.66	20.69	2	20.69	20.69	20.0	69	20.69	20	.65	20.46	20.21		(93)
8. Space he	eating req	uirement														
Set Ti to the			•		ed	at ste	ep 11 of	Tabl	e 9b	, so tha	t Ti,	m=(76)m an	d re-ca	lculate	
the utilisation					_					0			NI.		٦	
Jan		Mar	Apr	May		Jun	Jul	A	ug	Sep		Oct	Nov	Dec		
Utilisation f	 _			0.55	_	0.20	0.07			0.40	_	77	0.04	0.00	٦	(94)
(94)m= 0.98		0.88	0.74	0.55		0.38	0.27	0.2	9	0.48	0.	.77	0.94	0.98		(94)
Useful gain	T T	r `	<u> </u>		_	140.4	444.47	447	<u></u>	200.00		7.00	270.52	202.04	٦	(95)
(95)m= 399.3		444.46	399.59	312.84		210.1	141.17	147	.68	228.23	33	7.38	379.53	382.61		(93)
Monthly ave	erage exte	1	perature 8.9				16.6	16	<u>, </u>	111	1/	0.6	7.1	1 4 2	٦	(96)
` '		6.5		11.7		14.6		16.		14.1		J.6	7.1	4.2	J	(90)
Heat loss ra			ai tempe 412.25		_				_	· ,	-	1 50	460.00	EGE 0-	┐	(07)
(97)m= 569.5		499.22		314.21		10.15	141.17	147		228.57		1.58	469.62	565.87	┙	(97)
Space heat	- ř - · - · - · - · - · - · - · - · - · 	1 1			vn I		I		Ì		ŕ			100.0	٦	
(98)m= 126.5	9 76.51	40.74	9.12	1.02		0	0	0		0).57	64.87	136.34		(05)
									rotal	per year	(kWł	n/year) = Sum(9	8)15,912	465.76	(98)
Space heat	ing requir	ement in	kWh/m²	/year											8.94	(99)

This part is used for space heating, space cooling or water heating provided by a community scheme.

9b. Energy requirements – Community heating scheme

Fraction of space heat from secondary/supplementary heating (Table	2 11) '0' if none	0	(301)
Fraction of space heat from community system 1 – (301) =	[[1	(302)
The community scheme may obtain heat from several sources. The procedure allows includes boilers, heat pumps, geothermal and waste heat from power stations. See Ap	•		
Fraction of heat from Community heat pump		1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community h	neating system	1	(305)
Distribution loss factor (Table 12c) for community heating system		1.1	(306)
Space heating Annual space heating requirement		kWh/year 465.76	7
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	512.33	(307a)
Efficiency of secondary/supplementary heating system in % (from Ta	ble 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating	-		_ _
Annual water heating requirement If DHW from community scheme:		1843.63	╛
Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	2028	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307e) + (310a)(310e)] =	25.4	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	de	103.29	(330a)
warm air heating system fans	Ī	0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	103.29	(331)
Energy for lighting (calculated in Appendix L)		240.39	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-538.9	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity	r)	0	(334)
12b. CO2 Emissions – Community heating scheme			
	Energy Emission factor E kWh/year kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two for	uels repeat (363) to (366) for the second fuel	319	(367a)
CO2 associated with heat source 1 [(307b)+(310b)]] x 100 ÷ (367b) x 0.52 =	413.3	(367)
Electrical energy for heat distribution [(313)	x 0.52 =	13.18	(372)
Total CO2 associated with community systems (363)	.(366) + (368)(372) =	426.49	(373)
CO2 associated with space heating (secondary) (309) x	0 =	0	(374)
CO2 associated with water from immersion heater or instantaneous h	neater (312) x 0.52 =	0	(375)

Total CO2 associated with space and water heating (373) + (374) + (375) =(376) 426.49 CO2 associated with electricity for pumps and fans within dwelling (331)) x (378) 0.52 53.61 CO2 associated with electricity for lighting (332))) x (379) 0.52 124.76 Energy saving/generation technologies (333) to (334) as applicable x 0.01 =Item 1 (380)0.52 -279.69 sum of (376)...(382) =Total CO2, kg/year 325.17 (383) $(383) \div (4) =$ **Dwelling CO2 Emission Rate** (384)6.24 El rating (section 14) (385)95.51

			lloor D) otoilo						
Assessor Name: Software Name:	John Simpson Stroma FSAP 201	12	User D	Stroma Softwa					0006273 on: 1.0.4.26	
				Address						
Address :	AC 108, Aspen Cou	urt, Maitla	and Park	k Estate,	London	, NW3 2	EH.			
Overall dwelling dime	nsions:		Aro	o/m²\		۸۷ ۵۰	iaht/m\		Volume(m³	1
Ground floor				a(m²) 52.1	(1a) x		ight(m) 2.6	(2a) =	135.46	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e	e)+(1r	n) [52.1	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	135.46	(5)
2. Ventilation rate:										
Number of chimneys		econdar neating	'y □ + □	other 0] = [total 0	x	40 =	m³ per hou	(6a)
Number of open flues	<u> </u>		┪╻		」		x	20 =		=
•		0	J . L	0	J ¯ <u>L</u>	0			0	(6b)
Number of intermittent fa	ns					2	X	10 =	20	(7a)
Number of passive vents						0	X	10 =	0	(7b)
Number of flueless gas fi	res					0	X 4	40 =	0	(7c)
								Air ch	nanges per ho	our
Infiltration due to chimney	s, flues and fans = (6	Sa)+(6b)+(7	a)+(7b)+(7c) =	Γ	20		÷ (5) =	0.15	(8)
If a pressurisation test has b	een carried out or is intend	ed, procee	d to (17), (otherwise o	ontinue fr	om (9) to	(16)			_
Number of storeys in the	ne dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0. if both types of wall are priced deducting areas of openir	resent, use the value corres				•	uction			0	(11)
If suspended wooden f	loor, enter 0.2 (unsea	led) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent	ter 0.05, else enter 0								0	(13)
Percentage of windows	and doors draught s	tripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate				(8) + (10)	, , ,	, , ,	, ,		0	(16)
Air permeability value,	•		•	•	•	etre of e	envelope	area	5	(17)
If based on air permeabili Air permeability value applie.	•					is heina u	sed		0.4	(18)
Number of sides sheltere		o boon doi	io oi a ao	groo an poi	modelinty	io somig a			2	(19)
Shelter factor				(20) = 1 -	0.075 x (1	9)] =			0.85	(20)
Infiltration rate incorporat	ing shelter factor			(21) = (18)	x (20) =				0.34	(21)
Infiltration rate modified for	or monthly wind speed	d								
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed 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	 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	1	

0.43	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.34	0.36	0.38	0.4]	
alculate effec		-	rate for t	he appli	cable ca	se				!	!	<u>.</u>	
If mechanical If exhaust air he			andiv N. (2	3h) - (22a) v Emy (c	auation (N	JEN otho	avica (22h) - (222)			0	(2
If balanced with) = (23a)			0	(2
		•		_					2h\ (00h) [/	1 (00.0)	0	(2
a) If balance	o mecha	o o	0	o with nea	0		1K) (248	0	0	230) x [0) - 100]]	(2
b) If balance			-	-								J	(-
4b)m= 0	o mech	o 0	0	0	0	0	0	0	0	0	0	1	(2
							<u> </u>					J	(-
c) If whole h if (22b)n				•	•				5 x (23h	n)			
1c)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(
d) If natural	ventilatio	n or wh	ole hous	e positiv	/e input	L ventilatio	n from l	oft		<u> </u>	<u> </u>	J	
if (22b)n					•				0.5]				
4d)m= 0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58]	(
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)	-	-	-	_	
5)m= 0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58]	(
B. Heat losse	s and he	nat loce r	aramot	or:								_	
. Heat losse LEMENT	Gros	·	Openin		Net Ar	A2	U-valı	ام	AXU		k-value	۵	ΑΧk
	area	_	m		A,r		W/m2		(W/I	K)	kJ/m ² ·		kJ/K
indows Type	: 1				3.91	x1.	/[1/(1.4)+	0.04] =	5.18				(
indows Type	2				1.63	x1,	/[1/(1.4)+	0.04] =	2.16	=			(:
indows Type	3				5.89	x1.	/[1/(1.4)+	0.04] =	7.81	=			(
indows Type	4				1.59	x ₁ ,	/[1/(1.4)+	0.04] =	2.11	╡			(
alls	31.	1	13.02	,	18.08	=	0.18	[3.25	=		\neg	· (
otal area of e		i	10.0		31.1	=	0.10		0.20				(;
arty wall		,			44.62					— г			· (
or windows and	roof wind	ows use e	ffective wi	ndow H-va			formula 1		0 (e)+0 041 a	L as aiven in	naragrani		(
include the area						atou uomg	Torritaia 1	n (mo vara	0,10.0-1,0	io givoii iii	paragrapi	7 0.2	
bric heat los	s, W/K :	= S (A x	U)				(26)(30)	+ (32) =				20.52	2 (
eat capacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	(
nermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(
r design assess	ments wh	ere the de	tails of the	construct	ion are no	t known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		
n be used inste						_							
nermal bridge	•	,		• .	•	<						3.74	(
letails of therma Ital fabric he		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			24.20	
entilation hea		alculated	l monthly	,						25)m x (5)	1	24.26	6 (
Jan	Feb	Mar			Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
3)m= 26.5	26.34	26.18	Apr 25.44	May 25.3	24.66	24.66	24.54	24.9	25.3	25.58	25.88	1	(:
		<u> </u>	20.44	20.0	27.00	27.00	27.04		<u> </u>	<u> </u>	20.00	J	(
eat transfer o		·	,					` ′	= (37) + (3			1	
9)m= 50.76	50.6	50.44	49.7	49.56	48.91	48.91	48.79	49.16	49.56	49.84	50.14	I	

Heat loss para	meter (l	HLP), W/	m²K					(40)m	= (39)m ÷	· (4)			
(40)m= 0.97	0.97	0.97	0.95	0.95	0.94	0.94	0.94	0.94	0.95	0.96	0.96		
Number of dev	o in ma	nth (Tab	lo 10)	<u> </u>	<u> </u>	<u> </u>		,	Average =	Sum(40) ₁ .	12 /12=	0.95	(40)
Number of day Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
<u> </u>													
4. Water heat	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occu	ıpancy,	N								1.	75		(42)
if TFA > 13.9 if TFA £ 13.9		+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
Annual averag	e hot wa										.81		(43)
Reduce the annua not more that 125							to achieve	a water us	se target o	f			
							۸۰۰۰	Con	Oct	Nov	Doo		
Jan Hot water usage ii	Feb n litres per	Mar r day for ea	Apr ach month	May $Vd,m = fa$	Jun ctor from 7	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 83.39	80.36	77.33	74.29	71.26	68.23	68.23	71.26	74.29	77.33	80.36	83.39		
(11)	00.00	77.00	7 1.20	71.20	00.20	00.20	7 1.20	L		m(44) ₁₁₂ =		909.73	(44)
Energy content of	hot water	used - cal	culated me	onthly $= 4$.	190 x Vd,r	n x nm x E	0Tm / 3600			· /	L		` ′
(45)m= 123.67	108.16	111.61	97.31	93.37	80.57	74.66	85.67	86.7	101.03	110.29	119.77		
									Total = Su	m(45) ₁₁₂ =	:	1192.79	(45)
If instantaneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)		i			
(46)m= 18.55	16.22	16.74	14.6	14.01	12.09	11.2	12.85	13	15.16	16.54	17.96		(46)
Water storage Storage volum		\ includin	na anv so	olar or M	///HRS	storane	within sa	ame ves	امء		150		(47)
If community h	` ′		•			Ū		ATTIC VOO	501		150		(47)
Otherwise if no	•			•			` '	ers) ente	er '0' in (47)			
Water storage	loss:		`					,		•			
a) If manufact	urer's d	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(48)
Temperature fa	actor fro	m Table	2b							0.	54		(49)
Energy lost fro		_	-				(48) x (49)) =		0.	75		(50)
b) If manufactHot water stora			-										(E1)
If community h	-			6 Z (KVV	11/11116/08	iy <i>)</i>					0		(51)
Volume factor	_										0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)
Energy lost fro	m watei	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or ((54) in (5	55)								0.	75		(55)
Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(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)
If cylinder contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	ix H	
(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)
Primary circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit				,	•	. ,	, ,						
(modified by					ı —	ı —				<u> </u>			
(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 loco	ooloulotod	for oach	manth	(64)m	(60) · 2	GE (44	١,,,,						
Combi loss (61)m= 0	calculated 0	or each	month 0	0	(60) ÷ 3	05 × (41)m 0	0	0	0	0]	(61)
						<u> </u>	<u> </u>				<u> </u>	J (59)m + (61)m	(0.)
(62)m= 170.2	-i	158.21	142.4	139.96	125.66	121.25	132.2	_	147.63	155.38	166.36	(59)111 + (61)111	(62)
Solar DHW inp		L		<u> </u>		l						i	(/
(add additio									ar continu	ion to wat	or ricating)		
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	water hea	ter						-				I	
(64)m= 170.2	26 150.25	158.21	142.4	139.96	125.66	121.25	132.2	7 131.79	147.63	155.38	166.36		
	•						0	utput from w	ater heate	r (annual)	l12	1741.41	(64)
Heat gains t	rom water	heating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)	m] + 0.8	x [(46)m	+ (57)m	+ (59)m]	
(65)m= 78.4	1 69.63	74.39	68.43	68.32	62.86	62.1	65.76	64.9	70.87	72.74	77.1		(65)
include (5	7)m in cal	culation of	of (65)m	only if c	ylinder i	s in the	dwellin	g or hot w	ater is f	rom com	munity h	' leating	
5. Internal	gains (see	Table 5	and 5a):									
Metabolic ga				,									
Jai		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6		(66)
Lighting gai	ns (calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso se	e Table 5		•	•	ı	
(67)m= 13.6	1 12.09	9.83	7.44	5.56	4.7	5.08	6.6	8.86	11.24	13.12	13.99		(67)
Appliances	gains (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), al	so see Ta	ble 5			•	
(68)m= 152.6	69 154.27	150.28	141.78	131.05	120.96	114.23	112.6	1 116.63	125.13	135.86	145.95		(68)
Cooking gai	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	5		•	•	
(69)m= 31.7	6 31.76	31.76	31.76	31.76	31.76	31.76	31.76	31.76	31.76	31.76	31.76		(69)
Pumps and	fans gains	(Table 5	ōa)			•		•				•	
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses e.g.	evaporation	n (negat	tive valu	es) (Tab	le 5)								
(71)m= -70.0	08 -70.08	-70.08	-70.08	-70.08	-70.08	-70.08	-70.08	-70.08	-70.08	-70.08	-70.08		(71)
Water heati	ng gains (T	able 5)		-			-	-	-				
(72)m= 105.3	37 103.62	99.98	95.04	91.83	87.31	83.47	88.39	90.14	95.26	101.03	103.63		(72)
Total interr	al gains =	:			(66)m + (67)m	n + (68)r	n + (69)m +	(70)m + (7	'1)m + (72))m		
(73)m= 323.9	95 322.26	312.37	296.54	280.72	265.25	255.05	259.9	267.91	283.91	302.3	315.85		(73)
6. Solar ga													
Solar gains a		_	r flux from	Table 6a			itions to	convert to th	ne applical		tion.		
Orientation:	Access F Table 6d		Area m²		Flu	ıx ble 6a		g_ Table 6b	т	FF able 6c		Gains (W)	
						DIE Oa	, –	Table ob	, -	able oc		(v v)	7
North 0.9		X	1.6	53	X	10.63	X	0.63	x	0.7	=	5.3	<u> </u> (74)
North 0.9		X	5.8		-	10.63	x	0.63	x	0.7	=	19.14	(74)
North 0.9		X	1.6			20.32] x	0.63	×	0.7	=	10.12	<u> </u> (74)
North 0.9		X	5.8	39	-	20.32	X	0.63	x	0.7	=	36.58	<u> </u> (74)
North 0.9	0.77	X	1.6	63	x (34.53	X	0.63	X	0.7	=	17.2	(74)

	_		_						1				_
North	0.9x	0.77	X	5.89	X	34.53	X	0.63	X	0.7	=	62.16	(74)
North	0.9x	0.77	X	1.63	X	55.46	X	0.63	X	0.7	=	27.63	(74)
North	0.9x	0.77	X	5.89	X	55.46	X	0.63	x	0.7	=	99.84	(74)
North	0.9x	0.77	X	1.63	X	74.72	X	0.63	x	0.7	=	37.22	(74)
North	0.9x	0.77	X	5.89	X	74.72	X	0.63	X	0.7	=	134.49	(74)
North	0.9x	0.77	X	1.63	X	79.99	X	0.63	X	0.7	=	39.84	(74)
North	0.9x	0.77	X	5.89	X	79.99	X	0.63	X	0.7	=	143.98	(74)
North	0.9x	0.77	X	1.63	X	74.68	x	0.63	x	0.7	=	37.2	(74)
North	0.9x	0.77	X	5.89	X	74.68	X	0.63	X	0.7	=	134.42	(74)
North	0.9x	0.77	X	1.63	X	59.25	X	0.63	X	0.7	=	29.51	(74)
North	0.9x	0.77	X	5.89	x	59.25	x	0.63	x	0.7	=	106.65	(74)
North	0.9x	0.77	X	1.63	X	41.52	x	0.63	x	0.7	=	20.68	(74)
North	0.9x	0.77	X	5.89	x	41.52	x	0.63	x	0.7	=	74.73	(74)
North	0.9x	0.77	X	1.63	X	24.19	x	0.63	x	0.7	=	12.05	(74)
North	0.9x	0.77	X	5.89	x	24.19	X	0.63	x	0.7	=	43.54	(74)
North	0.9x	0.77	X	1.63	x	13.12	X	0.63	x	0.7	=	6.53	(74)
North	0.9x	0.77	X	5.89	x	13.12	X	0.63	x	0.7	=	23.61	(74)
North	0.9x	0.77	X	1.63	x	8.86	x	0.63	x	0.7	=	4.42	(74)
North	0.9x	0.77	X	5.89	x	8.86	X	0.63	X	0.7	=	15.96	(74)
South	0.9x	0.77	X	3.91	x	46.75	X	0.63	X	0.7	=	55.87	(78)
South	0.9x	0.77	X	1.59	x	46.75	X	0.63	x	0.7	=	22.72	(78)
South	0.9x	0.77	x	3.91	x	76.57	x	0.63	x	0.7	=	91.49	(78)
South	0.9x	0.77	X	1.59	x	76.57	x	0.63	x	0.7	=	37.21	(78)
South	0.9x	0.77	X	3.91	x	97.53	x	0.63	x	0.7	=	116.55	(78)
South	0.9x	0.77	x	1.59	x	97.53	x	0.63	x	0.7] =	47.39	(78)
South	0.9x	0.77	x	3.91	x	110.23	x	0.63	x	0.7] =	131.72	(78)
South	0.9x	0.77	X	1.59	x	110.23	X	0.63	x	0.7	=	53.57	(78)
South	0.9x	0.77	x	3.91	x	114.87	x	0.63	x	0.7] =	137.26	(78)
South	0.9x	0.77	X	1.59	x	114.87	X	0.63	x	0.7	=	55.82	(78)
South	0.9x	0.77	X	3.91	x	110.55	X	0.63	x	0.7	=	132.1	(78)
South	0.9x	0.77	x	1.59	x	110.55	x	0.63	x	0.7] =	53.72	(78)
South	0.9x	0.77	x	3.91	x	108.01	x	0.63	x	0.7	j =	129.07	(78)
South	0.9x	0.77	x	1.59	x	108.01	x	0.63	x	0.7	j =	52.49	(78)
South	0.9x	0.77	x	3.91	x	104.89	x	0.63	x	0.7] =	125.34	(78)
South	0.9x	0.77	x	1.59	x	104.89	x	0.63	x	0.7] =	50.97	(78)
South	0.9x	0.77	x	3.91	x	101.89	x	0.63	x	0.7] =	121.75	(78)
South	0.9x	0.77	x	1.59	x	101.89	x	0.63	x	0.7] =	49.51	(78)
South	0.9x	0.77	x	3.91	x	82.59	x	0.63	x	0.7	j =	98.69	(78)
South	0.9x	0.77	x	1.59	x	82.59	x	0.63	x	0.7] =	40.13	(78)
South	0.9x	0.77	x	3.91	x	55.42	x	0.63	x	0.7] =	66.22	(78)
South	0.9x	0.77	X	1.59	x	55.42	x	0.63	x	0.7	j =	26.93	(78)
	_		_		•		•		•		•		_

South	0.9x 0.77	×	3.9	91	X A	40.4	X	0.63	x	0.7	=	48.27	(78)
	0.9x 0.77	x	1.5	59	X	40.4	x	0.63	= x =	0.7	=	19.63	(78)
Solar gain	ns in watts, c	alculated	for eac	h month			(83)m = S	um(74)m .	(82)m				
(83)m= 10	3.02 175.4	243.3	312.76	364.8	369.64	353.18	312.47	266.67	194.41	123.3	88.28		(83)
Total gain	ıs – internal a	and solar	(84)m =	= (73)m ·	+ (83)m	, watts						•	
(84)m= 42	26.97 497.66	555.67	609.3	645.52	634.89	608.23	572.38	534.58	478.32	425.6	404.12		(84)
7. Mean	internal tem	perature	(heating	season)								
	ature during l					from Tab	ole 9, Th	1 (°C)				21	(85)
Utilisatio	n factor 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		
-	0.99 0.98	0.94	0.85	0.68	0.49	0.35	0.39	0.62	0.88	0.98	0.99		(86)
` ′		<u> </u>		ļ				<u> </u>					, ,
	ernal tempe	1		· `	i	<u> </u>			00.00	00.40	00.40	1	(07)
(87)m= 20	0.21 20.39	20.61	20.84	20.96	21	21	21	20.98	20.83	20.48	20.18		(87)
Tempera	ature during I	neating p	eriods ir	rest of	dwelling	from Ta	ble 9, T	h2 (°C)				<u>.</u>	
(88)m= 2	20.11	20.11	20.12	20.12	20.13	20.13	20.14	20.13	20.12	20.12	20.11		(88)
Utilisatio	n factor for g	ains for ı	est of d	welling,	h2,m (se	e Table	9a)						
	0.99 0.97	0.93	0.81	0.63	0.42	0.28	0.32	0.55	0.85	0.97	0.99		(89)
— Mean int	ernal tempe	rature in t	the rest	of dwalli	na T2 (f	ollow etc	ne 3 to .	Tin Tahl	0.00				
	9.07 19.32	19.64	19.95	20.09	20.13	20.13	20.14	20.12	19.94	19.47	19.03]	(90)
(66)										g area ÷ (4		0.51	(91)
										9 (-7	0.51	(01)
	ernal tempe	1 `						 				1	
` ′	9.65 19.87	20.13	20.41	20.53	20.57	20.57	20.58	20.56	20.39	19.99	19.61		(92)
· · · · · ·	ljustment to t												
(93)m = 19		1		· ·	1	1			•			1	
` '	9.65 19.87	20.13	interna 20.41	temper 20.53	ature fro 20.57	m Table 20.57	4e, whe	20.56	opriate 20.39	19.99	19.61		(93)
	heating req	20.13 uirement	20.41	20.53	20.57	20.57	20.58	20.56	20.39				(93)
Set Ti to	heating req the mean in	20.13 uirement ternal ter	20.41 nperatu	20.53	20.57	20.57	20.58	20.56	20.39			culate	(93)
Set Ti to	the mean in ation factor f	20.13 uirement ternal ter or gains	20.41 mperaturusing Ta	20.53 re obtainable 9a	20.57 ned at ste	20.57 ep 11 of	20.58 Table 9l	20.56 b, so tha	20.39 t Ti,m=(76)m an	d re-calc	culate	(93)
Set Ti to the utilisa	the mean in ation factor f	20.13 uirement ternal ter or gains Mar	20.41 mperaturusing Ta	20.53	20.57	20.57	20.58	20.56	20.39			culate	(93)
Set Ti to the utilisatio	the mean in ation factor f Jan Feb n factor for g	20.13 uirement ternal ter or gains Mar ains, hm	20.41 mperaturusing Ta	20.53 re obtain able 9a May	20.57 ned at sto	20.57 ep 11 of Jul	20.58 Table 9l	20.56 b, so tha	20.39 t Ti,m=(76)m an	d re-calc	culate	
Set Ti to the utilisatio Utilisatio (94)m=	the mean in ation factor f Jan Feb n factor for g	20.13 uirement ternal ter or gains of Mar pains, hm 0.93	20.41 nperatulusing Ta Apr : 0.83	20.53 re obtainable 9a May 0.65	20.57 ned at ste	20.57 ep 11 of	20.58 Table 9l	20.56 b, so tha	20.39 t Ti,m=(76)m an	d re-calc	culate	(93)
Set Ti to the utilisatio Utilisatio (94)m= Useful ga	the mean in ation factor f Jan Feb n factor for g 0.99 0.97 ains, hmGm	20.13 uirement ternal ter or gains of Mar pains, hm 0.93 , W = (94)	20.41 mperaturusing Ta Apr : 0.83	20.53 re obtainable 9a May 0.65	20.57 ned at sto Jun 0.46	20.57 ep 11 of Jul 0.32	20.58 Table 9l Aug 0.36	20.56 b, so tha Sep	20.39 t Ti,m=(** Oct 0.86	76)m and Nov	Dec	culate	(94)
Set Ti to the utilisatio Utilisatio (94)m= 0 Useful ga (95)m= 42	the mean in ation factor for go 0.99 0.97 ains, hmGm	20.13 uirement ternal ter or gains of Mar pains, hm 0.93 , W = (94) 515	20.41 mperatulusing Ta Apr : 0.83 4)m x (8- 503.05	20.53 re obtainable 9a May 0.65 4)m 422.31	20.57 ned at sto Jun 0.46 290.49	20.57 ep 11 of Jul	20.58 Table 9l	20.56 b, so tha	20.39 t Ti,m=(76)m an	d re-calc	culate	
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly	the mean in ation factor f Jan Feb n factor for g 0.99 0.97 ains, hmGm 20.79 481.56 average extends	20.13 uirement ternal ter or gains (Mar ains, hm 0.93 , W = (94 515 ernal tem	20.41 mperaturusing Ta Apr : 0.83 4)m x (8- 503.05 perature	20.53 re obtainable 9a May 0.65 4)m 422.31	20.57 ned at sto Jun 0.46 290.49 able 8	20.57 ep 11 of Jul 0.32 194.25	20.58 Table 9l Aug 0.36 203.44	20.56 b, so tha Sep 0.58	20.39 t Ti,m=(' Oct 0.86 411.6	76)m and Nov 0.97	Dec 0.99 399.61	culate	(94) (95)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 42	the mean in ation factor for go.99 0.97 ains, hmGm average extends.	20.13 uirement ternal ter or gains of Mar lains, hm 0.93 , W = (94 515 ernal tem 6.5	20.41 nperatulusing Ta Apr : 0.83 4)m x (8- 503.05 perature 8.9	20.53 re obtain able 9a May 0.65 4)m 422.31 e from Ta 11.7	20.57 ned at sto Jun 0.46 290.49 able 8 14.6	20.57 ep 11 of Jul 0.32 194.25	20.58 Table 9l Aug 0.36 203.44	20.56 b, so tha Sep 0.58 311.42	20.39 t Ti,m=(Oct 0.86 411.6	76)m and Nov	Dec	culate	(94)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 44 Heat loss	the mean in ation factor for go.99 0.97 ains, hmGm average external 4.9 s rate for me	20.13 uirement ternal ter or gains Mar pains, hm 0.93 , W = (94 515 ernal tem 6.5 an intern	20.41 mperature using Ta Apr : 0.83 4)m x (8- 503.05 perature 8.9 al temperature	20.53 re obtain able 9a May 0.65 4)m 422.31 e from Ta 11.7 erature,	20.57 ned at sto Jun 0.46 290.49 able 8 14.6 Lm , W =	20.57 ep 11 of Jul 0.32 194.25 16.6 =[(39)m;	20.58 Table 9l Aug 0.36 203.44 16.4 x [(93)m	20.56 b, so that Sep 0.58 311.42 14.1 - (96)m	20.39 t Ti,m=(' Oct 0.86 411.6	76)m and Nov 0.97 411.78	Dec 0.99 399.61	culate	(94) (95) (96)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 2 Heat loss (97)m= 77	the mean in ation factor for go.99 0.97 ains, hmGm 20.79 481.56 average extends 4.3 4.9 s rate for me	20.13 uirement ternal ter or gains of Mar lains, hm 0.93 , W = (94 515 ernal tem 6.5 an intern 687.77	20.41 nperaturusing Ta Apr : 0.83 4)m x (8- 503.05 perature 8.9 al tempe	20.53 re obtainable 9a May 0.65 4)m 422.31 e from Ta 11.7 erature, 437.83	20.57 ned at sto Jun 0.46 290.49 able 8 14.6 Lm , W = 292.08	20.57 ep 11 of Jul 0.32 194.25 16.6 =[(39)m; 194.41	20.58 Table 9l Aug 0.36 203.44 16.4 x [(93)m 203.72	20.56 b, so tha Sep 0.58 311.42 14.1 - (96)m 317.54	20.39 t Ti,m=(Oct 0.86 411.6 10.6] 485.34	76)m and Nov 0.97 411.78 7.1	Dec 0.99 399.61	culate	(94) (95)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 4 Heat loss (97)m= 77 Space he	the mean in ation factor for go.99 0.97 ains, hmGm everage external externa	20.13 uirement ternal ter or gains of the mark pains, hm 0.93 , W = (94 515 ernal tem 6.5 an intern 687.77 ement fo	20.41 mperature sing Ta Apr : 0.83 4)m x (8- 503.05 perature 8.9 al tempe 571.8 r each n	20.53 re obtainable 9a May 0.65 4)m 422.31 e from Ta 11.7 erature, 437.83 nonth, k	20.57 ned at stored at st	20.57 ep 11 of Jul 0.32 194.25 16.6 =[(39)m : 194.41 th = 0.02	20.58 Table 9l Aug 0.36 203.44 16.4 x [(93)m 203.72 4 x [(97)	20.56 b, so that Sep 0.58 311.42 14.1 - (96)m 317.54)m - (95	20.39 t Ti,m=(' Oct 0.86 411.6 10.6] 485.34)m] x (4	76)m and Nov 0.97 411.78 7.1 642.26 1)m	Dec 0.99 399.61 4.2 772.7	culate	(94) (95) (96)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 4 Heat loss (97)m= 77 Space he	the mean in ation factor for go.99 0.97 ains, hmGm 20.79 481.56 average extends 4.3 4.9 s rate for me	20.13 uirement ternal ter or gains of Mar lains, hm 0.93 , W = (94 515 ernal tem 6.5 an intern 687.77	20.41 nperaturusing Ta Apr : 0.83 4)m x (8- 503.05 perature 8.9 al tempe	20.53 re obtainable 9a May 0.65 4)m 422.31 e from Ta 11.7 erature, 437.83	20.57 ned at sto Jun 0.46 290.49 able 8 14.6 Lm , W = 292.08	20.57 ep 11 of Jul 0.32 194.25 16.6 =[(39)m; 194.41	20.58 Table 9l Aug 0.36 203.44 16.4 x [(93)m 203.72 24 x [(97) 0	20.56 b, so that Sep 0.58 311.42 14.1 - (96)m 317.54)m - (95) 0	20.39 t Ti,m=(' Oct 0.86 411.6 10.6] 485.34)m] x (4' 54.86	76)m and Nov 0.97 411.78 7.1 642.26 1)m 165.94	Dec 0.99 399.61 4.2 772.7		(94) (95) (96) (97)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 24 Heat loss (97)m= 77 Space he (98)m= 26	the mean in ation factor for go 1.99	20.13 uirement ternal ter or gains of Mar lains, hm 0.93 , W = (94 515 ernal tem 6.5 an intern 687.77 ement fo	20.41 Inperature Apr 3.83 4)m x (8-503.05) perature 8.9 al tempe 571.8 r each n 49.5	20.53 re obtainable 9a May 0.65 4)m 422.31 e from Ta 11.7 erature, 437.83 nonth, k\ 11.55	20.57 ned at stored at st	20.57 ep 11 of Jul 0.32 194.25 16.6 =[(39)m : 194.41 th = 0.02	20.58 Table 9l Aug 0.36 203.44 16.4 x [(93)m 203.72 24 x [(97) 0	20.56 b, so that Sep 0.58 311.42 14.1 - (96)m 317.54)m - (95	20.39 t Ti,m=(' Oct 0.86 411.6 10.6] 485.34)m] x (4' 54.86	76)m and Nov 0.97 411.78 7.1 642.26 1)m 165.94	Dec 0.99 399.61 4.2 772.7	culate	(94) (95) (96) (97)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 24 Heat loss (97)m= 77 Space he (98)m= 26	the mean in ation factor for go.99 0.97 ains, hmGm everage external externa	20.13 uirement ternal ter or gains of Mar lains, hm 0.93 , W = (94 515 ernal tem 6.5 an intern 687.77 ement fo	20.41 Inperature Apr 3.83 4)m x (8-503.05) perature 8.9 al tempe 571.8 r each n 49.5	20.53 re obtainable 9a May 0.65 4)m 422.31 e from Ta 11.7 erature, 437.83 nonth, k\ 11.55	20.57 ned at stored at st	20.57 ep 11 of Jul 0.32 194.25 16.6 =[(39)m : 194.41 th = 0.02	20.58 Table 9l Aug 0.36 203.44 16.4 x [(93)m 203.72 24 x [(97) 0	20.56 b, so that Sep 0.58 311.42 14.1 - (96)m 317.54)m - (95) 0	20.39 t Ti,m=(' Oct 0.86 411.6 10.6] 485.34)m] x (4' 54.86	76)m and Nov 0.97 411.78 7.1 642.26 1)m 165.94	Dec 0.99 399.61 4.2 772.7		(94) (95) (96) (97)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 77 Space he (98)m= 26	the mean in ation factor for go 1.99	20.13 uirement ternal ter or gains of Mar lains, hm 0.93 , W = (94 515 ernal tem 6.5 an intern 687.77 ement fo 128.54	nperaturusing Ta Apr : 0.83 4)m x (8- 503.05 perature 8.9 al tempe 571.8 r each n 49.5	20.53 re obtainable 9a May 0.65 4)m 422.31 e from Ta 11.7 erature, 437.83 nonth, k\ 11.55	20.57 ned at store Jun 0.46 290.49 able 8 14.6 Lm , W = 292.08 Wh/monto	20.57 ep 11 of Jul 0.32 194.25 16.6 =[(39)m : 194.41 th = 0.02	20.58 Table 9l Aug 0.36 203.44 16.4 x [(93)m 203.72 24 x [(97) 0 Tota	20.56 b, so that Sep 0.58 311.42 14.1 - (96)m 317.54)m - (95 0	20.39 t Ti,m=(' Oct 0.86 411.6 10.6] 485.34)m] x (4' 54.86	76)m and Nov 0.97 411.78 7.1 642.26 1)m 165.94	Dec 0.99 399.61 4.2 772.7	1139.77	(94) (95) (96) (97)
Set Ti to the utilisation (94)m= 0 Useful ga (95)m= 42 Monthly (96)m= 77 Space he (98)m= 26 Space he 9a. Energ	the mean in ation factor for go.99 0.97 ains, hmGm 20.79 481.56 average external eating requires for the factor for meaning requires for the factor for meaning requires for the factor for meaning requires for the factor for the fac	20.13 uirement ternal ter or gains of Mar pains, hm 0.93 , W = (94 515 ernal tem 6.5 an intern 687.77 ement fo 128.54 ement in	20.41 mperaturusing Ta Apr : 0.83 4)m x (8- 503.05 perature 8.9 al tempe 571.8 r each n 49.5 kWh/m²	20.53 re obtainable 9a May 0.65 4)m 422.31 e from Ta 11.7 erature, 437.83 nonth, kl 11.55 2/year eating sy	20.57 ned at sto Jun 0.46 290.49 able 8 14.6 Lm , W = 292.08 Wh/mont 0	20.57 ep 11 of Jul 0.32 194.25 16.6 =[(39)m : 194.41 th = 0.02 0	20.58 Table 9l Aug 0.36 203.44 16.4 x [(93)m 203.72 24 x [(97) 0 Tota	20.56 b, so that Sep 0.58 311.42 14.1 - (96)m 317.54)m - (95 0	20.39 t Ti,m=(' Oct 0.86 411.6 10.6] 485.34)m] x (4' 54.86	76)m and Nov 0.97 411.78 7.1 642.26 1)m 165.94	Dec 0.99 399.61 4.2 772.7	1139.77	(94) (95) (96) (97)

Fraction of space heat from main system(s)			(202) = 1 -	- (201) =				1	(202)
Fraction of total heating from main system 1			(204) = (20	02) × [1 –	(203)] =			1	(204)
Efficiency of main space heating system 1								93.5	(206)
Efficiency of secondary/supplementary heating s	system,	, %						0	(208)
Jan Feb Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heating requirement (calculated above)								I	
266.55 185.25 128.54 49.5 11.55	0	0	0	0	54.86	165.94	277.58		
$ (211)m = \{ [(98)m \times (204)] \} \times 100 \div (206) $ $ 285.08 198.13 137.48 52.94 12.35 $	0	0	0	0	58.67	177.48	296.87	[(211)
285.08 198.13 137.48 52.94 12.35	<u> </u>			I (kWh/yea				1219	(211)
Space heating fuel (secondary), kWh/month				(**************************************	,	715,1012		1219	
$= \{[(98) \text{m x } (201)]\} \times 100 \div (208)$									
(215)m= 0 0 0 0 0	0	0	0	0	0	0	0		
			Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}		0	(215)
Water heating									
Output from water heater (calculated above) 170.26	125.66	121.25	132.27	131.79	147.63	155.38	166.36		
Efficiency of water heater	123.00	121.20	102.21	101.70	147.00	100.00	100.00	79.8	(216)
· · · · · · · · · · · · · · · · · · ·	79.8	79.8	79.8	79.8	82.44	84.99	86.17	. 0.0	」` ′ (217)
Fuel for water heating, kWh/month	<u> </u>	'							
(219) m = (64) m x $100 \div (217)$ m (219)m= 197.97 175.99 187.75 173 173.81 1	157.47	454.05		105.45	470.07	400.00	100.00	ı	
(219)m= 197.97 175.99 187.75 173 173.81 1									
(210)111- 107.07 170.00 107.70 170 170.01 1	137.47	151.95	165.75	165.15 L= Sum(2)	179.07 19a) =	182.82	193.06	2402.70	7(240)
	137.47	151.95		165.15 I = Sum(2 ²	19a) ₁₁₂ =			2103.78 kWh/year	(219)
Annual totals Space heating fuel used, main system 1	137.47	151.95			19a) ₁₁₂ =	Nh/year		2103.78 kWh/year 1219	
Annual totals	137.47	151.95			19a) ₁₁₂ =			kWh/year	
Annual totals Space heating fuel used, main system 1 Water heating fuel used	137.47	151.95			19a) ₁₁₂ =			kWh/year	
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot	137.47	151.95			19a) ₁₁₂ =			kWh/year	
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump:	137.47	151.95			19a) ₁₁₂ =		30	kWh/year	(230c)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue	137.47	151.95	Tota	I = Sum(2 ⁻	19a) ₁₁₂ = k 1	Wh/year		kWh/year 1219 2103.78	(230c) (230e)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year	137.47	151.95	Tota		19a) ₁₁₂ = k 1	Wh/year	30	kWh/year 1219 2103.78	(230c) (230e) (231)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting			Tota	I = Sum(2 ⁻ of (230a).	19a) ₁₁₂ = k 1	Wh/year	30	kWh/year 1219 2103.78	(230c) (230e)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year			Tota	I = Sum(2 ⁻ of (230a).	19a) ₁₁₂ = k 1	Wh/year	30	kWh/year 1219 2103.78	(230c) (230e) (231)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting	ns includ	ding mid	Tota	I = Sum(2 ⁻ of (230a).	19a) ₁₁₂ = k 1	Wh/year	30 45	kWh/year 1219 2103.78	(230c) (230e) (231) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting	ns includ	ding mid ergy h/year	Tota	I = Sum(2 ⁻ of (230a).	19a) ₁₁₂ = k¹(230g) =	Wh/year	30 45	kWh/year 1219 2103.78 75 240.39	(230c) (230e) (231) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system	ns includ Ene kWh	ding mid ergy h/year	Tota	I = Sum(2 ⁻ of (230a).	(230g) = Emiss kg CO	ion fac 2/kWh	30 45 tor	1219 2103.78 75 240.39 Emissions kg CO2/yea	(230c) (230e) (231) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system	Ene kWh	ding mid ergy h/year) x	Tota	I = Sum(2 ⁻ of (230a).	(230g) = Emiss kg CO:	ion fac 2/kWh	30 45 tor	75 240.39 Emissions kg CO2/yea 263.3	(230c) (230e) (231) (232) (232)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions — Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Ene kWh (211) (215) (219)	ding mid ergy h/year) x) x	Tota	I = Sum(2'	(230g) = Emiss kg CO: 0.2	ion fac 2/kWh	30 45 tor =	75 240.39 Emissions kg CO2/yea 263.3 0 454.42	(230c) (230e) (231) (232) (261) (263) (264)
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary)	Ene kWh (211) (215) (219)	ding mid ergy h/year) x) x) x	sum	I = Sum(2'	(230g) = Emiss kg CO: 0.2	ion fac 2/kWh	30 45 tor =	75 240.39 Emissions kg CO2/yea 263.3	(230c) (230e) (231) (232) (232)

(232) x

Electricity for lighting

124.76

0.519

(268)

Total CO2, kg/year sum of (265)...(271) = 881.41 (272)

 $TER = 24.49 \tag{273}$

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:38:08

Project Information:

Assessed By: John Simpson (STRO006273) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 77.6m²

Site Reference: Maitland Park Estate

Plot Reference: AC 109

Address: AC 109, Aspen Court, Maitland Park Estate, London, NW3 2EH

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 21.63 kg/m²

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

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 35.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 30.8 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.12 (max. 0.30)
 0.12 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) 1.40 (max. 3.30) **OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

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:	0.53	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	ОК
9 Summertime temperature		
Overheating risk (Thames valley):	Slight	ok
Based on:		
Overshading:	Average or unknown	
Windows facing: North	2.24m²	
Windows facing: South	4.1m²	
Windows facing: North	6.18m²	
Windows facing: South	1.71m²	
Windows facing: North	1.71m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
10 Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m ² K	
Party Walls U-value	0 W/m²K	
Community heating, heat from electric heat pump		
Photovoltaic array		
Thotorollaid array		

			User D	etails:						
Assessor Name: Software Name:	John Simpson Stroma FSAP 2	2012		Stroma Softwa					006273 on: 1.0.4.26	
			i í	Address						
Address :	AC 109, Aspen (Court, Maitla	and Park	k Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
			Area	a(m²)		Av. He	eight(m)	, ,	Volume(m	<u> </u>
Ground floor				77.6	(1a) x	2	2.6	(2a) =	201.76	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+	-(1e)+(1r	n) =	77.6	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	201.76	(5)
2. Ventilation rate:										
	main heating	secondar heating	у	other		total			m³ per hoι	ır
Number of chimneys	0 +		+ [0] = [0	X	40 =	0	(6a)
Number of open flues	0 +	. 0	Ĭ + F	0	i	0	X	20 =	0	(6b)
Number of intermittent fa					J			10 =		= ``
					Ļ	0			0	(7a)
Number of passive vents	5				L	0	X	10 =	0	(7b)
Number of flueless gas f	ires					0	X	40 =	0	(7c)
								Air ch	anges per h	our
Infiltration due to chimens	us flues and force	(6a) . (6b) . (7	70) ı (7 b) ı (7 0) –	г			ı		
Infiltration due to chimne If a pressurisation test has a	•				ontinuo fr	0		÷ (5) =	0	(8)
Number of storeys in t		епава, ргосве	u 10 (17), (Julei Wise C	onunue n	om (9) to	(10)		0	(9)
Additional infiltration	are aweiling (115)						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: (0.25 for steel or timb	oer frame or	0.35 for	r masonr	v constr	uction	1(-)		0	(11)
if both types of wall are p					•				<u> </u>	``
deducting areas of open								,		_
If suspended wooden	•	,	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er									0	(13)
Percentage of window	s and doors draugh	nt stripped		0.05 10.0	(4.4)	001			0	(14)
Window infiltration				0.25 - [0.2			. (45)		0	(15)
Infiltration rate				(8) + (10)	, , ,	, , ,			0	(16)
Air permeability value			•		•	etre of e	envelope	area	2	(17)
If based on air permeabi	•					to the to an a			0.1	(18)
Air permeability value application. Number of sides sheltered	•	t nas been dor	ie or a deg	gree air pei	теарицу	is being u	sea			(19)
Shelter factor	5u			(20) = 1 -	0.075 x (1	19)] =			2 0.85	(20)
Infiltration rate incorpora	ting shelter factor			(21) = (18)					0.08	(21)
Infiltration rate modified	-	eed							0.00	`\`/
Jan Feb	 	ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		<u>, 1</u>			•		1	1	I	
(22)m= 5.1 5	4.9 4.4 4.3	3 3.8	3.8	3.7	4	4.3	4.5	4.7		
		L	I	I		1	1	I	I	
Wind Factor $(22a)m = (2a)m =$	22)m ÷ 4									
(000) - 4 07 4 05	100 11 10	0 05	0.05	I 000		I 400	1 440	I 440	l	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

0.11	0.11	0.1	0.09	0.09	d wind s	0.08	0.08	0.08	0.09	0.1	0.1		
Calculate effe		•	rate for t	he appli	cable ca	se	!		<u>I</u>	!	ļ		
If mechanical			andiv N. (2	2h) _ (22c) v Emy (o	gustion (NEN otho	nuina (22h) - (220)			0.5	(23
If exhaust air h		0 11		, ,	,	. `	,, .	,) = (23a)			0.5	(23
If balanced with		•	•	_					Dls \ /	005) [4 (00-)	76.5	(23
a) If balance (24a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	23D) X [0.22	÷ 100] 	(24
b) If balance					Ll		L	<u> </u>	<u> </u>		0.22		(
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h					ا			<u> </u>					•
,				•	o); otherv				5 × (23b	o)			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural	ventilation	on or wh	ole hous	e positiv	/e input \	/entilati	on from I	oft				l	
if (22b)r	n = 1, the	en (24d)	m = (22l	o)m othe	rwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]			•	
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air		rate - er	<u> </u>) or (24k	o) or (24d	c) or (24	d) in box	(25)				•	
25)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(2
3. Heat losse	s and he	eat loss r	paramete	er:									
ELEMENT	Gros		Openin		Net Are	еа	U-val	ıe	AXU		k-value	e /	λΧk
	area	(m²)	· m		A ,n	ገ ²	W/m2	K	(W/	K)	kJ/m²-l	<	J/K
Windows Type) 1				2.24	_x 1	/[1/(1.4)+	0.04] =	2.97				(27
Vindows Type	2				4.1	x1	/[1/(1.4)+	0.04] =	5.44				(27
Windows Type	3				6.18	x1	/[1/(1.4)+	0.04] =	8.19				(27
Windows Type) 4				1.71	_x 1	/[1/(1.4)+	0.04] =	2.27				(27
Windows Type) 5				1.71	x1	/[1/(1.4)+	0.04] =	2.27				(27
Nalls	46.5	i9	15.9	4	30.65	X	0.12	_ = [3.68	$\overline{}$ [(29
Total area of e	lements	, m²			46.59								(3
Party wall					44.62	x	0		0				(32
for windows and	roof wind	ows, use e	ffective wi	ndow U-va	alue calcula	ated using	g formula 1	/[(1/U-valu	ıe)+0.04] á	as given in	paragraph	3.2	
** include the area				ls and par	titions								
Fabric heat los		•	U)				(26)(30)					24.81	(33
Heat capacity	`	,							, , ,	2) + (32a).	(32e) =	0	(34
Thermal mass	•	`		,					tive Value			250	(3
For design asses: can be used inste				construct	ion are not	known pi	recisely the	indicative	values of	TMP in T	able 1f		
				using Ap	pendix k	(6.9	(36
mennai biluq	•	,		• .	•							0.0	(-
•								(33) +	(36) =			31.71	(37
f details of therma	at loss							(38)m	= 0.33 × (25)m x (5)		•
f details of therma Fotal fabric he Ventilation hea		alculated	monthly	/									
f details of therma Γotal fabric he		alculated Mar	l monthly Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
f details of therma Fotal fabric he	at loss ca				Jun 13.2	Jul 13.2	Aug 13.06	Sep 13.48	Oct 13.91	Nov 14.19	Dec 14.47		(38)
f details of therma Total fabric he Ventilation hea Jan 38)m= 15.04	Feb	Mar 14.76	Apr	May	 		l 	13.48		14.19			(38
f details of therma Total fabric he Jentilation hea	Feb	Mar 14.76	Apr	May	 		l 	13.48	13.91	14.19			(3

Heat loss para	ımeter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.6	0.6	0.6	0.59	0.59	0.58	0.58	0.58	0.58	0.59	0.59	0.6		
	!	!							Average =	Sum(40) ₁	12 /12=	0.59	(40)
Number of day	1	<u> </u>						-					
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occurring TFA > 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		42		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed i			se target c		.57		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i				,									
(44)m= 100.73	97.07	93.41	89.74	86.08	82.42	82.42	86.08	89.74	93.41	97.07	100.73		
	ļ.	!				Į.	ļ.		Total = Su	m(44) ₁₁₂ =		1098.89	(44)
Energy content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x E	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 149.38	130.65	134.82	117.54	112.78	97.32	90.18	103.49	104.72	122.04	133.22	144.67		
16 100 100 100 100 100 100 100 100 100 1			-6 (()		h (40		Total = Su	m(45) ₁₁₂ =	=	1440.81	(45)
If instantaneous w	vater neati •		,	not water	storage),		· · ·) tO (61)					
(46)m= 22.41 Water storage	19.6	20.22	17.63	16.92	14.6	13.53	15.52	15.71	18.31	19.98	21.7		(46)
Storage volum) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	` '					•					<u> </u>		(,
Otherwise if no	-			-			, ,	ers) ente	er '0' in ((47)			
Water storage	loss:												
a) If manufact	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufact			-								1		(54)
Hot water stor	-			e z (KVV	n/iitre/ua	iy)				0.	02		(51)
Volume factor	•		JII 4.0							1.	03		(52)
Temperature f	actor fro	m Table	2b							-	.6		(53)
Energy lost fro	m watei	rstorage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or		_	,								03		(55)
Water storage	loss cal	culated t	or 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 cylinder contains	L s dedicate	l d solar sto	L rage, (57)ı	<u>l</u> m = (56)m		<u>I</u> H11)] ÷ (5	<u>l</u> 0), else (5	<u>I</u> 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)
	loos (s		m Table			l	I	!	l		0		(58)
Primary circuit Primary circuit	`	,			59)m – 1	(58) ± 36	\$5 x (41)	ım			o		(00)
(modified by				,		` '	, ,		r thermo	stat)			
(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)
L													

Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$														
(61)m= 0	0	0	0	0 1)111 =	00) -	0 × (41) i i)	0	T 0	0	0	1	(61)
												<u> </u>	J · (59)m + (61)m	(-)
(62)m= 204.6	-i	190.1	171.03	168.06	150.8		158		158.22	177.32	186.71	199.94]	(62)
Solar DHW inp			<u> </u>		<u> </u>		ļ				1		<u></u>	` '
(add additio												-: ····································		
(63)m= 0	0	0	0	0	0	0	C	_	0	0	0	0	7	(63)
Output from	water hea	ter	ı				!						_	
(64)m= 204.6		190.1	171.03	168.06	150.8	2 145.46	158	.76	158.22	177.32	186.71	199.94	1	
			ı					Outp	out from w	ater heate	er (annual)	112	2091.65	(64)
Heat gains f	rom water	heating	kWh/m	onth 0.2	5 ′ [0.8	35 × (45)m	า + (6	31)m	n] + 0.8 x	k [(46)m	+ (57)m	+ (59)m	 n]	
(65)m= 93.8	9 83.38	89.05	81.88	81.72	75.15	74.21	78.	63	77.62	84.8	87.09	92.32]	(65)
include (5	7)m in cal	culation	of (65)m	only if c	ylinde	r is in the	dwell	ling	or hot w	ater is f	rom com	munity h	neating	
5. Internal	gains (see	e Table 5	and 5a):										
Metabolic ga	ains (Table	e 5), Wat	ts											
Jai	n Feb	Mar	Apr	May	Jur	n Jul	Α	ug	Sep	Oct	Nov	Dec]	
(66)m= 120.7	79 120.79	120.79	120.79	120.79	120.7	9 120.79	120	.79	120.79	120.79	120.79	120.79]	(66)
Lighting gair	ns (calcula	ted in Ap	pendix	L, equat	ion L9	or L9a), a	ılso s	ee -	Table 5				_	
(67)m= 19.1	1 16.97	13.8	10.45	7.81	6.59	7.13	9.2	26	12.43	15.79	18.42	19.64]	(67)
Appliances	gains (calc	ulated ir	Append	dix L, eq	uation	L13 or L1	3a),	also	see Ta	ble 5	-		_	
(68)m= 214.3	35 216.58	210.97	199.04	183.98	169.8	2 160.36	158	.14	163.74	175.67	190.74	204.89]	(68)
Cooking gai	ns (calcula	ted in A	ppendix	L, equat	ion L1	5 or L15a), als	o se	ee Table	5	-	-	_	
(69)m= 35.0	8 35.08	35.08	35.08	35.08	35.08	35.08	35.	80	35.08	35.08	35.08	35.08]	(69)
Pumps and	fans gains	(Table	5a)										_	
(70)m= 0	0	0	0	0	0	0	С)	0	0	0	0]	(70)
Losses e.g.	evaporatio	n (nega	tive valu	es) (Tab	le 5)									
(71)m= -96.6	-96.63	-96.63	-96.63	-96.63	-96.6	3 -96.63	-96	.63	-96.63	-96.63	-96.63	-96.63]	(71)
Water heati	ng gains (T	able 5)											_	
(72)m= 126.	2 124.08	119.69	113.72	109.84	104.3	8 99.74	105	.69	107.8	113.98	120.96	124.09]	(72)
Total intern	al gains =				(66)m + (67)n	n + (68	3)m +	+ (69)m +	(70)m + (7	71)m + (72))m	_	
(73)m= 418.8	39 416.87	403.7	382.44	360.86	340.0	3 326.46	332	.32	343.21	364.68	389.36	407.86		(73)
6. Solar ga														
Solar gains a		•				•	ations	to co		ne applica		tion.		
Orientation:	Access F Table 6d		Area m²			Flux Fable 6a		т	g_ able 6b	Т	FF able 6c		Gains (W)	
North 0.0					_		1					_	. ,	1,74
North 0.9		X			x	10.63] X]		0.4		0.8	=	5.28	(74)
		X			x	10.63] X] .,		0.4		0.8	=	14.57](74)] ₍₇₄₎
		x	1.7		x	10.63] X]	_	0.4		0.8	=	4.03](74)] ₍₇₄₎
		X	2.2		x	20.32] X]		0.4	X	0.8	=	10.09](74)] ₍₇₄₎
North 0.9	X 0.77	X	6.1	8	х	20.32	X		0.4	X	0.8	=	27.85	(74)

	_		_		_		_				_		_
North	0.9x	0.77	X	1.71	X	20.32	X	0.4	X	0.8	=	7.71	(74)
North	0.9x	0.77	X	2.24	X	34.53	X	0.4	X	0.8	=	17.15	(74)
North	0.9x	0.77	X	6.18	X	34.53	X	0.4	X	0.8	=	47.32	(74)
North	0.9x	0.77	X	1.71	x	34.53	X	0.4	X	0.8	=	13.09	(74)
North	0.9x	0.77	X	2.24	x	55.46	x	0.4	x	0.8	=	27.55	(74)
North	0.9x	0.77	X	6.18	x	55.46	X	0.4	x	0.8	=	76.01	(74)
North	0.9x	0.77	X	1.71	x	55.46	X	0.4	x	0.8	=	21.03	(74)
North	0.9x	0.77	X	2.24	x	74.72	x	0.4	x	0.8	=	37.11	(74)
North	0.9x	0.77	X	6.18	X	74.72	X	0.4	X	0.8	=	102.4	(74)
North	0.9x	0.77	X	1.71	x	74.72	X	0.4	X	0.8	=	28.33	(74)
North	0.9x	0.77	X	2.24	X	79.99	X	0.4	X	0.8	=	39.73	(74)
North	0.9x	0.77	X	6.18	X	79.99	X	0.4	X	0.8	=	109.62	(74)
North	0.9x	0.77	X	1.71	x	79.99	X	0.4	X	0.8	=	30.33	(74)
North	0.9x	0.77	X	2.24	X	74.68	X	0.4	X	0.8	=	37.1	(74)
North	0.9x	0.77	X	6.18	x	74.68	X	0.4	x	0.8	=	102.34	(74)
North	0.9x	0.77	X	1.71	x	74.68	x	0.4	x	0.8	=	28.32	(74)
North	0.9x	0.77	X	2.24	X	59.25	X	0.4	X	0.8	=	29.43	(74)
North	0.9x	0.77	X	6.18	x	59.25	X	0.4	x	0.8	=	81.2	(74)
North	0.9x	0.77	X	1.71	x	59.25	x	0.4	x	0.8	=	22.47	(74)
North	0.9x	0.77	X	2.24	x	41.52	x	0.4	x	0.8	=	20.62	(74)
North	0.9x	0.77	X	6.18	x	41.52	x	0.4	x	0.8	=	56.9	(74)
North	0.9x	0.77	X	1.71	x	41.52	x	0.4	x	0.8	=	15.74	(74)
North	0.9x	0.77	X	2.24	x	24.19	x	0.4	x	0.8	=	12.02	(74)
North	0.9x	0.77	X	6.18	x	24.19	x	0.4	x	0.8	=	33.15	(74)
North	0.9x	0.77	X	1.71	x	24.19	x	0.4	x	0.8	=	9.17	(74)
North	0.9x	0.77	X	2.24	x	13.12	x	0.4	x	0.8	=	6.52	(74)
North	0.9x	0.77	X	6.18	x	13.12	x	0.4	x	0.8	=	17.98	(74)
North	0.9x	0.77	X	1.71	x	13.12	x	0.4	x	0.8	=	4.97	(74)
North	0.9x	0.77	X	2.24	x	8.86	X	0.4	x	0.8	=	4.4	(74)
North	0.9x	0.77	X	6.18	x	8.86	X	0.4	X	0.8	=	12.15	(74)
North	0.9x	0.77	X	1.71	x	8.86	x	0.4	x	0.8	=	3.36	(74)
South	0.9x	0.77	X	4.1	x	46.75	X	0.4	x	0.8	=	42.51	(78)
South	0.9x	0.77	X	1.71	x	46.75	x	0.4	x	0.8	=	17.73	(78)
South	0.9x	0.77	X	4.1	x	76.57	x	0.4	x	0.8	=	69.62	(78)
South	0.9x	0.77	X	1.71	x	76.57	x	0.4	x	0.8	=	29.04	(78)
South	0.9x	0.77	X	4.1	x	97.53	x	0.4	x	0.8	=	88.68	(78)
South	0.9x	0.77	X	1.71	x	97.53	x	0.4	x	0.8	=	36.99	(78)
South	0.9x	0.77	X	4.1	x	110.23	x	0.4	x	0.8	=	100.23	(78)
South	0.9x	0.77	X	1.71	x	110.23	x	0.4	x	0.8	=	41.8	(78)
South	0.9x	0.77	X	4.1	x	114.87	x	0.4	x	0.8	=	104.44	(78)
South	0.9x	0.77	X	1.71	x	114.87	x	0.4	x	0.8	=	43.56	(78)
	L	<u> </u>	_		1		ı	-	I	<u> </u>	1	L	」 ` ′

South	0.9x	0.77	х	4.	1	x	1	10.55	x		0.4	X	0.8		=	100.51	(78)
South	0.9x	0.77	х	1.7	71	x	1′	10.55	x		0.4	×	0.8		=	41.92	(78)
South	0.9x	0.77	х	4.	1	x	1(08.01	x		0.4	×	0.8		=	98.21	(78)
South	0.9x	0.77	х	1.7	71	x	10	08.01	x		0.4	x	0.8		=	40.96	(78)
South	0.9x	0.77	х	4.	1	x	10	04.89	х		0.4	×	0.8		=	95.37	(78)
South	0.9x	0.77	х	1.7	71	x	1(04.89	x		0.4	×	0.8		=	39.78	(78)
South	0.9x	0.77	x	4.	1	x	1(01.89	x		0.4	×	0.8		=	92.64	(78)
South	0.9x	0.77	х	1.7	71	x	10	01.89	х		0.4	×	0.8		=	38.64	(78)
South	0.9x	0.77	х	4.	1	x	8	2.59	x		0.4	x	0.8		=	75.09	(78)
South	0.9x	0.77	х	1.7	71	x	8	2.59	x		0.4	x	0.8		=	31.32	(78)
South	0.9x	0.77	х	4.	1	x	5	5.42	x		0.4	×	0.8		=	50.39	(78)
South	0.9x	0.77	х	1.7	71	x	5	5.42	x		0.4	x	0.8		=	21.01	(78)
South	0.9x	0.77	х	4.	1	x	۷	10.4	x		0.4	×	0.8		=	36.73	(78)
South	0.9x	0.77	х	1.7	71	x	۷	10.4	x		0.4	x	0.8		=	15.32	(78)
Solar g	ains in	watts, ca	alculated	for eac	h month	1			(83)m	ı = Sı	um(74)m .	(82)m				•	
(83)m=	84.12	144.3	203.23	266.63	315.85		2.11	306.92	268	.24	224.54	160.7	5 100.87	71.	.96		(83)
Total ga		nternal a		·	`	T `		-								1	
(84)m=	503.02	561.17	606.93	649.07	676.71	66	2.14	633.38	600	.56	567.74	525.4	2 490.22	479	9.82		(84)
7. Mea	an inter	nal temp	erature	(heating	seasor	1)											
Tempe	erature	during h	neating p	eriods ir	n the livi	ng a	area f	rom Tab	ole 9	. Th′	1 (°C)					21	(85)
										,	` ,						
Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a) (85)																	
Utilisa [tion fac Jan	tor for g	ains for Mar	living are	ea, h1,m May	T	ee Ta Jun	ble 9a) Jul	Α	ug	Sep	Oct	: Nov	D	ec		
Utilisa (86)m=			ı	T .		j			0.3	ug	· , ,	Oct	: Nov 0.98	D.9			(86)
(86)m=	Jan 0.99	Feb	Mar 0.94	Apr 0.81	May 0.62	0.	Jun .43	Jul 0.31	0.3	ug 34	Sep 0.55		+	_			(86)
(86)m=	Jan 0.99	Feb 0.98	Mar 0.94	Apr 0.81	May 0.62	0.	Jun .43	Jul 0.31	0.3	ug 34	Sep 0.55		0.98	_	99		(86)
(86)m= Mean (87)m=	Jan 0.99 interna 20.62	Feb 0.98 I temper 20.73	Mar 0.94 ature in 20.86	Apr 0.81 living are 20.97	0.62 ea T1 (fo	0. ollow	Jun .43 w ste 21	Jul 0.31 ps 3 to 7 21	0.3 7 in T	ug 34 able	Sep 0.55 9c) 21	0.85	0.98	0.9	99		
(86)m= Mean (87)m=	Jan 0.99 interna 20.62	Feb 0.98	Mar 0.94 ature in 20.86	Apr 0.81 living are 20.97	0.62 ea T1 (fo	0. ollow	Jun .43 w ste 21	Jul 0.31 ps 3 to 7 21	0.3 7 in T	ug 34 able 1 9, Th	Sep 0.55 9c) 21	0.85	0.98	0.9	99		
(86)m= Mean (87)m= Tempe (88)m=	Jan 0.99 interna 20.62 erature 20.43	Feb 0.98 I temper 20.73 during h	Mar 0.94 eature in 20.86 neating p	Apr 0.81 living are 20.97 periods in 20.44	May 0.62 ea T1 (for 21) n rest of 20.44	ollow dwe	Jun .43 w ster 21 elling 0.45	Jul 0.31 ps 3 to 7 21 from Ta 20.45	0.37 in T 2 able 9 20.	ug 34 able 1 9, Th	Sep 0.55 e 9c) 21 n2 (°C)	20.96	0.98	20	99		(87)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa	Jan 0.99 interna 20.62 erature 20.43	Feb 0.98 I temper 20.73 during h 20.43	Mar 0.94 ature in 20.86 neating p 20.43 ains for	Apr 0.81 living are 20.97 periods in 20.44 rest of d	May 0.62 ea T1 (for the second	ollow dwe	Jun .43 w ste 21 elling 0.45 m (se	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table	0.37 in T 2 able 9 20.	ug 34 able 1 9, Th	Sep 0.55 e 9c) 21 n2 (°C) 20.45	20.96	0.98	20	99		(87)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Jan 0.99 interna 20.62 erature 20.43 ation fac	Feb 0.98 I temper 20.73 during h 20.43 etor for gar	Mar 0.94 ature in 20.86 neating p 20.43 ains for 0.92	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79	May 0.62 ea T1 (for rest of 20.44 welling, 0.59	0.00llowdwee	Jun .43 w ste 21 elling 0.45 m (se 0.4	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27	0.37 in T 2 able 9 20. 9a) 0.3	ug 34 able 1 able 45 able 3	Sep 0.55 e 9c) 21 n2 (°C) 20.45	0.85 20.96 20.44 0.82	0.98	20	99		(87)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean	Jan 0.99 interna 20.62 erature 20.43 tion fac 0.99 interna	Feb 0.98 I temper 20.73 during h 20.43 etor for g 0.97 I temper	Mar 0.94 eature in 20.86 neating p 20.43 ains for 0.92 eature in	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest	May 0.62 ea T1 (for 21 n rest of 20.44 welling, 0.59 of dwell	dwe 200 h2,r	Jun .43 w ste 21 elling 0.45 m (se 0.4	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 ollow ste	0.3 7 in T 2 able 9 20. 9a) 0.3	ug as4 able 1 ab	Sep 0.55 e 9c) 21 n2 (°C) 20.45 o.5	0.85 20.96 20.44 0.82 e 9c)	0.98 20.78 20.44 0.97	20.	99		(87) (88) (89)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Jan 0.99 interna 20.62 erature 20.43 ation fac	Feb 0.98 I temper 20.73 during h 20.43 etor for gar	Mar 0.94 ature in 20.86 neating p 20.43 ains for 0.92	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79	May 0.62 ea T1 (for rest of 20.44 welling, 0.59	dwe 200 h2,r	Jun .43 w ste 21 elling 0.45 m (se 0.4	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27	0.37 in T 2 able 9 20. 9a) 0.3	ug as4 able 1 ab	Sep 0.55 29c) 21 12 (°C) 20.45 7 in Table 20.45	0.85 20.96 20.44 0.82 e 9c) 20.4	0.98 20.78 20.44 0.97	20.	99		(87) (88) (89) (90)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean	Jan 0.99 interna 20.62 erature 20.43 tion fac 0.99 interna	Feb 0.98 I temper 20.73 during h 20.43 etor for g 0.97 I temper	Mar 0.94 eature in 20.86 neating p 20.43 ains for 0.92 eature in	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest	May 0.62 ea T1 (for 21 n rest of 20.44 welling, 0.59 of dwell	dwe 200 h2,r	Jun .43 w ste 21 elling 0.45 m (se 0.4	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 ollow ste	0.3 7 in T 2 able 9 20. 9a) 0.3	ug as4 able 1 ab	Sep 0.55 29c) 21 12 (°C) 20.45 7 in Table 20.45	0.85 20.96 20.44 0.82 e 9c) 20.4	0.98 20.78 20.44 0.97	20.	99	0.42	(87) (88) (89)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Jan 0.99 interna 20.62 erature 20.43 ation fact 0.99 interna 19.92 interna	Feb 0.98 I temper 20.73 during h 20.43 etor for gas 0.97 I temper 20.08	Mar 0.94 eature in 20.86 neating p 20.43 ains for 0.92 ature in 20.26	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4	May 0.62 ea T1 (for 21 n rest of 20.44 welling, 0.59 of dwell 20.44	dwe 20 h2,r c c c c c c c c c c c c c c c c c c c	Jun .43 w ste 21 elling 0.45 m (se 0.4 T2 (fc 0.45) g) = fl	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 bllow ste 20.45 A × T1	0.37 in T 2 2 20. 9a) 0.4 constant of the cons	ug	Sep 0.55 e 9c) 21 n2 (°C) 20.45 o.5 o.5 o.5	0.85 20.96 20.44 0.82 e 9c) 20.4	0.98 20.78 20.44 0.97	20.	99	0.42	(87) (88) (89) (90) (91)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Jan 0.99 interna 20.62 erature 20.43 tion fac 0.99 interna 19.92 interna 20.22	Feb 0.98 I temper 20.73 during h 20.43 etor for g 0.97 I temper 20.08 I temper 20.35	Mar 0.94 ature in 20.86 neating p 20.43 ains for 0.92 ature in 20.26 ature (for	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4 or the wh 20.64	May	dwee 200 h2,r 00 according 200	Jun .43 w ste 21 elling 0.45 m (se 0.4 T2 (fd 0.45) = fl 0.68	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 collow ste 20.45 A × T1 20.68	0.37 in T 2 able 9 20. 9a) 0.3 + (1 20.	ug	Sep 0.55 e 9c) 21 n2 (°C) 20.45 7 in Table 20.45 f A) × T2 20.68	0.85 20.96 20.44 0.82 e 9c) 20.4 LA = Li	0.98 20.78 20.44 0.97 20.17 ving area ÷ (20.	999 0.6 43 999	0.42	(87) (88) (89) (90)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Mean (92)m= [Apply	Jan 0.99 interna 20.62 erature 20.43 ition fac 0.99 interna 19.92 interna 20.22 adjustr	Feb 0.98 I temper 20.73 during h 20.43 etor for gas 0.97 I temper 20.08 I temper 20.35 ment to the	Mar 0.94 eature in 20.86 neating p 20.43 ains for 0.92 eature in 20.26 eature (for 20.51 he mean	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4 or the wh 20.64 n interna	May 0.62 ea T1 (for 21 n rest of 20.44 welling, 0.59 of dwell 20.44 nole dwell 20.67 I temper	0.000 0.00	Jun .43 w ste 21 elling 0.45 m (se 0.4 T2 (fc 0.45) g) = fl 0.68 re fro	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 collow ste 20.45 A × T1 20.68 m Table	0.37 in T 2 20.	ug 34 1	Sep 0.55 29c) 21 12 (°C) 20.45 7 in Table 20.45 A) × T2 20.68 re appro	0.85 20.96 20.44 0.82 e 9c) 20.4 LA = Li	0.98 20.78 20.44 0.97 20.17 ving area ÷ (0.9 200 200 0.9 19 4) =	999 0.66 443 43 1.99 1.9	0.42	(87) (88) (89) (90) (91) (92)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Mean (92)m= [Apply (93)m= [Jan 0.99 interna 20.62 erature 20.43 tion fact 0.99 interna 19.92 interna 20.22 adjustr 20.22	Feb 0.98 I temper 20.73 during h 20.43 etor for g 0.97 I temper 20.08 I temper 20.35 ment to tl 20.35	Mar 0.94 ature in 20.86 neating p 20.43 ains for 0.92 ature in 20.26 ature (for 20.51 he mean 20.51	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4 or the wh 20.64 n interna 20.64	May	0.000 0.00	Jun .43 w ste 21 elling 0.45 m (se 0.4 T2 (fd 0.45) = fl 0.68	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 collow ste 20.45 A × T1 20.68	0.37 in T 2 able 9 20. 9a) 0.3 + (1 20.	ug 34 1	Sep 0.55 e 9c) 21 n2 (°C) 20.45 7 in Table 20.45 f A) × T2 20.68	0.85 20.96 20.44 0.82 e 9c) 20.4 LA = Li	0.98 20.78 20.44 0.97 20.17 ving area ÷ (0.9	999 0.66 443 43 1.99 1.9	0.42	(87) (88) (89) (90) (91)
(86)m= Mean (87)m= Tempe (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	Jan 0.99 interna 20.62 erature 20.43 ation fact 0.99 interna 19.92 interna 20.22 adjustr 20.22 ace hea	Feb 0.98 I temper 20.73 during h 20.43 etor for gas 0.97 I temper 20.08 I temper 20.35 ment to th 20.35 ting requ	Mar 0.94 eature in 20.86 neating p 20.43 ains for 0.92 ature in 20.26 ature (for 20.51 he mean 20.51 uiremen	Apr 0.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4 or the wh 20.64 n interna 20.64	May 0.62 ea T1 (for 21 n rest of 20.44 welling, 0.59 of dwell 20.44 nole dwell 20.67 I temper 20.67	dwe 20 h2,r c c c c c c c c c c c c c c c c c c c	Jun .43 w ste 21 elling 0.45 m (se 0.4 T2 (fc 0.45) = fl 0.68 re fro 0.68	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 collow ste 20.45 A × T1 20.68 m Table 20.68	0.37 in T 2 20. 9a) 0 eps 3 20. + (1 20. 4e, 20.	ug 34 1	Sep 0.55 29c) 21 12 (°C) 20.45 7 in Table 20.45 f A) × T2 20.68 re appro-	0.85 20.96 20.44 0.82 e 9c) 20.4 LA = Li 20.64 ppriate 20.64	0.98 20.78 20.44 0.97 20.17 ving area ÷ (20.43	0.9 200 200 0.9 19 4) =	999 0.6 0.6 0.6 0.9 0.9 0.9 0.19		(87) (88) (89) (90) (91) (92)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Apply (93)m= [8. Spa Set Ti	Jan 0.99 interna 20.62 erature 20.43 ition fac 0.99 interna 19.92 interna 20.22 adjustr 20.22 ace hea to the i	Feb 0.98 I temper 20.73 during h 20.43 ctor for garen or garen	Mar 0.94 ature in 20.86 neating p 20.43 ains for 0.92 ature in 20.26 ature (for 20.51 he mean 20.51 uiremen ternal te	Apr O.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4 or the wh 20.64 n interna 20.64	May 0.62 ea T1 (for part of the content of the con	dwe 20 h2,r c c c c c c c c c c c c c c c c c c c	Jun .43 w ste 21 elling 0.45 m (se 0.4 T2 (fc 0.45) = fl 0.68 re fro 0.68	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 collow ste 20.45 A × T1 20.68 m Table 20.68	0.37 in T 2 20. 9a) 0 eps 3 20. + (1 20. 4e, 20.	ug 34 1	Sep 0.55 29c) 21 12 (°C) 20.45 7 in Table 20.45 f A) × T2 20.68 re appro-	0.85 20.96 20.44 0.82 e 9c) 20.4 LA = Li 20.64 ppriate 20.64	0.98 20.78 20.44 0.97 20.17 ving area ÷ (0.9 200 200 0.9 19 4) =	999 0.6 0.6 0.6 0.9 0.9 0.9 0.19		(87) (88) (89) (90) (91) (92)
(86)m= [Mean (87)m= [Tempe (88)m= [Utilisa (89)m= [Mean (90)m= [Apply (93)m= [8. Spa Set Ti	Jan 0.99 interna 20.62 erature 20.43 ition fac 0.99 interna 19.92 interna 20.22 adjustr 20.22 ace hea to the i	Feb 0.98 I temper 20.73 during h 20.43 etor for gas 0.97 I temper 20.08 I temper 20.35 ment to th 20.35 ting requ	Mar 0.94 ature in 20.86 neating p 20.43 ains for 0.92 ature in 20.26 ature (for 20.51 he mean 20.51 uiremen ternal te	Apr O.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4 or the wh 20.64 in interna 20.64 imperaturusing Ta	May 0.62 ea T1 (for 21) n rest of 20.44 welling, 0.59 of dwell 20.44 nole dwell 20.67 I temper 20.67 re obtain able 9a	dwed 200 h2,r containing 200 acturned and another second and another second and another second and another seco	Jun .43 w ste 21 elling 0.45 m (se 0.4 T2 (fc 0.45) = fl 0.68 re fro 0.68	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 collow ste 20.45 A × T1 20.68 m Table 20.68	0.37 in T 2 2 able \$ 20. 9a) 0 + (1 20. + 4e, 20. Table 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ug	Sep 0.55 e 9c) 21 n2 (°C) 20.45 7 in Tabl 20.45 f A) × T2 20.68 re appro- 20.68	0.85 20.96 20.44 0.82 e 9c) 20.4 LA = Li 20.64 ppriate 20.64	0.98 20.78 20.44 0.97 20.17 ving area ÷ (20.43 20.43 (76)m ar	0.9 200 200 0.9 19 4) =	999 0.6 0.6 0.6 0.9 0.9 0.9 0.19		(87) (88) (89) (90) (91) (92)
Mean (87)m= Tempe (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa Set Ti the uti	Jan 0.99 interna 20.62 erature 20.43 ition fac 0.99 interna 19.92 interna 20.22 adjustr 20.22 ace hea to the illisation Jan	Feb 0.98 I temper 20.73 during h 20.43 etor for garage of the second of	Mar 0.94 eature in 20.86 neating p 20.43 ains for 0.92 ature in 20.26 ature (for 20.51 he mean 20.51 uiremen ternal te or gains Mar	Apr O.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4 or the wh 20.64 n interna 20.64 mperaturusing Tal Apr	May 0.62 ea T1 (for part of the content of the con	dwed 200 h2,r containing 200 acturned and another second and another second and another second and another seco	Jun 2.43 w ste 21 elling 0.45 m (se 0.45 T2 (fo 0.45 c).68 re fro 0.68 at ste	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 collow ste 20.45 A × T1 20.68 m Table 20.68 ep 11 of	0.37 in T 2 2 able \$ 20. 9a) 0 + (1 20. + 4e, 20. Table 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ug 34 1	Sep 0.55 29c) 21 12 (°C) 20.45 7 in Table 20.45 f A) × T2 20.68 re appro-	0.85 20.96 20.44 0.82 e 9c) 20.4 LA = Li 20.64 t Ti,max	0.98 20.78 20.44 0.97 20.17 ving area ÷ (20.43 20.43 (76)m ar	0.9 200 200 0.9 19 4) =	999 0.6 43 999 19 19		(87) (88) (89) (90) (91) (92)
Mean (87)m= Tempe (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa Set Ti the uti	Jan 0.99 interna 20.62 erature 20.43 ition fac 0.99 interna 19.92 interna 20.22 adjustr 20.22 ace hea to the illisation Jan	Feb 0.98 I temper 20.73 during h 20.43 ctor for gare of the second o	Mar 0.94 eature in 20.86 neating p 20.43 ains for 0.92 ature in 20.26 ature (for 20.51 he mean 20.51 uiremen ternal te or gains Mar	Apr O.81 living are 20.97 periods in 20.44 rest of d 0.79 the rest 20.4 or the wh 20.64 n interna 20.64 mperaturusing Tal Apr	May 0.62 ea T1 (for 21) n rest of 20.44 welling, 0.59 of dwell 20.44 nole dwell 20.67 I temper 20.67 re obtain able 9a	dwed 200 h2,r containing 200 acturned 200 h2 acturned 200 h2 h2 h2 h2 h2 h2 h2 h2 h2 h2 h2 h2 h2	Jun 2.43 w ste 21 elling 0.45 m (se 0.45 T2 (fo 0.45 c).68 re fro 0.68 at ste	Jul 0.31 ps 3 to 7 21 from Ta 20.45 ee Table 0.27 collow ste 20.45 A × T1 20.68 m Table 20.68 ep 11 of	0.37 in T 2 2 able \$ 20. 9a) 0 + (1 20. + 4e, 20. Table 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ug 34 1 34 1 1 1 1 1 1 1 1 1	Sep 0.55 e 9c) 21 n2 (°C) 20.45 7 in Tabl 20.45 f A) × T2 20.68 re appro- 20.68	0.85 20.96 20.44 0.82 e 9c) 20.4 LA = Li 20.64 t Ti,max	0.98 20.78 20.44 0.97 20.17 ving area ÷ (20.43 20.43 (76)m area Nov	0.9 200 200 0.9 19 4) =	999 0.6 .43 .999 .99 .19 cald		(87) (88) (89) (90) (91) (92)

Useful gains, hmGm , W = (94)m x (84)m														
(95)m= 497.45 545.68 561.89 516.63 407.4 272.99 183.22 191.64 296.81 434.45 474.65 475.95		(95)												
Monthly average external temperature from Table 8														
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2		(96)												
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m]														
(97)m= 744.05 720.17 651.04 537.16 409.27 273.04 183.23 191.65 297.24 457.77 611.64 738.44		(97)												
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m														
(98)m= 183.47 117.26 66.33 14.78 1.4 0 0 0 0 17.35 98.63 195.29 Total per year (kWh/year) = Sum(98) ₁₆₉₁₂ =	694.5	(98)												
Space heating requirement in kWh/m²/year 8.95 (99)														
9b. Energy requirements – Community heating scheme This part is used for space heating, space cooling or water heating provided by a community scheme.														
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 0 (301)														
Fraction of space heat from community system $1 - (301) = 1$ The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter														
The community scheme may obtain heat from several sources. The procedure allows for CHP and up to four other heat sources; the latter includes boilers, heat pumps, geothermal and waste heat from power stations. See Appendix C.														
Fraction of heat from Community heat pump														
Fraction of neat from Community neat pump Fraction of total space heat from Community heat pump (302) × (303a) = 1														
Factor for control and charging method (Table 4c(3)) for community heating system	1	(305)												
Distribution loss factor (Table 12c) for community heating system	1.1	(306)												
Space heating Annual space heating requirement kWh/year 694.5														
Annual space heating requirement														
Annual space heating requirement Space heat from Community heat pump (98) x (304a) x (305) x (306) =		(307a)												
	694.5													
Space heat from Community heat pump (98) x (304a) x (305) x (306) =	694.5 763.95	(307a)												
Space heat from Community heat pump (98) × (304a) × (305) × (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = Water heating	694.5 763.95	(307a) (308												
Space heat from Community heat pump (98) × (304a) × (305) × (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (304a) × (305) × (306) = [Water heating Annual water heating requirement	694.5 763.95	(307a) (308												
Space heat from Community heat pump (98) × (304a) × (305) × (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = Water heating	694.5 763.95 0	(307a) (308												
Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (304a) × (305) × (306) = [Water heating requirement Annual water heating requirement If DHW from community scheme:	694.5 763.95 0 0 2091.65	(307a) (308 (309)												
Space heat from Community heat pump (98) × (304a) × (305) × (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) × (303a) × (305) × (306) =	694.5 763.95 0 0 2091.65	(307a) (308 (309) (310a)												
Space heat from Community heat pump (98) × (304a) × (305) × (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) × (301) × 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) × (303a) × (305) × (306) = Electricity used for heat distribution 0.01 × [(307a)(307e) + (310a)(310e)] =	694.5 763.95 0 0 2091.65 2300.82 30.65	(307a) (308 (309) (310a) (313)												
Space heat from Community heat pump (98) x (304a) x (305) x (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio	694.5 763.95 0 0 2091.65 2300.82 30.65 0	(307a) (308 (309) (310a) (313) (314)												
Space heat from Community heat pump (98) x (304a) x (305) x (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	694.5 763.95 0 0 2091.65 2300.82 30.65 0	(307a) (308 (309) (310a) (313) (314) (315) (330a)												
Space heat from Community heat pump (98) x (304a) x (305) x (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans	694.5 763.95 0 0 2091.65 2300.82 30.65 0 163.07	(307a) (308 (309) (310a) (313) (314) (315) (330a) (330b)												
Space heat from Community heat pump (98) x (304a) x (305) x (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans pump for solar water heating	694.5 763.95 0 0 2091.65 2300.82 30.65 0 0 163.07	(307a) (308 (309) (310a) (313) (314) (315) (330a)												
Space heat from Community heat pump (98) x (304a) x (305) x (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans pump for solar water heating Total electricity for the above, kWh/year = (330a) + (330b) + (330g) =	694.5 763.95 0 0 2091.65 2300.82 30.65 0 163.07 0 163.07	(307a) (308 (309) (310a) (313) (314) (315) (330a) (330b) (330g) (331)												
Space heat from Community heat pump (98) x (304a) x (305) x (306) = Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) Space heating requirement from secondary/supplementary system (98) x (301) x 100 ÷ (308) = Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump (64) x (303a) x (305) x (306) = Electricity used for heat distribution 0.01 x [(307a)(307e) + (310a)(310e)] = Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) = (107) ÷ (314) = Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside warm air heating system fans pump for solar water heating	694.5 763.95 0 0 2091.65 2300.82 30.65 0 0 163.07 0	(307a) (308 (309) (310a) (313) (314) (315) (330a) (330b) (330g)												

(334)Electricity generated by wind turbine (Appendix M) (negative quantity) 12b. CO2 Emissions – Community heating scheme Energy **Emission factor Emissions** kWh/year kg CO2/kWh kg CO2/year CO2 from other sources of space and water heating (not CHP) If there is CHP using two fuels repeat (363) to (366) for the second fuel Efficiency of heat source 1 (%) 319 (367a) CO2 associated with heat source 1 $[(307b)+(310b)] \times 100 \div (367b) \times$ 498.63 (367)0.52 Electrical energy for heat distribution (372)[(313) x]0.52 15.91 Total CO2 associated with community systems (363)...(366) + (368)...(372)(373)514.53 CO2 associated with space heating (secondary) (309) x(374)0 0 CO2 associated with water from immersion heater or instantaneous heater (312) x (375)0.52 0 Total CO2 associated with space and water heating (373) + (374) + (375) =514.53 (376)CO2 associated with electricity for pumps and fans within dwelling (331)) x (378)0.52 84.63 CO2 associated with electricity for lighting (332))) x (379)0.52 175.15 Energy saving/generation technologies (333) to (334) as applicable Item 1 x = 0.01 =(380) 0.52 -416.4 sum of (376)...(382) = Total CO2, kg/year (383)357.92 **Dwelling CO2 Emission Rate** $(383) \div (4) =$ (384)4.61

El rating (section 14)

(385)

96.09

			lloor F) otoilo:						
Assessor Name: Software Name:	John Simpson Stroma FSAP 20)12	User D	Strom Softwa					0006273 on: 1.0.4.26	
	10.100.1			Address						
Address :	AC 109, Aspen Co	ourt, Maitla	and Parl	k Estate,	London	, NW3 2	2EH			
Overall dwelling dim	iensions:		۸ro	o/m²\		۸۷ ۵۸	iaht/m\		Volume(m ³	11
Ground floor				a(m²) 77.6	(1a) x		2.6	(2a) =	201.76	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1	1e)+(1r	n)	77.6	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	(3n) =	201.76	(5)
2. Ventilation rate:				_		_				
Number of chimneys	main heating 0 +	secondar heating	ry □ + □	other 0] = [total	x	40 =	m³ per hou	(6a)
Number of open flues	0 +	0	┧╻┝	0	」	0	x	20 =	0	(6b)
•		0		U	J Ľ			10 =		= ' '
Number of intermittent f					Ĺ	3			30	(7a)
Number of passive vent	ts				L	0	X	10 =	0	(7b)
Number of flueless gas	fires					0	X ·	40 =	0	(7c)
								Δir ch	nanges per ho	our
Infiltration due to chimn	ove fluor and fans -	(6a)+(6b)+(7	72)±(7h)±((7c) –	г					_
	been carried out or is inten				continue fr	30 om (9) to		÷ (5) =	0.15	(8)
Number of storeys in		μ.σσσ	u 10 (/ /),			o (o) to	(1.0)		0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration:	0.25 for steel or timbe	r frame or	0.35 fo	r masoni	y constr	uction			0	(11)
	present, use the value corre	esponding to	the great	ter wall are	a (after					
•	nings); if equal user 0.35 n floor, enter 0.2 (unse	aled) or 0	.1 (seale	ed), else	enter 0				0	(12)
•	enter 0.05, else enter 0	,	(σσαιτ	, o.oo	00. 0				0	(13)
•	ws and doors draught								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	e, q50, expressed in co	ubic metre	es per ho	our per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeat	•								0.4	(18)
	lies if a pressurisation test h	as been dor	ne or a de	gree air pe	rmeability	is being u	sed			7
Number of sides shelter Shelter factor	rea			(20) = 1 -	0.075 x (1	9)] =			0.85	(19) (20)
Infiltration rate incorpora	ating shelter factor			(21) = (18		/ -			0.34	(21)
Infiltration rate modified	-	ed							0.54	(21)
Jan Feb	Mar Apr May	1	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind s	<u> </u>	, 1	1	1 3		<u> </u>	1	1	J	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7]	
`			<u> </u>	1		I	1	1	J	
Wind Factor (22a)m = ('		r			ı			1	
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	0.42	0.42	0.37	0.36	0.32	0.32	0.31	0.34	0.36	0.38	0.4		
Calculate effec		-	rate for t										
If mechanica												0	(23
If exhaust air h) = (23a)			0	(23
If balanced with		-	-	_								0	(23
a) If balance		1				<u> </u>	- ^ `	i `	 		```	÷ 100] I	(0
24a)m= 0		0	0	0	. 0	0	0	0	0	0	0		(2
b) If balance							 	ŕ	r ´ `	- 		Ī	(0
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h		tract ven ‹ (23b), t		•	•				5 v (22k	5)			
$\frac{11 (220)11}{24c)m} = 0$	0.5 7	0	0	0	0	0	0	0	0	0	0		(2
d) If natural													(-
,		en (24d)		•	•				0.5]				
24d)m= 0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(2
Effective air	change	rate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)			•		
25)m= 0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(2
3. Heat losse	e and he	at lose r	aramoto	or:									
ELEMENT	Gros		Openin		Net Ar	A 2	U-valı	IA.	AXU		k-value	2	ΑΧk
LEWIENI	area		m		A,r		W/m2		(W/		kJ/m²·l		d/K
Vindows Type) 1				2.24	x1	/[1/(1.4)+	0.04] =	2.97				(2
Vindows Type	2				4.1	x1	/[1/(1.4)+	0.04] =	5.44				(2
Vindows Type	3				6.18	x1	/[1/(1.4)+	0.04] =	8.19	=			(2
Vindows Type	e 4				1.71	x1	/[1/(1.4)+	0.04] =	2.27	Ħ			(2
Vindows Type	÷ 5				1.71	x1	/[1/(1.4)+	0.04] =	2.27				(2
Valls	46.5	59	15.94	4	30.65	, x	0.18		5.52	٦ r			(2
otal area of e	lements	, m²			46.59	<u></u>							(3
Party wall					44.62	=	0		0	_ [–	(3
for windows and	roof wind	ows, use e	ffective wi	ndow U-va						as given in	paragraph		(`~
* include the area	as on both	sides of in	ternal wali	ls and par	titions				, -		, , ,		
abric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				26.65	(3
leat capacity	Cm = S((Axk)						((28)	(30) + (32	2) + (32a).	(32e) =	0	(3
hermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(3
or design assess an be used inste				construct	ion are not	t known pi	ecisely the	indicative	values of	TMP in T	able 1f		
hermal bridge				ısina Ar	nendix k	<						4.88	(3
details of therma					-	`						4.00	(
otal fabric he			(/	(-	• /			(33) +	(36) =			31.53	(3
entilation hea	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × ((25)m x (5))		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	39.26	39.03	37.92	37.71	36.74	36.74	36.56	37.11	37.71	38.13	38.57		(3
38)m= 39.51												-	
39.51 39.51	:oefficier	 าt, W/K						(39)m	= (37) + (37)	38)m			
·	coefficier 70.8	nt, W/K 70.56	69.45	69.24	68.27	68.27	68.09	(39)m 68.65	= (37) + (69.24	38)m 69.66	70.1		

Heat loss para	meter (I	HLP), W/	m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.92	0.91	0.91	0.89	0.89	0.88	0.88	0.88	0.88	0.89	0.9	0.9		
								,	Average =	Sum(40) ₁ .	12 /12=	0.89	(40)
Number of day		· ` ·	le 1a)										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heat	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occu	inancv	N									40		(42)
if TFA > 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		42		(42)
Annual averag											.57		(43)
Reduce the annua not more that 125	-				-	-	to achieve	a water us	se target o	f			
Jan Hot water usage ii	Feb	Mar Mar	Apr	May	Jun	Jul Table 10 x	Aug	Sep	Oct	Nov	Dec		
					1	1	, ,	ı		T	1		
(44)m= 100.73	97.07	93.41	89.74	86.08	82.42	82.42	86.08	89.74	93.41	97.07	100.73		
Energy content of	hot water	used - cal	culated mo	onthly = 4 .	190 x Vd.r	n x nm x D)Tm / 3600			m(44) ₁₁₂ = ables 1b. 1		1098.89	(44)
(45)m= 149.38	130.65	134.82	117.54	112.78	97.32	90.18	103.49	104.72	122.04	133.22	144.67		
(45)11= 149.36	130.03	134.02	117.54	112.70	97.32	90.10	103.49			m(45) ₁₁₂ =	l l	1440.81	(45)
If instantaneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)		rotar – Su	III(4 3)112 -	· I	1440.01	(10)
(46)m= 22.41	19.6	20.22	17.63	16.92	14.6	13.53	15.52	15.71	18.31	19.98	21.7		(46)
Water storage	loss:									<u> </u>			
Storage volum	e (litres)) includin	g any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
If community h	eating a	and no ta	nk in dw	elling, e	nter 110	litres in	(47)						
Otherwise if no		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage			ft-	ممامات	/1.\\/h	·/do./\							(40)
a) If manufact				or is kno	wn (kvvr	n/day):				1.	39		(48)
Temperature fa										0.	54		(49)
Energy lost fro b) If manufact		_	-		or is not		(48) x (49)) =		0.	75		(50)
Hot water stora			-								0		(51)
If community h	•			`		,					<u> </u>		()
Volume factor	from Ta	ble 2a									0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)
Energy lost fro	m wate	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or ((54) in (55)								0.	75		(55)
Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(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)
If cylinder contains	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(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)
Primary circuit	•	•									0		(58)
Primary circuit				,	•	. ,	, ,						
(modified by					ı —	ı —			ı —	<u> </u>			(F5)
(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 calculated for each month (61)m = (60) \div 365 × (41)m													
$\begin{array}{c c} \text{Combi loss} \\ \hline (61)\text{m} = & 0 \end{array}$	calculated	or each	montn ((61)m =	(60) ÷ 3	05 × (41)m 0	0	0	0	0		(61)
	!			<u> </u>		<u> </u>					<u> </u>	(F0)m + (G1)m	(01)
(62)m= 195.9		181.41	162.63	159.38	142.41	136.78	150.0		168.64	178.31	(57)m + 191.26	(59)m + (61)m	(62)
Solar DHW inp							l		1				(02)
(add additio									ar contribu	lion to wate	er neaung)		
(63)m= 0	0	0	0	0	0	0	0		0	0	0		(63)
Output from	water hea	ter		<u> </u>		<u> </u>	<u> </u>		<u> </u>	<u> </u>	<u> </u>	I	
(64)m= 195.9	-	181.41	162.63	159.38	142.41	136.78	150.0	8 149.81	168.64	178.31	191.26		
` ′		l					0	I utput from w	ater heate	r (annual)	I12	1989.43	(64)
Heat gains f	rom water	heating.	kWh/me	onth 0.2	5 ′ [0.85	× (45)m	ı + (61)ml + 0.8	x [(46)m	+ (57)m	+ (59)m	1	-
(65)m= 86.9		82.1	75.16	74.78	68.43	67.26	71.69		77.86	80.37	85.38	اً	(65)
	7)m in cal	culation (of (65)m	only if c	vlinder i	s in the	dwellir	a or hot w	/ater is f	rom com	munity h	ı neating	
5. Internal	•				,			9			,		
Metabolic ga				, ·									
Jar		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 120.7	+	120.79	120.79	120.79	120.79	120.79	120.7		120.79	120.79	120.79		(66)
Lighting gair	ns (calcula	ted in Ap	pendix	L, equat	on L9 o	r L9a), a	lso se	e Table 5			•	l	
(67)m= 19.2		13.87	10.5	7.85	6.62	7.16	9.3	12.49	15.86	18.51	19.73		(67)
Appliances	gains (calc	ulated ir	Append	dix L, eq	uation L	13 or L1	3a), al	so see Ta	ıble 5	Į.	!		
(68)m= 214.3	35 216.58	210.97	199.04	183.98	169.82	160.36	158.1	4 163.74	175.67	190.74	204.89		(68)
Cooking gai	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	÷ 5				
(69)m= 35.0	8 35.08	35.08	35.08	35.08	35.08	35.08	35.08	35.08	35.08	35.08	35.08		(69)
Pumps and	fans gains	(Table 5	Ба)			•	•	•	•	•	•		
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses e.g.	evaporation	n (nega	tive valu	es) (Tab	le 5)	•		•				•	
(71)m= -96.6	-96.63	-96.63	-96.63	-96.63	-96.63	-96.63	-96.6	-96.63	-96.63	-96.63	-96.63		(71)
Water heating	ng gains (1	able 5)				•		-				•	
(72)m= 116.8	36 114.75	110.35	104.38	100.5	95.05	90.41	96.35	98.46	104.64	111.62	114.76		(72)
Total intern	al gains =				(66)m + (67)m	า + (68)	n + (69)m +	(70)m + (7	71)m + (72))m	•	
(73)m= 412.6	410.61	397.43	376.15	354.56	333.72	320.16	326.0	3 336.93	358.41	383.1	401.61		(73)
6. Solar ga	ins:												
Solar gains a		_	r flux from	Table 6a			itions to	convert to the	ne applical		tion.		
Orientation:	Access F Table 6d		Area m²		Flu	ıx ble 6a		g_ Table 6b	т	FF able 6c		Gains	
			1112		Га	Die ba	. –	Table 6b	_ '	able oc		(W)	7
North 0.9		X	2.2	24	X	10.63	X	0.63	x	0.7	=	7.28	(74)
North 0.9		X	6.1	8	X	10.63	×	0.63	x	0.7	=	20.08	(74)
North 0.9		X	1.7		X	10.63	x	0.63	x	0.7	=	5.56	(74)
North 0.9		X	2.2	24	x	20.32	×	0.63	x	0.7	=	13.91	(74)
North 0.9	x 0.77	X	6.1	8	x	20.32	x	0.63	х	0.7	=	38.38	(74)

North	0.9x	0.77	1 x	1.71] x	20.32	1 x	0.63	×	0.7	l ₌	10.62	(74)
North	0.9x	0.77	」^]x	2.24	l ^ l x	34.53] ^] x	0.63	X	0.7	l	23.64	(74)
North	0.9x	0.77] ^] x	6.18] ^] x	34.53] ^] x	0.63	x	0.7		65.22	(74)
North	0.9x	0.77] ^] x	1.71] ^] x	34.53] ^] x	0.63	x	0.7	l	18.05	(74)
North	0.9x	0.77]	2.24] ^] _x	55.46] ^] x	0.63	X	0.7	! _	37.97	(74)
North	0.9x	0.77] ^] x	6.18] ^] x	55.46] ^] x	0.63	x	0.7		104.76	(74)
North	0.9x	0.77] x	1.71] x	55.46] x	0.63	x	0.7	! _	28.99	(74)
North	0.9x	0.77) x	2.24] x	74.72] x	0.63	x	0.7	! _	51.15	(74)
North	0.9x	0.77	X	6.18] x	74.72] x	0.63	x	0.7	! _	141.11	(74)
North	0.9x	0.77]]	1.71]]	74.72]]	0.63	X	0.7	! 	39.05	 (74)
North	0.9x	0.77]] x	2.24	l X	79.99]]	0.63	X	0.7] =	54.76	= (74)
North	0.9x	0.77	X	6.18	l X	79.99]]	0.63	X	0.7	! =	151.07	= (74)
North	0.9x	0.77]] x	1.71) x	79.99]] _X	0.63	X	0.7	! =	41.8	(74)
North	0.9x	0.77	X	2.24) x	74.68)] x	0.63	x	0.7	 =	51.12	(74)
North	0.9x	0.77	X	6.18	X	74.68) x	0.63	x	0.7	 =	141.04	(74)
North	0.9x	0.77	X	1.71	x	74.68)] x	0.63	x	0.7	 =	39.03	(74)
North	0.9x	0.77	X	2.24	x	59.25	X	0.63	x	0.7	 =	40.56	(74)
North	0.9x	0.77	X	6.18	x	59.25	X	0.63	х	0.7	 =	111.9	(74)
North	0.9x	0.77	x	1.71	x	59.25	x	0.63	x	0.7	=	30.96	(74)
North	0.9x	0.77	x	2.24	×	41.52	x	0.63	х	0.7	=	28.42	(74)
North	0.9x	0.77	x	6.18	x	41.52	x	0.63	x	0.7	j =	78.41	(74)
North	0.9x	0.77	x	1.71	x	41.52	x	0.63	x	0.7	j =	21.7	(74)
North	0.9x	0.77	x	2.24	x	24.19	x	0.63	x	0.7	j =	16.56	(74)
North	0.9x	0.77	x	6.18	x	24.19	x	0.63	x	0.7	=	45.69	(74)
North	0.9x	0.77	x	1.71	x	24.19	x	0.63	x	0.7	=	12.64	(74)
North	0.9x	0.77	X	2.24	x	13.12	x	0.63	x	0.7	=	8.98	(74)
North	0.9x	0.77	X	6.18	x	13.12	X	0.63	x	0.7	=	24.78	(74)
North	0.9x	0.77	X	1.71	x	13.12	X	0.63	x	0.7	=	6.86	(74)
North	0.9x	0.77	X	2.24	x	8.86	X	0.63	X	0.7	=	6.07	(74)
North	0.9x	0.77	X	6.18	x	8.86	X	0.63	x	0.7	=	16.74	(74)
North	0.9x	0.77	X	1.71	x	8.86	X	0.63	x	0.7	=	4.63	(74)
South	0.9x	0.77	X	4.1	x	46.75	X	0.63	x	0.7	=	58.58	(78)
South	0.9x	0.77	X	1.71	x	46.75	X	0.63	x	0.7	=	24.43	(78)
South	0.9x	0.77	X	4.1	x	76.57	X	0.63	x	0.7	=	95.94	(78)
South	0.9x	0.77	X	1.71	x	76.57	X	0.63	x	0.7	=	40.01	(78)
South	0.9x	0.77	x	4.1	x	97.53	x	0.63	x	0.7] =	122.21	(78)
South	0.9x	0.77	X	1.71	x	97.53	x	0.63	x	0.7	=	50.97	(78)
South	0.9x	0.77	X	4.1	x	110.23	X	0.63	x	0.7	=	138.13	(78)
South	0.9x	0.77	X	1.71	x	110.23	X	0.63	X	0.7	=	57.61	(78)
South	0.9x	0.77	X	4.1	x	114.87	X	0.63	X	0.7	=	143.94	(78)
South	0.9x	0.77	X	1.71	x	114.87	X	0.63	X	0.7	=	60.03	(78)

South	0.9x	0.77	Х	4	.1	x [1	10.55	X	0.63	3	_ x [0.7		=	138.52	(78)
South	0.9x	0.77	Х	1.	71	x [1	10.55	x	0.63	3] x [0.7		=	57.77	(78)
South	0.9x	0.77	X	4	.1	x [1(08.01	X	0.63	3	x[0.7		=	135.34	(78)
South	0.9x	0.77	X	1.	71	x	10	08.01	X	0.63	3	x[0.7		=	56.45	(78)
South	0.9x	0.77	X	4	.1	x	10	04.89	X	0.63	3	x[0.7		=	131.43	(78)
South	0.9x	0.77	X	1.	71	x	10	04.89	X	0.63	3	x[0.7		=	54.82	(78)
South	0.9x	0.77	Х	4	.1	x [1(01.89	X	0.63	3] x [0.7		=	127.66	(78)
South	0.9x	0.77	Х	1.	71	x [1(01.89	X	0.63	3] x [0.7		=	53.25	(78)
South	0.9x	0.77	Х	4	.1	x [8	2.59	X	0.63	3] x	0.7		=	103.48	(78)
South	0.9x	0.77	Х	1.	71	x [8	2.59	X	0.63	3] x [0.7		=	43.16	(78)
South	0.9x	0.77	Х	4	.1	x	5	5.42	X	0.63	3] x	0.7		=	69.44	(78)
South	0.9x	0.77	X	1.	71	x	5	5.42	X	0.63	3	x	0.7		=	28.96	(78)
South	0.9x	0.77	Х	4	.1	x	4	40.4	X	0.63	3	x [0.7		=	50.62	(78)
South	0.9x	0.77	X	1.	71	x	4	40.4	X	0.63	3	X	0.7		=	21.11	(78)
_		watts, ca		1		$\overline{}$	10.01		È	= Sum(74	' 		1,00,04		-	1	(00)
(83)m=	115.93	198.87 Internal a	280.08	367.44	435.28		13.91	422.98	369	67 309	.44	221.53	139.01	99.1	7		(83)
(84)m=	528.58	609.47	677.51	743.6	789.84	Ť	77.64	743.14	695	.7 646	37	579.94	522.11	500.	70		(84)
` ′		ļ		ļ	<u> </u>		7.04	740.14		.7 040	.57	373.34	J22.11	300.	75		(0.)
		rnal temp		· ·		<i></i>				TI 4 (0.6							
ı emp	erature	during h	ieating p	periods i	n the livi	ing a	area 1	rom lat	ole 9,	Th1 (℃	;)					21	(85)
Lier-								L.L. O\			,						
Utilisa		ctor for g		T .	I	ΤÌ			I .		·	0-4	Nev				
	Jan	Feb	Mar	Apr	May	Į,	Jun	Jul	Αι	ug S	ер	Oct	Nov	De	ЭС		(86)
(86)m=	Jan 1	Feb 0.99	Mar 0.97	Apr 0.91	May 0.76	0	Jun).56	Jul 0.4	Aı 0.4	ug S 5 0.	ep 7	Oct 0.94	Nov 0.99	De	ЭС		(86)
(86)m= Mean	Jan 1 interna	Feb 0.99	Mar 0.97 ature in	Apr 0.91 living ar	0.76 ea T1 (f	ollov	Jun 0.56 w ste	Jul 0.4 ps 3 to 7	0.4 ' in T	ug S 5 0. able 9c)	ep 7	0.94	0.99	1			
(86)m= Mean (87)m=	Jan 1 interna 20.17	Feb 0.99 al temper 20.32	Mar 0.97 ature in 20.54	Apr 0.91 living ar 20.79	0.76 ea T1 (f	ollov 20	Jun 0.56 w ste 0.99	Jul 0.4 ps 3 to 7	0.4 7 in T	ug Si 5 0. able 9c)	ep 77		+	-			(86)
(86)m= Mean (87)m= Temp	Jan 1 interna 20.17 erature	Feb 0.99 al temper 20.32 during h	Mar 0.97 ature in 20.54 eating p	Apr 0.91 living ar 20.79 periods i	0.76 rea T1 (f	ollov	Jun 0.56 w ste 0.99 elling	Jul 0.4 ps 3 to 7 21 from Ta	Au 0.47 in T	ug S 5 0. able 9c) 20. 0, Th2 (°	ep 77 97 C)	0.94	0.99	20.1	4		(87)
(86)m= Mean (87)m=	Jan 1 interna 20.17	Feb 0.99 al temper 20.32	Mar 0.97 ature in 20.54	Apr 0.91 living ar 20.79	0.76 ea T1 (f	ollov	Jun 0.56 w ste 0.99	Jul 0.4 ps 3 to 7	0.4 7 in T	ug S 5 0. able 9c) 20. 0, Th2 (°	ep 77 97 C)	0.94	0.99	1	4		
(86)m= Mean (87)m= Temp (88)m=	Jan 1 interna 20.17 erature 20.15 ation fac	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga	Mar 0.97 ature in 20.54 eating p 20.16 ains for	Apr 0.91 living ar 20.79 periods i 20.17	May 0.76 rea T1 (f 20.94 n rest of 20.17 welling,	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Jun 0.56 w ste 0.99 elling 0.18 m (se	Jul 0.4 ps 3 to 7 21 from Ta 20.18	Au 0.47 in T 27 able 9 20.	ug S 5 0. able 9c) 20. 0, Th2 (°	ep 7 7 97 C) 18	0.94	0.99 20.43 20.17	20.1	4		(87)
(86)m= Mean (87)m= Temp (88)m=	Jan 1 interna 20.17 erature 20.15	Feb 0.99 1 temper 20.32 during h 20.16	Mar 0.97 ature in 20.54 eating p	Apr 0.91 living ar 20.79 periods i 20.17	May 0.76 rea T1 (f 20.94 n rest of 20.17	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Jun 0.56 w ste 0.99 elling 0.18	Jul 0.4 ps 3 to 7 21 from Ta 20.18	Au 0.47 in T 27 able 9 20.	ug S 5 0. able 9c) 20. 0, Th2 (°	ep 7 7 97 C) 18	0.94	0.99	20.1	4		(87)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	Jan 1 interna 20.17 erature 20.15 ation fac	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88	May 0.76 rea T1 (f 20.94 n rest of 20.17 lwelling, 0.71	0 ollow 20 h2,i	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33	Au 0.4 7 in T 2° able 9 20. 9a) 0.3	ug S 5 0. able 9c) 20. 0, Th2 (° 19 20.	ep	20.77	0.99 20.43 20.17	20.1	4		(87)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	Jan 1 interna 20.17 erature 20.15 ation fac	Feb 0.99 al temper 20.32 during h 20.16 etor for ga 0.99	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88	May 0.76 rea T1 (f 20.94 n rest of 20.17 lwelling, 0.71	0 0 2	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33	Au 0.4 7 in T 2° able 9 20. 9a) 0.3	ag S 5 0. able 9c) 20. 7 0.6 to 7 in 7	Page 1	0.94 20.77 20.17 0.91 9C) 19.92	0.99 20.43 20.17 0.99	20.1	6		(87)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean	Jan 1 interna 20.17 erature 20.15 ation fac 0.99 interna	Feb 0.99 al temper 20.32 during h 20.16 ctor for gas 0.99 al temper	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest	May 0.76 rea T1 (f 20.94 n rest of 20.17 lwelling, 0.71 of dwell	0 0 2	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fo	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 ollow ste	Au 0.47 in T 22 able 9 20.5 9a) 0.3	ag S 5 0. able 9c) 20. 7 0.6 to 7 in 7	Page 1	0.94 20.77 20.17 0.91 9C) 19.92	0.99 20.43 20.17 0.99	20.1	6	0.42	(87) (88) (89)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	Jan 1 interna 20.17 erature 20.15 ation fact 0.99 interna 19.04	Feb 0.99 al temper 20.32 during h 20.16 ctor for gas 0.99 al temper	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94	May 0.76 rea T1 (f 20.94 n rest of 20.17 welling, 0.71 of dwell 20.12	0 0 0 20 20	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fo 0.18	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow stee 20.18	Au 0.4 7 in T 2 20 9a) 0.3 20.	able 9c) 20. 7 0.6 19 20.	ep 77 7 997 C) 118 Fable fL	0.94 20.77 20.17 0.91 9C) 19.92	0.99 20.43 20.17 0.99	20.1	6	0.42	(87) (88) (89) (90)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	Jan 1 interna 20.17 erature 20.15 ation fact 0.99 interna 19.04	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga 0.99 al temper 19.27	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94	May 0.76 rea T1 (f 20.94 n rest of 20.17 welling, 0.71 of dwell 20.12	0 0 0 0 0 0 0 0 0 0	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fo 0.18	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow stee 20.18	Au 0.4 7 in T 2 20 9a) 0.3 20.	able 9c) 20. 7	ep 77 7 997 C) 118	0.94 20.77 20.17 0.91 9C) 19.92	0.99 20.43 20.17 0.99	20.1	14	0.42	(87) (88) (89) (90)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	Jan 1 interna 20.17 erature 20.15 ation fac 0.99 interna 19.04 interna 19.51	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga 0.99 al temper 19.27	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58 ature (for	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94 or the wh 20.29	May 0.76 rea T1 (f 20.94 n rest of 20.17 welling, 0.71 of dwell 20.12 nole dwell 20.47	00 00 00 00 00 00 00 0	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fo 0.18 g) = fl 0.52	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow ste 20.18 A × T1 20.53	Au 0.4 7 in T 2 2 8 8 9a) 0.3 20. + (1 20.9	able 9c) 20. 7	ep 77 7	0.94 20.77 20.17 0.91 900 19.92 A = Livi	0.99 20.43 20.17 0.99 19.43 ng area ÷ (4	1 20.1 20.1 1 19.0 4) =	14	0.42	(87) (88) (89) (90) (91)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m=	Jan 1 interna 20.17 erature 20.15 ation fac 0.99 interna 19.04 interna 19.51 adjustr 19.51	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga 0.99 al temper 19.27 al temper 19.71 ment to th 19.71	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58 ature (for 19.98 ne mean 19.98	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94 or the wh 20.29 n interna	May 0.76 rea T1 (f 20.94 n rest of 20.17 welling, 0.71 of dwell 20.12 nole dwell 20.47	0 0 0 0 0 0 0 0 0 0	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fo 0.18 g) = fl 0.52	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow ste 20.18 A × T1 20.53	Au 0.4 7 in T 2 2 8 8 9a) 0.3 20. + (1 20.9	able 9c) able 9c) 20. 7	ep	0.94 20.77 20.17 0.91 900 19.92 A = Livi	0.99 20.43 20.17 0.99 19.43 ng area ÷ (4	1 20.1 20.1 1 19.0 4) =	011	0.42	(87) (88) (89) (90) (91)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	Jan 1 interna 20.17 erature 20.15 ation fac 0.99 interna 19.04 interna 19.51 adjustr 19.51 ace hea	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga 0.99 al temper 19.27 al temper 19.71 ment to th 19.71 ating requ	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58 ature (for 19.98 he mean 19.98 uiremen	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94 or the wh 20.29 n internal 20.29	May 0.76 rea T1 (f 20.94 n rest of 20.17 lwelling, 0.71 of dwell 20.12 nole dwe 20.47 ltemper 20.47	0 0 0 0 0 0 0 0 0 0	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fc 0.18 0.52 re fro 0.52	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow ste 20.18 A × T1 20.53 m Table 20.53	Ai 0.4 7 in T 2 2 bble \$ 20. 9a) 0.3 20. + (1 20.9 4e, 1	able 9c) able 9c) 20. 7	ep 77 797 C) 18 Table fL T2 5 ppro 5 5	0.94 20.77 20.17 0.91 9°C) 19.92 A = Livi 20.28 priate 20.28	0.99 20.43 20.17 0.99 19.43 ng area ÷ (4	1 20.1 20.1 1 19.0 4) = 19.4 19.4	149		(87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	Jan 1 interna 20.17 erature 20.15 ation fac 0.99 interna 19.04 interna 19.51 adjustr 19.51 ace head i to the	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga 0.99 al temper 19.27 al temper 19.71 ment to th 19.71 ating requires	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58 ature (for 19.98 he mean 19.98 uiremen ernal te	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94 or the wh 20.29 n interna 20.29 temperature	May 0.76 rea T1 (f 20.94 n rest of 20.17 lwelling, 0.71 of dwell 20.12 nole dwe 20.47 ltempe 20.47	0 0 0 0 0 0 0 0 0 0	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fc 0.18 0.52 re fro 0.52	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow ste 20.18 A × T1 20.53 m Table 20.53	Ai 0.4 7 in T 2 2 able \$ 20. 9a) 0.3 20. + (1 20.9 4e, 1	able 9c) able 9c) 20. 7	ep 77 797 C) 18 Table fL T2 5 ppro 5 5	0.94 20.77 20.17 0.91 9°C) 19.92 A = Livi 20.28 priate 20.28	0.99 20.43 20.17 0.99 19.43 ng area ÷ (4	1 20.1 20.1 1 19.0 4) = 19.4 19.4	149		(87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	Jan 1 interna 20.17 erature 20.15 ation fac 0.99 interna 19.04 interna 19.51 adjustr 19.51 ace hea it to the illisation	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga 0.99 al temper 19.27 al temper 19.71 ment to th 19.71 ating requires the factor for ga factor for ga 19.71 mean into factor for ga 19.71 ating requires the factor for ga 19.71 ating requires the factor for ga 19.71 ating requires the factor for ga 19.71 ating requires the factor for ga 19.71	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58 ature (for 19.98 he mean 19.98 diremen ernal teepr gains	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94 or the wh 20.29 c internal 20.29 t mperatu using Ta	May 0.76 rea T1 (f 20.94 n rest of 20.17 lwelling, 0.71 of dwell 20.12 nole dwe 20.47 al tempe 20.47 are obtain	ollov 20 h2,1 0 lling 20 cratur 20 ned	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fo 0.18 0.52 re fro 0.52 at ste	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow ste 20.18 A × T1 20.53 m Table 20.53 eep 11 of	All 0.4 7 in T 2 2 8 ble 9 20.9 9a) 0.3 8 pps 3 20. 4 (1) 20.3 Tabl	able 9c) 20. 20. 7	ep	0.94 20.77 20.17 0.91 9c) 19.92 A = Livi 20.28 Driate 20.28 Ti,m=	0.99 20.43 20.17 0.99 19.43 ng area ÷ (4 19.85 (76)m an	1 20.1 20.1 1 19.0 4) = 19.4 d re-0	14 6 01 19 19		(87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Span Set T the ut	Jan 1 interna 20.17 erature 20.15 ation face 0.99 interna 19.04 interna 19.51 adjustr 19.51 ace head i to the cillisation Jan	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga 0.99 al temper 19.27 al temper 19.71 ment to th 19.71 ating requires	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58 ature (for 19.98 he mean 19.98 direment ernal tector gains Mar	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94 or the wh 20.29 n interna 20.29 temperaturusing Tale	May 0.76 rea T1 (f 20.94 n rest of 20.17 lwelling, 0.71 of dwell 20.12 nole dwe 20.47 ltempe 20.47	ollov 20 h2,1 0 lling 20 cratur 20 ned	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fc 0.18 0.52 re fro 0.52	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow ste 20.18 A × T1 20.53 m Table 20.53	Ai 0.4 7 in T 2 2 able \$ 20. 9a) 0.3 20. + (1 20.9 4e, 1	able 9c) 20. 20. 7	ep 77 797 C) 18 Table fL T2 5 ppro 5 5	0.94 20.77 20.17 0.91 9°C) 19.92 A = Livi 20.28 priate 20.28	0.99 20.43 20.17 0.99 19.43 ng area ÷ (4	1 20.1 20.1 1 19.0 4) = 19.4 19.4	14 6 01 19 19		(87) (88) (89) (90) (91) (92)
(86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Span Set T the ut	Jan 1 interna 20.17 erature 20.15 ation face 0.99 interna 19.04 interna 19.51 adjustr 19.51 ace head i to the cillisation Jan	Feb 0.99 al temper 20.32 during h 20.16 ctor for ga 0.99 al temper 19.27 al temper 19.71 ment to th 19.71 ating required factor for ga	Mar 0.97 ature in 20.54 eating p 20.16 ains for 0.96 ature in 19.58 ature (for 19.98 he mean 19.98 direment ernal tector gains Mar	Apr 0.91 living ar 20.79 periods i 20.17 rest of c 0.88 the rest 19.94 or the wh 20.29 n interna 20.29 temperaturusing Tale	May 0.76 rea T1 (f 20.94 n rest of 20.17 lwelling, 0.71 of dwell 20.12 nole dwe 20.47 al tempe 20.47 are obtain	olloy 20 h2,1 0 lling 20 cling	Jun 0.56 w ste 0.99 elling 0.18 m (se 0.49 T2 (fo 0.18 0.52 re fro 0.52 at ste	Jul 0.4 ps 3 to 7 21 from Ta 20.18 ee Table 0.33 collow ste 20.18 A × T1 20.53 m Table 20.53 eep 11 of	All 0.4 7 in T 2 2 8 ble 9 20.9 9a) 0.3 8 pps 3 20. 4 (1) 20.3 Tabl	able 9c) able 9c) 20. 7	ep	0.94 20.77 20.17 0.91 9c) 19.92 A = Livi 20.28 Driate 20.28 Ti,m=	0.99 20.43 20.17 0.99 19.43 ng area ÷ (4 19.85 (76)m an	1 20.1 20.1 1 19.0 4) = 19.4 d re-0	14 16 19 19 20 20 20 20 20 20 20 20 20 20 20 20 20		(87) (88) (89) (90) (91) (92)

Useful gains, hmGm , W = (94)m x (84)m	1 007 70	L 000 44	105.04			100.05		(OE)
(95)m= 525.01 599.81 650.4 658.7 574.61 400.98 Monthly average external temperature from Table 8	267.73	280.41	425.94	530.6	513.76	498.25		(95)
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W								, ,
(97)m= 1080.68 1048.48 951.27 791.24 607.06 404.24	268.02	280.98	439.47	670.27	888.18	1071.51		(97)
Space heating requirement for each month, kWh/mon	th = 0.02	24 x [(97	ı)m – (95)m] x (4	1)m			
(98)m= 413.42 301.51 223.85 95.43 24.14 0	0	0	0	103.91	269.59	426.51		
		Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	1858.35	(98)
Space heating requirement in kWh/m²/year							23.95	(99)
9a. Energy requirements – Individual heating systems	including	micro-C	CHP)					
Space heating: Fraction of space heat from secondary/supplementary	, cyctom						0	(201)
	-	(202) = 1	(201) -				0	╡ `
Fraction of space heat from main system(s)			, ,	(000)1			1	(202)
Fraction of total heating from main system 1		(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficiency of main space heating system 1							93.5	(206)
Efficiency of secondary/supplementary heating system	n, %						0	(208)
Jan Feb Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space heating requirement (calculated above)				ı		•		
413.42 301.51 223.85 95.43 24.14 0	0	0	0	103.91	269.59	426.51		
$(211)m = \{[(98)m \times (204)] \} \times 100 \div (206)$	_	_						(211)
442.16 322.47 239.41 102.06 25.82 0	0	0	0	111.14	288.33	456.16		_
		Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	F	1987.54	(211)
Space heating fuel (secondary), kWh/month								
$= \{[(98) \text{m x } (201)] \} \times 100 \div (208)$	_	ī	Г	Г	Г	I		
(215)m= 0 0 0 0 0 0	0	0	0	0	0	0		7
		lota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	F	0	(215)
Water heating								
Output from water heater (calculated above) 195.98 172.74 181.41 162.63 159.38 142.41	136.78	150.08	149.81	168.64	178.31	191.26		
Efficiency of water heater	1	100.00	1 .0.0	100.01			79.8	(216)
(217)m= 86.76 86.29 85.38 83.45 81.06 79.8	79.8	79.8	79.8	83.57	85.91	86.89	70.0	(217)
Fuel for water heating, kWh/month	Į	!	<u> </u>	ļ.	<u>I</u>			
(219) m = (64) m x $100 \div (217)$ m						•		
(219)m= 225.89 200.19 212.49 194.89 196.61 178.46	171.4	188.07	187.74	201.8	207.55	220.11		_
		Tota	I = Sum(2	19a) ₁₁₂ =			2385.2	(219)
Annual totals				k'	Wh/year		kWh/year	7
Space heating fuel used, main system 1							1987.54	╛
Water heating fuel used							2385.2	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230c)

boiler with a fan-assisted flue		45	(230e)
Total electricity for the above, kWh/year	sum of (230a	a)(230g) =	75 (231)
Electricity for lighting			338.99 (232)
12a. CO2 emissions – Individual heating system	s including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216 =	429.31 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	515.2 (264)
Space and water heating	(261) + (262) + (263) + (264) =		944.51 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	175.94 (268)
Total CO2, kg/year	sum	n of (265)(271) =	1159.37 (272)

TER =

(273)

21.63

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:37:09

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 52.1m² Site Reference: Plot Reference: Maitland Park Estate AC 208

AC 208, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

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

Dwelling Carbon Dioxide Emission Rate (DER) 6.04 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 32.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 30.1 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.12 (max. 0.70) External wall 0.12 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK** (no floor) Floor

Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

Regulations Compliance Report

100.0%	
75.0%	OK
0.5	
1.5	OK
90%	
70%	OK
Medium	oK
Average or unknown	
6.18m²	
1.66m²	
4.1m²	
1.64m²	
3.00	
None	
2.0 m ³ /m ² h	
0.12 W/m ² K	
0 W/m²K	
	75.0% 0.5 1.5 90% 70% Medium Average or unknown 6.18m² 1.66m² 4.1m² 1.64m² 3.00 None 2.0 m³/m²h 0.12 W/m²K

Community heating, heat from electric heat pump

Photovoltaic array

			User D	Notaile:						
			User L					0.70.0	2222	
Assessor Name:	John Simps			Strom					006273	
Software Name:	Stroma FS		_	Softwa				Versic	n: 1.0.4.26	
			Property							
Address :		en Court, Mait	land Parl	k Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
			Are	a(m²)		Av. He	ight(m)	_	Volume(m ³	<u>-</u>
Ground floor				52.1	(1a) x	:	2.6	(2a) =	135.46	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	52.1	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	135.46	(5)
2. Ventilation rate:										
	main heating	seconda heating		other		total			m³ per hou	ır
Number of chimneys	0	+ 0	+	0] = [0	X	40 =	0	(6a)
Number of open flues	0	+ 0	╡ + ┌	0	Ī = Ē	0	x	20 =	0	(6b)
Number of intermittent fa	ans				, <u> </u>	0	x	10 =	0	(7a)
Number of passive vents	3				Ē	0	x	10 =	0	(7b)
Number of flueless gas f	ires				F	0	x	40 =	0	(7c)
					L					
								Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fa	ans = $(6a)+(6b)+$	(7a)+(7b)+((7c) =		0		÷ (5) =	0	(8)
If a pressurisation test has b			ed to (17),	otherwise o	continue fr	om (9) to	(16)			_
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration							[(9))-1]x0.1 =	0	(10)
Structural infiltration: 0					•	ruction			0	(11)
if both types of wall are p deducting areas of openi			to the grea	ter wall are	a (after					
If suspended wooden	floor, enter 0.2	(unsealed) or (0.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	iter 0.05, else e	enter 0							0	(13)
Percentage of window	s and doors dra	aught stripped							0	(14)
Window infiltration				0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expresse	d in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	2	(17)
If based on air permeabi	lity value, then	$(18) = [(17) \div 20] +$	(8), otherw	rise (18) = (16)				0.1	(18)
Air permeability value applie	es if a pressurisatio	n test has been do	one or a de	gree air pe	rmeability	is being u	sed			 `
Number of sides sheltered	ed								2	(19)
Shelter factor				(20) = 1 -	[0.0 75 x (1	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter fact	tor		(21) = (18	x (20) =				0.08	(21)
Infiltration rate modified	for monthly win	d speed	_				_		-	
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table	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 <i>≟ 4</i>									
(00-)	<u></u>	1.00	T 0.05	1 0 00		1 4 00	1 440	1 40	1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.11	0.11	0.1	0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.1	0.1		
Calculate effe		•	rate for t	he appli	cable ca	se	•						
If exhaust air h			andiv N (2	13h) - (23a	a) v Emy (e	aguation (I	N5N othe	nwica (23h) = (23a)			0.5	(23
If balanced with		0		, ,	,	. `	,, .	`) = (23a)			0.5	(23
		-	-	_					Ob)m . /	(22h)[1 (220)	76.5	(23
a) If balance (24a)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	20)m + (0.21	230) × [0.21	0.22	1 ÷ 100]	(24
· ·	<u> </u>	<u>l</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	ļ	!	<u> </u>	ļ	0.22	J	(-
b) If balance	0		0	0	0	0	0	0	0	0	0]	(2
c) If whole h	OUSE EX	tract ver	tilation (r positiv	L /e input v	L ventilatio	n from o	L outside	<u> </u>	<u>ļ</u>	<u>ļ</u>	J	
•				-	•		c) = (22k)		.5 × (23k	o)			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
d) If natural	ventilatio	on or wh	ole hous	e positiv	ve input	ventilatio	on from I	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]			,	
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change	rate - er	nter (24a) or (24k	o) or (24	c) or (24	d) in box	(25)		,		,	
25)m= 0.23	0.22	0.22	0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22		(2
3. Heat losse	s and he	eat loss r	naramet	er.									
ELEMENT	Gros	•	Openin		Net Ar	ea	U-valı	IE.	AXU		k-value	9	AXk
	area	-	m			A , m^2 W/m2K (W/K) kJ/ m^2 -							kJ/K
Vindows Type	e 1				6.18	x1	/[1/(1.4)+	0.04] =	8.19				(2
Vindows Type	2				1.66	x1	/[1/(1.4)+	0.04] =	2.2				(2
Windows Type	e 3				4.1	x1	/[1/(1.4)+	0.04] =	5.44				(2
Windows Type	e 4				1.64	x1	/[1/(1.4)+	0.04] =	2.17				(2
Nalls	31.	1	13.5	8	17.52	<u>x</u>	0.12	i	2.1	= [(2
Total area of e	lements	, m²			31.1								(3
Party wall					44.62	x	0		0				(3:
for windows and	roof wind	ows, use e	effective wi	ndow U-va	alue calcul	ated using		\ /[(1/U-valu		as given in	paragraph	 1 3.2	`
* include the area	as on both	sides of ir	nternal wal	ls and par	titions								
abric heat los	ss, W/K :	= S (A x	U)				(26)(30)	+ (32) =				20.11	(3:
Heat capacity	Cm = S((Axk)						((28)	(30) + (3	2) + (32a).	(32e) =	0	(3
Thermal mass	parame	ter (TMF	P = Cm -	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(3
For design asses				construct	ion are no	t known pi	recisely the	indicative	values of	TMP in Ta	able 1f		
can be used inste Thermal bridg				usina Ar	nendiy l	(F 44	(3
f details of therma	•	,		• .	-	`						5.41	(3
Total fabric he		aro not un	om (00) -	- 0.00 % (0	'''			(33) +	(36) =			25.52	(3
entilation hea	at loss ca	alculated	l monthl	y				(38)m	= 0.33 × ((25)m x (5))		`
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
38)m= 10.1	10	9.91	9.43	9.34	8.86	8.86	8.77	9.05	9.34	9.53	9.72		(3
 leat transfer o	coefficier	nt. W/K			!			(39)m	= (37) + (38)m			
		·	04.05	24.05	34.38	34.38	34.28	34.57	<u> </u>		35.23	1	
39)m= 35.61	35.52	35.42	34.95	34.85	1 34.30	34.30	34.20	1 34.37	34.85	35.04	1 33.23		

Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Heat loss para	meter (H	HLP), W/	′m²K					(40)m	= (39)m ÷	- (4)			
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 0.68	0.68	0.68	0.67	0.67	0.66	0.66	0.66	0.66	0.67	0.67	0.68		
										Average =	Sum(40) ₁	12 /12=	0.67	(40)
4. Water heating energy requirement: **RVM/year:** Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)2)] + 0.0013 x (TFA - 13.9) if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)2)] + 0.0013 x (TFA - 13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day [all water use, not and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day Vd, average = (25 x N) + 36 Total = Sum(44)			`	· ·					-					
### A. Water heating energy requirement: ### Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 ### Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 ### Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 times per person per day I/O under usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 times per person per day I/O under used on the value usage in litres per day I/O under used on the value usage in litres per day I/O each month Vd, m = factor from Table 1c x (43) #### How the value usage in litres per day I/O each month Vd, m = factor from Table 1c x (43) ###################################					– –			⊢ <u> </u>		-	 			
Assumed occupancy, N	(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
Assumed occupancy, N														
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)z)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day (vd, average = (25 x N) + 36 Reduce the annual average hot water usage in litres per day for each month Vd, m = factor from Table 1c x (43) [44]m=	4. Water heat	ting ene	rgy requi	irement:								kWh/ye	ar:	
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36	if TFA > 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	TFA -13		75		(42)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) Total = Sum(44) = Sum(45) = Sum(45) =	Annual averag Reduce the annua	e hot wa al average	hot water	usage by	5% if the a	lwelling is	designed t			se target o		.81		(43)
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) Total = Sum(44) = Sum(45) = Sum(45) =	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Total = Sum(44) 12 = 909.73 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 123.67 108.16 111.61 97.31 93.37 80.57 74.66 85.67 86.7 101.03 110.29 119.77 Total = Sum(45) 12 119.79 119.77 (46)m= 18.55 16.22 16.74 14.6 14.01 12.09 11.2 12.85 13 15.16 16.54 17.96 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 (52) Temperature factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) x (54) x (55) x (41) x (55) x (41) x (55) x (4								_						
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x mm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)me	(44)m= 83.39	80.36	77.33	74.29	71.26	68.23	68.23	71.26	74.29	77.33	80.36	83.39		
123.67 108.16 111.61 97.31 93.37 80.57 74.66 85.67 86.7 101.03 110.29 119.77			<u> </u>	<u> </u>	ļ	<u> </u>	<u> </u>	<u> </u>		Total = Su	m(44) ₁₁₂ =	=	909.73	(44)
Total = Sum(45) 192.79 (45) (46) 18.55 16.22 16.74 14.6 14.01 12.09 11.2 12.85 13 15.16 16.54 17.96 (46) (46) (46) (46) (46) (47) (47) (47) (47) (47) (47) (47) (47) (47) (48) (48) (48) (49) (48) (Energy content of	hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	n x nm x C	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
## instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### (46)m=	(45)m= 123.67	108.16	111.61	97.31	93.37	80.57	74.66	85.67	86.7	101.03	110.29	119.77		
(46)m= 18.55 16.22 16.74 14.6 14.01 12.09 11.2 12.85 13 15.16 16.54 17.96 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50 b) If manufacturer's declared cylinder loss factor is not known: 0.02 (51 Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51 If community heating see section 4.3 0.02 1.03 (52 Temperature factor from Table 2b 0.6 (53 Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54 Enter (50) or (54) in (55) 1.03 (54 Enter (50) or (54) in (55) (50) me (55) x (41)m (56)me (55) x (41)m (56)me (55) x (41	If in a tampa and a second			-f /			t O :	havea (40		Total = Su	m(45) ₁₁₂ =	= [1192.79	(45)
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47 If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48 Temperature factor from Table 2b 0 (49 Energy lost from water storage, kWh/year (48) x (49) = 110 (50 b) If manufacturer's declared cylinder loss factor is not known:				·	not water	r storage), r	·	DOXES (46)) tO (61)			· · · · · · · · · · · · · · · · · · ·		
Storage volume (litres) including any solar or WWHRS storage within same vessel 0	1 7		16.74	14.6	14.01	12.09	11.2	12.85	13	15.16	16.54	17.96		(46)
If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) formunity heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = (32.01 28.92 32.01 30.98 32.01	_		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year India (52) Energy lost from water storage, kWh/year India (54) Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = (55) × (41)m) (56)m = 32.01 28.92 32.01 30.98 32.01	J	` ,					Ū					<u> </u>		(,
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)m = (56)m where (H11) is from Appendix H	•	-			-				ers) ente	er '0' in ((47)			
Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 32.01 28.92 32.01 30.98 3	Water storage	loss:												
Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52) Temperature factor from Table 2b 0.6 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 1.03 (54) Enter (50) or (54) in (55) (1.03) (55) Water storage loss calculated for each month ((56)m = (55) x (41)m) (56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (56) If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) - (H11)] ÷ (50), else (57)m = (56)m where (H111) is from Appendix H (57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)	a) If manufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 32.01 28.92 32.01 30.98 32.	Temperature fa	actor fro	m Table	2b								0		(49)
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 32.01 28.92 32.01 30.98 32.01 30.	0.		•					(48) x (49)) =		1	10		(50)
If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 32.01 28.92 32.01 30.98 32.01 30.	•			-								1		(54)
Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)m= 32.01 28.92 32.01 30.98 32.01		-			e z (KVV	n/iitre/ua	iy)				0.	02		(51)
Temperature factor from Table 2b Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = 32.01 28.92 32.01 30.98		•		011 4.0							1.	03		(52)
Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (56)m where (H11) is from Appendix H (57)m = 32.01 28.92 32.01 30.98	Temperature fa	actor fro	m Table	2b							-			(53)
Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m = 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (56)m where (H11) is from Appendix H (57)m = 32.01 28.92 32.01 30.98	Energy lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	03		(54)
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (56)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H (57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)m = (56)m where (H11) is from Appendix H	••		-											(55)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H (57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)m	Water storage	loss cal	culated f	for each	month			((56)m = ((55) × (41)	m				
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷ (50), else (57)m = (56)m where (H11) is from Appendix H (57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01 30.98 32.01 30.98 32.01 (57)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)
	` '												хН	. ,
	(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)
Primary circuit loss (annual) from Table 3		loco /or	nual) fra	m Table	. 2					ı				(58)
Primary circuit loss (annual) from Table 3 Primary circuit loss calculated for each month $(59)m = (58) \div 365 \times (41)m$	•	`	,			59)m = 4	(58) ± 36	35 × (41)	ım			·		(30)
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)	•				,	•	. ,	, ,		r thermo	stat)			
	`			ı —	ı —	ı —	ı —		<u> </u>		'	23.26		(59)

Combi loss	calculated	for each	month (′61)m =	(60) ÷ 3	365 x (41)m							
(61)m= 0	0	0	0	0	0	0))	0	0	0	0	1	(61)
	L equired for	water h	L eating ca	L	L I for eac	ch month	(62)	m =	0 85 x (45)m +	(46)m +	(57)m +	ı (59)m + (61)m	
(62)m= 178.	-i	166.89	150.8	148.64	134.06		140		140.19	156.31	163.78	175.04]	(62)
Solar DHW inp	ut calculated	using App	endix G or	· Appendix	H (nega	tive quantity	y) (ent	ter '0'	if no sola	r contribu	tion to wate	er heating)	J	
(add additio												•		
(63)m= 0	0	0	0	0	0	0	0)	0	0	0	0]	(63)
Output from	water hea	ter				•					•	•	•	
(64)m= 178.	94 158.09	166.89	150.8	148.64	134.06	129.94	140	.95	140.19	156.31	163.78	175.04]	
	•	•	•	•		•		Outp	out from wa	ater heate	er (annual)	112	1843.63	(64)
Heat gains	from water	heating,	kWh/m	onth 0.2	5 ´ [0.8	5 × (45)m	ı + (6	31)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m	1]	
(65)m= 85.3	34 75.91	81.33	75.15	75.27	69.58	69.05	72.	71	71.62	77.82	79.47	84.04]	(65)
include (5	57)m in cal	culation (of (65)m	only if c	ylinder	is in the	dwell	ling	or hot w	ater is f	rom com	munity h	neating	
5. Interna	gains (see	e Table 5	and 5a):										
Metabolic g	ains (Table	e 5), Wat	ts											
Ja		Mar	Apr	May	Jun	Jul	Α	ug	Sep	Oct	Nov	Dec		
(66)m= 87.	6 87.6	87.6	87.6	87.6	87.6	87.6	87	.6	87.6	87.6	87.6	87.6		(66)
Lighting gai	ns (calcula	ted in Ap	pendix	L, equat	ion L9	or L9a), a	lso s	ee -	Table 5					
(67)m= 13.6	12.09	9.83	7.44	5.56	4.7	5.08	6.0	6	8.86	11.24	13.12	13.99]	(67)
Appliances	gains (calc	ulated in	Append	dix L, eq	uation I	_13 or L1	3a),	also	see Tal	ole 5		-		
(68)m= 152.	69 154.27	150.28	141.78	131.05	120.96	114.23	112	.64	116.63	125.13	135.86	145.95]	(68)
Cooking ga	ins (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), als	o se	ee Table	5	-			
(69)m= 31.7	76 31.76	31.76	31.76	31.76	31.76	31.76	31.	76	31.76	31.76	31.76	31.76]	(69)
Pumps and	fans gains	(Table 5	5a)											
(70)m= 0	0	0	0	0	0	0	0)	0	0	0	0		(70)
Losses e.g.	evaporation	n (nega	tive valu	es) (Tab	le 5)								_	
(71)m= -70.	08 -70.08	-70.08	-70.08	-70.08	-70.08	-70.08	-70	.08	-70.08	-70.08	-70.08	-70.08]	(71)
Water heati	ng gains (1	able 5)											_	
(72)m= 114.	71 112.95	109.32	104.37	101.16	96.64	92.8	97.	72	99.47	104.59	110.37	112.96		(72)
Total interi	nal gains =				(60	6)m + (67)m	n + (68	3)m +	+ (69)m + (70)m + (71)m + (72))m	_	
(73)m= 330.	28 328.59	318.71	302.87	287.06	271.59	261.39	266	.25	274.24	290.25	308.64	322.18		(73)
6. Solar ga														
•	re calculated	•					ations	to co		e applica		tion.		
Orientation:	Access F Table 6d		Area m²			ux able 6a		т	g_ able 6b	Т	FF able 6c		Gains (W)	
North							1							1,,
North 0.9		X	4.		X	10.63] X		0.4	_ ×	8.0	=	9.67	(74)
North 0.9		X	1.6		X	10.63	X		0.4		0.8	=	3.87	[(74)
North 0.9		X	4.		X	20.32] X		0.4	×	0.8	=	18.48](74)
North 0.9		X	1.6		X _	20.32] X]		0.4	_ ×	0.8	=	7.39	[(74)
North 0.9	0.77	X	4.	1	Х	34.53	X		0.4	X	0.8	=	31.4	(74)

			_		_		_		_		_		_
North	0.9x	0.77	X	1.64	X	34.53	X	0.4	X	0.8	=	12.56	(74)
North	0.9x	0.77	X	4.1	X	55.46	X	0.4	X	0.8	=	50.43	(74)
North	0.9x	0.77	X	1.64	X	55.46	X	0.4	x	0.8	=	20.17	(74)
North	0.9x	0.77	X	4.1	X	74.72	X	0.4	X	0.8	=	67.93	(74)
North	0.9x	0.77	X	1.64	X	74.72	x	0.4	X	0.8	=	27.17	(74)
North	0.9x	0.77	X	4.1	X	79.99	X	0.4	X	0.8	=	72.72	(74)
North	0.9x	0.77	X	1.64	X	79.99	X	0.4	X	0.8	=	29.09	(74)
North	0.9x	0.77	X	4.1	X	74.68	x	0.4	X	0.8	=	67.9	(74)
North	0.9x	0.77	X	1.64	X	74.68	X	0.4	X	0.8	=	27.16	(74)
North	0.9x	0.77	X	4.1	X	59.25	x	0.4	X	0.8	=	53.87	(74)
North	0.9x	0.77	X	1.64	X	59.25	X	0.4	X	0.8	=	21.55	(74)
North	0.9x	0.77	X	4.1	X	41.52	X	0.4	X	0.8	=	37.75	(74)
North	0.9x	0.77	X	1.64	x	41.52	x	0.4	X	0.8	=	15.1	(74)
North	0.9x	0.77	X	4.1	X	24.19	x	0.4	X	0.8	=	21.99	(74)
North	0.9x	0.77	X	1.64	X	24.19	X	0.4	X	0.8	=	8.8	(74)
North	0.9x	0.77	x	4.1	x	13.12	x	0.4	x	0.8	=	11.93	(74)
North	0.9x	0.77	X	1.64	X	13.12	x	0.4	X	0.8	=	4.77	(74)
North	0.9x	0.77	X	4.1	X	8.86	X	0.4	X	0.8	=	8.06	(74)
North	0.9x	0.77	X	1.64	X	8.86	x	0.4	X	0.8] =	3.22	(74)
South	0.9x	0.77	X	6.18	X	46.75	X	0.4	X	0.8	=	64.07	(78)
South	0.9x	0.77	X	1.66	X	46.75	X	0.4	X	0.8	=	17.21	(78)
South	0.9x	0.77	X	6.18	x	76.57	x	0.4	X	0.8	=	104.93	(78)
South	0.9x	0.77	X	1.66	X	76.57	x	0.4	X	0.8	=	28.19	(78)
South	0.9x	0.77	X	6.18	X	97.53	x	0.4	X	0.8] =	133.67	(78)
South	0.9x	0.77	X	1.66	x	97.53	x	0.4	X	0.8	=	35.9	(78)
South	0.9x	0.77	X	6.18	X	110.23	X	0.4	X	0.8	=	151.07	(78)
South	0.9x	0.77	X	1.66	X	110.23	X	0.4	X	0.8	=	40.58	(78)
South	0.9x	0.77	X	6.18	x	114.87	x	0.4	X	0.8	=	157.43	(78)
South	0.9x	0.77	X	1.66	X	114.87	X	0.4	X	0.8	=	42.29	(78)
South	0.9x	0.77	X	6.18	X	110.55	x	0.4	X	0.8	=	151.5	(78)
South	0.9x	0.77	X	1.66	X	110.55	x	0.4	X	0.8	=	40.7	(78)
South	0.9x	0.77	X	6.18	X	108.01	X	0.4	X	0.8	=	148.03	(78)
South	0.9x	0.77	X	1.66	X	108.01	x	0.4	X	0.8	=	39.76	(78)
South	0.9x	0.77	X	6.18	X	104.89	X	0.4	X	0.8	=	143.76	(78)
South	0.9x	0.77	X	1.66	X	104.89	X	0.4	x	0.8	=	38.61	(78)
South	0.9x	0.77	x	6.18	x	101.89	x	0.4	x	0.8] =	139.63	(78)
South	0.9x	0.77	X	1.66	x	101.89	x	0.4	x	0.8] =	37.51	(78)
South	0.9x	0.77	x	6.18	x	82.59	x	0.4	x	0.8	=	113.18	(78)
South	0.9x	0.77	x	1.66	x	82.59	x	0.4	x	0.8] =	30.4	(78)
South	0.9x	0.77	x	6.18	x	55.42	x	0.4	x	0.8] =	75.95	(78)
South	0.9x	0.77	X	1.66	x	55.42	x	0.4	x	0.8] =	20.4	(78)

South	0.9x	0.77	x	6.1	8	x		40.4	x		0.4] ;	× 「	0.8		=	55.36	(78)
South	0.9x	0.77	x	1.6	6	x		40.4	X		0.4	= ;	× \sqsubset	0.8		=	14.87	(78)
	_								•				_					_
Solar g	ains in	watts, ca	alculated	for eac	n month				(83)m	= St	um(74)m .	(82))m					
(83)m=	94.82	158.99	213.53	262.25	294.82	2	94.01	282.85	257	.78	229.98	174	1.37	113.05	81.5	52		(83)
Total g	ains – ir	nternal a	and solar	(84)m =	(73)m	+ (83)m	, watts	•	•								
(84)m=	425.1	487.58	532.23	565.13	581.88	Ę	565.6	544.23	524	.03	504.23	464	1.62	421.68	403.	.7		(84)
7. Me	an inter	nal temp	perature	(heating	season)												
Temp	erature	during h	neating p	eriods ir	the livi	ng	area	from Tab	ole 9,	Th	1 (°C)						21	(85)
Utilisa	ation fac	tor for g	ains for I	iving are	a, h1,m	ı (s	ee Ta	ıble 9a)										
	Jan	Feb	Mar	Apr	May	Ì	Jun	Jul	Αι	ug	Sep	С	ct	Nov	De	ЭС		
(86)m=	0.98	0.94	0.87	0.73	0.55	Т	0.39	0.28	0.0	3	0.47	0.	75	0.94	0.98	8		(86)
Mean	interna	tompor	ature in	living ar	22 T1 /f/	مااد	w eto	ne 3 to 7	in T	able	2 00)						ı	
(87)m=	20.65	20.78	20.9	20.98	21	T	21	21	2		21	20	.98	20.82	20.6	32		(87)
						<u> </u>		ļ	<u> </u>					20.02	20.0			()
-			eating p			$\overline{}$		i	1		<u> </u>			1			l	(00)
(88)m=	20.36	20.36	20.36	20.37	20.37		20.38	20.38	20.	38	20.37	20.	.37	20.37	20.3	86		(88)
Utilisa	ation fac	tor for g	ains for ı	est of d	welling,	h2	,m (se	e Table	9a)									
(89)m=	0.97	0.93	0.85	0.69	0.52		0.35	0.24	0.2	:6	0.43	0.7	71	0.93	0.98	8		(89)
Mean	interna	temper	ature in	the rest	of dwell	ina	T2 (f	ollow ste	eps 3	to 7	in Tabl	e 9c	:)					
(90)m=	19.9	20.08	20.24	20.34	20.37	Ť	20.38	20.38	20.		20.37	20.		20.15	19.8	86		(90)
											f	LA =	Livin	g area ÷ (4	l) =		0.49	(91)
Maga	:			ماندر ممالا س	منتام مانت	11:	~\ f	I A T 4	. /4	£I	Λ) Το							
(92)m=	20.26	20.42	ature (fo	20.65	20.67	_	19) = 11 20.68	20.68	20.0		A) × 12	20	.65	20.48	20.2	2		(92)
` ′						<u> </u>			l					20.40	20.2	.5		(32)
(93)m=	20.26	20.42	he mean 20.56	20.65	20.67	$\overline{}$	20.68	20.68	20.0		20.68	ė-	.65	20.48	20.2	93	1	(93)
			uirement	20.00	20.07	L	20.00	20.00	20.	00	20.00	20.	.00	20.40	20.2	.5		(00)
			ernal ter	mporatiu	o obtair	200	l at et	on 11 of	Tabl	o Oh	o co tha	+ Ti :	m_(76)m an	d ro-c	ماد	vulato	
			or gains i			iec	al Si	ер п ог	I abi	e ar), 50 ii a	L 11,1)=(rojili ali	u 1 0- 0	aic	uiale	
	Jan	Feb	Mar	Apr	May	Π	Jun	Jul	Aı	ug	Sep	С	ct	Nov	De	ec		
Utilisa		tor for g	ains, hm		,	١			<u> </u>	<u> </u>							ı	
(94)m=	0.97	0.93	0.86	0.71	0.54		0.37	0.26	0.2	8	0.45	0.	73	0.93	0.98	В		(94)
Usefu	ıl gains,	hmGm .	, W = (94	1)m x (84	4)m				!					<u>. </u>			,	
(95)m=	412.96	454.81	455.1	401.14	311.7	2	08.98	140.27	146	.77	227.18	340).32	391.52	394.	98		(95)
Month	nly avera	age exte	rnal tem	perature	from T	abl	le 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	loss rate	for mea	an intern	al tempe	erature,	Lm	າ , W =	=[(39)m :	x [(93	3)m-	– (96)m]						
(97)m=	568.5	551.33	498.18	410.72	312.76	2	09.03	140.28	146	.77	227.4	350).34	468.77	564.	71		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Wr	n/mon	th = 0.02	24 x [(97)	m – (95)m] :	x (4	1)m				
(98)m=	115.72	64.86	32.05	6.89	0.79		0	0	0		0	7.4	45	55.62	126.	27		
'										Total	per year	(kWh	/year) = Sum(9	8)15,91	2 =	409.67	(98)
Space	e heatin	g require	ement in	kWh/m²	/year												7.86	(99)

9b. Energy requirements – Community heating scheme

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	0	(301)
Fraction of space heat from community system 1 – (301) =	Ĭ	1	(302)
The community scheme may obtain heat from several sources. The procedure includes boilers, heat pumps, geothermal and waste heat from power stations.		ne latter	-
Fraction of heat from Community heat pump	إ	1	(303a)
Fraction of total space heat from Community heat pump	(302) x (303a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for commu	unity heating system	1	(305)
Distribution loss factor (Table 12c) for community heating system	m [1.1	(306)
Space heating Annual space heating requirement	[kWh/year 409.67	
Space heat from Community heat pump	(98) x (304a) x (305) x (306) =	450.63	(307a)
Efficiency of secondary/supplementary heating system in % (from	om Table 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary syst	tem (98) x (301) x 100 ÷ (308) =	0	(309)
Water heating	•		_
Annual water heating requirement		1843.63	
If DHW from community scheme: Water heat from Community heat pump	(64) x (303a) x (305) x (306) =	2028	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307e) + (310a)(310e)] =	24.79	(313)
Cooling System Energy Efficiency Ratio	[0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from	outside	103.29	(330a)
warm air heating system fans	Ī	0	(330b)
pump for solar water heating	Ī	0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	103.29	(331)
Energy for lighting (calculated in Appendix L)		240.39	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-538.9	(333)
Electricity generated by wind turbine (Appendix M) (negative qu	antity)	0	(334)
12b. CO2 Emissions - Community heating scheme			
	Energy Emission factor I kWh/year kg CO2/kWh I	Emissions kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using	g two fuels repeat (363) to (366) for the second fuel	319	(367a)
CO2 associated with heat source 1 [(307b)+	-(310b)] x 100 ÷ (367b) x 0.52 =	403.26	(367)
Electrical energy for heat distribution	[(313) x 0.52 =	12.86	(372)
Total CO2 associated with community systems	(363)(366) + (368)(372) =	416.13	(373)
CO2 associated with space heating (secondary)	(309) x 0 =	0	(374)
CO2 associated with water from immersion heater or instantane	eous heater (312) x 0.52 =	0	(375)

Total CO2 associated with space and water heating (373) + (374) + (375) =(376) 416.13 CO2 associated with electricity for pumps and fans within dwelling (331)) x (378) 0.52 53.61 CO2 associated with electricity for lighting (332))) x (379) 0.52 124.76 Energy saving/generation technologies (333) to (334) as applicable x = 0.01 =Item 1 (380)0.52 -279.69 sum of (376)...(382) =Total CO2, kg/year 314.81 (383) $(383) \div (4) =$ **Dwelling CO2 Emission Rate** (384)6.04 El rating (section 14) (385)95.66

			User D	etails:						
Assessor Name:	John Simpso			Strom					006273	
Software Name:	Stroma FSAF			Softwa				Versio	n: 1.0.4.26	
				Address						
Address :	AC 208, Asper	n Court, Maitla	and Park	k Estate,	London	, NW3 2	EH.			
Overall dwelling dime	ensions:		A	- (2)		A 11 .	!!: 4 <i>(</i>)		Malassa a feed	2)
Ground floor				a(m²)	(10) v		ight(m)	7(20) - 1	Volume(m	<u> </u>
					(1a) x		2.6	(2a) =	135.46	(3a
Total floor area TFA = (1	a)+(1b)+(1c)+(1d	l)+(1e)+(1r	ו) [י	52.1	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	135.46	(5)
2. Ventilation rate:								·		
	main heating	secondar heating	у	other		total			m³ per hou	ır
Number of chimneys	0 0	+ 0	+ F	0] = [0	х	40 =	0	(68
Number of open flues	0	+ 0	╡ᆠ┝	0	」] ₌ 「	0	X	20 =	0	(6l
·					J ⊨		=	10 =	-	╡`
Number of intermittent fa					Ĺ	2			20	(7a
Number of passive vents	3				L	0	X	10 =	0	(7
Number of flueless gas f	ires					0	X	40 =	0	(70
									_	
								Air ch	anges per he	our
nfiltration due to chimne	•					20		÷ (5) =	0.15	(8)
If a pressurisation test has b		intended, procee	d to (17), o	otherwise o	ontinue fr	om (9) to	(16)	ı		— ,
Number of storeys in t Additional infiltration	ne dwelling (ns)						[(0)	41.0.4	0	(9)
Structural infiltration: 0	25 for steel or tir	mbor frame or	0 35 for	r maconr	v constr	uction	[(9)	-1]x0.1 =	0	(10
if both types of wall are p					•	uction			0	(1
deducting areas of openi		-	3		- (
If suspended wooden	floor, enter 0.2 (u	nsealed) or 0	.1 (seale	ed), else	enter 0				0	(12
If no draught lobby, en	ter 0.05, else ent	er 0							0	(13
Percentage of window	s and doors drau	ght stripped							0	(14
Window infiltration				0.25 - [0.2	, ,	_			0	(1
Infiltration rate				(8) + (10)					0	(16
Air permeability value,	• •		•	•	•	etre of e	envelope	area	5	(17
f based on air permeabi	-					io hoina	aad		0.4	(18
Air permeability value applie Number of sides sheltere		est nas been dor	ie or a deg	gree air pei	теаршіу	is being u	sea		2	(19
Shelter factor	,u			(20) = 1 -	0.075 x (1	9)] =			0.85	(20
nfiltration rate incorpora	ting shelter factor			(21) = (18)	x (20) =				0.34	(2
nfiltration rate modified f	_								0.01	
Jan Feb		May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp				_ ~3	r					
(22)m= 5.1 5		4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
, [] ,	. 1 1		l	I	•	I	<u> </u>	I		

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

0.43	0.42	0.41	0.37	0.36	0.32	0.32	0.31	0.34	0.36	0.38	0.4]	
Calculate effec		-	rate for t	he appli	cable ca	se	!	!		!	!	<u>,</u>	——— <i>"</i>
If mechanical If exhaust air he			andiv N. (2	3h) _ (22a	a) × Emy (c	auation (N	VEVV otho	nuico (22h) - (222)			0	(2
If balanced with) = (23a)			0	(2
		•	-	_					2h\ (00h) [/	1 (00 a)	0	(2
a) If balance	o mech	anicai ve	ntilation	with ne	at recove		1R) (248	$\frac{1}{0} = \frac{2}{2}$	20)m + (. 0	23b) x [$\frac{1-(230)}{0}$) ÷ 100]]	(2
b) If balance			-	_								J	(-
4b)m= 0	o mech	o 0	0	0	0	0	0	0	0	0	0	1	(2
												J	\-
c) If whole h if (22b)n				•	•				5 x (23h	n)			
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(2
d) If natural	ventilatio	n or wh	ole hous	e positiv	ve input	L ventilatio	n from I	oft		<u> </u>	<u>!</u>	J	
if (22b)n				•	•				0.5]				
4d)m= 0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58]	(2
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)	-	-	-	_	
5)m= 0.59	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58]	(2
3. Heat losse	e and he	at lose r	aramoto	or.								_	
. Heat losse LEMENT	Gros	·	Openin		Net Ar	A2	U-valı	IΩ	AXU		k-valu	۵	ΑXk
LEWIENI	area	_	m		A,r		W/m2		(W/I	K)	kJ/m ² ·		kJ/K
indows Type	: 1				5.93	x1.	/[1/(1.4)+	0.04] =	7.86				(:
indows Type	2				1.59	x1,	/[1/(1.4)+	0.04] =	2.11	=			(2
indows Type	3				3.93	x1.	/[1/(1.4)+	0.04] =	5.21	=			(2
indows Type	4				1.57	x ₁ ,	/[1/(1.4)+	0.04] =	2.08	╡			(2
'alls	31.	1	13.02	,	18.08	=	0.18	L	3.25	=		\neg	(2
otal area of e		i	10.0.		31.1	=	0.10		0.20				(;
arty wall	1011101110	,			44.62					— г			(:
or windows and	roof wind	ows use e	ffective wi	ndow H-va			o formula 1		0 (e)+0 041 a	L as aiven in	naragrani		(,
include the area						atou uomg	normala 1	/[(// O Vala	0,10.0-1,0	io givoii iii	paragrapi	70.2	
abric heat los	s, W/K	= S (A x	U)				(26)(30)	+ (32) =				20.52	2 (
eat capacity	Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	(;
nermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		250	(:
or design assess	ments wh	ere the de	tails of the	construct	ion are no	t known pr	ecisely the	e indicative	values of	TMP in Ta	able 1f		
n be used inste						,							
nermal bridge	•	,			-	<						3.74	(;
details of therma Intal fabric he		are not kn	own (36) =	= 0.05 x (3	11)			(33) +	(36) =			24.25	5 (
entilation hea		alculated	l monthly	,						25)m x (5)	١	24.23	2 (
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
3)m= 26.5	26.34	26.18	25.44	25.3	24.66	24.66	24.54	24.9	25.3	25.58	25.88	1	(;
´		<u> </u>	_∪.⊣¬	20.0	1 27.00			<u> </u>	<u> </u>	<u> </u>	1 -0.00	J	(
eat transfer o		·	40.00	40.50	10.5:	40.01	40 ==	· · ·	= (37) + (3			1	
9)m= 50.76	50.59	50.44	49.69	49.56	48.91	48.91	48.79	49.16	49.56	49.84	50.13	I	

Heat loss para	meter (l	HLP), W/	m²K					(40)m	= (39)m ÷	· (4)			
(40)m= 0.97	0.97	0.97	0.95	0.95	0.94	0.94	0.94	0.94	0.95	0.96	0.96		
Number of dev	o in ma	nth (Tab	lo 10)	<u> </u>	<u> </u>	<u> </u>		,	Average =	Sum(40) ₁ .	12 /12=	0.95	(40)
Number of day Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
<u> </u>													
4. Water heat	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assumed occu	ıpancy,	N								1.	75		(42)
if TFA > 13.9 if TFA £ 13.9		+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.	.9)			
Annual averag	e hot wa										.81		(43)
Reduce the annua not more that 125							to achieve	a water us	se target o	f			
							۸۰۰۰	Con	Oct	Nov	Doo		
Jan Hot water usage ii	Feb n litres per	Mar r day for ea	Apr ach month	May $Vd,m = fa$	Jun ctor from 7	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 83.39	80.36	77.33	74.29	71.26	68.23	68.23	71.26	74.29	77.33	80.36	83.39		
(11)	00.00	77.00	7 1.20	71.20	00.20	00.20	7 1.20	L		m(44) ₁₁₂ =		909.73	(44)
Energy content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	n x nm x E	0Tm / 3600			· /	L		` ′
(45)m= 123.67	108.16	111.61	97.31	93.37	80.57	74.66	85.67	86.7	101.03	110.29	119.77		
									Total = Su	m(45) ₁₁₂ =	:	1192.79	(45)
If instantaneous w	ater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)		i			
(46)m= 18.55	16.22	16.74	14.6	14.01	12.09	11.2	12.85	13	15.16	16.54	17.96		(46)
Water storage Storage volum		\ includin	na anv so	olar or M	///HRS	storane	within sa	ame ves	امء		150		(47)
If community h	` ′		•			Ū		ATTIC VOO	501		150		(47)
Otherwise if no	•			•			` '	ers) ente	er '0' in (47)			
Water storage	loss:		`					,		•			
a) If manufact	urer's d	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	39		(48)
Temperature fa	actor fro	m Table	2b							0.	54		(49)
Energy lost fro		_	-				(48) x (49)) =		0.	75		(50)
b) If manufactHot water stora			-										(E1)
If community h	-			6 Z (KVV	11/11116/08	iy <i>)</i>					0		(51)
Volume factor	_										0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)
Energy lost fro	m watei	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or ((54) in (5	55)								0.	75		(55)
Water storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(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)
If cylinder contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	ix H	
(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)
Primary circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit				,	•	. ,	, ,						
(modified by					ı —	ı —				<u> </u>			
(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 of	salaulatad	for oach	month	(61)m –	(60) · 3	65 v (11	\m						
(61)m= 0	0 0	0	0	0	0	05 x (41	0	0	0	0	0	1	(61)
	<u> </u>				<u> </u>	<u> </u>	<u>. </u>	<u> </u>			ļ	J · (59)m + (61)m	
(62)m= 170.2		158.21	142.4	139.96	125.66	121.25	132.2		147.63	155.38	166.36]	(62)
Solar DHW inpu	ut calculated	using App	endix G o	r Appendix	H (negat	ive quantity	y) (ente	r '0' if no sola	ar contribut	tion to wate	er heating)	ı	
(add addition	nal lines if	FGHRS	and/or \	NWHRS	applies	s, see Ap	pendi	x G)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from	water hea	ter											
(64)m= 170.2	6 150.25	158.21	142.4	139.96	125.66	121.25	132.2	131.79	147.63	155.38	166.36		_
							C	output from w	ater heate	r (annual)	112	1741.41	(64)
Heat gains f	rom water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	ı + (61)m] + 0.8	x [(46)m	+ (57)m	+ (59)m]	
(65)m= 78.4	69.63	74.39	68.43	68.32	62.86	62.1	65.7	6 64.9	70.87	72.74	77.1		(65)
include (5	7)m in cald	culation	of (65)m	only if c	ylinder i	s in the	dwellir	ng or hot w	vater is f	rom com	munity h	neating	
5. Internal	gains (see	Table 5	and 5a):									
Metabolic ga	ins (Table	5), Wat	ts		_	-	_		_	_		_	
Jar	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec		
(66)m= 87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6	87.6]	(66)
Lighting gair	s (calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso se	e Table 5	_	_		_	
(67)m= 13.6°	12.09	9.83	7.44	5.56	4.7	5.08	6.6	8.86	11.24	13.12	13.99		(67)
Appliances (gains (calc	ulated ir	Append	dix L, eq	uation L	.13 or L1	3a), a	lso see Ta	ıble 5			_	
(68)m= 152.6	9 154.27	150.28	141.78	131.05	120.96	114.23	112.6	116.63	125.13	135.86	145.95		(68)
Cooking gair	ns (calcula	ted in A	ppendix	L, equat	ion L15	or L15a), also	see Table	5			_	
(69)m= 31.76	31.76	31.76	31.76	31.76	31.76	31.76	31.7	6 31.76	31.76	31.76	31.76]	(69)
Pumps and	ans gains	(Table 5	5a)									_	
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses e.g.	evaporatio	n (nega	tive valu	es) (Tab	le 5)				_			_	
(71)m= -70.0	8 -70.08	-70.08	-70.08	-70.08	-70.08	-70.08	-70.0	8 -70.08	-70.08	-70.08	-70.08		(71)
Water heating	ig gains (T	able 5)											
(72)m= 105.3	7 103.62	99.98	95.04	91.83	87.31	83.47	88.3	9 90.14	95.26	101.03	103.63		(72)
Total intern	al gains =				(66)m + (67)m	n + (68)	m + (69)m +	(70)m + (7	71)m + (72))m		
(73)m= 323.9		312.37	296.54	280.72	265.25	255.05	259.9	267.91	283.91	302.3	315.85		(73)
6. Solar ga													
Solar gains ar		•					ations to		ne applical		tion.	0-1	
Orientation:	Table 6d		Area m²		Flu Ta	ıx ble 6a		g_ Table 6b	Т	FF able 6c		Gains (W)	
North 0.9							1 "г				_		1(74)
		×	3.9		-	10.63]	0.63	×	0.7	=	12.77	[(74)]
North 0.9:		×	1.5		-	10.63	」	0.63	×	0.7	=	5.1	[74] (74)
North 0.9		×	3.9		—	20.32	」 ×	0.63		0.7	=	9.75](74)] ₍₇₄₎
North 0.9		×	1.5		-	20.32	」	0.63	≓		=		-
140101 0.9	0.77	X	3.9	13	X (34.53	X	0.63	X	0.7	=	41.47	(74)

	_		_										_
North	0.9x	0.77	X	1.57	X	34.53	X	0.63	X	0.7	=	16.57	(74)
North	0.9x	0.77	X	3.93	X	55.46	X	0.63	X	0.7	=	66.62	(74)
North	0.9x	0.77	X	1.57	X	55.46	X	0.63	x	0.7	=	26.61	(74)
North	0.9x	0.77	X	3.93	X	74.72	X	0.63	x	0.7	=	89.74	(74)
North	0.9x	0.77	X	1.57	X	74.72	X	0.63	X	0.7	=	35.85	(74)
North	0.9x	0.77	X	3.93	X	79.99	X	0.63	X	0.7	=	96.07	(74)
North	0.9x	0.77	X	1.57	X	79.99	X	0.63	X	0.7	=	38.38	(74)
North	0.9x	0.77	X	3.93	X	74.68	x	0.63	x	0.7	=	89.69	(74)
North	0.9x	0.77	X	1.57	X	74.68	X	0.63	x	0.7	=	35.83	(74)
North	0.9x	0.77	X	3.93	X	59.25	x	0.63	x	0.7] =	71.16	(74)
North	0.9x	0.77	X	1.57	X	59.25	x	0.63	x	0.7	=	28.43	(74)
North	0.9x	0.77	X	3.93	X	41.52	x	0.63	x	0.7	=	49.86	(74)
North	0.9x	0.77	X	1.57	x	41.52	X	0.63	x	0.7	=	19.92	(74)
North	0.9x	0.77	X	3.93	x	24.19	X	0.63	x	0.7	=	29.05	(74)
North	0.9x	0.77	X	1.57	x	24.19	X	0.63	x	0.7	=	11.61	(74)
North	0.9x	0.77	X	3.93	x	13.12	X	0.63	x	0.7	=	15.76	(74)
North	0.9x	0.77	X	1.57	x	13.12	X	0.63	X	0.7	=	6.29	(74)
North	0.9x	0.77	X	3.93	x	8.86	x	0.63	x	0.7	=	10.65	(74)
North	0.9x	0.77	X	1.57	x	8.86	X	0.63	x	0.7	=	4.25	(74)
South	0.9x	0.77	X	5.93	X	46.75	x	0.63	x	0.7	=	84.73	(78)
South	0.9x	0.77	X	1.59	X	46.75	x	0.63	x	0.7	=	22.72	(78)
South	0.9x	0.77	X	5.93	x	76.57	X	0.63	x	0.7	=	138.76	(78)
South	0.9x	0.77	X	1.59	X	76.57	x	0.63	x	0.7	=	37.21	(78)
South	0.9x	0.77	X	5.93	X	97.53	x	0.63	x	0.7	=	176.76	(78)
South	0.9x	0.77	X	1.59	x	97.53	x	0.63	x	0.7	=	47.39	(78)
South	0.9x	0.77	X	5.93	X	110.23	x	0.63	x	0.7	=	199.78	(78)
South	0.9x	0.77	X	1.59	X	110.23	X	0.63	x	0.7	=	53.57	(78)
South	0.9x	0.77	X	5.93	X	114.87	X	0.63	X	0.7	=	208.18	(78)
South	0.9x	0.77	X	1.59	X	114.87	X	0.63	x	0.7	=	55.82	(78)
South	0.9x	0.77	X	5.93	X	110.55	x	0.63	x	0.7	=	200.34	(78)
South	0.9x	0.77	X	1.59	X	110.55	x	0.63	x	0.7	=	53.72	(78)
South	0.9x	0.77	X	5.93	X	108.01	x	0.63	x	0.7	=	195.75	(78)
South	0.9x	0.77	X	1.59	X	108.01	x	0.63	x	0.7	=	52.49	(78)
South	0.9x	0.77	X	5.93	x	104.89	X	0.63	x	0.7	=	190.1	(78)
South	0.9x	0.77	X	1.59	X	104.89	x	0.63	x	0.7	=	50.97	(78)
South	0.9x	0.77	X	5.93	x	101.89	X	0.63	x	0.7	=	184.65	(78)
South	0.9x	0.77	X	1.59	x	101.89	x	0.63	x	0.7	=	49.51	(78)
South	0.9x	0.77	X	5.93	x	82.59	x	0.63	x	0.7	=	149.67	(78)
South	0.9x	0.77	X	1.59	x	82.59	x	0.63	x	0.7	=	40.13	(78)
South	0.9x	0.77	X	5.93	x	55.42	x	0.63	x	0.7	=	100.43	(78)
South	0.9x	0.77	X	1.59	x	55.42	x	0.63	x	0.7	=	26.93	(78)
	_		_		_				•		_		_

	_															_
South	0.9x	0.77	X	5.9	93	X	4	40.4	X		0.63	x	0.7	=	73.21	(78)
South	0.9x	0.77	X	1.5	59	X	4	40.4	X		0.63	X	0.7	=	19.63	(78)
_			alculated			$\overline{}$		1	<u> </u>		um(74)m .	`	-	1	1	4
(83)m=	125.32	210.13	282.19	346.57	389.59		38.51	373.76	340.	.66	303.94	230.46	149.41	107.74		(83)
·			and solar	` ,	<u> </u>	·						·	1	1	1	
(84)m=	449.27	532.38	594.57	643.11	670.31	65	53.76	628.81	600.	.57	571.85	514.37	451.71	423.59		(84)
7. Me	an inter	nal temp	perature	(heating	season)										
Temp	erature	during h	neating p	eriods ir	n the livi	ng a	area t	from Tab	ole 9,	Th	1 (°C)				21	(85)
Utilisa	ation fac	tor for g	ains for I	iving are	ea, h1,m	ı (se	ee Ta	ıble 9a)								
	Jan	Feb	Mar	Apr	May	Ι,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
(86)m=	0.99	0.97	0.93	0.82	0.66	(0.48	0.34	0.3	7	0.58	0.86	0.97	0.99		(86)
Moon	intorno	ltompor	oturo in l	living or	00 T1 /f	حالم	w oto	no 2 to 7	 7 in T	oble.	2 (00)	<u> </u>	1	<u>I</u>	ı	
(87)m=	20.25	20.44	ature in 20.66	20.87	20.97	1	w Sie 21	21	21		20.99	20.86	20.52	20.21	1	(87)
(07)111=	20.25	20.44	20.00	20.01	20.91	_	21			<u>'</u>	20.99	20.00	20.02	20.21	İ	(0.)
Temp	erature	during h	neating p	eriods ir	rest of	dw	elling	from Ta	able 9), Th	n2 (°C)		1	1	1	
(88)m=	20.1	20.11	20.11	20.12	20.12	2	0.13	20.13	20.	14	20.13	20.12	20.12	20.11		(88)
Utilisa	ation fac	tor for g	ains for r	est of d	welling,	h2,	m (se	e Table	9a)							
(89)m=	0.98	0.96	0.91	0.79	0.61).41	0.27	0.3	3	0.51	0.82	0.96	0.99		(89)
Moan	intorna	l tompor	ature in	the rest	of dwall	ina	T2 (f	ollow sta	ne 3	to 7	7 in Tahl	0.00		<u>!</u>	J	
(90)m=	19.12	19.4	19.71	19.98	20.1	Ť	0.13	20.13	20.		20.12	19.98	19.53	19.08		(90)
(50)111=	10.12	15.4	15.71	10.00	20.1		0.10	20.10	20.	'		<u> </u>	ng area ÷ (4		0.40	(91)
											•	D (- Livi	ig area . (., –	0.49	(91)
Mean	interna	temper	ature (fo	r the wh	ole dwe	llin	g) = fl	LA × T1	+ (1	– fL	A) × T2				,	
(92)m=	19.67	19.91	20.17	20.41	20.52	2	0.55	20.56	20.	56	20.54	20.41	20.02	19.63		(92)
Apply	adjustn	nent to t	he mean	interna	temper	atu	re fro	m Table	4e, 1	whe	re appro	opriate	_	-	-	
(93)m=	19.67	19.91	20.17	20.41	20.52	2	0.55	20.56	20.	56	20.54	20.41	20.02	19.63		(93)
8. Sp	ace hea	ting requ	uirement													
						ned	at ste	ep 11 of	Tabl	e 9b	o, so tha	t Ti,m=	(76)m an	d re-cald	culate	
the ut			or gains u			_							1	1	1	
	Jan	Feb	Mar	Apr	May	<u> </u>	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
			ains, hm			_						ı	1	1	1	(0.1)
(94)m=	0.98	0.96	0.91	0.8	0.63	_ C).44	0.31	0.3	4	0.55	0.83	0.96	0.99		(94)
			, W = (94	, ·	r e			1	1			ı		1	1	(05)
(95)m=	441.1	509.82	539.75	514.36	424.06		39.84	193.37	202.	.61	312.4	426.48	433.02	417.7		(95)
	<u> </u>		rnal tem		r	_							1	1	1	(0.0)
(96)m=	4.3	4.9	6.5	8.9	11.7		14.6	16.6	16.		14.1	10.6	7.1	4.2		(96)
			an intern	<u>.</u>		_		-``	- `	_	· ,		1	 	1	
(97)m=	780.17	759.4	689.6	572.11	437.13	<u> </u>	91.18	193.5	202.		316.79	486.06	643.63	773.53		(97)
•		· · ·	ement fo		l e	Wh,		I		Ì		í 	T .	1	1	
(98)m=	252.27	167.71	111.48	41.58	9.73		0	0	0		0	44.33	151.64	264.74		_
										Total	per year	(kWh/yea	ır) = Sum(9	8) _{15,912} =	1043.47	(98)
Space	e heatin	g require	ement in	kWh/m²	² /year										20.03	(99)
9a En	erav rec	uiremer	nts – Indi	vidual b	eating s	vste	ems i	ncluding	micr	·0-C	HP)					
	e heatir		no- mai	viadai II	Janny 3	, 	JHIO-I	Horaaing	-111101	3 -0						
-		_	at from se	econdar	v/supnle	me	entarv	system							0	(201)
	0 , 0 p		5.77 50	201.001	,, = = PP10		y	2,000111							<u> </u>	`(

Fraction of space heat from main system(s)			(202) = 1 -	- (201) =				1	(202)
Fraction of total heating from main system 1			(204) = (20	02) × [1 –	(203)] =			1	(204)
Efficiency of main space heating system 1								93.5	(206)
Efficiency of secondary/supplementary heating s	system	, %						0	(208)
Jan Feb Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heating requirement (calculated above) 252.27 167.71 111.48 41.58 9.73	0	0	0	0	44.33	151.64	264.74	1	
$(211)m = \{[(98)m \times (204)] \} \times 100 \div (206)$				U	44.00	101.04	204.74		(211)
269.8 179.37 119.23 44.47 10.4	0	0	0	0	47.41	162.19	283.14]	(211)
	1		Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	<u> </u>	1116.01	(211)
Space heating fuel (secondary), kWh/month									
= {[(98)m x (201)] } x 100 ÷ (208)								1	
(215)m= 0 0 0 0 0	0	0	0 Tota	0	0 ar) =Sum(2	0	0		7(045)
Water heating			TOla	i (KVVII/yea	ai) =Suiii(2	213) _{15,1012}		0	(215)
Output from water heater (calculated above)									
, , , , , , , , , , , , , , , , , , , ,	125.66	121.25	132.27	131.79	147.63	155.38	166.36		
Efficiency of water heater								79.8	(216)
` '	79.8	79.8	79.8	79.8	82.04	84.75	86.05		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m									
` '	157.47	151.95	165.75	165.15	179.95	183.34	193.33		
			Total	I = Sum(2)	19a) ₁₁₂ =				(040)
			Total	i – Odini(Z	1 0 4 /112			2108.06	(219)
Annual totals			rota	r = Odin(2		Wh/year		kWh/yea	
Space heating fuel used, main system 1			1010	1 – Odiii(2		Wh/year		kWh/year 1116.01	
Space heating fuel used, main system 1 Water heating fuel used			Total	i – Gam(z		Wh/year		kWh/yea	
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot			Total	i – Sam(2		Wh/year		kWh/year 1116.01	
Space heating fuel used, main system 1 Water heating fuel used			7010	- Sump		Wh/year	30	kWh/year 1116.01	
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot			Total	- Sump		Wh/year		kWh/year 1116.01	
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump:							30	kWh/year 1116.01	(230c)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue					k1		30	kWh/year 1116.01 2108.06	(230c) (230e)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year	ns inclu	ding mid	sum	of (230a).	k1		30	kWh/year 1116.01 2108.06	(230c) (230e) (231)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting			sum	of (230a).	k \(230g) =		30 45	kWh/year 1116.01 2108.06 75 240.39	(230c) (230e) (231) (232)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting	Ene	ding mid e rgy h/year	sum	of (230a).	k \(230g) =	ion fac	30 45	kWh/year 1116.01 2108.06	(230c) (230e) (231) (232)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting	Ene	e rgy h/year	sum	of (230a).	(230g) =	ion fac 2/kWh	30 45	kWh/year 1116.01 2108.06 75 240.39	(230c) (230e) (231) (232)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system	En e	e rgy h/year	sum	of (230a).	(230g) = Emiss kg CO2	ion fac 2/kWh	30 45 tor	kWh/year 1116.01 2108.06 75 240.39 Emissions kg CO2/ye	(230c) (230e) (231) (232)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1)	Ene kW (211	ergy h/year) x	sum	of (230a).	(230g) = Emiss kg CO: 0.5	ion fac 2/kWh 16	30 45 tor	kWh/year 1116.01 2108.06 75 240.39 Emissions kg CO2/ye 241.06 0	(230c) (230e) (231) (232) (261) (263)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Ene kW (211 (215 (219	ergy h/year) ×) ×	sum	of (230a).	(230g) = Emiss kg CO2	ion fac 2/kWh 16	30 45 tor = =	kWh/year 1116.01 2108.06 75 240.39 Emissions kg CO2/ye 241.06 0 455.34	(230c) (230e) (231) (232) (261) (263) (264)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating Space and water heating	Ene kW (211 (215 (219	ergy h/year) x) x) x	sum cro-CHP	of (230a).	Emiss kg CO: 0.2	ion fac 2/kWh 16	30 45 tor = =	kWh/year 1116.01 2108.06 75 240.39 Emissions kg CO2/ye 241.06 0 455.34 696.4	(230c) (230e) (231) (232) (261) (263) (264) (265)
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Electricity for lighting 12a. CO2 emissions – Individual heating system Space heating (main system 1) Space heating (secondary) Water heating	Ene kW (211 (215 (219	ergy h/year) x) x) x) + (262) -	sum cro-CHP	of (230a).	(230g) = Emiss kg CO: 0.5	ion fac 2/kWh 16 19	30 45 tor = =	kWh/year 1116.01 2108.06 75 240.39 Emissions kg CO2/ye 241.06 0 455.34	(230c) (230e) (231) (232) (261) (263) (264)

Total CO2, kg/year sum of (265)...(271) = 860.09 (272)

TER = 23.86 (273)

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:37:19

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 77.4m² Site Reference: Plot Reference: Maitland Park Estate AC 209

AC 209, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 21.12 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 4.66 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 34.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 30.5 kWh/m²

OK

2 Fabric U-values

Element Average Highest 0.12 (max. 0.70) External wall 0.12 (max. 0.30) OK Party wall 0.00 (max. 0.20) **OK** (no floor) Floor

Roof (no roof)

Openings 1.40 (max. 2.00) OK 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

Regulations Compliance Report

Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	ОК
Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.53	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	ОК
Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
sed on:		
Overshading:	Average or unknown	
Windows facing: South	2.24m²	
Windows facing: South	6.18m²	
Windows facing: South	1.71m²	
Windows facing: North	4.1m²	
Windows facing: North	2.24m²	
Windows facing: North	1.68m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m ² K	
Party Walls U-value	0 W/m²K	
Community heating, heat from electric heat pump		
Photovoltaic array		

			Heer F	Notoile:						
Access Names	John Circi	200	– USE ITL		_ NI	Lau -		CTDA	000070	
	•									
Software Name:	Stroma FS/							versic	n: 1.0.4.26	
			· ·							
	•	en Court, Mait	land Parl	k Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.26							<u> </u>			
Ground floor				77.4	(1a) x		2.6	(2a) =	201.24	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	77.4	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	201.24	(5)
2. Ventilation rate:										
			ry	other		total			m³ per hou	ır
Number of chimneys	0	+ 0	+ [0] = [0	X	40 =	0	(6a)
Number of open flues	0	+ 0		0		0	x	20 =	0	(6b)
Number of intermittent fa	ans					0	x	10 =	0	(7a)
Number of passive vents	3				Ē	0	x	10 =	0	(7b)
Number of flueless gas f	ires				F	0	x	40 =	0	(7c)
					L					
								Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fa	ans = (6a) + (6b) + (6b)	7a)+(7b)+(7c) =		0		÷ (5) =	0	(8)
			ed to (17),	otherwise (continue fr	om (9) to	(16)			
	he dwelling (ns)							0	(9)
Additional infiltration							[(9])-1]x0.1 =	0	(10)
Structural infiltration: 0	0.25 for steel or	timber frame of	r 0.35 fo	r masoni	ry consti	uction			0	(11)
			to the great	ter wall are	a (after					
If suspended wooden	floor, enter 0.2	(unsealed) or ().1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	iter 0.05, else e	enter 0							0	(13)
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.26				(14)						
Software Name: John Simpson Stroma Number: STR0006273 Software Version: Version: 1.0.4.26					(15)					
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expresse	d in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	2	(17)
If based on air permeabi	lity value, then	$(18) = [(17) \div 20] +$	(8), otherw	ise (18) = ((16)				0.1	(18)
Air permeability value applie	es if a pressurisatio	n test has been do	ne or a de	gree air pe	rmeability	is being u	sed			 `
Sasessor Name: John Simpson Stroma Number: STRO006273			(19)							
Shelter factor				(20) = 1 -	[0.075 x ([*]	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter fact	tor		(21) = (18) x (20) =				0.08	(21)
Software Name: John Simpson Stroma Number: STR0006273 Software Version: Version: 1.0.4.26										
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Address										
(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 <i>÷ 1</i>									
(00a)	.2)111 - 4	400 005	1 005				1	1	1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

Adjusted infiltration rate	(allowing for s	helter an	d wind s	:need) –	(21a) v	(22a)m					
0.11 0.11	0.1 0.09	0.09	0.08	0.08	0.08	0.08	0.09	0.1	0.1	1	
Calculate effective air ch	I		cable ca	se	<u> </u>	<u> </u>	<u> </u>	<u>!</u>	<u>!</u>	<u></u>	
If mechanical ventilation										0.5	(23a)
If exhaust air heat pump usi) = (23a)			0.5	(23b)
If balanced with heat recove	ery: efficiency in S	% allowing f	or in-use fa	actor (from	n Table 4h) =				76.5	(23c)
a) If balanced mechan		1		- ` ` 		ŕ	– `		- `) ÷ 100]	
(24a)m= 0.23 0.22	0.22 0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]	(24a)
b) If balanced mechan		n without	heat rec	covery (N	ЛV) (24b	m = (22)	 	- ´		7	
(24b)m= 0 0	0 0	0	0	0	0	0	0	0	0]	(24b)
c) If whole house extra if (22b)m < 0.5 x (•	•				.5 × (23b	o)			
(24c)m= 0 0	0 0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation if (22b)m = 1, ther							0.5]				
(24d)m= 0 0	0 0	0	0	0	0	0	0	0	0]	(24d)
Effective air change ra	ite - enter (24	a) or (24b	o) or (24	c) or (24	d) in box	(25)				-	
(25)m= 0.23 0.22	0.22 0.21	0.21	0.2	0.2	0.2	0.2	0.21	0.21	0.22]	(25)
3. Heat losses and hea	t loss parame	ter:									
ELEMENT Gross area (r	Openi		Net Ar A ,r		U-valı W/m2		A X U (W/l		k-value kJ/m²-		A X k kJ/K
Windows Type 1	,		2.24		/[1/(1.4)+		2.97	$\stackrel{\prime}{\Box}$			(27)
Windows Type 2			6.18	x ₁ ,	/[1/(1.4)+	0.04] =	8.19	一			(27)
Windows Type 3			1.71	_	/[1/(1.4)+	0.04] =	2.27	=			(27)
Windows Type 4			4.1		/[1/(1.4)+	0.04] =	5.44	=			(27)
Windows Type 5			2.24	_{x1} ,	/[1/(1.4)+	0.04] =	2.97	\exists			(27)
Windows Type 6			1.68		/[1/(1.4)+	0.04] =	2.23	\dashv			(27)
Walls 46.54	18.	15	28.39	=	0.12		3.41	=			(29)
Total area of elements, r			46.54	_	0.12		0.11				(31)
Party wall			44.62	=	0		0	– 1			(32)
* for windows and roof window	s. use effective v	/indow U-va						L as aiven in	paragrapl		(02)
** include the areas on both si				J			, ,	Ü	, , ,		
Fabric heat loss, W/K = \$	S (A x U)				(26)(30)	+ (32) =				27.47	(33)
Heat capacity Cm = S(A	xk)					((28)	(30) + (32	2) + (32a).	(32e) =	0	(34)
Thermal mass paramete	r (TMP = Cm	÷ TFA) in	kJ/m²K			Indica	tive Value	: Medium		250	(35)
For design assessments when can be used instead of a detail		e constructi	ion are not	t known pr	ecisely the	indicative	e values of	TMP in Ta	able 1f		
Thermal bridges : S (L x	,	• .	•	<						7.52	(36)
if details of thermal bridging ar Total fabric heat loss	e not known (36)	= 0.05 x (3)	1)			(33) +	(36) =			24.00	(37)
Ventilation heat loss cald	rulated month	lv						(25)m x (5)	١	34.99	(37)
Jan Feb	Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
	14.72 14.01	13.87	13.17	13.17	13.02	13.45	13.87	14.15	14.44	1	(38)
Heat transfer coefficient,		1		I	<u> </u>	<u>l</u>	= (37) + (37)	<u> </u>	<u>I</u>	1	
	49.71 49	48.86	48.15	48.15	48.01	48.43	48.86	49.14	49.42	1	
Stroma FSAP 2012 Version: 1	ļ			<u> </u>	<u> </u>	<u> </u>		Sum(39) ₁	<u> </u>	48.9 6 a	ge 2 of 389)
	(= 5.0.	,									

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 0.65	0.64	0.64	0.63	0.63	0.62	0.62	0.62	0.63	0.63	0.63	0.64		
	!								Average =	Sum(40) ₁	12 /12=	0.63	(40)
Number of day	<u> </u>	1 ` ` 	· ·						<u> </u>				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rgy requ	irement:								kWh/ye	ear:	
Assumed occu if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		.41		(42)
Annual average Reduce the annual not more that 125	al average	hot water	usage by	5% if the a	lwelling is	designed i			se target c		.48		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i								- 1					
(44)m= 100.63	96.97	93.31	89.65	85.99	82.33	82.33	85.99	89.65	93.31	96.97	100.63		
		•		Į.		Į.	ļ.		Total = Su	ım(44) ₁₁₂ =	=	1097.73	(44)
Energy content of	f hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	n x nm x E	Tm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 149.22	130.51	134.68	117.41	112.66	97.22	90.09	103.38	104.61	121.91	133.08	144.52		
W. in a 4 a 1 d a					()		h (40		Total = Su	ım(45) ₁₁₂ =	=	1439.29	(45)
If instantaneous w	vater neati 1	· ·	of use (no	not water	r storage), r		· · ·	, , , ,					
(46)m= 22.38 Water storage	19.58	20.2	17.61	16.9	14.58	13.51	15.51	15.69	18.29	19.96	21.68		(46)
Storage volum) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	` .	•				•					<u> </u>		(,
Otherwise if no	-			_			, ,	ers) ente	er '0' in ((47)			
Water storage	loss:												
a) If manufact	turer's d	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		•					(48) x (49)) =		1	10		(50)
b) If manufact			-								1		(54)
Hot water stor	•			ie z (KVV	n/iitre/ua	iy)				0.	.02		(51)
Volume factor	•		011 4.0							1.	.03		(52)
Temperature f	actor fro	m Table	2b							-	0.6		(53)
Energy lost fro	m watei	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	.03		(54)
Enter (50) or		_								-	.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 cylinder contains												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)
	<u> </u>	ļ.		<u>l</u>	<u> </u>		<u> </u>	L	L	<u> </u>			(58)
Primary circuit Primary circuit	,	,			59)m – 1	(58) <u>-</u> 36	S5 v (41)	ım			0		(50)
(modified by				,	•	` '	, ,		r thermo	stat)			
(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)
		<u> </u>	L	L	L	<u> </u>	<u> </u>	<u> </u>	L	<u> </u>			

Camb:	laaa a	الم ما ما ما	.	مام		(C4) ma	100	N . O	CF (44)	١									
		alculated		CN I			(bt		· ` `			0		\top		Ι,	<u> </u>	1	(61)
(61)m=	0	0	0	ᆜ	0	0	Ļ	0	0	(22)		0	0		0	(53)		(50)	(01)
		.		_	170.91		_			(62) 158			ì	`		Èή		· (59)m + (61)m 1	(62)
(62)m=	204.5	180.44	189.9			167.94		50.71	145.36			158.11	177.1		86.57		9.79]	(62)
		calculated	_										r contri	oution	to wate	er nea	ating)		
(63)m=	0	al lines if	0	3 <i>c</i>	0	0	o ap	o 0	, see Ap	pend	_	0	0	$\overline{}$	0)	1	(63)
					0	U	<u> </u>					0							(00)
(64)m=	204.5	vater hea	189.9	<u>. T</u>	170.91	167.94	1 1	50.71	145.36	158	65	158.11	177.1	0 1	86.57	100	9.79	1	
(04)111=	204.5	100.44	109.9	<u> </u>	170.91	107.94	<u> </u>	50.7 1	140.00	l		out from wa				<u> </u>	0.13	2090.13	(64)
∐oot a	aine fr	om water	hootin	~ I	k\\/h/m/	onth 0.2	Б [′]	[U 0E	v (45)m								:0\m](-,
(65)m=	93.84	_	89	y, ı	81.84	81.68	_	75.12	74.18	78.	<u> </u>	77.58	84.70		7.04	92.		'	(65)
)m in cald	<u> </u>																(00)
	`	•			. ,		yılı	idei i	S III III E (JWEII	irig	or flot w	alei is	HOII	COIII	mun	iity i	leating	
		gains (see			·):													
Metabo	olic gai Jan	ns (Table Feb	5), W Ma	\neg	s Apr	May		Jun	Jul	Λ.	ug	Sep	Oc	.	Nov		ec	1	
(66)m=	120.58	_	120.5	-	120.58	120.58	-	20.58	120.58	120	_	120.58	120.5	-	20.58	├).58	_	(66)
, ,		s (calcula	l						<u> </u>	l .			120.0			120		J	()
(67)m=	9 gairis	16.94	13.78	÷	10.43	7.8	_	6.58	7.11	9.2		12.41	15.7	5 1	8.39	10	0.6	1	(67)
		ains (calc	<u> </u>						ļ	<u> </u>				<u></u>	0.00			J	()
(68)m=	213.92		210.5		198.64	183.61	_	69.48	160.04	157		163.41	175.3	2 1	90.35	204	L 48	1	(68)
		s (calcula		_						<u> </u>								J	()
(69)m=	35.06	35.06	35.06	÷	35.06	35.06	_	35.06	35.06	35.		35.06	35.00	3 3	5.06	35.	06	1	(69)
. ,		ans gains	l			00.00	`		00.00	00.		00.00	00.0					J	()
(70)m=	0	0	0	, 3,	0	0	Ι	0	0	0		0	0	Т	0		<u> </u>	1	(70)
		vaporatio	<u> </u>	Lativ			مار									`		J	(- /
(71)m=	-96.47	1	-96.4	_	-96.47	-96.47	_	96.47	-96.47	-96	47	-96.47	-96.4	7 -9	96.47	-96	5.47	1	(71)
		g gains (T	<u> </u>		00.11	00.17	<u>L</u>		00.11			00.17		<u> </u>				J	()
(72)m=	126.13	<u> </u>	119.6	_	113.66	109.79	1	04.33	99.7	105	.64	107.75	113.9	2 1:	20.89	124	1.02	1	(72)
		ıl gains =	<u> </u>				I .)m + (67)m	l								J	()
(73)m=	418.29	_	403.1	₂ T	381.9	360.36	3	39.57	326.02	331	_	342.74	364.1	<u> </u>	88.81		7.28	1	(73)
` '	ar gair		100.11		001.0	000.00	Ţ	00.01	020.02	001	.01	0 12.7 1	00 111	, , ,	00.01	101	.20		(- /
	Ĭ	calculated	using so	olar	flux from	Table 6a	and	assoc	iated equa	tions	to co	nvert to th	e appli	cable o	rientat	tion.			
Orienta	ation:	Access F	actor		Area			Flu	IX			g_			FF			Gains	
		Table 6d			m²			Tal	ble 6a		T	able 6b		Tabl	e 6c			(W)	
North	0.9x	0.77		x	4.	1	x	1	0.63	x		0.4	x		0.8		=	9.67	(74)
North	0.9x	0.77		x	2.2	24	x	1	0.63	x		0.4	×		0.8	\equiv	=	5.28	(74)
North	0.9x	0.77		x	1.6	88	x		0.63	x		0.4	x		0.8	\Box	=	3.96	(74)
North	0.9x	0.77		x	4.	1	x	2	20.32	x		0.4	x		0.8	一	=	18.48	(74)
North	0.9x	0.77		x	2.2	24	x		20.32	x		0.4	x		0.8		=	10.09	(74)

	_		_										_
North	0.9x	0.77	X	1.68	X	20.32	X	0.4	X	0.8	=	7.57	(74)
North	0.9x	0.77	X	4.1	X	34.53	X	0.4	X	0.8	=	31.4	(74)
North	0.9x	0.77	X	2.24	x	34.53	x	0.4	x	0.8	=	17.15	(74)
North	0.9x	0.77	X	1.68	X	34.53	X	0.4	x	0.8	=	12.86	(74)
North	0.9x	0.77	X	4.1	X	55.46	X	0.4	X	0.8	=	50.43	(74)
North	0.9x	0.77	X	2.24	X	55.46	X	0.4	X	0.8	=	27.55	(74)
North	0.9x	0.77	X	1.68	x	55.46	X	0.4	X	0.8	=	20.66	(74)
North	0.9x	0.77	X	4.1	x	74.72	x	0.4	x	0.8	=	67.93	(74)
North	0.9x	0.77	X	2.24	X	74.72	X	0.4	X	0.8	=	37.11	(74)
North	0.9x	0.77	X	1.68	x	74.72	X	0.4	X	0.8	=	27.84	(74)
North	0.9x	0.77	X	4.1	x	79.99	x	0.4	x	0.8	=	72.72	(74)
North	0.9x	0.77	X	2.24	x	79.99	x	0.4	x	0.8	=	39.73	(74)
North	0.9x	0.77	X	1.68	x	79.99	x	0.4	x	0.8	=	29.8	(74)
North	0.9x	0.77	x	4.1	x	74.68	x	0.4	x	0.8	=	67.9	(74)
North	0.9x	0.77	x	2.24	x	74.68	X	0.4	x	0.8	=	37.1	(74)
North	0.9x	0.77	x	1.68	x	74.68	X	0.4	x	0.8	=	27.82	(74)
North	0.9x	0.77	x	4.1	x	59.25	X	0.4	X	0.8	=	53.87	(74)
North	0.9x	0.77	x	2.24	x	59.25	X	0.4	x	0.8	=	29.43	(74)
North	0.9x	0.77	x	1.68	x	59.25	X	0.4	x	0.8	=	22.07	(74)
North	0.9x	0.77	x	4.1	x	41.52	X	0.4	X	0.8	=	37.75	(74)
North	0.9x	0.77	x	2.24	x	41.52	X	0.4	x	0.8	=	20.62	(74)
North	0.9x	0.77	x	1.68	x	41.52	x	0.4	x	0.8] =	15.47	(74)
North	0.9x	0.77	x	4.1	x	24.19	x	0.4	x	0.8	=	21.99	(74)
North	0.9x	0.77	X	2.24	x	24.19	x	0.4	x	0.8	=	12.02	(74)
North	0.9x	0.77	х	1.68	x	24.19	x	0.4	x	0.8	=	9.01	(74)
North	0.9x	0.77	x	4.1	x	13.12	X	0.4	X	0.8	=	11.93	(74)
North	0.9x	0.77	x	2.24	x	13.12	X	0.4	x	0.8	=	6.52	(74)
North	0.9x	0.77	x	1.68	x	13.12	X	0.4	x	0.8	=	4.89	(74)
North	0.9x	0.77	x	4.1	x	8.86	X	0.4	X	0.8	=	8.06	(74)
North	0.9x	0.77	x	2.24	x	8.86	X	0.4	x	0.8	=	4.4	(74)
North	0.9x	0.77	x	1.68	x	8.86	X	0.4	x	0.8	=	3.3	(74)
South	0.9x	0.77	x	2.24	x	46.75	X	0.4	x	0.8	=	23.22	(78)
South	0.9x	0.77	x	6.18	x	46.75	X	0.4	x	0.8] =	64.07	(78)
South	0.9x	0.77	x	1.71	x	46.75	x	0.4	x	0.8	=	17.73	(78)
South	0.9x	0.77	x	2.24	x	76.57	X	0.4	x	0.8	=	38.03	(78)
South	0.9x	0.77	x	6.18	x	76.57	x	0.4	x	0.8	=	104.93	(78)
South	0.9x	0.77	x	1.71	x	76.57	x	0.4	x	0.8	=	29.04	(78)
South	0.9x	0.77	x	2.24	x	97.53	x	0.4	x	0.8	j =	48.45	(78)
South	0.9x	0.77	x	6.18	x	97.53	x	0.4	x	0.8] =	133.67	(78)
South	0.9x	0.77	x	1.71	x	97.53	x	0.4	x	0.8	j =	36.99	(78)
South	0.9x	0.77	x	2.24	x	110.23	x	0.4	x	0.8] =	54.76	(78)
	_		-		•		•		•		•		_

0 "	_								1	_		_			_		_
South	0.9x	0.77	×	6.1	8	X	1	10.23	X		0.4	×	0.8		= <u> </u>	151.07	(78)
South	0.9x	0.77	X	1.7	'1	X	1	10.23	X		0.4	X	0.8		= [41.8	(78)
South	0.9x	0.77	X	2.2	24	X	1	14.87	X		0.4	X	0.8		= [57.06	(78)
South	0.9x	0.77	X	6.1	8	X	1	14.87	X		0.4	X	0.8		= [157.43	(78)
South	0.9x	0.77	X	1.7	'1	X	1	14.87	X		0.4	x	0.8	:	= [43.56	(78)
South	0.9x	0.77	X	2.2	24	X	1	10.55	X		0.4	x	0.8	:	= [54.91	(78)
South	0.9x	0.77	X	6.1	8	X	1	10.55	X		0.4	x	0.8	:	= [151.5	(78)
South	0.9x	0.77	X	1.7	'1	x	1	10.55	X		0.4	X	0.8		= [41.92	(78)
South	0.9x	0.77	X	2.2	24	X	10	08.01	X		0.4	X	0.8		= [53.65	(78)
South	0.9x	0.77	X	6.1	8	X	10	08.01	X		0.4	X	0.8		= [148.03	(78)
South	0.9x	0.77	X	1.7	'1	x	10	08.01	X		0.4	X	0.8		= [40.96	(78)
South	0.9x	0.77	X	2.2	24	x	10	04.89	X		0.4	X	0.8		= [52.11	(78)
South	0.9x	0.77	X	6.1	8	x	10	04.89	X		0.4	x	0.8	:	= [143.76	(78)
South	0.9x	0.77	X	1.7	'1	x	10	04.89	X		0.4	x	0.8	:	= [39.78	(78)
South	0.9x	0.77	X	2.2	24	x	10	01.89	X		0.4	x	0.8	:	= [50.61	(78)
South	0.9x	0.77	X	6.1	8	x	10	01.89	X		0.4	x	0.8		= [139.63	(78)
South	0.9x	0.77	X	1.7	'1	x	10	01.89	X		0.4	X	0.8		= [38.64	(78)
South	0.9x	0.77	X	2.2	24	x	8	2.59	X		0.4	X	0.8	:	= [41.02	(78)
South	0.9x	0.77	X	6.1	8	x	8	2.59	x		0.4	X	0.8		= [113.18	(78)
South	0.9x	0.77	X	1.7	' 1	x	8	2.59	x		0.4	×	0.8		= [31.32	(78)
South	0.9x	0.77	X	2.2	24	x	5	5.42	x		0.4	x	0.8	_	= [27.53	(78)
South	0.9x	0.77	x	6.1	8	x	5	5.42	x		0.4	×	0.8	<u> </u>	<u> </u>	75.95	(78)
South	0.9x	0.77	X	1.7	' 1	x	5	5.42	x		0.4	×	0.8		- [21.01	(78)
South	0.9x	0.77	X	2.2	24	x		10.4	x		0.4	×	0.8		- [20.07	(78)
South	0.9x	0.77	x	6.1	8	x		10.4	x		0.4	×	0.8	<u> </u>	- [55.36	(78)
South	0.9x	0.77	х	1.7	' 1	x		10.4	x		0.4	×	0.8		- [15.32	(78)
	-											_			_		
Solar ç	jains in	watts, ca	lculate	d for eac	h mont	h			(83)n	n = Sı	um(74)m	.(82)m					
(83)m=	123.94	208.15	280.52	346.28	390.93	3	90.59	375.45	341	.01	302.72	228.5	4 147.82	106.5	52		(83)
Total g	ains – i	nternal a	nd sola	r (84)m =	= (73)m	+ (83)m	, watts									
(84)m=	542.23	624.41	683.64	728.18	751.3	7	30.16	701.48	672	2.88	645.46	592.7	2 536.63	513.8	8		(84)
7. Me	an inter	nal temp	erature	(heating	seaso	n)											
Temp	erature	during h	eating p	periods in	the liv	/ing	area f	rom Tab	ole 9	, Th	1 (°C)				Γ	21	(85)
Utilisa	ation fac	ctor for ga	ains for	living are	ea, h1,ı	n (s	ee Ta	ble 9a)							_		
	Jan	Feb	Mar	Apr	May	,	Jun	Jul	А	ug	Sep	Oct	Nov	De	С		
(86)m=	0.99	0.97	0.91	0.78	0.6		0.42	0.3	0.3	33	0.52	0.81	0.97	0.99			(86)
Mean	interna	l tempera	ature in	living ar	ea T1 (follo	w ste	os 3 to 7	7 in 1	 Γable	e 9c)		•				
(87)m=	20.6	20.74	20.87	20.97	21	T	21	21	2	$\overline{}$	21	20.96	20.78	20.57	7		(87)
Tomn	oraturo	during h	oating r	ariode ir	roet o	f dv	ollina	from Ta	hlo '	 0 Th	I >2 (°C)				_		
(88)m=	20.39	20.39	20.39	20.4	20.4	_	20.41	20.41	20.	\neg	20.41	20.4	20.4	20.4			(88)
		<u> </u>		l					L	I	· · · ·						` '
(89)m=	0.99	otor for ga	0.9	0.75	welling 0.56	$\overline{}$,m (se _{0.38}	e Table 0.26	9a) 0.2	₂₀ T	0.47	0.78	0.96	0.99			(89)
(03)111=	0.33	0.90	0.3	1 0.75	0.50		0.00	0.20	L 0.4		0.47	0.10	0.90	1 0.99			(00)

Mean intern	al temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to 7	7 in Tabl	le 9c)				
(90)m= 19.86	20.05	20.24	20.37	20.4	20.41	20.41	20.41	20.41	20.37	20.13	19.82		(90)
								1	fLA = Livin	g area ÷ (4	4) =	0.42	(91)
Mean intern	al temper	ature (fo	or the wh	ole dwe	lling) = f	LA × T1	+ (1 – fL	.A) × T2					
(92)m= 20.17	20.34	20.5	20.62	20.65	20.66	20.66	20.66	20.66	20.62	20.4	20.14		(92)
Apply adjus		he mear	internal	temper	ature fro	m Table	4e, whe	re appr	opriate				
(93)m= 20.17		20.5	20.62	20.65	20.66	20.66	20.66	20.66	20.62	20.4	20.14		(93)
8. Space he													
Set Ti to the the utilisation			•		ed at st	ep 11 of	Table 9	o, so tha	ıt Ti,m=(76)m an	d re-calc	ulate	
Jan		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa		I.	<u> </u>	,			9						
(94)m= 0.99	0.96	0.9	0.76	0.58	0.4	0.28	0.3	0.49	0.79	0.96	0.99		(94)
Useful gain	s, hmGm	, W = (94	4)m x (84	4)m									
(95)m= 534.3	3 599.5	614.79	555.34	435.25	291.62	195.39	204.46	317.08	468.67	514.34	508.43		(95)
Monthly ave	 _	T T	r i — —	from T	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	1	ì	· ·	i	i e					050.04	707.7		(07)
(97)m= 793.4		696.1	574.27	437.27	291.69	195.39	204.47	317.5	489.45	653.61	787.7		(97)
Space heat (98)m= 192.7		60.5	13.63	1.5	0	0.02	0	0	15.46	100.27	207.77		
(00)									(kWh/year		L	706.22	(98)
Space heat	ina requir	ement in	k\/\/h/m²	2/vear				, , , , , , , , , , , , , , , , , , , ,	()	, (-	[9.12	(99)
·				•							Ĺ	9.12	
9b. Energy r			The state of the s				ina prov	idad by	a aamm	unitu ook	2000		
This part is un Fraction of s			• .		•		.	•		urilly Scr	ieme.	0	(301)
Fraction of s			•		•		`	,				1	<u> </u>
The community	•		•	•	•	,	allows for	CHP and	un to four	other heat	sources: th		(~~/
includes boilers									ир то тоиг	Julei Heat	sources, u	ie iallei	
Fraction of h	eat from (Commun	ity heat	pump								1	(303a
Fraction of to	otal space	heat fro	m Comn	nunity he	eat pump)			(3	02) x (303	a) =	1	(304a
Factor for co	ntrol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem		Ī	1	(305)
Distribution I	oss factor	(Table 1	12c) for (commun	ity heati	ng syste	m				[1.1	(306)
Space heati		`	,		,	5 ,					L	kWh/yea	
Annual space	•	requiren	nent									706.22	<u></u>
Space heat f	rom Com	munity h	eat pum	p				(98) x (30	04a) x (30	5) x (306) :	<u> </u>	776.84	(307a
Efficiency of	secondar	y/supple	mentary	heating	system	in % (frc	m Table	4a or A	ppendix	E)	[0	(308
Space heatir	ng require	ment fro	m secon	dary/su	plemen	tary syst	tem	(98) x (30	01) x 100 ·	÷ (308) =	[0	(309)
·						- ·					L		
Water heating Annual water	_	equirem	ent								[2090.13	
	communi										L		

				_
Water heat from Community heat pump	(64) x (303a)	x (305) x (306) =	2299.15	(310a)
Electricity used for heat distribution	0.01 × [(307a)(30	07e) + (310a)(310e)] =	30.76	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling syste	em, if not enter 0) = $(107) \div (314)$	4) =	0	(315)
Electricity for pumps and fans within dwelling mechanical ventilation - balanced, extract or p	•		162.65	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (33	30b) + (330g) =	162.65	(331)
Energy for lighting (calculated in Appendix L)	l		336.8	(332)
Electricity generated by PVs (Appendix M) (n	negative quantity)		-799.71	(333)
Electricity generated by wind turbine (Append	dix M) (negative quantity)		0	(334)
12b. CO2 Emissions – Community heating so	cheme			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water h Efficiency of heat source 1 (%)	•			(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	= 500.45	(367)
Electrical energy for heat distribution	[(313) x	0.52	= 15.96	(372)
Total CO2 associated with community system	ms (363)(366) + (368)(3	72)	= 516.42	(373)
CO2 associated with space heating (seconda	ary) (309) x	0	= 0	(374)
CO2 associated with water from immersion h	neater or instantaneous heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and water h	heating (373) + (374) + (375) =		516.42	(376)
CO2 associated with electricity for pumps and	d fans within dwelling (331)) x	0.52	= 84.42	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 174.8	(379)
Energy saving/generation technologies (333) Item 1	to (334) as applicable	0.52 x 0.01 =	-415.05	(380)
	<u> </u>			_
Total CO2, kg/year sum o	of (376)(382) =		360.58	(383)

El rating (section 14)

(385)

96.05

			User D	otaile: -						
Assessor Name:	John Simpson			Strom:	a Num	ber.		STRC	0006273	
Software Name:	Stroma FSAP 20	012		Softwa					on: 1.0.4.26	
		Р	roperty i	Address	AC 209)				
Address :	AC 209, Aspen Co	ourt, Maitla	and Park	κ Estate,	London	, NW3 2	EH.			
1. Overall dwelling dime	ensions:									
			Area	a(m²)		Av. He	ight(m)		Volume(m ³	')
Ground floor			- 7	77.4	(1a) x	2	2.6	(2a) =	201.24	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1r	n) = 7	77.4	(4)			_		
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	201.24	(5)
2. Ventilation rate:										
	main heating	secondar heating	у	other		total			m³ per hou	r
Number of chimneys	0 +	0	+ [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	ī + F	0	j = F	0	x	20 =	0	(6b)
Number of intermittent fa	ans				_ _ _	3	x	10 =	30	(7a)
Number of passive vents	•				L	0	x	10 =	0	(7b)
·					Ļ			40 =		= ' '
Number of flueless gas f	iies					0	^	10 –	0	(7c)
								Air ch	hanges per ho	our
Infiltration due to chimne	evs. flues and fans =	(6a)+(6b)+(7	7a)+(7b)+(7c) =	Г	30		÷ (5) =	0.15	(8)
If a pressurisation test has t	•				ontinue fr			. (-)	0.10	(-/
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	0.25 for steel or timbe	er frame or	0.35 for	r masonr	y constr	ruction			0	(11)
if both types of wall are p deducting areas of openi	present, use the value corr	responding to	the great	er wall are	a (after					
If suspended wooden	• / .	ealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	nter 0.05, else enter 0)	`	,.					0	(13)
Percentage of window	s and doors draught	stripped							0	(14)
Window infiltration				0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	2) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in co	ubic metre	s per ho	our per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeabi	lity value, then (18) =	[(17) ÷ 20]+(8), otherwi	ise (18) = (16)				0.4	(18)
Air permeability value applie		has been dor	ne or a deg	gree air pe	rmeability	is being u	sed			_
Number of sides shelter	ed			(20) = 1 -	'n 075 v (1	Q\1 -			2	(19)
Shelter factor Infiltration rate incorpora	ting chalter factor			(20) = 1 $(21) = (18)$		[S]] =			0.85	(20)
•		ad		(21) = (10)	/ X (20) =				0.34	(21)
Infiltration rate modified to	Mar Apr Ma	1	Jul	Aug	Sep	Oct	Nov	Dec	7	
	<u> </u>	y Juli	Jui	Aug	Оер	l Oct	INOV	Dec	_	
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	7	
()···-	77		L	I	7	I +.0	I0	I	J	
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]	

· —	T	<u> </u>				i 	` 	<u> </u>	Ι.	Ι.	ı	1		
	1 -					l .	0.31	0.34	0.36	0.38	0.4	j		
		•	rate for t	пс арри	cabic ca	30							0	
If exhaust air I	neat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N5)) , othe	rwise (23b) = (23a)				0	$\exists_{\scriptscriptstyle (}$
If balanced wi	h heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fror	n Table 4h) =					0	寸(
a) If balanc	ed mecha	anical ve	entilation	with hea	at recove	ery (MV	HR) (24a	ı)m = (2	2b)m + (23b) × [1 – (23c)	÷ 100]		_
4a)m= 0	0	0	0	0	0	0	0	0	0	0	0	1		(
b) If balanc	ed mech	anical ve	entilation	without	heat rec	covery (I	MV) (24b)m = (22	2b)m + (2	23b)		•		
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0			(
,				•	•				.5 x (23b))	•			
	0	0	0	0	0	0	0	0	0	0	0]		(
d) If natural					•				0.51	l		I		
	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58]		(
Effective ai	r change	rate - er	nter (24a	or (24b	o) or (24	c) or (24	ld) in box	(25)	!		ļ.	1		
	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58]		(
		-4										1		
	Gros	SS	Openin	gs					A X U (W/l	K)				
indows Typ		` ,			2.24		/[1/(1.4)+	0.04] =	2.97	$\stackrel{\prime}{\Box}$				
indows Typ	e 2				6.18		/[1/(1.4)+	0.04] =	8.19	一				
						_				=				
										\dashv				
•						=				=				
,,						=				\dashv				
			10.11	=		=		—, ¦		╡╶		¬ ,		_
			10.13	2		=	0.18		5.11	[_
	cicinents	, 111				_		_						_
•	d roof wind	'owooo c	effootivo wi	ndow II v							norogranh			'
						aleu usiriç	y iorriula i	/[(1/ O- vaic	1 0)+0.04] a	is giveri iri	i parayrapi	1 3.2		
Cast As As As As As As As														
eat capacity	Cm = S((A x k)						((28).	(30) + (32	2) + (32a).	(32e) =		0	司
ermal mas	s parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	: Medium		2	250	司
_				construct	ion are not	t known pi	recisely the	indicative	e values of	TMP in T	able 1f			_
A														
At At At C At At C At														
Cast 0.42 0.42 0.37 0.36 0.32 0.31 0.34 0.38 0.38 0.4														
Calculate effective air change rate for the applicable case if mechanical ventilation: If exhaust are the purpousing Appendix N, (23b) = (23a) x Fmv (equation (N5i), otherwise (23b) = (23b) x = (23a) (23a) (23b) x 1 that are recovery: efficiency in % all lowing for in-see factor (from Table 44) = (22b)m + (23b) x [1 - (23c) > 100] (24a)m = (22b)m + (23b) x [1 - (23c) > 100] (24a)m = (22b)m + (23b) x [1 - (23c) > 100] (24a)m = (22b)m + (23b) x [1 - (23c) > 100] (24a)m = (22b)m + (23b) x [1 - (23c) > 100] (24a)m = (22b)m + (23														
Cast 0.43														
UIII= 1 39.42	J 39.17	აგ.94	১/.৪3	37.02	30.05	30.05	30.47	37.03	37.62	38.04	38.48]		
´														
eat transfer	1	· ·	<u> </u>		1	1	Τ_				Τ_	1		

leat lo	ss para	meter (F	HLP), W	m²K					(40)m	= (39)m ÷	- (4)			
10)m=	0.95	0.95	0.95	0.93	0.93	0.92	0.92	0.92	0.92	0.93	0.94	0.94		_
umbe	r of dov	o in moi	oth (Toh	lo 1o\					,	Average =	Sum(40) ₁	12 /12=	0.93	(40
lullibe	Jan	Feb	nth (Tab Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
l1)m=	31	28	31	30	31	30	31	31	30 30	31	30	31		(4
. ,	<u> </u>							<u> </u>		<u> </u>				•
4 \Ma	tor hoat	ing one	rgy requi	iromont:								kWh/ye	var:	
1 . ۷۷ <i>۵</i>	ilei neai	ing ener	igy requi	nement.								KVVII/ye	:ai.	
if TF				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		41		(4.
nnua	averag	e hot wa						(25 x N)				.48		(4
		_			5% if the d ater use, l	-	-	to achieve	a water us	se target o	of -			
ot more								A	Can	0.4	Nov	Dag		
ot wate	Jan er usage ii	Feb	Mar day for ea	Apr ach month	May $Vd, m = fa$	Jun ctor from 7	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
l4)m=	100.63	96.97	93.31	89.65	85.99	82.33	82.33	85.99	89.65	93.31	96.97	100.63		
	100.00	00.07	00.01	00.00	00.00	02.00	02.00	00.00	<u> </u>		m(44) ₁₁₂ =		1097.73	(4
nergy (content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x C	07m / 3600			ables 1b, 1	L		`
5)m=	149.22	130.51	134.68	117.41	112.66	97.22	90.09	103.38	104.61	121.91	133.08	144.52		
										Total = Su	m(45) ₁₁₂ =	-	1439.29	(4
instant	aneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)	i	,			
6)m=	22.38	19.58	20.2	17.61	16.9	14.58	13.51	15.51	15.69	18.29	19.96	21.68		(4
	storage e volum		includir	na anv sa	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(4
_		, ,			elling, e		_					100		
	•	_			-			mbi boil	ers) ente	er '0' in ((47)			
	storage													
•					or is kno	wn (kWh	n/day):				1.	39		(4
empe	rature f	actor fro	m Table	2b							0.	54		(4
٠.			storage					(48) x (49)) =		0.	75		(5
•				-	oss fact e 2 (kW							0		(5
		•	ee secti		0 2 (1111)	11/11(10)(40	· y /					0		(0
olum(e factor	from Tal	ble 2a									0		(5
empe	rature f	actor fro	m Table	2b								0		(5
٠.			storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(5
Enter	(50) or ((54) in (5	55)								0.	75		(5
/ater	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
66)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		(5
cylinde	er contains	dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Appendi	хH	
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		(5
rimar	v circuit	loss (an	nual) fro	m Table	- 							0		(5
		•				59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor fi	rom Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)			
9)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		(5

Combi	اممه مم	loulete d	for oo	ah .	manth /	(61)m	/ec	N . 20	SE (41)	١m							
(61)m=	0	alculated 0	or ead	on r	nonth (0	(bt	0	0)m o		0	0	0	0	7	(61)
L		<u>I</u>		<u></u>			L to			<u> </u>				ļ	<u> </u>	⅃ + (59)m + (61)m	` ,
(62)m=	195.82		181.2	_	162.51	159.26	_	42.31	136.68	149		149.7	168.51	178.17	191.11	¬` ′ ` ` ` ′	(62)
L		calculated	<u> </u>						<u> </u>	<u> </u>				<u> </u>			(- /
		al lines if	_					_						iioir to wat	or mouning	,,	
(63)m=	0	0	0	T	0	0	Γ	0	0	0	_	0	0	0	0	7	(63)
Output	from w	ater hea	ter						Į.	I						_	
(64)m=	195.82	172.6	181.2	7	162.51	159.26	1.	42.31	136.68	149	.97	149.7	168.51	178.17	191.11	7	
L				_!_			_		ı		Outp	out from wa	ater heate	er (annual)	112	1987.91	(64)
Heat ga	ains fro	m water	heatin	g, I	kWh/mo	onth 0.2	5 ´	[0.85	× (45)m	+ (6	1)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)r	n]	
(65)m=	86.89	77.06	82.06	T	75.11	74.74	-	68.4	67.23	71.	65	70.86	77.81	80.32	85.33	7	(65)
inclu	de (57)	m in calc	culatio	n of	f (65)m	only if o	ylir	nder i	s in the o	dwell	ing	or hot w	ater is f	rom com	munity	_ heating	
5. Inte	ernal g	ains (see	: Table	5 :	and 5a)):											
Metabo	olic gai	ns (Table	5). W	atts	 S												
	Jan	Feb	Ma	\neg	Apr	May		Jun	Jul	Α	ug	Sep	Oct	Nov	Dec	7	
(66)m=	120.58	120.58	120.5	В	120.58	120.58	1:	20.58	120.58	120	.58	120.58	120.58	120.58	120.58	7	(66)
Lighting	g gains	(calcula	ted in	App	pendix l	L, equat	ion	L9 o	r L9a), a	lso s	ee -	Table 5			•	_	
(67)m=	19.07	16.94	13.78	T	10.43	7.8	(6.58	7.11	9.2	24	12.41	15.75	18.39	19.6	7	(67)
Applian	nces ga	ains (calc	ulated	in .	Append	dix L, eq	uat	tion L	13 or L1	3a), i	also	see Tal	ble 5		•	_	
(68)m=	213.92	216.14	210.5	5	198.64	183.61	10	69.48	160.04	157	.82	163.41	175.32	190.35	204.48	7	(68)
Cookin	g gains	s (calcula	ted in	Ap	pendix	L, equa	tior	ո L15	or L15a)	, als	0 SE	e Table	5		•	_	
(69)m=	35.06	35.06	35.06		35.06	35.06	3	35.06	35.06	35.	06	35.06	35.06	35.06	35.06	7	(69)
Pumps	and fa	ıns gains	(Table	e 5a	a)											_	
(70)m=	3	3	3		3	3		3	3	3	}	3	3	3	3	7	(70)
Losses	e.g. e	vaporatio	n (neg	jativ	ve valu	es) (Tab	le	5)	-							_	
(71)m=	-96.47	-96.47	-96.47	7	-96.47	-96.47	-9	96.47	-96.47	-96	.47	-96.47	-96.47	-96.47	-96.47		(71)
Water h	neating	gains (T	able 5	5)													
(72)m=	116.79	114.68	110.2	9	104.32	100.45		95	90.36	96	.3	98.41	104.59	111.56	114.69		(72)
Total in	nterna	l gains =	:					(66)	m + (67)m	1 + (68	3)m +	- (69)m + ((70)m + (7	71)m + (72))m	_	
(73)m=	411.96	409.93	396.7	9	375.57	354.03	3	33.23	319.69	325	.54	336.41	357.84	382.47	400.95		(73)
	ar gain																
_		calculated	_	olar			and			tions	to co		e applica		tion.		
Orienta		Access F Table 6d			Area m²			Flu Tal	x ble 6a		т	g_ able 6b	т	FF able 6c		Gains (W)	
N.I. a. antila										1						, ,	٦
North	0.9x		_	Х	4.		X		0.63	X		0.63	_ ×	0.7	=	13.32	(74)
North	0.9x	0.77		Х	2.2		X		0.63	X		0.63		0.7	=	7.28	[(74)
North	0.9x	0.77		X	1.6		X		0.63	X		0.63		0.7	=	5.46	[(74)
North	0.9x	0.77		Х	4.		X	_	20.32	X		0.63		0.7	_ =	25.46	[(74)
North	0.9x	0.77		X	2.2	24	X	2	20.32	X		0.63	X	0.7	=	13.91	(74)

	_		_						ī				_
North	0.9x	0.77	X	1.68	X	20.32	X	0.63	X	0.7	=	10.43	(74)
North	0.9x	0.77	X	4.1	X	34.53	X	0.63	X	0.7	=	43.27	(74)
North	0.9x	0.77	X	2.24	X	34.53	X	0.63	X	0.7	=	23.64	(74)
North	0.9x	0.77	X	1.68	X	34.53	X	0.63	X	0.7	=	17.73	(74)
North	0.9x	0.77	X	4.1	X	55.46	X	0.63	X	0.7	=	69.5	(74)
North	0.9x	0.77	X	2.24	X	55.46	X	0.63	X	0.7	=	37.97	(74)
North	0.9x	0.77	X	1.68	X	55.46	X	0.63	x	0.7	=	28.48	(74)
North	0.9x	0.77	X	4.1	X	74.72	X	0.63	X	0.7	=	93.62	(74)
North	0.9x	0.77	X	2.24	X	74.72	X	0.63	X	0.7	=	51.15	(74)
North	0.9x	0.77	X	1.68	x	74.72	X	0.63	X	0.7	=	38.36	(74)
North	0.9x	0.77	X	4.1	x	79.99	x	0.63	x	0.7	=	100.22	(74)
North	0.9x	0.77	X	2.24	x	79.99	X	0.63	x	0.7	=	54.76	(74)
North	0.9x	0.77	X	1.68	x	79.99	x	0.63	x	0.7	=	41.07	(74)
North	0.9x	0.77	X	4.1	x	74.68	x	0.63	x	0.7	=	93.57	(74)
North	0.9x	0.77	X	2.24	x	74.68	x	0.63	x	0.7	=	51.12	(74)
North	0.9x	0.77	X	1.68	x	74.68	x	0.63	x	0.7	=	38.34	(74)
North	0.9x	0.77	X	4.1	x	59.25	x	0.63	x	0.7	=	74.24	(74)
North	0.9x	0.77	X	2.24	x	59.25	X	0.63	X	0.7	=	40.56	(74)
North	0.9x	0.77	X	1.68	x	59.25	x	0.63	x	0.7	=	30.42	(74)
North	0.9x	0.77	X	4.1	x	41.52	x	0.63	x	0.7	=	52.02	(74)
North	0.9x	0.77	X	2.24	x	41.52	x	0.63	x	0.7	=	28.42	(74)
North	0.9x	0.77	x	1.68	x	41.52	X	0.63	x	0.7	=	21.32	(74)
North	0.9x	0.77	X	4.1	x	24.19	x	0.63	x	0.7	=	30.31	(74)
North	0.9x	0.77	x	2.24	x	24.19	x	0.63	x	0.7	=	16.56	(74)
North	0.9x	0.77	x	1.68	x	24.19	x	0.63	x	0.7	=	12.42	(74)
North	0.9x	0.77	X	4.1	x	13.12	x	0.63	x	0.7	=	16.44	(74)
North	0.9x	0.77	X	2.24	x	13.12	x	0.63	x	0.7	=	8.98	(74)
North	0.9x	0.77	X	1.68	x	13.12	x	0.63	x	0.7	=	6.73	(74)
North	0.9x	0.77	X	4.1	x	8.86	X	0.63	x	0.7	=	11.11	(74)
North	0.9x	0.77	X	2.24	x	8.86	X	0.63	X	0.7	=	6.07	(74)
North	0.9x	0.77	X	1.68	x	8.86	x	0.63	x	0.7	=	4.55	(74)
South	0.9x	0.77	X	2.24	x	46.75	x	0.63	x	0.7	=	32.01	(78)
South	0.9x	0.77	x	6.18	x	46.75	x	0.63	x	0.7	=	88.3	(78)
South	0.9x	0.77	x	1.71	x	46.75	X	0.63	x	0.7	=	24.43	(78)
South	0.9x	0.77	x	2.24	x	76.57	X	0.63	x	0.7	=	52.42	(78)
South	0.9x	0.77	x	6.18	x	76.57	x	0.63	x	0.7	=	144.61	(78)
South	0.9x	0.77	x	1.71	x	76.57	x	0.63	x	0.7	=	40.01	(78)
South	0.9x	0.77	x	2.24	x	97.53	x	0.63	x	0.7	=	66.77	(78)
South	0.9x	0.77	x	6.18	x	97.53	x	0.63	x	0.7	=	184.21	(78)
South	0.9x	0.77	x	1.71	x	97.53	x	0.63	x	0.7	=	50.97	(78)
South	0.9x	0.77	x	2.24	x	110.23	x	0.63	x	0.7	=	75.46	(78)
	_		_		-				-		_		

0 11	г					1			,			_					_
South	0.9x	0.77	×	6.	18	X	1	10.23	X		0.63	×	0.7	=	20	08.2	(78)
South	0.9x	0.77	X	1.	71	X	1	10.23	X		0.63	X	0.7		5	7.61	(78)
South	0.9x	0.77	×	2.	24	X	1	14.87	X		0.63	×	0.7	=	= 78	3.64	(78)
South	0.9x	0.77	×	6.	18	X	1	14.87	X		0.63	X	0.7	=	21	6.96	(78)
South	0.9x	0.77	X	1.	71	X	1	14.87	X		0.63	x	0.7	-	= 60	0.03	(78)
South	0.9x	0.77	х	2.	24	X	1	10.55	X		0.63	x	0.7	-	- 7:	5.68	(78)
South	0.9x	0.77	х	6.	18	X	1	10.55	X		0.63	x	0.7	-	20	8.79	(78)
South	0.9x	0.77	X	1.	71	x	1	10.55	X		0.63	x	0.7	-	5	7.77	(78)
South	0.9x	0.77	×	2.	24	x	10	08.01	X		0.63	x	0.7	-	7:	3.94	(78)
South	0.9x	0.77	Х	6.	18	x	10	08.01	X		0.63	X	0.7	-	2	204	(78)
South	0.9x	0.77	х	1.	71	x	10	08.01	X		0.63	x	0.7	-	= 50	6.45	(78)
South	0.9x	0.77	х	2.	24	x	10	04.89	X		0.63	x	0.7	-	= 7·	1.81	(78)
South	0.9x	0.77	×	6.	18	x	10	04.89	X		0.63	x	0.7		= 19	8.11	(78)
South	0.9x	0.77	×	1.	71	x	10	04.89	X		0.63	x	0.7		54	4.82	(78)
South	0.9x	0.77		2.	24	x	10	01.89	x		0.63	×	0.7	= -	= 69	9.75	(78)
South	0.9x	0.77		6.	18	x	10	01.89	x		0.63	×	0.7	╡:	19	2.43	(78)
South	0.9x	0.77	×	1.	71	x	10	01.89	x		0.63	×	0.7	<u> </u>	5	3.25	(78)
South	0.9x	0.77	×	2.	24	x	8	2.59	x		0.63	x	0.7		50	6.54	(78)
South	0.9x	0.77	x	6.	18	x	8	2.59	X		0.63	i x	0.7		= 15	5.98	(78)
South	0.9x	0.77	x	1.	71	x	8	2.59	X		0.63	×	0.7	= :	= 4;	3.16	(78)
South	0.9x	0.77	×	2.	24	X	5	5.42	X		0.63	X	0.7	= :	3	7.94	(78)
South	0.9x	0.77	\equiv	6.	18	X	_	5.42) x		0.63	╡ ×	0.7		10	4.67	(78)
South	0.9x	0.77	x	1.	71	X	5	5.42)]		0.63	i x	0.7	╡.	= 28	3.96	(78)
South	0.9x	0.77	-		 24	X		10.4) x		0.63	╡ ×	0.7	╡.		7.66	(78)
South	0.9x	0.77			18	X	\vdash	10.4)]		0.63	╡ ×	0.7	〓.		6.3	(78)
South	0.9x	0.77			71	X		10.4]]		0.63	d x	0.7	〓.		1.11	(78)
	L	-				I			J			_					」 ` `
Solar o	ains in	watts, ca	lculate	d for eac	h mon	th			(83)m	n = Su	m(74)m	.(82)m					
(83)m=	170.8	286.85	386.59	477.21	538.7		38.29	517.42	469	.95	417.18	314.9	6 203.72	146.79	€		(83)
Total g	ains – i	nternal a	nd sola	r (84)m	= (73)n	า + (83)m	, watts			•		•	•			
(84)m=	582.76	696.78	783.37	852.78	892.78	8 8	71.52	837.11	795	5.49	753.59	672.8	586.19	547.7	4		(84)
7. Me	an inter	nal temp	erature	(heating	seaso	on)											
		during he		`			area f	rom Tal	ole 9	, Th1	(°C)					21	(85)
		ctor for ga	•			·					,						_
	Jan	Feb	Mar	Apr	Ma	Ť	Jun	Jul	A	ug	Sep	Oct	Nov	Dec	;		
(86)m=	0.99	0.98	0.95	0.87	0.71	_	0.52	0.37	0.4	- +	0.64	0.9	0.98	1			(86)
Maan	interna	l tempera	atura in	livina a	22 T1	(follo	w sta	ne 3 to 7	7 in 7	 Dahla	9c)			•			
(87)m=	20.18	20.37	20.6	20.83	20.96	Ì	20.99	21	2	$\overline{}$	20.98	20.82	20.46	20.14	.]		(87)
		<u> </u>		<u> </u>	<u> </u>				L								,
•		during he		20.14	n rest o	$\overline{}$		20.15		$\overline{}$	<u>`</u>	20.14	20.14	20.12			(88)
(88)m=	20.12	<u> </u>	20.13	<u> </u>	<u> </u>		20.15		20.	.10	20.15	20.12	20.14	20.13			(00)
		tor for ga		1		_	<u> </u>		–				i	1	\neg		155
(89)m=	0.99	0.98	0.94	0.83	0.66		0.45	0.3	0.3	33	0.56	0.87	0.98	0.99			(89)

Mean intern	ai tempei	ature in	110 1001	or awciii	119 12 (1	Ollow Ste	7P3 0 10 1	ill labi	c 30)				
00)m= 19.04	19.31	19.64	19.96	20.1	20.15	20.15	20.15	20.14	19.95	19.45	18.99		(90
	•					•	•	f	LA = Livin	g area ÷ (4	4) =	0.42	(91
	-1.6				W \		. /4 (1	A) TO					
Mean intern						i e	`						(00
2)m= 19.52	19.76	20.04	20.32	20.46	20.5	20.51	20.51	20.49	20.31	19.87	19.48		(92
Apply adjus						i	1				1		
19.52	19.76	20.04	20.32	20.46	20.5	20.51	20.51	20.49	20.31	19.87	19.48		(93
8. Space he	ating requ	uirement											
Set Ti to the the utilisatio			•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fa	ctor for g	ains, hm	:	-									
0.99	0.97	0.93	0.84	0.68	0.48	0.33	0.37	0.59	0.87	0.97	0.99		(94
——⊔ Useful gains	. hmGm	. W = (94	I)m x (84	 4)m	<u> </u>	l				l	<u>[</u>		
05)m= 576.67	1	732.42	717.66	605.18	416.61	277.26	290.6	447.18	587.08	571.32	543.52		(95
Monthly ave	ļ				<u> </u>				001.00	01.1102	0.0.02		`
16)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96
<i>'</i>										7.1	4.2		(00)
Heat loss ra						-``	-` ´	`			4440.00		(07
<i>'</i>	1 1092.43	992.47	824.46	630.58	419.23	277.49	291.01	456.22	699.09	924.68	1112.66		(97
Space heati		ement fo	r each n	nonth, k\	Nh/mont	th = 0.02	24 x [(97))m – (95)m] x (4 ⁻	1)m			
100000					l	ı							
8)m= 406.03	278.54	193.48	76.89	18.9	0	0	0	0	83.34	254.43	423.44		
406.03	278.54	193.48	76.89	18.9	0	0		0 I per year		<u> </u>	<u> </u>	1735.04	(98
		ļ			0	0				<u> </u>	<u> </u>	1735.04	Ⅎ`
Space heati	ng require	ement in	kWh/m²	²/year	-		Tota	l per year		<u> </u>	<u> </u>		(98
Space heati	ng require	ement in	kWh/m²	²/year	-		Tota	l per year		<u> </u>	<u> </u>		닠`
Space heati a. Energy re Space heat	ng require equirementing:	ement in nts – Indi	kWh/m² vidual h	?/year eating sy	ystems i	ncluding	Tota	l per year		<u> </u>	<u> </u>	22.42	(99
Space heati a. Energy re Space heat Fraction of s	ng require equirementing: space hea	ement in nts – Indi at from se	kWh/m² vidual h econdar	eating sy	ystems i	ncluding system	Tota	I per year		<u> </u>	<u> </u>		(99
Space heati a. Energy re Space heat	ng require equirementing: space hea	ement in nts – Indi at from se	kWh/m² vidual h econdar	eating sy	ystems i	ncluding system	Tota	I per year		<u> </u>	<u> </u>	22.42	(99)
Space heati a. Energy re Space heat Fraction of s	ng require equirement ing: space head space head	ement in nts – Indi at from se	kWh/m² vidual h econdar ain syst	eating sy y/supple em(s)	ystems i	ncluding system	Tota micro-C (202) = 1	I per year	(kWh/year	<u> </u>	<u> </u>	22.42	(20)
Space heating as Energy residence heat Fraction of series Fraction of the Energy residence has been series as the Energy resid	ng require equirement ing: space hea space hea otal heati	ement in nts - Indi at from se at from m ng from i	kWh/m² vidual h econdar ain syst main sys	eating sy y/supple em(s) stem 1	ystems i	ncluding system	Tota micro-C (202) = 1	DHP) - (201) =	(kWh/year	<u> </u>	<u> </u>	0 1 1	(20)
Space heating as Energy residence heat Fraction of series Fraction of the Efficiency	ng require equirement ing: space hea space hea otal heati	ement in outs — Indi out from se out from m out from in out from	kWh/m² vidual h econdar ain syst main sys ng syste	eating sy y/supple em(s) stem 1	ystems i mentary	ncluding system	Tota micro-C (202) = 1	DHP) - (201) =	(kWh/year	<u> </u>	<u> </u>	22.42 0 1 1 93.5	(20)
Space heating as Energy residence heat Fraction of states of the Efficiency of Efficiency of the Efficiency of the Efficiency of Efficiency of the Efficienc	ng require equirement ing: space hea space hea otal heati	ement in outs — Indi out from se out from m out from in out from	kWh/m² vidual h econdary ain systemain systementar	eating sy y/supple em(s) stem 1 em 1 y heating	ystems i mentary	ncluding system	Total micro-C (202) = 1 - (204) = (204)	CHP) - (201) = 02) × [1 - ((kWh/year) = Sum(9	8)15,912 =	0 1 1 93.5	(20 (20 (20 (20 (20
Space heating as Energy response to the Space heat Fraction of states of the Efficiency of Efficiency of Landard Tank (Landard T	ng require equirement ing: space hea space hea otal heati main spa seconda	ement in outs - Indi out from set from m out from ing	kWh/m² vidual h econdary ain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	ystems i mentary g system Jun	ncluding system	Tota micro-C (202) = 1	DHP) - (201) =	(kWh/year	<u> </u>	<u> </u>	22.42 0 1 1 93.5	(20 (20 (20 (20 (20
Space heating as Energy respection of section of section of section of the Efficiency of Efficiency of Landard Space heating as Espace hea	ng requirements ing: space heats space heats the main space seconda Feb ng require	ement in outs — Indi out from se out from m out fr	kWh/m² vidual h econdary ain systemain systementar Apr alculate	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	ystems i mentary g system Jun	ncluding system	Tota micro-C (202) = 1 - (204) = (204)	CHP) - (201) = 02) × [1 - ((kWh/year	Nov	8) _{15,912} =	0 1 1 93.5	(20 (20 (20 (20 (20
Space heating as Energy response to the Space heat Fraction of states of the Efficiency of Efficiency of Landard Tank (Landard T	ng requirements ing: space heats space heats otal heati main space seconda Feb ng require	ement in outs - Indi out from set from m out from ing	kWh/m² vidual h econdary ain systemain systementar Apr	eating sy y/supple em(s) stem 1 em 1 y heating	ystems i mentary g system Jun	ncluding system	Total micro-C (202) = 1 - (204) = (204)	CHP) - (201) = 02) × [1 - ((kWh/year) = Sum(9	8)15,912 =	0 1 1 93.5	(20 (20 (20 (20 (20
Space heating as Energy respection of section of section of section of the Efficiency of Efficiency of Landard Space heating as Espace hea	ng requirements ing: space head space head otal heati f main space seconda Feb ng require 278.54	ement in outs — Indi out from set from m outs from m	kWh/m² vidual h econdary ain systemain systementar Apr alculated	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	ystems i mentary g system Jun	ncluding system	Tota micro-C (202) = 1 - (204) = (204)	CHP) - (201) = 02) × [1 - ((kWh/year	Nov	8) _{15,912} =	0 1 1 93.5	(20 (20 (20 (20 (20 ear
Space heating as Energy respection of a space heating of Efficiency of Efficiency of Land Space heating 406.03	ng requirements ing: space heats space heats otal heati finain space seconda Feb ng require 278.54 8)m x (20	ement in outs — Indi out from set from m outs from m	kWh/m² vidual h econdary ain systemain systementar Apr alculated	eating sy y/supple em(s) stem 1 em 1 y heating May d above)	ystems i mentary g system Jun	ncluding system	Tota micro-C (202) = 1 - (204) = (204)	CHP) - (201) = 02) × [1 - ((kWh/year	Nov	8) _{15,912} =	0 1 1 93.5	(20 (20 (20 (20 (20 ear
Space heating as Energy respectively as Energy respection of a Erraction of a Efficiency of Efficien	ng requirements ing: space heats space heats otal heati finain space seconda Feb ng require 278.54 8)m x (20	ement in outs — Indi outs — Indi outs — Indi outs — Indi outs — Indi outs — Indi outs — Indi outs — Indi outs — Indi	kWh/m² vidual h econdary ain systemain systementar Apr alculated 76.89	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 18.9	ystems i mentary g system Jun	ncluding system	Tota micro-C (202) = 1 - (204) = (204) Aug 0	Der year	(203)] = Oct 83.34	Nov 254.43	Dec 423.44	0 1 1 93.5 0 kWh/ye	(20) (20) (20) (20) (20) ear
Space heating. a. Energy results as Energy resu	ng requirement ing: space heat space heat space heat space heat in space in	ement in outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs - Indi outs -	kWh/m² vidual h econdary ain systemain systementar Apr alculated 76.89 00 ÷ (20) 82.24	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 18.9	ystems i mentary g system Jun	ncluding system	Tota micro-C (202) = 1 - (204) = (204) Aug 0	per year	(203)] = Oct 83.34	Nov 254.43	Dec 423.44	0 1 1 93.5	(20) (20) (20) (20) (20) ear
Space heating as Energy respection of a space heating a space	ng requirements ing: space heads space heads otal heatiff main space seconda Feb ng require 3 278.54 8)m x (20 6 297.9	ement in outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs –	kWh/m² vidual h econdary ain systemain systemain systementar Apr alculated 76.89 00 ÷ (20 82.24	eating sy y/supple em(s) stem 1 em 1 y heating May d above) 18.9	ystems i mentary g system Jun	ncluding system	Tota micro-C (202) = 1 - (204) = (204) Aug 0	Der year	(203)] = Oct 83.34	Nov 254.43	Dec 423.44	0 1 1 93.5 0 kWh/ye	(20) (20) (20) (20) (20) ear
Space heating as Energy respection of section ng requirement ing: space heat sp	ement in nts – Indi at from se at from m ng from in ace heati iry/supple Mar ement (c 193.48 04)] } x 1 206.93 econdary 00 ÷ (20	kWh/m² vidual h econdary ain systemain systementar Apr alculated 76.89 00 ÷ (20 82.24	eating syly/supple em(s) stem 1 em 1 y heating May d above 18.9 06) 20.22 month	ystems i mentary g system Jun 0	ncluding system	Tota micro-C (202) = 1 - (204) = (204) 0 Tota	Der year	(203)] = Oct 83.34 89.13 ar) =Sum(2	Nov 254.43 272.11 211) _{15,1012}	Dec 423.44	0 1 1 93.5 0 kWh/ye	(20) (20) (20) (20) ear	
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Space heating as Energy respection of section ng requirement ing: space heat space heat space heat space heat in space in	ement in nts – Indi at from se at from m ng from in ace heati iry/supple Mar ement (c 193.48 04)] } x 1 206.93 econdary 00 ÷ (20	kWh/m² vidual h econdary ain systemain systementar Apr alculated 76.89 00 ÷ (20 82.24	eating syly/supple em(s) stem 1 em 1 y heating May d above 18.9 06) 20.22 month	ystems i mentary g system Jun 0	ncluding system	Tota micro-C (202) = 1 - (204) = (204) Aug 0 Tota	Der year	(203)] = Oct 83.34 89.13 ar) =Sum(2	Nov 254.43 272.11 211) _{15,1012}	Dec 423.44	0 1 1 93.5 0 kWh/ye	(20) (20) (20) (20) (21) (21)	
Space heating as Energy respection of a space heating and space heating are space heating and space he	ng requirements space heat space	ement in outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs –	kWh/m² vidual h econdary ain systemain systemain systementar Apr alculated 76.89 00 ÷ (20 82.24 y), kWh/8) 0	eating sylv/supple em(s) stem 1 em 1 May dabove) 18.9 06) 20.22 month	ystems i mentary g system Jun 0	ncluding system	Tota micro-C (202) = 1 - (204) = (204) Aug 0 Tota	Der year	(203)] = Oct 83.34 89.13 ar) =Sum(2	Nov 254.43 272.11 211) _{15,1012}	Dec 423.44	0 1 1 93.5 0 kWh/ye	(20 (20 (20 (20 (20
Space heating as Energy respection of a space heating and space he	ng require ring: space hea	ement in outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs – Indi outs –	kWh/m² vidual h econdary ain systemain systemain systementar Apr alculated 76.89 00 ÷ (20 82.24 y), kWh/8) 0	eating sylv/supple em(s) stem 1 em 1 May dabove) 18.9 06) 20.22 month	ystems i mentary g system Jun 0	ncluding system	Tota micro-C (202) = 1 - (204) = (204) Aug 0 Tota	Der year	(203)] = Oct 83.34 89.13 ar) =Sum(2	Nov 254.43 272.11 211) _{15,1012}	Dec 423.44	0 1 1 93.5 0 kWh/ye	(20) (20) (20) (20) (21) (21)

C217)m													
(219)m = (64)m x 100 ÷ (217)m (219)m = 225.81 200.5 213.29 195.91 197.07 178.33 171.28 187.93 187.6 202.9 207.75 219.98 Total = Sum(219a) ₁₋₁₂ = 2388.36 (219) Annual totals Space heating fuel used, main system 1 Water heating fuel used	(217)m= 86.72 86.08	84.99	82.95	80.81	79.8	79.8	79.8	79.8	83.05	85.76	86.88		(217)
225.81 200.5 213.29 195.91 197.07 178.33 171.28 187.93 187.6 202.9 207.75 219.98	•												
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year kWh/year 1855.66 2388.36 (230c) 45 (230e) 75 (231)	` '			197.07	178.33	171.28	187.93	187.6	202.9	207.75	219.98		
Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year 1855.66 2388.36 (230c) 230c) 45 (230e)							Tota	I = Sum(2	19a) ₁₁₂ =	l	ı	2388.36	(219)
Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year 2388.36 2388.36 (230c) 30 (230c) 45 (230e)	Annual totals								k'	Wh/year	•	kWh/year	
Electricity for pumps, fans and electric keep-hot central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year sum of (230a)(230g) = 75 (231)	Space heating fuel use	ed, main	system '	1								1855.66	
central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year 30 (230c) 45 (230e) 75 (231)	Water heating fuel use	d										2388.36	
boiler with a fan-assisted flue Total electricity for the above, kWh/year sum of (230a)(230g) = 75 (231)	Electricity for pumps, fa	ans and	electric k	keep-ho	t								
Total electricity for the above, kWh/year sum of (230a)(230g) = 75 (231)	central heating pump:										30		(230c)
	boiler with a fan-assis	sted flue									45		(230e)
Electricity for lighting 336.8 (232)	Total electricity for the	above, k	:Wh/yea	r			sum	of (230a).	(230g) =			75	(231)
	Electricity for lighting											336.8	(232)
12a. CO2 emissions – Individual heating systems including micro-CHP	12a. CO2 emissions -	– Individu	ual heati	ng syste	ems inclu	uding mi	cro-CHP						
Energy Emission factor Emissions					En	erqy			Emiss	ion fac	tor	Emissions	}
kWh/year kg CO2/kWh kg CO2/year									kg CO	2/kWh		kg CO2/yea	ar
Space heating (main system 1) (211) x 0.216 = 400.82 (261)	Space heating (main s	ystem 1)			(211	l) x			0.2	16	=	400.82	(261)
Space heating (secondary) $(215) \times 0.519 = 0 (263)$	Space heating (second	dary)			(215	5) x			0.5	19	=	0	(263)
Water heating (219) x 0.216 = 515.88 (264)	Water heating				(219	9) x			0.2	16	=	515.88	(264)
Space and water heating $(261) + (262) + (263) + (264) =$ 916.71 (265)	Space and water heati	ng			(261) + (262)	+ (263) + (264) =				916.71	(265)
Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267)	Electricity for pumps, fa	ans and	electric k	keep-ho	t (231) x			0.5	19	=	38.93	(267)
Electricity for lighting (232) x 0.519 = 174.8 (268)	Electricity for lighting				(232	2) x			0.5	19	=	174.8	(268)
Total CO2, kg/year $sum of (265)(271) = 1130.43$ (272)	Total CO2, kg/year							sum o	of (265)(2	271) =		1130.43	(272)

TER =

(273)

21.12

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:37:28

Project Information:

Assessed By: John Simpson (STRO006273) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 94.7m²

Site Reference: Maitland Park Estate

Plot Reference: AC 210

Address: AC 210, Aspen Court, Maitland Park Estate, London, NW3 2EH

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 21.99 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 5.75 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 42.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 41.0 kWh/m²

OK

2 Fabric U-values

 Element
 Average
 Highest

 External wall
 0.12 (max. 0.30)
 0.12 (max. 0.70)
 OK

 Party wall
 0.00 (max. 0.20)
 OK

Floor (no floor) Roof (no roof)

Openings 1.40 (max. 2.00) 1.40 (max. 3.30) **OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

Regulations Compliance Report

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	0
echanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.53	
Maximum	1.5	0
MVHR efficiency:	90%	
Minimum	70%	0
ummertime temperature		
Overheating risk (Thames valley):	Medium	0
d on:		
Overshading:	Average or unknown	
Windows facing: North	2.24m²	
Windows facing: East	2.71m²	
Windows facing: East	6.73m²	
Windows facing: South	2.24m²	
Windows facing: South	1.5m²	
Windows facing: South	1.65m²	
Windows facing: South	1.68m²	
Windows facing: South	2.71m²	
Windows facing: East	2.71m²	
Windows facing: North	2.71m²	
Windows facing: North	4.1m²	
Windows facing: North	1.5m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
Key features		
Air permeablility	2.0 m³/m²h	
External Walls U-value	0.12 W/m²K	
Party Walls U-value	0 W/m²K	

Photovoltaic array

		Hoon	Deteiler						
Accessor Name:	John Cimpoon	User	Details:	- Mirror	b a		CTD C	0006272	
Assessor Name: Software Name:	John Simpson Stroma FSAP 2012		Stroma Softwa					0006273 on: 1.0.4.26	
Contraro Hamo.	5.10111.01 57 ti 2012	Property	Address:				7 01010	711 1101 1120	
Address :	AC 210, Aspen Court,	· · · ·				EH.			
1. Overall dwelling dime	ensions:								
		Are	ea(m²)		Av. He	ight(m)		Volume(m	3)
Ground floor			94.7	(1a) x	2	2.6	(2a) =	246.22	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	(1n)	94.7	(4)					
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	246.22	(5)
2. Ventilation rate:									
		ondary ating	other		total			m³ per hou	ır
Number of chimneys	0 +	0 +	0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0 +	0	j = F	0	x	20 =	0	(6b)
Number of intermittent fa	ans			,	0	x ·	10 =	0	(7a)
Number of passive vents	3			-	0	x	10 =	0	(7b)
Number of flueless gas f				L		x	40 =		=
Number of flueless gas i	1163			L	0	^	10 –	0	(7c)
							Air ch	nanges per he	our
Infiltration due to chimne	eys, flues and fans = (6a)+	-(6b)+(7a)+(7b)+	·(7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has I	been carried out or is intended,	proceed to (17),	otherwise o	ontinue fr	om (9) to				``
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber fra			•	uction			0	(11)
deducting areas of open	present, use the value correspo ings); if equal user 0.35	naing to the grea	iter wall area	а (аптег					
If suspended wooden	floor, enter 0.2 (unsealed	l) or 0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, er	nter 0.05, else enter 0							0	(13)
Percentage of window	s and doors draught strip	ped						0	(14)
Window infiltration			0.25 - [0.2					0	(15)
Infiltration rate			(8) + (10)	`	, , ,	. ,		0	(16)
•	q50, expressed in cubic	•	•	•	etre of e	envelope	area	2	(17)
·	lity value, then (18) = [(17) es if a pressurisation test has be				is heina u	sad		0.1	(18)
Number of sides sheltere		oon done or a de	gree an per	modelinty	io boilig a	50 u		1	(19)
Shelter factor			(20) = 1 - [0.075 x (1	9)] =			0.92	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18)	x (20) =				0.09	(21)
Infiltration rate modified	for monthly wind speed								
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed 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 (20-) (2	12)m : 4								
Wind Factor $(22a)m = (2(22a)m = 1.27)$ 1.25	' 	0.95 0.95	0.92	1	1.08	1.12	1.18	1	
(220)111= 1.21 1.20	1.23 1.1 1.00	0.90 0.90	0.92	ı	1.08	1.12	1.18	J	

djusted infiltra	ı		ng for sl	1	1	` 	`	ì ´	0.4	0.4	T 0.44	1	
0.12 Calculate effec	0.12 Ctive air (0.11 change	i -	0.1 he appli	0.09 cable ca	0.09 ise	0.09	0.09	0.1	0.1	0.11	J	
If mechanica		•		.,								0.5	(23
If exhaust air he	eat pump ι	using Appe	endix N, (2	?3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23
If balanced with	heat reco	very: effic	eiency in %	allowing	for in-use f	actor (fron	n Table 4h	ı) =				76.5	(23
a) If balance	d mecha	anical ve	entilation	with he	at recov	ery (MVI	HR) (24a	a)m = (22)	2b)m + (2	23b) × [1 – (23c)	÷ 100]	
24a)m= 0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.22	0.23		(24
b) If balance	d mecha	anical ve	entilation	without	heat red	covery (N	ЛV) (24b	o)m = (22	2b)m + (2	23b)		,	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h if (22b)n				•					.5 × (23b)			
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)n									0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
Effective air	change	rate - er	nter (24a) or (24l	o) or (24	c) or (24	d) in bo	x (25)				_	
25)m= 0.24	0.23	0.23	0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.22	0.23]	(25
3. Heat losse	s and he	at loss	paramet	er:									
LEMENT	Gros area	SS	Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/ł	〈)	k-value kJ/m²-l		A X k kJ/K
Vindows Type	1				2.24	x1.	/[1/(1.4)+	0.04] =	2.97				(27
Vindows Type	2				2.71	x1.	/[1/(1.4)+	0.04] =	3.59				(27
Vindows Type	3				6.73	x1.	/[1/(1.4)+	0.04] =	8.92				(27
Vindows Type	e 4				2.24	x1.	/[1/(1.4)+	0.04] =	2.97				(27
Vindows Type	e 5				1.5	x1.	/[1/(1.4)+	0.04] =	1.99				(27
Vindows Type	6				1.65	x1.	/[1/(1.4)+	0.04] =	2.19				(27
Vindows Type	e 7				1.68	x1.	/[1/(1.4)+	0.04] =	2.23				(27
Vindows Type	8 8				2.71	x1.	/[1/(1.4)+	0.04] =	3.59				(27
Vindows Type	9				2.71	x1.	/[1/(1.4)+	0.04] =	3.59				(27
Vindows Type	e 10				2.71	x1.	/[1/(1.4)+	0.04] =	3.59				(27
Vindows Type	e 11				4.1	x1.	/[1/(1.4)+	0.04] =	5.44				(27
Vindows Type	12				1.5	x1.	/[1/(1.4)+	0.04] =	1.99				(27
Valls	79.1	4	32.4	8	46.66	5 X	0.12	i	5.6	= [(29
otal area of e	lements	, m²			79.14	1							(31
					22.3	1 X	0		0	\neg			(32
arty wall	roof winde					lated using	formula 1	 I/[(1/U-valu	ıe)+0.04] a	s given in	paragraph	1 3.2	
Party wall for windows and * include the area		sides of if		,									
for windows and	as on both			,			(26)(30) + (32) =				48.66	(33
for windows and * include the area	as on both ss, W/K =	= S (A x		•			(26)(30)		(30) + (32	2) + (32a).	(32e) =	48.66	(33)

n be u	. 1 1 1				- · A									
	Ū	`	,		using Ap	•	K.						13.33	(3
	abric hea		are not kn	OWII (30) =	= 0.05 x (3	1)			(33) +	(36) =			61.99	(3
			alculated	l monthly	٧				(38)m	= 0.33 × (25)m x (5)		01.00	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
3)m=	19.13	18.94	18.75	17.81	17.63	16.69	16.69	16.5	17.06	17.63	18	18.38		(3
eat tr	ansfer c	coefficier	nt. W/K			I			(39)m	= (37) + (37)	38)m		I	
9)m=	81.12	80.93	80.75	79.81	79.62	78.68	78.68	78.49	79.05	79.62	79.99	80.37		
ļ						!	•	•		_	Sum(39) ₁ .	12 /12=	79.76	(3
		<u> </u>	HLP), W/		i		i	i	` '	= (39)m ÷	ì	i	1	
)m=	0.86	0.85	0.85	0.84	0.84	0.83	0.83	0.83	0.83	0.84	0.84	0.85		— ,
umbe	er of dav	s in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	0.84	(4
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
)m=	31	28	31	30	31	30	31	31	30	31	30	31		(
Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
													1	
cum	ed occu	ıpancy, İ	V				- 400	\0\1 0 (0012 v /	ΓΕΛ 12		68		(
		N _ 1	⊥ 1 76 v	[1 - AVA	/_N NNN3	2/0 v /TE	- ∧ -1'3 U	ソンハエハル			uı .			
if TF			+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	-A -13.9)2)] + 0.0) X C I UC	IFA -13.	9)			
if TF if TF inual	A > 13.9 A £ 13.9 I averag	9, N = 1 e hot wa	ater usaç	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		97	.96		(
if TF if TF inual duce	A > 13.9 A £ 13.9 I average the annua	9, N = 1 e hot wa al average	ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Iwelling is	erage = designed		+ 36		97	.96		(
if TF if TF inual duce	A > 13.9 A £ 13.9 I average the annual of that 125	e hot wa e hot wa al average litres per p	ater usaç hot water person per	ge in litre usage by a day (all w	es per da 5% if the d vater use, l	ay Vd,av Iwelling is thot and co	erage = designed (old)	(25 x N) to achieve	+ 36 a water us	se target o	97	1]	(
if TF if TF inual iduce it more	A > 13.9 A £ 13.9 I average the annual of that 125 Jan	9, N = 1 e hot wa al average litres per p	ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d	ay Vd,av dwelling is hot and co	erage = designed ((25 x N) to achieve	+ 36		97	.96 Dec		(
if TF inual duce more	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan arrusage ir	e hot wa al average litres per p Feb	nter usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d rater use, I May Vd,m = fa	ay Vd,av Iwelling is thot and co Jun ctor from	erage = designed (ald) Jul Table 1c x	(25 x N) to achieve Aug (43)	+ 36 a water us Sep	se target o	97 Nov	Dec]]	(
if TF inual duce more	A > 13.9 A £ 13.9 I average the annual of that 125 Jan	9, N = 1 e hot wa al average litres per p	ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed ((25 x N) to achieve	+ 36 a water us Sep	Oct	97 Nov	Dec 107.76	1175.55	
if TF if TF inual duce more t more	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	e hot wa al average litres per p Feb n litres per	hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa 92.09	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 88.17	(25 x N) to achieve Aug (43)	+ 36 a water us Sep	Oct 99.92 Fotal = Su	Nov 103.84 m(44) ₁₁₂ =	Dec 107.76	1175.55	
if TF if TF innual duce t more t wate	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan er usage in	e hot wa al average litres per p Feb n litres per	hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa 92.09	ay Vd,av Iwelling is hot and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 88.17	(25 x N) to achieve Aug (43) 92.09	+ 36 a water us Sep	Oct 99.92 Fotal = Su	Nov 103.84 m(44) ₁₁₂ =	Dec 107.76	1175.55	
if TF innual duce it more t water ergy c	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage ir 107.76 content of 159.8	P, N = 1 e hot wa al average litres per p litres per 103.84 hot water 139.77	Mar 99.92 used - calc	ge in litre usage by day (all w Apr ach month 96 culated me 125.74	es per da 5% if the corater use, I May Vd,m = fa 92.09 onthly = 4.	ay Vd,av lwelling is hot and co Jun ctor from 7 88.17 190 x Vd,r	erage = designed sold) Jul Table 1c x 88.17 m x nm x E 96.47	(25 x N) to achieve Aug (43) 92.09 97m / 3600 110.71	+ 36 a water us Sep 96 0 kWh/mon	Oct 99.92 Fotal = Su 130.56	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1	Dec 107.76 = c, 1d) 154.76	1175.55 1541.34	
if TF if TF innual duce t more t t wate ergy c ergy c	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage ir 107.76 content of 159.8	P, N = 1 e hot wa al average litres per p litres per 103.84 hot water 139.77	Mar 99.92 used - calc	ge in litre usage by day (all w Apr ach month 96 culated me 125.74	es per da 5% if the da 5% if th	ay Vd,av lwelling is hot and co Jun ctor from 7 88.17 190 x Vd,r	erage = designed sold) Jul Table 1c x 88.17 m x nm x E 96.47	(25 x N) to achieve Aug (43) 92.09	+ 36 a water us Sep 96 0 kWh/mon	Oct 99.92 Fotal = Su 130.56	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51	Dec 107.76 = c, 1d) 154.76		
if TF if TF if TF innual duce t more t water t water in)m= stant	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 107.76 content of 159.8 taneous w 23.97	P, N = 1 e hot wa al average litres per p litres per l 103.84 hot water 139.77 rater heatin 20.96	Mar 99.92 used - calc	ge in litre usage by day (all w Apr ach month 96 culated me 125.74	es per da 5% if the da 5% if th	ay Vd,av lwelling is hot and co Jun ctor from 7 88.17 190 x Vd,r	erage = designed sold) Jul Table 1c x 88.17 m x nm x E 96.47	(25 x N) to achieve Aug (43) 92.09 97m / 3600 110.71	+ 36 a water us Sep 96 0 kWh/mon	Oct 99.92 Fotal = Su 130.56	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51	Dec 107.76 = c, 1d) 154.76		
if TF if TF inual duce t more t wate t wate ergy c nstant	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 107.76 content of 159.8 taneous w. 23.97 storage	P, N = 1 e hot wa al average litres per p litres per 103.84 hot water 139.77 eater heatin 20.96 loss:	Mar day for ea 144.23 ang at point 21.63	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no	es per da 5% if the da 5% if th	ay Vd,av lwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage),	erage = designed sold) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61	+ 36 a water us Sep 96 112.03 1 to (61) 16.8	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TF if TF if TF innual duce t more t water ergy (innual mstant) m= mstant orage orage	A > 13.9 A £ 13.9 I average the annual of that 125 Jan er usage in 107.76 159.8 taneous w. 23.97 storage e volume	P, N = 1 e hot wa al average litres per litres per litres per 103.84 hot water 139.77 rater heatif 20.96 loss: e (litres)	Mar Mar May for ea 99.92 used - calc 144.23 ag at point 21.63	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no	es per da 5% if the covater use, la May Vd,m = fa 92.09 enthly = 4. 120.65 en hot water 18.1 en la ror W	ay Vd,av lwelling is hot and co Jun ctor from 88.17 190 x Vd,r 104.11 r storage), 15.62	erage = designed sold) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage	(25 x N) to achieve Aug (43) 92.09 77m / 3600 110.71 boxes (46) 16.61 within sa	+ 36 a water us Sep 96 112.03 1 to (61) 16.8	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76		
if TF if TF inual duce it more t wate t wate ergy c nstant nstant corrag	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 107.76 107.76 content of 159.8 taneous we 23.97 storage e volumemunity h	e hot was all average litres per per per per per per per per per per	Mar day for ea 99.92 used - calc 144.23 ing at point 21.63 includin nd no tal	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no 18.86 ag any so nk in dw	es per da 5% if the d vater use, I May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W velling, e	ay Vd,av welling is that and co Jun ctor from 188.17 190 x Vd,r 104.11 r storage), 15.62	erage = designed in designed i	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 112.03 16.8 ame vess	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TF if TF inual duce i more t water inual more inual more t water inual more inual m	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 107.76 107.76 content of 159.8 taneous we 23.97 storage e volumemunity h	P, N = 1 e hot wa al average litres per p litres per p 103.84 hot water 139.77 vater heatin 20.96 loss: e (litres) eating a p stored	Mar day for ea 99.92 used - calc 144.23 ing at point 21.63 includin nd no tal	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no 18.86 ag any so nk in dw	es per da 5% if the d vater use, I May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W velling, e	ay Vd,av welling is that and co Jun ctor from 188.17 190 x Vd,r 104.11 r storage), 15.62	erage = designed in designed i	(25 x N) to achieve Aug (43) 92.09 77m / 3600 110.71 boxes (46) 16.61 within sa	+ 36 a water us Sep 96 112.03 16.8 ame vess	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TF if TF if TF innual duce t more t water ergy (innual mater) metal more committee herw ater	A > 13.9 A £ 13.9 I average the annual of that 125 Jan 107.76 107.76 159.8 anneous we 23.97 storage e volume munity he vise if no storage	e hot was all average litres per per litres per per litres per per litres per	Mar Mar Mar 99.92 used - calc 144.23 including and no talchot water	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no 18.86 ag any so ank in dw er (this in	es per da 5% if the d vater use, I May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W velling, e	ay Vd,av lwelling is hot and co Jun ctor from 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS nter 110 nstantar	erage = designed (a) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 112.03 16.8 ame vess	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TF if TF innual duce t more t water ergy (innual innua	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 107.76 107.76 2001tent of 159.8 23.97 storage e volume munity he vise if no storage anufactions.	e hot wa al average litres per l litres per l 103.84 hot water 139.77 vater heatin 20.96 loss: e (litres) eating a o stored loss: urer's de	Mar Mar Mar 99.92 used - calc 144.23 including and no talchot water	Apr Apr Ach month 96 125.74 of use (not) 18.86 ag any so ank in dwer (this in oss factors)	es per da 5% if the d rater use, I May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W relling, e	ay Vd,av lwelling is hot and co Jun ctor from 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS nter 110 nstantar	erage = designed (a) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 112.03 16.8 ame vess	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TF if TF innual duce t more t water t water innual innual t water innual inn	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 107.76 107.76 159.8 23.97 storage enunity havise if no storage enaufaction anufaction e hot wa all average litres per per litres per per litres per litr	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	ge in litre usage by day (all w Apr ach month 96 125.74 of use (not) 18.86 ag any so ank in dw er (this in) oss facto 2b , kWh/ye	es per da 5% if the of water use, I May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or Water velling, each of is known	ay Vd,av liwelling is that and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS enter 110 nstantar wn (kWh	erage = designed (a) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21			
if TF if TF innual duce t more t water ergy c isi)m= mstant orag commherw ater i If m empe mergy If m	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 107.76 107.76 2000 tent of 159.8 23.97 storage enumity howise if no storage anufactor enthal enth	e hot was all average litres per per litres per per litres per per litres per per litres per per litres per li	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	ge in litre usage by day (all w Apr ach month 96 125.74 of use (not 18.86 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l	es per da 5% if the of water use, I May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W welling, e ncludes i or is known ar oss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS enter 110 nstantar wn (kWh	rerage = designed sold) Jul Table 1c x 88.17 m x nm x L 96.47 enter 0 in 14.47 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47) ombi boil	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21 0 0 0 10		
if TF if TF	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 107.76 107.76 23.97 Storage enthal vise if no estorage enthal 125 rature fair lost from anufaction anufacti	e hot was all average litres per	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	ge in litre usage by day (all w Apr ach month 96 125.74 of use (not 18.86 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Table	es per da 5% if the of water use, I May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or Water velling, each of is known	ay Vd,av liwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS enter 110 nstantar wn (kWh	rerage = designed sold) Jul Table 1c x 88.17 m x nm x L 96.47 enter 0 in 14.47 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47) ombi boil	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TF if TF if TF if TF innual iduce it more it water it water instant in therw ater it herw ate	A > 13.9 A £ 13.9 I average the annual enthat 125 Jan 107.76 107.76 159.8 23.97 storage enunity how is enunity how is in no storage enunfactor enunity in the interest of anufactor enunity how is enunity in the interest of anufactor enunity in the interest of anufac	e hot was all average litres per	Mar day for ea 99.92 used - calc 144.23 including at point 21.63 including and no tale at the calc and the	ge in litre usage by day (all w Apr ach month 96 125.74 of use (not 18.86 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Table	es per da 5% if the of water use, I May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W welling, e ncludes i or is known ar oss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS enter 110 nstantar wn (kWh	rerage = designed sold) Jul Table 1c x 88.17 m x nm x L 96.47 enter 0 in 14.47 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47) ombi boil	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Su 130.56 Total = Su 19.58	Nov 103.84 m(44) ₁₁₂ = sbbles 1b, 1 142.51 m(45) ₁₁₂ = 21.38 47)	Dec 107.76 = c, 1d) 154.76 = 23.21 0 0 0 10		

Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) =	1.0)3		(54)
Enter (50) or (54) in (55)		1.0)3		(55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$				
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.0	.01 30.98	32.01		(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	50), else (57)m = (56)m who	ere (H11) is fron	n Appendix	Н	
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.0	.01 30.98	32.01		(57)
Primary circuit loss (annual) from Table 3		0)		(58)
Primary circuit loss calculated for each month (59)m = (58) ÷	365 × (41)m	·			
(modified by factor from Table H5 if there is solar water hea	ting and a cylinder ther	rmostat)			
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26	23.26 22.51 23.2	.26 22.51	23.26		(59)
Combi loss calculated for each month (61)m = (60) \div 365 × (4	1)m				
(61)m= 0 0 0 0 0 0	0 0 0	0	0		(61)
Total heat required for water heating calculated for each month	$h (62)m = 0.85 \times (45)m$	n + (46)m + ((57)m + (59)m + (61)m	
(62)m= 215.08 189.69 199.5 179.23 175.93 157.61 151.79	165.98 165.52 185.	5.83 196.01	210.04		(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quan	ity) (enter '0' if no solar contr	tribution to water	r heating)		
(add additional lines if FGHRS and/or WWHRS applies, see A	ppendix G)				
(63)m= 0 0 0 0 0 0	0 0 0	0	0		(63)
Output from water heater					
(64)m= 215.08 189.69 199.5 179.23 175.93 157.61 151.79	165.98 165.52 185.	5.83 196.01	210.04		
	Output from water he	eater (annual)1	.12	2192.18	(64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)	m + (61)ml + 0.8 x [(46	6)m + (57)m -	+ (59)m 1		
	(0.)] . 0.0 / [(.0	· (· (·) · · ·	. (00)]		
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3	81.03 80.04 87.6		95.68		(65)
	81.03 80.04 87.6	.63 90.18	95.68	ating	(65)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3	81.03 80.04 87.6	.63 90.18	95.68	ating	(65)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a):	81.03 80.04 87.6	.63 90.18	95.68	ating	(65)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the	81.03 80.04 87.6 dwelling or hot water	.63 90.18	95.68	ating	(65)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts	81.03 80.04 87.6 dwelling or hot water	is from comm	95.68 munity he	ating	(65)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24	81.03 80.04 87.6 dwelling or hot water in Aug Sep Oc. 134.24 134.24 134.24	is from comm	95.68 munity he	ating	
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	81.03 80.04 87.6 dwelling or hot water in Aug Sep Oc. 134.24 134.24 134.24	90.18 is from common Nov Nov Nov 1.24 134.24	95.68 munity he		
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.	81.03 80.04 87.6 dwelling or hot water Aug Sep O 134.24 134.24 134. also see Table 5 10.69 14.35 18.3	0ct Nov 1.24 134.24	95.68 munity he		(66)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.	81.03 80.04 87.6 dwelling or hot water Aug Sep O 134.24 134.24 134. also see Table 5 10.69 14.35 18.3 13a), also see Table 5	0ct Nov 1.24 134.24	95.68 munity he		(66)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.	81.03 80.04 87.6 dwelling or hot water Aug Sep O 134.24 134.24 134. also see Table 5 10.69 14.35 18.2 13a), also see Table 5 182.56 189.04 202.	0ct Nov 1.24 134.24	95.68 munity he Dec 134.24		(66) (67)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.25 134.26 134.	81.03 80.04 87.6 dwelling or hot water Aug Sep O 134.24 134.24 134. also see Table 5 10.69 14.35 18.3 13a), also see Table 5 182.56 189.04 202. a), also see Table 5	0ct Nov 1.24 134.24 22.2 21.27 5.2.81 220.2	95.68 munity he Dec 134.24		(66) (67) (68)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the final content of the first of the fi	81.03 80.04 87.6 dwelling or hot water Aug Sep O 134.24 134.24 134. also see Table 5 10.69 14.35 18.2 13a), also see Table 5 182.56 189.04 202.	0ct Nov 1.24 134.24 22.2 21.27 5.2.81 220.2	95.68 munity he Dec 134.24 22.67 236.55		(66) (67)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.25 Lighting gains (calculated in Appendix L, equation L9 or L9a), (67)m= 22.06 19.59 15.94 12.06 9.02 7.61 8.23 Appliances gains (calculated in Appendix L, equation L13 or L (68)m= 247.46 250.03 243.56 229.78 212.4 196.05 185.13 Cooking gains (calculated in Appendix L, equation L15 or L15 (69)m= 36.42 36.42 36.42 36.42 36.42 36.42 36.42 36.42 36.42	Aug Sep O 134.24 134.24 134. also see Table 5 10.69 14.35 18.3 13a), also see Table 5 182.56 189.04 202. a), also see Table 5 36.42 36.42 36.42	0ct Nov 1.24 134.24 22 21.27 36 2.81 220.2	95.68 munity he Dec 134.24 22.67 236.55		(66) (67) (68) (69)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the final content of the first of the fi	81.03 80.04 87.6 dwelling or hot water Aug Sep O 134.24 134.24 134. also see Table 5 10.69 14.35 18.3 13a), also see Table 5 182.56 189.04 202. a), also see Table 5	0ct Nov 1.24 134.24 22 21.27 36 2.81 220.2	95.68 munity he Dec 134.24 22.67 236.55		(66) (67) (68)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the final state of the first of the firs	81.03 80.04 87.6 81.03 80.04 87.6 87.	0ct Nov 1.24 134.24 22.2 21.27 36.2.81 220.2 20.2 0 0	95.68 munity he Dec 134.24 22.67 236.55 36.42 0		(66) (67) (68) (69) (70)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.	81.03 80.04 87.6 81.03 80.04 87.6 87.	0ct Nov 1.24 134.24 22.2 21.27 36.2.81 220.2 20.2 0 0	95.68 munity he Dec 134.24 22.67 236.55		(66) (67) (68) (69)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.25 Lighting gains (calculated in Appendix L, equation L9 or L9a), (67)m= 22.06 19.59 15.94 12.06 9.02 7.61 8.23 Appliances gains (calculated in Appendix L, equation L13 or L (68)m= 247.46 250.03 243.56 229.78 212.4 196.05 185.13 Cooking gains (calculated in Appendix L, equation L15 or L15 (69)m= 36.42 36.4	Aug Sep Oo 134.24 134.24 134.24 134.24 134.35 18.31 182.56 189.04 202.41 202.42 36	0ct Nov 1.24 134.24 134.24 122 21.27 136.42 136.42 10 0 0 7.39 -107.39	95.68 munity he Dec 134.24 22.67 236.55 36.42 0 -107.39		(66) (67) (68) (69) (70)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the final include (57)m in calculation of (65)m only if cylinder is in the final include (57)m in calculation of (65)m only if cylinder is in the final include (57)m in calculation of (65)m only if cylinder is in the final include (57)m only if cylinder is in the final included in Special included in Appendix L (66)m= 134.24 1	Aug Sep Our 134.24 134.24 134.24 134.24 134.35 182.56 189.04 202.24), also see Table 5 36.42 36.	0ct Nov 1.24 134.24 134.24 134.24 134.24 136.42 10 0 0 7.39 -107.39	95.68 munity he Dec 134.24 22.67 236.55 36.42 0 -107.39		(66) (67) (68) (69) (70)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.25 Lighting gains (calculated in Appendix L, equation L9 or L9a), (67)m= 22.06 19.59 15.94 12.06 9.02 7.61 8.23 Appliances gains (calculated in Appendix L, equation L13 or L (68)m= 247.46 250.03 243.56 229.78 212.4 196.05 185.13 Cooking gains (calculated in Appendix L, equation L15 or L15 (69)m= 36.42 36.4	Aug Sep Or	0ct Nov 1.24 134.24 134.24 134.24 134.24 136.42 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	95.68 munity he Dec 134.24 22.67 236.55 36.42 0 -107.39 128.6 m		(66) (67) (68) (69) (70) (71)
(65)m= 97.36 86.41 92.18 84.6 84.34 77.41 76.3 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.	Aug Sep Or	0ct Nov 1.24 134.24 134.24 134.24 134.24 136.42 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	95.68 munity he Dec 134.24 22.67 236.55 36.42 0 -107.39		(66) (67) (68) (69) (70)

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

Orienta	tion:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	2.24	x	10.63	x	0.4	x	0.8] =	5.28	(74)
North	0.9x	0.77	x	2.71	x	10.63	x	0.4	x	0.8	=	6.39	(74)
North	0.9x	0.77	x	4.1	x	10.63	x	0.4	x	0.8	=	9.67	(74)
North	0.9x	0.77	x	1.5	x	10.63	x	0.4	x	0.8	=	3.54	(74)
North	0.9x	0.77	x	2.24	x	20.32	X	0.4	X	0.8	=	10.09	(74)
North	0.9x	0.77	x	2.71	x	20.32	x	0.4	x	0.8	=	12.21	(74)
North	0.9x	0.77	x	4.1	x	20.32	x	0.4	x	0.8	=	18.48	(74)
North	0.9x	0.77	X	1.5	x	20.32	X	0.4	X	0.8	=	6.76	(74)
North	0.9x	0.77	x	2.24	x	34.53	x	0.4	x	0.8	=	17.15	(74)
North	0.9x	0.77	X	2.71	x	34.53	X	0.4	X	0.8	=	20.75	(74)
North	0.9x	0.77	X	4.1	X	34.53	X	0.4	X	0.8	=	31.4	(74)
North	0.9x	0.77	x	1.5	x	34.53	X	0.4	X	0.8	=	11.49	(74)
North	0.9x	0.77	X	2.24	X	55.46	X	0.4	X	0.8	=	27.55	(74)
North	0.9x	0.77	x	2.71	x	55.46	X	0.4	X	0.8	=	33.33	(74)
North	0.9x	0.77	X	4.1	x	55.46	X	0.4	X	0.8	=	50.43	(74)
North	0.9x	0.77	X	1.5	x	55.46	X	0.4	X	0.8	=	18.45	(74)
North	0.9x	0.77	x	2.24	x	74.72	X	0.4	X	0.8	=	37.11	(74)
North	0.9x	0.77	X	2.71	x	74.72	X	0.4	X	0.8	=	44.9	(74)
North	0.9x	0.77	X	4.1	x	74.72	X	0.4	X	0.8	=	67.93	(74)
North	0.9x	0.77	x	1.5	x	74.72	X	0.4	X	0.8	=	24.85	(74)
North	0.9x	0.77	X	2.24	x	79.99	X	0.4	X	0.8	=	39.73	(74)
North	0.9x	0.77	X	2.71	x	79.99	X	0.4	X	0.8	=	48.07	(74)
North	0.9x	0.77	x	4.1	X	79.99	X	0.4	x	0.8	=	72.72	(74)
North	0.9x	0.77	x	1.5	x	79.99	x	0.4	X	0.8	=	26.61	(74)
North	0.9x	0.77	x	2.24	x	74.68	X	0.4	X	0.8	=	37.1	(74)
North	0.9x	0.77	X	2.71	X	74.68	X	0.4	X	0.8	=	44.88	(74)
North	0.9x	0.77	X	4.1	x	74.68	X	0.4	X	0.8	=	67.9	(74)
North	0.9x	0.77	X	1.5	X	74.68	X	0.4	X	0.8	=	24.84	(74)
North	0.9x	0.77	X	2.24	X	59.25	X	0.4	X	0.8	=	29.43	(74)
North	0.9x	0.77	X	2.71	X	59.25	X	0.4	X	0.8	=	35.61	(74)
North	0.9x	0.77	X	4.1	x	59.25	X	0.4	X	0.8	=	53.87	(74)
North	0.9x	0.77	X	1.5	x	59.25	X	0.4	X	0.8	=	19.71	(74)
North	0.9x	0.77	X	2.24	X	41.52	X	0.4	X	0.8	=	20.62	(74)
North	0.9x	0.77	X	2.71	X	41.52	X	0.4	X	0.8	=	24.95	(74)
North	0.9x	0.77	x	4.1	x	41.52	X	0.4	X	0.8	=	37.75	(74)
North	0.9x	0.77	x	1.5	x	41.52	x	0.4	x	0.8	=	13.81	(74)
North	0.9x	0.77	x	2.24	x	24.19	x	0.4	x	0.8	=	12.02	(74)
North	0.9x	0.77	x	2.71	x	24.19	x	0.4	x	0.8	=	14.54	(74)
North	0.9x	0.77	x	4.1	x	24.19	x	0.4	X	0.8	=	21.99	(74)

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North	0.9x	0.77	X	1.5	X	24.19	X	0.4	X	0.8	=	8.05	(74)
North	0.9x	0.77	X	2.24	X	13.12	X	0.4	X	0.8	=	6.52	(74)
North	0.9x	0.77	X	2.71	X	13.12	X	0.4	X	0.8	=	7.88	(74)
North	0.9x	0.77	X	4.1	X	13.12	X	0.4	X	0.8	=	11.93	(74)
North	0.9x	0.77	X	1.5	X	13.12	X	0.4	X	0.8	=	4.36	(74)
North	0.9x	0.77	X	2.24	X	8.86	X	0.4	X	0.8	=	4.4	(74)
North	0.9x	0.77	X	2.71	x	8.86	X	0.4	X	0.8	=	5.33	(74)
North	0.9x	0.77	X	4.1	x	8.86	x	0.4	x	0.8	=	8.06	(74)
North	0.9x	0.77	X	1.5	x	8.86	X	0.4	X	0.8	=	2.95	(74)
East	0.9x	0.77	X	2.71	x	19.64	X	0.4	X	0.8	=	11.8	(76)
East	0.9x	0.77	X	6.73	x	19.64	x	0.4	x	0.8	=	29.31	(76)
East	0.9x	0.77	X	2.71	x	19.64	x	0.4	x	0.8	=	11.8	(76)
East	0.9x	0.77	X	2.71	x	38.42	X	0.4	x	0.8	=	23.09	(76)
East	0.9x	0.77	X	6.73	x	38.42	X	0.4	x	0.8	=	57.34	(76)
East	0.9x	0.77	X	2.71	x	38.42	x	0.4	X	0.8	=	23.09	(76)
East	0.9x	0.77	X	2.71	x	63.27	x	0.4	x	0.8	=	38.03	(76)
East	0.9x	0.77	X	6.73	x	63.27	X	0.4	x	0.8	=	94.43	(76)
East	0.9x	0.77	X	2.71	x	63.27	x	0.4	X	0.8	=	38.03	(76)
East	0.9x	0.77	X	2.71	x	92.28	X	0.4	x	0.8	=	55.46	(76)
East	0.9x	0.77	X	6.73	x	92.28	X	0.4	X	0.8	=	137.72	(76)
East	0.9x	0.77	X	2.71	x	92.28	x	0.4	x	0.8	=	55.46	(76)
East	0.9x	0.77	X	2.71	x	113.09	x	0.4	x	0.8] =	67.97	(76)
East	0.9x	0.77	X	6.73	x	113.09	x	0.4	x	0.8	=	168.78	(76)
East	0.9x	0.77	X	2.71	x	113.09	x	0.4	x	0.8	=	67.97	(76)
East	0.9x	0.77	x	2.71	x	115.77	x	0.4	x	0.8] =	69.57	(76)
East	0.9x	0.77	x	6.73	x	115.77	x	0.4	x	0.8] =	172.78	(76)
East	0.9x	0.77	X	2.71	x	115.77	x	0.4	x	0.8] =	69.57	(76)
East	0.9x	0.77	X	2.71	x	110.22	x	0.4	x	0.8] =	66.24	(76)
East	0.9x	0.77	X	6.73	x	110.22	x	0.4	x	0.8] =	164.49	(76)
East	0.9x	0.77	X	2.71	x	110.22	x	0.4	x	0.8	j =	66.24	(76)
East	0.9x	0.77	X	2.71	x	94.68	x	0.4	x	0.8	=	56.9	(76)
East	0.9x	0.77	X	6.73	x	94.68	x	0.4	х	0.8	j =	141.3	(76)
East	0.9x	0.77	x	2.71	×	94.68	x	0.4	x	0.8] =	56.9	(76)
East	0.9x	0.77	X	2.71	x	73.59	x	0.4	x	0.8	=	44.22	(76)
East	0.9x	0.77	X	6.73	x	73.59	x	0.4	x	0.8	=	109.83	(76)
East	0.9x	0.77	X	2.71	x	73.59	x	0.4	x	0.8	j =	44.22	(76)
East	0.9x	0.77	X	2.71	x	45.59	x	0.4	x	0.8	j =	27.4	(76)
East	0.9x	0.77	X	6.73	x	45.59	x	0.4	x	0.8	j =	68.04	(76)
East	0.9x	0.77	x	2.71	×	45.59	×	0.4	x	0.8	j =	27.4	(76)
East	0.9x	0.77	X	2.71	x	24.49	x	0.4	x	0.8	j =	14.72	(76)
East	0.9x	0.77	X	6.73	x	24.49	x	0.4	х	0.8	i =	36.55	(76)
	L		_						•		•		_

East 0.9x 0.77 x 2.71 x 24.49 x 0.4 x 0.8 = 14.72 East 0.9x 0.77 x 2.71 x 16.15 x 0.4 x 0.8 = 9.71 East 0.9x 0.77 x 6.73 x 16.15 x 0.4 x 0.8 = 24.1 East 0.9x 0.77 x 2.71 x 16.15 x 0.4 x 0.8 = 9.71 South 0.9x 0.77 x 2.24 x 46.75 x 0.4 x 0.8 = 23.22 South 0.9x 0.77 x 1.5 x 46.75 x 0.4 x 0.8 = 15.55 South 0.9x 0.77 x 1.65 x 46.75 x 0.4 x 0.8 = 17.11 South 0.9x 0.77 x 1.68 x 46.75 x 0.4 x 0.8 = 17.11 South 0.9x 0.77 x 1.68 x 46.75 x 0.4 x 0.8 = 17.42 South 0.9x 0.77 x 1.68 x 46.75 x 0.4 x 0.8 = 17.42	(76) (76) (76) (78) (78) (78) (78) (78) (78) (78) (78
East	(76) (76) (78) (78) (78) (78) (78) (78) (78)
East 0.9x 0.77	(76) (78) (78) (78) (78) (78) (78) (78)
South 0.9x 0.77 x 2.24 x 46.75 x 0.4 x 0.8 = 23.22 South 0.9x 0.77 x 1.5 x 46.75 x 0.4 x 0.8 = 15.55 South 0.9x 0.77 x 1.65 x 46.75 x 0.4 x 0.8 = 17.11 South 0.9x 0.77 x 1.68 x 46.75 x 0.4 x 0.8 = 17.42	(78) (78) (78) (78) (78) (78) (78) (78)
South 0.9x 0.77 x 1.5 x 46.75 x 0.4 x 0.8 = 15.55 South 0.9x 0.77 x 1.65 x 46.75 x 0.4 x 0.8 = 17.11 South 0.9x 0.77 x 1.68 x 46.75 x 0.4 x 0.8 = 17.42	(78) (78) (78) (78) (78) (78) (78)
South 0.9x 0.77 x 1.65 x 46.75 x 0.4 x 0.8 = 17.11 South 0.9x 0.77 x 1.68 x 46.75 x 0.4 x 0.8 = 17.42	(78) (78) (78) (78) (78) (78)
South 0.9x 0.77 x 1.68 x 46.75 x 0.4 x 0.8 = 17.42	(78) (78) (78) (78)
Could a 2	(78) (78) (78)
South 0.9x 0.77 x 2.71 x 46.75 x 0.4 x 0.8 = 28.1	(78)
	(78)
South 0.9x 0.77 x 2.24 x 76.57 x 0.4 x 0.8 = 38.03	===
South 0.9x 0.77 x 1.5 x 76.57 x 0.4 x 0.8 = 25.47	(70)
South 0.9x 0.77 x 1.65 x 76.57 x 0.4 x 0.8 = 28.02	(78)
South 0.9x 0.77 x 1.68 x 76.57 x 0.4 x 0.8 = 28.53	(78)
South 0.9x 0.77 x 2.71 x 76.57 x 0.4 x 0.8 = 46.01	(78)
South 0.9x 0.77 x 2.24 x 97.53 x 0.4 x 0.8 = 48.45	(78)
South 0.9x 0.77 x 1.5 x 97.53 x 0.4 x 0.8 = 32.44	(78)
South 0.9x 0.77 x 1.65 x 97.53 x 0.4 x 0.8 = 35.69	(78)
South 0.9x 0.77 x 1.68 x 97.53 x 0.4 x 0.8 = 36.34	(78)
South 0.9x 0.77 x 2.71 x 97.53 x 0.4 x 0.8 = 58.61	(78)
South 0.9x 0.77 x 2.24 x 110.23 x 0.4 x 0.8 = 54.76	(78)
South 0.9x 0.77 x 1.5 x 110.23 x 0.4 x 0.8 = 36.67	(78)
South 0.9x 0.77 x 1.65 x 110.23 x 0.4 x 0.8 = 40.34	(78)
South 0.9x 0.77 x 1.68 x 110.23 x 0.4 x 0.8 = 41.07	(78)
South 0.9x 0.77 x 2.71 x 110.23 x 0.4 x 0.8 = 66.25	(78)
South 0.9x 0.77 x 2.24 x 114.87 x 0.4 x 0.8 = 57.06	(78)
South 0.9x 0.77 x 1.5 x 114.87 x 0.4 x 0.8 = 38.21	(78)
South 0.9x 0.77 x 1.65 x 114.87 x 0.4 x 0.8 = 42.03	(78)
South 0.9x 0.77 x 1.68 x 114.87 x 0.4 x 0.8 = 42.8	(78)
South 0.9x 0.77 x 2.71 x 114.87 x 0.4 x 0.8 = 69.03	(78)
South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 54.91	(78)
South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 36.77	(78)
South 0.9x 0.77 x 1.65 x 110.55 x 0.4 x 0.8 = 40.45	(78)
South 0.9x 0.77 x 1.68 x 110.55 x 0.4 x 0.8 = 41.19	(78)
South 0.9x 0.77 x 2.71 x 110.55 x 0.4 x 0.8 = 66.44	(78)
South 0.9x 0.77 x 2.24 x 108.01 x 0.4 x 0.8 = 53.65	(78)
South 0.9x 0.77 x 1.5 x 108.01 x 0.4 x 0.8 = 35.93	(78)
South 0.9x 0.77 x 1.65 x 108.01 x 0.4 x 0.8 = 39.52	(78)
South 0.9x 0.77 x 1.68 x 108.01 x 0.4 x 0.8 = 40.24	(78)
South 0.9x 0.77 x 2.71 x 108.01 x 0.4 x 0.8 = 64.91	(78)
South 0.9x 0.77 x 2.24 x 104.89 x 0.4 x 0.8 = 52.11	(78)
South 0.9x 0.77 x 1.5 x 104.89 x 0.4 x 0.8 = 34.89	(78)

South 0.5% 0.77		_																	
South 0.9	South	0.9x	0.77		X	1.6	5	X	10	04.89	X		0.4	x	0.8		=	38.38	(78)
South 0.9x 0.77 x 1.65 x 101.89 x 0.4 x 0.8 = 33.89 78 South 0.9x 0.77 x 1.68 x 101.89 x 0.4 x 0.8 = 33.89 78 South 0.9x 0.77 x 1.68 x 101.89 x 0.4 x 0.8 = 37.28 78 South 0.9x 0.77 x 1.68 x 101.89 x 0.4 x 0.8 = 37.28 78 South 0.9x 0.77 x 2.24 x 82.89 x 0.4 x 0.8 = 37.28 78 South 0.9x 0.77 x 2.27 x 1.68 x 101.89 x 0.4 x 0.8 = 41.02 78 South 0.9x 0.77 x 2.27 x 1.68 x 101.89 x 0.4 x 0.8 = 41.02 78 South 0.9x 0.77 x 1.68 x 101.89 x 0.4 x 0.8 = 41.02 78 South 0.9x 0.77 x 1.68 x 82.89 x 0.4 x 0.8 = 41.02 78 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 41.02 78 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 30.22 78 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 30.22 78 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 40.02 78 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 30.22 78 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 30.22 78 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.65 x 82.89 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.68 x 40.4 x 40.4 x 0.4 x 0.8 = 40.80 77 South 0.9x 0.77 x 1.6 x 40.80 78 South 0.9x 0.77	South	0.9x	0.77		x	1.6	8	X	10	04.89	X		0.4	x [0.8		=	39.08	(78)
South 0.9x 0.77 x 1.65 x 101.89 x 0.4 x 0.8 = 33.88 (78) South 0.9x 0.77 x 1.65 x 101.89 x 0.4 x 0.8 = 37.28 (78) South 0.9x 0.77 x 1.68 x 101.89 x 0.4 x 0.8 = 37.28 (78) South 0.9x 0.77 x 1.68 x 101.89 x 0.4 x 0.8 = 61.23 (78) South 0.9x 0.77 x 2.21 x 101.89 x 0.4 x 0.8 = 61.23 (78) South 0.9x 0.77 x 2.21 x 101.89 x 0.4 x 0.8 = 61.23 (78) South 0.9x 0.77 x 1.65 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.65 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 2.24 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 2.24 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.65 x 65.42 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.8 x 0.8 = 70.22 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.8 x 0.8 x 0.22 (78) South 0.9x 0.77 x 1.68	South	0.9x	0.77		x	2.7	1	X	10	04.89	X		0.4	x [0.8		=	63.04	(78)
South	South	0.9x	0.77		x	2.2	4	X	10	01.89	X		0.4	x [0.8		=	50.61	(78)
South	South	0.9x	0.77		x	1.5	5	X	10	01.89	x		0.4	x [0.8		=	33.89	(78)
South 0.9x 0.77 x 2.271 x 1.15 x 82.59 x 0.4 x 0.8 = 41.02 (78) South 0.9x 0.77 x 1.15 x 82.59 x 0.4 x 0.8 = 41.02 (78) South 0.9x 0.77 x 1.15 x 82.59 x 0.4 x 0.8 = 27.47 (78) South 0.9x 0.77 x 1.16 x 82.59 x 0.4 x 0.8 = 30.22 (78) South 0.9x 0.77 x 1.16 x 82.59 x 0.4 x 0.8 = 30.22 (78) South 0.9x 0.77 x 1.16 x 82.59 x 0.4 x 0.8 = 30.27 (78) South 0.9x 0.77 x 1.16 x 82.59 x 0.4 x 0.8 = 30.27 (78) South 0.9x 0.77 x 1.16 x 82.59 x 0.4 x 0.8 = 49.63 (78) South 0.9x 0.77 x 2.271 x 82.59 x 0.4 x 0.8 = 49.63 (78) South 0.9x 0.77 x 2.271 x 82.59 x 0.4 x 0.8 = 49.63 (78) South 0.9x 0.77 x 1.16 x 5.542 x 0.4 x 0.8 = 49.63 (78) South 0.9x 0.77 x 1.16 x 5.542 x 0.4 x 0.8 = 27.53 (78) South 0.9x 0.77 x 1.16 x 5.542 x 0.4 x 0.8 = 27.53 (78) South 0.9x 0.77 x 1.16 x 5.542 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.16 x 5.542 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 2.24 x 40.4 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 2.24 x 40.4 x 0.4 x 0.8 = 20.25 (78) South 0.9x 0.77 x 2.24 x 40.4 x 0.4 x 0.8 = 20.07 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 2.271 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 2.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.16 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 2.271 x 40.4 x 0.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 2.271 x 40.4 x 0.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 2.271 x 40.4 x 0.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 2.271 x 40.4 x 0.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 2.28 x 0.4 x 0.8 x 0.4 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x 0.8 x	South	0.9x	0.77		x	1.6	5	X	10	01.89	x		0.4	x [0.8		=	37.28	(78)
South	South	0.9x	0.77		x	1.6	8	X	10	01.89	x		0.4	x [0.8		=	37.96	(78)
South 0.9x 0.77 x 1.65 x 82.59 x 0.4 x 0.8 = 2.7747 (78) South 0.9x 0.77 x 1.665 x 82.59 x 0.4 x 0.8 = 30.72 (78) South 0.9x 0.77 x 1.665 x 82.59 x 0.4 x 0.8 = 30.77 (78) South 0.9x 0.77 x 2.21 x 82.59 x 0.4 x 0.8 = 30.77 (78) South 0.9x 0.77 x 2.24 x 55.42 x 0.4 x 0.8 = 449.63 (78) South 0.9x 0.77 x 1.55 x 55.42 x 0.4 x 0.8 = 2.753 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 18.43 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.05 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.05 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 20.05 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 20.05 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 20.05 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 33.3 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 33.3 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 33.3 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 33.3 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 114.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 114.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 114.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 114.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 144.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.4 x 0.8 = 1	South	0.9x	0.77		x	2.7	1	X	10	01.89	X		0.4	x [0.8		=	61.23	(78)
South	South	0.9x	0.77		x	2.2	4	X	8	2.59	x		0.4	x [0.8		=	41.02	(78)
South 0.9x 0.77 x 1.68 x 82.59 x 0.4 x 0.8 = 30.77 (78) South 0.9x 0.77 x 1.5 x 55.42 x 0.4 x 0.8 = 49.63 (78) South 0.9x 0.77 x 1.5 x 55.42 x 0.4 x 0.8 = 18.43 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 18.43 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 2.21 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 1.5 x 40.4 x 0.4 x 0.8 = 20.67 (78) South 0.9x 0.77 x 1.5 x 40.4 x 0.4 x 0.8 = 20.07 (78) South 0.9x 0.77 x 1.5 x 40.4 x 0.4 x 0.8 = 20.07 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.55 (78) South 0.9x 0.77 x 2.1.68 x 40.4 x 0.4 x 0.8 = 15.55 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.8 = 15.55 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.8 = 15.55 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.55 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.55 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.2.24 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.2.24 x 2.71 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.2.24 x 2.2 x	South	0.9x	0.77		x	1.5	5	X	8	2.59	x		0.4	x [0.8		=	27.47	(78)
South 0,9x 0,77 x 2,271 x 82.59 x 0,4 x 0,8 = 49.63 (78) South 0,9x 0,77 x 1.65 x 55.42 x 0,4 x 0,8 = 20.28 (78) South 0,9x 0,77 x 1.65 x 55.42 x 0,4 x 0,8 = 20.28 (78) South 0,9x 0,77 x 1.65 x 55.42 x 0,4 x 0,8 = 20.28 (78) South 0,9x 0,77 x 1.68 x 55.42 x 0,4 x 0,8 = 20.28 (78) South 0,9x 0,77 x 1.68 x 55.42 x 0,4 x 0,8 = 20.65 (78) South 0,9x 0,77 x 1.68 x 55.42 x 0,4 x 0,8 = 20.65 (78) South 0,9x 0,77 x 2.71 x 55.42 x 0,4 x 0,8 = 20.65 (78) South 0,9x 0,77 x 2.71 x 55.42 x 0,4 x 0,8 = 20.65 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,8 = 20.07 (78) South 0,9x 0,77 x 1.65 x 40,4 x 0,4 x 0,8 = 20.07 (78) South 0,9x 0,77 x 1.65 x 40,4 x 0,4 x 0,8 = 20.07 (78) South 0,9x 0,77 x 1.65 x 40,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.65 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 15,55 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 15,55 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 0,4 x 0,4 x 0,8 = 14,78 (78) South 0,9x 0,77 x 1.68 x 40,4 x 1,4 x 1,	South	0.9x	0.77		x	1.6	5	X	8	2.59	x		0.4	x [0.8		=	30.22	(78)
South 0.9x 0.77 x 2.224 x 55.42 x 0.4 x 0.8 = 27.53 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 2.71 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 2.71 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 2.71 x 55.42 x 0.4 x 0.8 = 20.67 (78) South 0.9x 0.77 x 1.5 x 40.4 x 0.4 x 0.8 = 20.07 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.8 = 24.28 (78) Solar gains in watts, calculated for each month (83)m = 179.19 317.12 462.8 617.48 728.65 738.82 765.94 621.2 616.38 358.54 216.86 151.87 (83) Total gains - internal and solar (84)m = (73)m + (83)m, watts (84)m = 642.84 778.61 909.46 1040.1 1126.99 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 (84) Themperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 20.25 20.44 20.68 20.89 20.89 20.8 21 21 21 20.29 20.20 20.22 20.21 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m = 0.99 0.98 0.93 0.8 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1	South	0.9x	0.77		x	1.6	8	X	8	2.59	x		0.4	x [0.8		=	30.77	(78)
South 0.9x 0.77 x 1.55 x 55.42 x 0.4 x 0.8 = 18.43 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0.9x 0.77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 1.68 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 2.71 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0.9x 0.77 x 2.71 x 55.42 x 0.4 x 0.8 = 20.07 (78) South 0.9x 0.77 x 2.24 x 40.4 x 0.4 x 0.8 = 20.07 (78) South 0.9x 0.77 x 1.55 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.4 x 0.8 = 24.28 (78) South 0.9x 0.77 x 2.21 x 40.2 x 0.3 x 0.5 x 0.4 x 0.8 = 24.2 x 0.8 x 0	South	0.9x	0.77		x	2.7	1	X	8	2.59	X		0.4	x [0.8		=	49.63	(78)
South 0,9x 0,77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.28 (78) South 0,9x 0,77 x 1.65 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0,9x 0,77 x 2.71 x 55.42 x 0.4 x 0.8 = 20.65 (78) South 0,9x 0,77 x 2.71 x 55.42 x 0.4 x 0.8 = 33.3 (78) South 0,9x 0,77 x 2.24 x 40.4 x 0.4 x 0.8 = 33.3 (78) South 0,9x 0,77 x 1.5 x 40.4 x 0.4 x 0.8 = 20.07 (78) South 0,9x 0,77 x 1.5 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0,9x 0,77 x 1.65 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0,9x 0,77 x 1.65 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0,9x 0,77 x 1.65 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0,9x 0,77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0,9x 0,77 x 2.71 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0,9x 0,77 x 2.71 x 40.4 x 0.4 x 0.8 = 24.28 (78) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 179.19 317.12 462.8 617.48 728.65 738.82 705.94 621.2 516.38 358.54 216.86 151.87 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 642.84 778.61 909.46 1040.1 1126.69 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) (86)m = 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1.1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 20.25 20.44 20.88 20.89 20.98 21 21 21 21 20.99 20.85 20.5 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling from Table 9, Th2 (°C) (88)m = 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.22 20.21 20.21 20.21 (88) Wean internal temperature in the rest of dwelling from Table 9a) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (89)m = 0.99 0.98 0.98 0.93 0.8 0.95 0.4 0.27 0.3 0.54 0.87 0.98 1 1 660	South	0.9x	0.77		x	2.2	4	X	5	5.42	x		0.4	x [0.8		=	27.53	(78)
South 0.9x 0.77	South	0.9x	0.77		x	1.5	5	X	5	5.42	x		0.4	x [0.8		=	18.43	(78)
South 0.9x 0.77	South	0.9x	0.77		x	1.6	5	X	5	5.42	X		0.4	x [0.8		=	20.28	(78)
South 0.9x 0.77 x 22.24 x 40.4 x 0.4 x 0.8 = 20.07 (78) South 0.9x 0.77 x 1.5 x 40.4 x 0.4 x 0.8 = 13.44 (78) South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.66 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.8 = 24.28 (78) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 179.19 317.12 462.8 617.48 728.65 738.82 705.94 621.2 516.38 358.54 216.86 151.87 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (84)m = 642.84 778.61 909.46 1040.1 1126.69 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 20.25 20.44 20.68 20.89 20.98 21 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling, h2,m (see Table 9a) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m = 0.99 0.98 0.93 0.8 0.50 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (89)m = 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.02 20.06 19.58 19.16 (89)	South	0.9x	0.77		x	1.6	8	X	5	5.42	x		0.4	x [0.8		=	20.65	(78)
South 0.9x 0.77 × 1.5 × 40.4 × 0.4 × 0.8 = 13.44 (78) South 0.9x 0.77 × 1.66 × 40.4 × 0.4 × 0.8 = 14.78 (78) South 0.9x 0.77 × 1.66 × 40.4 × 0.4 × 0.8 = 15.05 (78) South 0.9x 0.77 × 1.68 × 40.4 × 0.4 × 0.8 = 15.05 (78) South 0.9x 0.77 × 2.71 × 40.4 × 0.4 × 0.8 = 24.28 (78) Solar gains in watts, calculated for each month (83)m = Sum(74)m(62)m (83)m = 179.19 317.12 462.8 617.48 728.65 738.82 705.94 621.2 516.38 358.54 216.86 151.87 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 642.84 778.61 909.46 1040.1 1126.69 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 20.25 20.44 20.68 20.89 20.98 21 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m = 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) Mean internal temperature in the rest of dwelling, h2,m (see Table 9a) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (89)m = 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89)	South	0.9x	0.77		x	2.7	1	X	5	5.42	x		0.4	x [0.8		=	33.3	(78)
South 0.9x 0.77 x 1.65 x 40.4 x 0.4 x 0.8 = 14.78 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.8 = 24.28 (78) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m= 179.19 317.12 462.8 617.48 728.65 738.82 705.94 621.2 516.38 356.54 216.86 151.87 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 642.84 778.61 909.46 1040.1 1126.69 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°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= 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.25 20.44 20.68 20.89 20.98 21 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.21 20.21 (88) Mean internal temperature in the rest of dwelling from Table 9a) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (89)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)	South	0.9x	0.77		x	2.2	4	X		10.4	X		0.4	x [0.8		=	20.07	(78)
South 0.9x 0.77 x 1.68 x 40.4 x 0.4 x 0.4 x 0.8 = 15.05 (78) South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.4 x 0.8 = 24.28 (78) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 179.19 317.12 462.8 617.48 728.65 738.82 705.94 621.2 516.38 358.54 216.86 151.87 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 642.84 778.61 909.46 1040.1 1126.69 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°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 = 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m = 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.22 20.21 20.21 (88) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (89)m = 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)	South	0.9x	0.77		x	1.5	5	X	4	10.4	X		0.4	x [0.8		=	13.44	(78)
South 0.9x	South	0.9x	0.77		x	1.6	5	X		10.4	X		0.4	x	0.8		=	14.78	(78)
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 179.19 317.12 462.8 617.48 728.65 738.82 705.94 621.2 516.38 358.54 216.86 151.87 Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 642.84 778.61 909.46 1040.1 1126.69 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 Temperature during heating periods in the living area from Table 9, Th1 (°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 = 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m = 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m = 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m = 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.20 20.06 19.58 19.16 (90)	South	0.9x	0.77		x	1.6	8	X		10.4	X		0.4	x	0.8		=	15.05	(78)
(83)m=	South	0.9x	0.77		x	2.7	1	x		10.4	x		0.4	x	0.8		=	24.28	(78)
(83)m=											-								
Total gains — internal and solar (84)m = (73)m + (83)m , watts (84)m= 642.84 778.61 909.46 1040.1 1126.69 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) [86]m= 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.23 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)	Solar g	ains in	watts, ca	lculat	ed	for each	montl	h_			(83)m	ı = Su	m(74)m .	(82)m					
(84)m= 642.84 778.61 909.46 1040.1 1126.69 1113.27 1065.12 986.64 894.21 760.63 646.86 602.97 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°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= 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.22 20.23 20.23			l l								621	1.2	516.38	358.54	216.86	151	.87		(83)
7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.20 20.06 19.58 19.16 (90)	Total g				_	<u> </u>		<u> </u>							1			ı	
Temperature during heating periods in the living area from Table 9, Th1 (°C) 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= 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.23 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)	(84)m=	642.84	778.61	909.4	6	1040.1	1126.69	11	13.27	1065.12	986	.64	894.21	760.63	646.86	602	.97		(84)
Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	7. Me	an inter	nal temp	eratu	re (heating	seaso	n)											
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Temp	erature	during he	eating	g pe	eriods in	the liv	ing	area f	rom Tab	ole 9,	, Th1	(°C)					21	(85)
(86)m= 1 0.98 0.95 0.83 0.64 0.45 0.32 0.37 0.6 0.9 0.99 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.20 20.06 19.58 19.16	Utilisa	ition fac	tor for ga	ains fo	or li	ving are	a, h1,r	n (s	ее Та	ble 9a)					_			1	
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)		Jan	Feb	Ма	r	Apr	May		Jun	Jul	A	ug	Sep	Oct	Nov	D	ес		
(87)m= 20.25 20.44 20.68 20.89 20.98 21 21 21 20.99 20.85 20.5 20.21 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.20 20.06 19.58 19.16	(86)m=	1	0.98	0.95		0.83	0.64	(0.45	0.32	0.3	37	0.6	0.9	0.99	1			(86)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.23 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)	Mean	interna	l tempera	ature	in li	ving are	ea T1 (follo	w ste	ps 3 to 7	in T	able	9c)						
(88)m= 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)	(87)m=	20.25	20.44	20.68	3	20.89	20.98		21	21	2	1	20.99	20.85	20.5	20.	21		(87)
(88)m= 20.2 20.21 20.21 20.22 20.22 20.23 20.23 20.23 20.22 20.22 20.22 20.21 20.21 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)	Temp	erature	durina he	eating	3 D E	eriods in	rest o	f dw	ellina	from Ta	able 9	9. Th	2 (°C)		•				
(89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.20 20.06 19.58 19.16	· r		 		' ' '			_	Ť				<u>` </u>	20.22	20.21	20.	21		(88)
(89)m= 0.99 0.98 0.93 0.8 0.59 0.4 0.27 0.3 0.54 0.87 0.98 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.20 20.06 19.58 19.16	l Itilien		tor for as	ine fr	 \r r	26t Ut 41	velling	h?	m (so	a Table	0 <i>a)</i>		!		1			I	
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)	r		 		$\overline{}$	ı		$\overline{}$	<u> </u>		–	3	0.54	0.87	0.98	1			(89)
(90)m= 19.21 19.48 19.81 20.1 20.2 20.23 20.23 20.23 20.22 20.06 19.58 19.16 (90)			<u> </u>								<u> </u>				1	<u> </u>			()
	r				$\overline{}$	ī		Ť	<u> </u>		·		ī		10.50	10	16		(00)
$\frac{12A - \text{Living area} + (7) - 0.42}{0.42}$	(an)in=	19.21	19.48	19.8	<u>' </u>	∠U. I	20.2		.∪.∠3	20.23	20	23					10	0.40	_
													"	_, (— LIVI	y aroa + (•	., –		0.42	(91)

Mean inter	nal tampa	aturo (fo	r tho wh	olo dwo	lling) – fl	. ∧ ∨ T1	. /1 fl	۸) ی T2					
(92)m= 19.6		20.17	20.43	20.53	20.55	20.55	20.55	20.54	20.39	19.96	19.6		(92)
Apply adju		l											,
(93)m= 19.6		20.17	20.43	20.53	20.55	20.55	20.55	20.54	20.39	19.96	19.6		(93)
8. Space h	eating req	uirement											
Set Ti to th					ed at sto	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Jar	1	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation f			<u> </u>	IVICIA	Juli	Jui	Aug	Оср	001	1404	DCC		
(94)m= 0.99	 	0.93	0.81	0.61	0.42	0.29	0.33	0.56	0.88	0.98	1		(94)
Useful gair	ns, hmGm	, W = (94	4)m x (8	4)m		ļ				l			
(95)m= 638.2	29 761.72	849.09	840.65	690.21	467.07	310.65	325.59	503.53	667.12	634.62	599.97		(95)
Monthly av	erage exte	rnal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss r			al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]		-		
(97)m= 1244.	54 1212.19	1104.05	920.5	702.84	467.99	310.72	325.74	509.1	779.31	1029.08	1237.51		(97)
Space hea	ting require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m	,	İ	
(98)m= 451.0	302.72	189.69	57.49	9.4	0	0	0	0	83.47	284.01	474.33		_
							Tota	l per year	(kWh/yeaı	r) = Sum(9	8)15,912 =	1852.16	(98)
Space hea	ting require	ement in	kWh/m²	²/year								19.56	(99)
9b. Energy i	equiremer	nts – Cor	mmunity	heating	scheme								
This part is Fraction of s					-		• .	-		unity sch	neme.	0	(301)
Fraction of s	space heat	from co	mmunity	y system	1 – (30	1) =						1	(302)
The community	•		•	•	,	,	allows for	CHP and t	up to four	other heat	sources; t	he latter	」 ` ′
includes boilers		-			rom powe	r stations.	See Appei	ndix C.					7(2025)
Fraction of h			•									1	(303a)
Fraction of t	•			•						02) x (303	a) =	1	(304a)
Factor for co				,	. ,,		•	iting sys	tem			1	(305)
Distribution	loss factor	(Table 1	(2c) for (commun	ity heatii	ng syste	m					1.1	(306)
Space heat	_	_									1	kWh/year	_
Annual space	e heating	requiren	nent									1852.16	╛
Space heat	from Com	munity h	eat pum	p				(98) x (30	04a) x (30	5) x (306) :	=	2037.38	(307a)
Efficiency of	secondar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space heati	ng require	ment fro	m secon	dary/sup	plemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water heat	-	equirem	ent									2192.18	7
If DHW from	communi	ty schem	ne:	n				(64) x (30)3a) x (304	5) x (306) :	_	2411.39	」 □(310a)
Electricity us		-		-			0.01	× [(307a).				44.49	(313)
•				•			0.01	[(oora).	(5575) T	(υτυα)((0.00)] =		╣
Cooling Sys	_	•	•								ı	0	(314)
Space cooli	ng (if there	is a fixe	d coolin	g system	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)

rom outside		199.01	(330a)
		0	(330b)
		0	(330g)
=(330a) + (330l	b) + (330g) =	199.01	(331)
		389.61	(332)
ty)		-979.34	(333)
e quantity)		0	(334)
Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
	(366) for the second fue	el 319	(367a)
07b)+(310b)] x 100 ÷ (367b) x	0.52	723.8	(367)
[(313) x	0.52	23.09	(372)
(363)(366) + (368)(372	2)	746.89	(373)
(309) x	0 :	0	(374)
taneous heater (312) x	0.52	0	(375)
(373) + (374) + (375) =		746.89	(376)
welling (331)) x	0.52	103.28	(378)
(332))) x	0.52	202.21	(379)
plicable	0.52 x 0.01 =	-508.28	(380)
		544.1	(383)
		5.75	(384)
	Energy kWh/year HP) using two fuels repeat (363) to 07b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(372 (309) x staneous heater (312) x (373) + (374) + (375) = welling (331)) x	=(330a) + (330b) + (330g) = ty) Energy Emission factor kg CO2/kWh HP) using two fuels repeat (363) to (366) for the second fuel 07b)+(310b)] x 100 ÷ (367b) x	0

El rating (section 14)

			User D) otoilo:						
A N 1			User L					OTDO	22222	
Assessor Name:	John Simps			Strom					006273	
Software Name:	Stroma FS			Softwa				Versic	n: 1.0.4.26	
			Property							
Address :		oen Court, Mait	land Parl	k Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
_			Are	a(m²)		Av. He	eight(m)	_	Volume(m ³	<u> </u>
Ground floor				94.7	(1a) x		2.6	(2a) =	246.22	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	94.7	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	246.22	(5)
2. Ventilation rate:										
	main heating	seconda heating	ıry	other		total			m³ per hou	ır
Number of chimneys	0	+ 0	+	0] = [0	Х	40 =	0	(6a)
Number of open flues	0	+ 0	╡ + ┌	0	-	0	x	20 =	0	(6b)
Number of intermittent fa	ans					3	x	10 =	30	(7a)
Number of passive vents	3				F	0	x	10 =	0	(7b)
Number of flueless gas f	ires				F	0	x	40 =	0	(7c)
					L					
								Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fa	ans = $(6a)+(6b)+$	(7a)+(7b)+(7c) =		30		÷ (5) =	0.12	(8)
If a pressurisation test has b			ed to (17),	otherwise (continue fr	rom (9) to	(16)			_
Number of storeys in t	he dwelling (ns	5)							0	(9)
Additional infiltration							[(9))-1]x0.1 =	0	(10)
Structural infiltration: 0					•	ruction			0	(11)
if both types of wall are p deducting areas of openi			to the great	ter wall are	ea (after					
If suspended wooden	floor, enter 0.2	(unsealed) or (0.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	iter 0.05, else e	enter 0							0	(13)
Percentage of window	s and doors dra	aught stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expresse	d in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeabi	lity value, then	$(18) = [(17) \div 20] +$	(8), otherw	ise (18) = ((16)				0.37	(18)
Air permeability value applie	es if a pressurisatio	on test has been do	one or a de	gree air pe	rmeability	is being u	ısed			` ′
Number of sides sheltered	ed								1	(19)
Shelter factor				(20) = 1 -	[0.075 x ([*]	19)] =			0.92	(20)
Infiltration rate incorpora	ting shelter fact	tor		(21) = (18) x (20) =				0.34	(21)
Infiltration rate modified t	for monthly win	d speed							_	
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table	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 : 1									
vviilu i acitii (22a)iii = (2	<u> </u>	1.00 0.05	1 0.05	0.00		1.00	1 440	1 440	1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

Adjusted infiltr	ation rate	allowi	ng for sh	elter an	ıd wind s	peed) =	(21a) x	(22a)m					
0.44	0.43	0.42	0.38	0.37	0.33	0.33	0.32	0.34	0.37	0.39	0.4]	
Calculate effec		-	rate for t	he appli	cable ca	se	•	•	•	•	•		
If mechanica		-	andiv NL (O	ah) (aa	a) Emy (a	austica (N	VEVV otho	muiaa (22h	\ (220\			0	(23
If balanced with		0		, ,	,	. `	,, .	`) = (23a)			0	(23
		•	•	ŭ		`		,	Ola) (1	001.)	4 (00)	0	(23
a) If balance	ed mecha	nicai ve	ntilation	with ne	at recove	ery (IVIVI	TR) (248	$\frac{a)m = (2a)}{a}$	2b)m + (<i>i</i>	23b) × [1 – (23c) 1 0	1 ÷ 100]]	(24
											0	J	(24
b) If balance	ed mecna			without	neat rec		VIV) (24k 0	í `	r `		Ι ,	1	(24
(24b)m= 0		0	0		ا	0		0	0	0	0	J	(22
c) If whole h	iouse exti n < 0.5 ×			•	•				5 x (23h)			
(24c)m = 0	0.0 1	0	0	0	0	0	0) = (22)	0	0	0	0	1	(24
d) If natural		n or wh	ole hous		ا	entilation	n from					J	•
	n = 1, the								0.5]				
(24d)m= 0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58]	(24
Effective air	change r	ate - er	nter (24a	or (24b	o) or (24c	c) or (24	d) in bo	x (25)	•	•	•		
(25)m= 0.6	0.59	0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58]	(25
3. Heat losse	es and had	ot loop i	ooromote	r:				•			•	•	
	Gross	_	Openin		Net Are	22	U-val	110	AXU		k-value		ΑΧk
ELEMENT	area (m		A,m		W/m2		(W/I	〈)	kJ/m²-l		kJ/K
Nindows Type	e 1				1.63	x1.	/[1/(1.4)+	- 0.04] =	2.16				(27
Nindows Type	e 2				1.98	x1.	/[1/(1.4)+	- 0.04] =	2.62				(27
Windows Type	∋ 3				4.91	x1.	/[1/(1.4)+	- 0.04] =	6.51	=			(27
Windows Type	e 4				1.63	x1.	/[1/(1.4)+	- 0.04] =	2.16	=			(27
Nindows Type					1.09		/[1/(1.4)+	- 0.04] ₌	1.45	=			(27
Vindows Type					1.2		/[1/(1.4)+		1.59	=			(27
Nindows Type					1.22	=	/[1/(1.4)+		1.62	╡			(27
Windows Type					1.98	_	/[1/(1.4)+		2.62	=			(27
Windows Type						_	/[1/(1.4)+			╡			•
Windows Type					1.98				2.62	=			(27
,,					1.98		/[1/(1.4)+		2.62	╡			(2)
Vindows Type					2.99		/[1/(1.4)+		3.96	4			(2
Nindows Type	9 12				1.09	x1,	/[1/(1.4)+	- 0.04] =	1.45	릴 ,			(27
Nalls	79.14		23.68	3	55.46	X	0.18	=	9.98				(29
Total area of e	elements,	m²			79.14								(3.
Party wall					22.31	X	0	=	0	[(32
	l roof windo					ated using	formula 1	1/[(1/U-valu	ıe)+0.04] a	ns given in	paragraph	3.2	
	as on hoth s	SIMPS UT IN			titions								
** include the area				s anu par	titions		(26)(30) + (32) =				44.2	2 (21
** include the area Fabric heat los	ss, W/K =	S (A x		s anu par	titions		(26)(30		(30) + (32	2) + (32a)	(32e) =	41.3	==
for windows and the area fabric heat los fat capacity Thermal mass	ss, W/K = Cm = S(<i>F</i>	S (A x A x k)	U)	·			(26)(30	((28).	(30) + (32	, , ,	(32e) =	41.36 0 250	(34

nerma	ai biliuge	;o.∪(∟	x r) can	culated	using Ap	pendix I	K						8.94	(3
details	of therma	l bridging	are not kn	own (36) =	= 0.05 x (3	11)								
otal fa	bric hea	at loss							(33) +	(36) =			50.31	(3
entila	tion hea	t 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		
3)m=	48.44	48.14	47.84	46.44	46.18	44.96	44.96	44.74	45.43	46.18	46.71	47.26		(3
eat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (3	38)m			
9)m=	98.75	98.45	98.15	96.76	96.49	95.28	95.28	95.05	95.75	96.49	97.02	97.58		
eat lo	ss para	meter (H	HLP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	96.75	(;
0)m=	1.04	1.04	1.04	1.02	1.02	1.01	1.01	1	1.01	1.02	1.02	1.03		
										Average =	Sum(40) ₁ .	12 /12=	1.02	(4
umbe 1			nth (Tab										1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		,
1)m=	31	28	31	30	31	30	31	31	30	31	30	31		(-
. Wa	ter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
sum	ed occu	pancy, I	N									68	1	(
Juli				[1 - evn	(-0.0003	349 x (TF	-A -13.9	1211 + 0 (0013 x (ΓFA -13		.00	J	•
if TF	A > 13.9), IN = 1	+ I./OX	II CAP				<i>,_,</i> , , , , ,			J)			
	A > 13.9 A £ 13.9		+ 1.76 X	i cyb	(0.000	7.0 % (1.	71 .0.0	<i>)</i> 2)] 1 0.0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		3)			
if TF	A £ 13.9	9, N = 1			es per da							.96]	(
if TF inual duce i	A £ 13.9 averag the annua), N = 1 e hot wa laverage	ater usag hot water	ge in litre usage by	es per da 5% if the d	ay Vd,av Wwelling is	erage = designed	(25 x N)	+ 36		97	7.96]	(
if TF inual duce i	A £ 13.9 averag the annua), N = 1 e hot wa laverage	ater usag hot water	ge in litre usage by	es per da	ay Vd,av Wwelling is	erage = designed	(25 x N)	+ 36		97	7.96]	(
if TF, inual duce t t more	A £ 13.9 averagethe annuate that 125 Jan	e hot wa e hot wa d average litres per p	ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		97	7.96]	(
if TF, inual duce t t more	A £ 13.9 averagethe annuate that 125 Jan	e hot wa e hot wa d average litres per p	ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, i	ay Vd,av dwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	97]	(
if TF, nnual duce t t more [t wate	A £ 13.9 averagethe annuate that 125 Jan	e hot wa e hot wa d average litres per p	ater usag hot water person per Mar	ge in litre usage by day (all w Apr	es per da 5% if the d vater use, l	ay Vd,av dwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	97]	(
if TF, inual duce if more t more t wate	averagithe annual that 125 Jan r usage ir	e hot wa al average litres per p Feb a litres per 103.84	hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the o vater use, i May Vd,m = fa 92.09	ay Vd,av dwelling is hot and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 88.17	(25 x N) to achieve Aug (43) 92.09	+ 36 a water us Sep	Oct 99.92 Fotal = Su	Nov 103.84 m(44) ₁₁₂ =	Dec 107.76	1175.55	
if TFA	average the annual that 125 Jan r usage ir 107.76	e hot wa al average litres per p Feb n litres per 103.84	hot water person per Mar day for ea 99.92 used - calo	ge in litre usage by day (all w Apr ach month 96	es per da 5% if the covater use, in May $Vd,m = fa$ 92.09 $0nthly = 4$.	ay Vd,av twelling is hot and co Jun ctor from 1 88.17	erage = designed and designed a	(25 x N) to achieve Aug (43) 92.09	+ 36 a water us Sep 96 c kWh/mor	Oct 99.92 Fotal = Su th (see Ta	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1	Dec 107.76 = c, 1d)	1175.55	
if TFA	averagithe annual that 125 Jan r usage ir	e hot wa al average litres per p Feb a litres per 103.84	hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the o vater use, i May Vd,m = fa 92.09	ay Vd,av dwelling is hot and co Jun ctor from 1	erage = designed (d) Jul Table 1c x 88.17	(25 x N) to achieve Aug (43) 92.09	+ 36 a water us Sep 96 0 kWh/mor 112.03	Oct 99.92 Fotal = Su 130.56	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51	Dec 107.76 = c, 1d) 154.76		((
if TF, inual duce is more [t watee ergy c i)m= [A £ 13.9 average the annual that 125 Jan rusage ir 107.76 content of 159.8	Poor N = 1 Poor N = 1	Mar 99.92 used - calc	ge in litre usage by day (all w Apr ach month 96 culated me 125.74	es per da 5% if the covater use, i May Vd,m = fa 92.09 onthly = 4.	ay Vd,av dwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r	erage = designed and designed a	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71	+ 36 a water us Sep 96 0 kWh/mor 112.03	Oct 99.92 Fotal = Su 130.56	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1	Dec 107.76 = c, 1d) 154.76	1175.55	
if TF, inual duce if more t water the water in the inual in the inual in the inual in the inual in the inual in the inual in the inual in the inual inual in the inual in the inual inual in the inual inual in the inual inual inual in the inual inual inual in the inual in	A £ 13.9 average the annual that 125 Jan rusage in 107.76 content of 159.8 anneous w	Poor N = 1 e hot was all average litres per per litres per 103.84 hot water 139.77	Mar Mar 99.92 used - calc 144.23	ge in litre usage by day (all w Apr ach month 96 culated me 125.74	es per da 5% if the covater use, i May Vd,m = fa 92.09 onthly = 4. 120.65	ay Vd,av Iwelling is hot and co Jun ctor from 7 88.17 190 x Vd,r 104.11 r storage),	erage = designed ald) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46)	+ 36 a water us Sep 96 0 kWh/mor 112.03 0 to (61)	Oct 99.92 Fotal = Su 130.56 Fotal = Su	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ =	Dec 107.76 = c, 1d) 154.76		
if TF, innual duce it more [t wate t wate ergy c ergy c instanta	A £ 13.9 average the annual that 125 Jan rusage in 107.76 tontent of 159.8 anneous w. 23.97	Poor N = 1 Poor N = 1	Mar 99.92 used - calc	ge in litre usage by day (all w Apr ach month 96 culated me 125.74	es per da 5% if the covater use, i May Vd,m = fa 92.09 onthly = 4.	ay Vd,av dwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r	erage = designed and designed a	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71	+ 36 a water us Sep 96 0 kWh/mor 112.03	Oct 99.92 Fotal = Su 130.56	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51	Dec 107.76 = c, 1d) 154.76		
if TFA nnual duce is t more if wate	average the annual that 125 Jan rusage ir 107.76 159.8 anneous we 23.97 storage	e hot was all average litres per per litres per per litres per lit	Mar day for ea 144.23 ang at point 21.63	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no	es per da 5% if the covater use, i May Vd,m = fa 92.09	ay Vd,av dwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage),	erage = designed (d) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61	+ 36 a water us Sep 96 112.03 1 to (61) 16.8	Oct 99.92 Fotal = Sunth (see Tail 130.56 Fotal = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TF, innual iduce it more [A £ 13.9 average the annual that 125 Jan 107.76 107.76 159.8 anneous we 23.97 storage evolume	Poor N = 1 Poor N = 1	Mar Mar May for ea 99.92 used - calc 144.23 ag at point 21.63	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no 18.86	es per da 5% if the covater use, i May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1	ay Vd,av dwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62	erage = designed and ld) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa	+ 36 a water us Sep 96 112.03 1 to (61) 16.8	Oct 99.92 Fotal = Sunth (see Tail 130.56 Fotal = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76		
if TF/ innual innual iduce it more [[if TF/ innual iduce it idu	average the annual that 125 Jan 107.76 107.76 159.8 anneous we 23.97 storage e volumently h	e hot was all average litres per per litres per per litres per lit	Mar day for ea 99.92 used - calc 144.23 ing at point 21.63 includin nd no ta	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no 18.86 ag any so ank in dw	es per da 5% if the covater use, i May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or Water velling, e	ay Vd,av dwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 WHRS	erage = designed (d) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage) litres in	(25 x N) to achieve Aug (43) 92.09 777 / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 0 kWh/mor 112.03 0 to (61) 16.8 ame ves	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TFA	A £ 13.9 average the annual that 125 Jan 107.76 107.76 159.8 aneous we 23.97 storage evolument of unity here is not an unity here.	Poor N = 1 Poor N = 1	Mar day for ea 99.92 used - calc 144.23 ing at point 21.63 includin nd no ta	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no 18.86 ag any so ank in dw	es per da 5% if the covater use, i May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1	ay Vd,av dwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 WHRS	erage = designed (d) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage) litres in	(25 x N) to achieve Aug (43) 92.09 777 / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 0 kWh/mor 112.03 0 to (61) 16.8 ame ves	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TFA innual induce in it water if water i	A £ 13.9 average the annual that 125 Jan 107.76 107.76 159.8 aneous we 23.97 storage evolumentity he is if no storage	e hot water land loss: e hot water litres per per litres per per litres per per litres	Mar Mar Mar 99.92 used - calc 144.23 including and no talchot water	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no 18.86 ag any so ank in dw er (this in	es per da 5% if the covater use, i May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W welling, e	ay Vd,av dwelling is hot and co Jun ctor from 88.17 190 x Vd,r 104.11 r storage), 15.62 WHRS enter 110 nstantar	erage = designed (d) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 92.09 777 / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 0 kWh/mor 112.03 0 to (61) 16.8 ame ves	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TFA innual iduce is it more it water if me [instanta instant	average the annual that 125 Jan 107.76 107.76 109.8 23.97 Storage evolument of the evo	Poor N = 1 Poor N = 1	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	Apr Apr Ach month 96 125.74 of use (not) 18.86 ag any so ank in dwer (this in oss factors)	es per da 5% if the covater use, i May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or Water velling, e	ay Vd,av dwelling is hot and co Jun ctor from 88.17 190 x Vd,r 104.11 r storage), 15.62 WHRS enter 110 nstantar	erage = designed (d) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 92.09 777 / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 0 kWh/mor 112.03 0 to (61) 16.8 ame ves	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = abbles 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TFA innual induce in it wate if wat	average the annual that 125 Jan 107.76 107.76 159.8 aneous w 23.97 storage evoluments if no storage anufactorage anufactorature factorature factorature factorature factorature factorage	e hot water Feb Ilitres per per 103.84 hot water 139.77 ater heatin 20.96 loss: e (litres) eating a per stored loss: urer's defactor fro	Mar day for ear 99.92 used - calc 144.23 ing at point 21.63 including and no talk hot water and rable are also are al	ge in litre usage by day (all w Apr ach month 96 125.74 of use (not 18.86 ag any so ank in dw er (this in oss facto 2b	es per da 5% if the co yater use, i May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or Water yelling, each or is known is known is known is water or is known is	ay Vd,av dwelling is hot and co Jun ctor from 88.17 190 x Vd,r 104.11 r storage), 15.62 WHRS enter 110 nstantar	erage = designed (d) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47) ombi boil	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21 150 39		
if TFA innual educe is the more for wate for wate for more for some [for age for	A £ 13.9 average the annual that 125 Jan 107.76 107.76 159.8 23.97 storage evolument of the annual that the a	Poor N = 1 e hot was all average litres per per litres	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	ge in litre usage by day (all w Apr ach month 96 125.74 of use (not) 18.86 ag any so ank in dw er (this in) oss facto 2b , kWh/ye	es per da 5% if the covater use, if the cov	ay Vd,av dwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 WHRS enter 110 nstantar	erage = designed (d) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 92.09 777 / 3600 110.71 boxes (46) 16.61 within sa (47)	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = ables 1b, 1 142.51 m(45) ₁₁₂ = 21.38	Dec 107.76 = c, 1d) 154.76 = 23.21		
if TFA innual iduce is it more if water if water if water if water if water if water if water if water if water if water if water if water if instanta if water if instanta	average the annual that 125 Jan 107.76 107.76 109.8 23.97 Storage evolument of the evo	Poor N = 1 Poor N = 1	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	ge in litre usage by day (all w Apr ach month 96 125.74 of use (no 18.86 ag any se ank in dw er (this in oss facto 2b , kWh/ye cylinder	es per da 5% if the covater use, is May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W velling, e ncludes i or is known loss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS enter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47) ombi boil	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = sbles 1b, 1 142.51 m(45) ₁₁₂ = 21.38 47) 1 0 0	Dec 107.76 = c, 1d) 154.76 = 23.21 150 39 54 75		
if TFA innual educe is the more of wate all finstants forage committees therw fater s in therw fater s in the more in the mo	A £ 13.9 average the annual that 125 Jan 107.76 107.76 159.8 aneous we 23.97 storage e volumently he ise if no storage anufaction anufactio	e hot water Feb a litres per per litres per per litres per per litres per li	Mar Mar Mar Mar Mar Mar Mar Mar Mar Mar	ge in litre usage by day (all w Apr ach month 96 125.74 of use (not 18.86 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder com Table	es per da 5% if the covater use, if the cov	ay Vd,av liwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS enter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47) ombi boil	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = sbles 1b, 1 142.51 m(45) ₁₁₂ = 21.38 47) 1 0 0	Dec 107.76 = c, 1d) 154.76 = 23.21 150 39		
if TFA innual educe is the more of wate (5)m= (ater s) common therw fater s) If m empe hergy) If m of wate common the mergy (ater s)	average the annual that 125 Jan 107.76 107.76 159.8 23.97 storage evoluments if no storage anufaction anu	e hot water Feb a litres per per litres per per litres per per litres per li	Mar day for ea 99.92 used - calc 144.23 including at point 21.63 including and no tale at the calc and the	ge in litre usage by day (all w Apr ach month 96 125.74 of use (not 18.86 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder com Table	es per da 5% if the covater use, is May Vd,m = fa 92.09 onthly = 4. 120.65 o hot water 18.1 olar or W velling, e ncludes i or is known loss fact	ay Vd,av liwelling is hot and co Jun ctor from 1 88.17 190 x Vd,r 104.11 r storage), 15.62 /WHRS enter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 88.17 m x nm x E 96.47 enter 0 in 14.47 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 92.09 07m / 3600 110.71 boxes (46) 16.61 within sa (47) ombi boil	+ 36 a water us Sep 96 112.03 16.8 ame vess ers) ente	Oct 99.92 Total = Sunth (see Tail 130.56 Total = Sunth (see Tail 19.58	Nov 103.84 m(44) ₁₁₂ = sbbles 1b, 1 142.51 m(45) ₁₁₂ = 21.38 47) 1 0 0	Dec 107.76 = c, 1d) 154.76 = 23.21 150 39 54 75		

Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53	3) =	0		(54)
Enter (50) or (54) in (55)		0.	75		(55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$				
(56)m= 23.33 21.07 23.33 22.58 23.33 22.58 23.33	3 23.33 22.58	23.33 22.58	23.33		(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) - (H11)] ÷	- (50), else (57)m = (56)m	where (H11) is fro	m Appendix	кH	
(57)m= 23.33 21.07 23.33 22.58 23.33 22.58 23.33	3 23.33 22.58	23.33 22.58	23.33		(57)
Primary circuit loss (annual) from Table 3		(0		(58)
Primary circuit loss calculated for each month (59)m = (58) \div	$365 \times (41) \text{m}$				
(modified by factor from Table H5 if there is solar water he	ating and a cylinder	thermostat)			
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26	6 23.26 22.51	23.26 22.51	23.26		(59)
Combi loss calculated for each month (61)m = (60) ÷ 365 × (41)m				
(61)m= 0 0 0 0 0 0	0 0	0 0	0		(61)
Total heat required for water heating calculated for each mon	$nth (62)m = 0.85 \times (4)$	15)m + (46)m +	(57)m + ((59)m + (61)m	
(62)m= 206.4 181.85 190.82 170.83 167.24 149.2 143.0	7 157.3 157.12	177.15 187.61	201.36		(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quar	ntity) (enter '0' if no solar o	contribution to wate	r heating)		
(add additional lines if FGHRS and/or WWHRS applies, see	Appendix G)				
(63)m= 0 0 0 0 0 0 0	0 0	0 0	0		(63)
Output from water heater					
(64)m= 206.4 181.85 190.82 170.83 167.24 149.2 143.0	7 157.3 157.12	177.15 187.61	201.36		
	Output from water	er heater (annual) _{1.}	12	2089.95	(64)
Heat gains from water heating, kWh/month 0.25 ´[0.85 × (45)m + (61)m] + 0.8 x [[(46)m + (57)m	+ (59)m		
(65)m= 90.41 80.14 85.23 77.88 77.39 70.69 69.3	5 74.09 73.32	80.69 83.46	88.73		(65)
` '					(65)
(65)m= 90.41 80.14 85.23 77.88 77.39 70.69 69.39 include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a):					(65)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a):					(65)
include (57)m in calculation of (65)m only if cylinder is in th 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts	e dwelling or hot wa				(65)
include (57)m in calculation of (65)m only if cylinder is in th 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts	e dwelling or hot wa	ter is from com	munity he		(65)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24	e dwelling or hot war	ter is from com	munity he		
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 13	Aug Sep 24 134.24 134.24 , also see Table 5	Oct Nov 134.24 134.24	munity he		
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.24 134.26 134.24 134.26 134.24 134.26 134.24 13	Aug Sep 24 134.24 134.24 136.69 14.35	Oct Nov 134.24 134.24 18.22 21.27	Dec		(66)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 13	Aug Sep 24 134.24 134.24 , also see Table 5 3 10.69 14.35 L13a), also see Tabl	Oct Nov 134.24 134.24 18.22 21.27	Dec 134.24		(66) (67)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 13	Aug Sep 24 134.24 134.24 , also see Table 5 B 10.69 14.35 L13a), also see Table 3 182.56 189.04	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2	Dec		(66)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Aug Sep 24 134.24 134.24 , also see Table 5 B 10.69 14.35 L13a), also see Table 13 182.56 189.04 5a), also see Table 5	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2	Dec 134.24 22.67 236.55		(66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 13	Aug Sep 24 134.24 134.24 , also see Table 5 B 10.69 14.35 L13a), also see Table 13 182.56 189.04 5a), also see Table 5	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2	Dec 134.24		(66) (67)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Aug Sep 24 134.24 134.24 , also see Table 5 3 10.69 14.35 L13a), also see Tabl 13 182.56 189.04 5a), also see Table 5 2 36.42 36.42	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2 5 36.42 36.42	Dec 134.24 22.67 236.55		(66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Aug Sep 24 134.24 134.24 , also see Table 5 B 10.69 14.35 L13a), also see Table 13 182.56 189.04 5a), also see Table 5	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2	Dec 134.24 22.67 236.55		(66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan	Aug Sep 24 134.24 134.24 , also see Table 5 B 10.69 14.35 L13a), also see Table 13 182.56 189.04 5a), also see Table 5 2 36.42 36.42 3 3	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2 3 36.42 36.42	Dec 134.24 22.67 236.55 36.42 3		(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Aug Sep 24 134.24 134.24 , also see Table 5 B 10.69 14.35 L13a), also see Table 13 182.56 189.04 5a), also see Table 5 2 36.42 36.42 3 3	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2 5 36.42 36.42	Dec 134.24 22.67 236.55		(66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 13	Aug Sep 24 134.24 134.24 , also see Table 5 B 10.69 14.35 L13a), also see Table 13 182.56 189.04 5a), also see Table 5 2 36.42 36.42 3 3	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2 3 36.42 36.42	Dec 134.24 22.67 236.55 36.42 3		(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan	Aug Sep 24 134.24 134.24 , also see Table 5 3 10.69 14.35 L13a), also see Tabl 13 182.56 189.04 5a), also see Table 5 2 36.42 36.42 3 3 3 3	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2 3 36.42 36.42	Dec 134.24 22.67 236.55 36.42 3		(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 134.24 13	Aug Sep 24 134.24 134.24 , also see Table 5 3 10.69 14.35 L13a), also see Tabl 13 182.56 189.04 5a), also see Table 5 2 36.42 36.42 3 3 3 3	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2 3 36.42 36.42 3 3 -107.39 -107.39	Dec 134.24 22.67 236.55 36.42 3 -107.39		(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in the state of the state	Aug Sep 24 134.24 134.24 , also see Table 5 3 10.69 14.35 L13a), also see Table 5 3 182.56 189.04 5a), also see Table 5 2 36.42 36.42 3 3 3 39 -107.39 -107.39 - 2 99.58 101.84 7)m + (68)m + (69)m + (70)	Oct Nov 134.24 134.24 18.22 21.27 le 5 202.81 220.2 3 36.42 36.42 3 3 -107.39 -107.39	Dec 134.24 22.67 236.55 36.42 3 -107.39		(66) (67) (68) (69) (70)

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

Orienta	tion:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.63	x	10.63	x	0.63	x	0.7] =	5.3	(74)
North	0.9x	0.77	x	1.98	x	10.63	x	0.63	x	0.7	=	6.43	(74)
North	0.9x	0.77	x	2.99	x	10.63	x	0.63	x	0.7	=	9.72	(74)
North	0.9x	0.77	x	1.09	x	10.63	x	0.63	x	0.7] =	3.54	(74)
North	0.9x	0.77	x	1.63	x	20.32	x	0.63	x	0.7] =	10.12	(74)
North	0.9x	0.77	X	1.98	x	20.32	x	0.63	x	0.7	=	12.3	(74)
North	0.9x	0.77	x	2.99	x	20.32	x	0.63	x	0.7	=	18.57	(74)
North	0.9x	0.77	x	1.09	x	20.32	x	0.63	X	0.7	=	6.77	(74)
North	0.9x	0.77	x	1.63	x	34.53	x	0.63	x	0.7	=	17.2	(74)
North	0.9x	0.77	x	1.98	x	34.53	x	0.63	x	0.7	=	20.89	(74)
North	0.9x	0.77	x	2.99	x	34.53	x	0.63	x	0.7	=	31.55	(74)
North	0.9x	0.77	x	1.09	x	34.53	x	0.63	x	0.7	=	11.5	(74)
North	0.9x	0.77	x	1.63	x	55.46	x	0.63	x	0.7	=	27.63	(74)
North	0.9x	0.77	x	1.98	x	55.46	x	0.63	x	0.7	=	33.56	(74)
North	0.9x	0.77	x	2.99	x	55.46	x	0.63	x	0.7	=	50.68	(74)
North	0.9x	0.77	x	1.09	x	55.46	X	0.63	x	0.7	=	18.48	(74)
North	0.9x	0.77	x	1.63	x	74.72	x	0.63	x	0.7	=	37.22	(74)
North	0.9x	0.77	x	1.98	x	74.72	x	0.63	x	0.7	=	45.21	(74)
North	0.9x	0.77	x	2.99	x	74.72	X	0.63	x	0.7	=	68.27	(74)
North	0.9x	0.77	x	1.09	x	74.72	x	0.63	x	0.7	=	24.89	(74)
North	0.9x	0.77	x	1.63	x	79.99	x	0.63	x	0.7	=	39.84	(74)
North	0.9x	0.77	x	1.98	x	79.99	X	0.63	x	0.7	=	48.4	(74)
North	0.9x	0.77	x	2.99	x	79.99	X	0.63	X	0.7	=	73.09	(74)
North	0.9x	0.77	x	1.09	x	79.99	X	0.63	X	0.7	=	26.64	(74)
North	0.9x	0.77	x	1.63	x	74.68	X	0.63	X	0.7	=	37.2	(74)
North	0.9x	0.77	x	1.98	x	74.68	X	0.63	X	0.7	=	45.19	(74)
North	0.9x	0.77	X	2.99	x	74.68	X	0.63	X	0.7	=	68.24	(74)
North	0.9x	0.77	X	1.09	x	74.68	X	0.63	X	0.7	=	24.88	(74)
North	0.9x	0.77	x	1.63	X	59.25	X	0.63	x	0.7	=	29.51	(74)
North	0.9x	0.77	X	1.98	x	59.25	X	0.63	X	0.7	=	35.85	(74)
North	0.9x	0.77	X	2.99	x	59.25	X	0.63	X	0.7	=	54.14	(74)
North	0.9x	0.77	x	1.09	x	59.25	X	0.63	X	0.7	=	19.74	(74)
North	0.9x	0.77	x	1.63	x	41.52	X	0.63	X	0.7	=	20.68	(74)
North	0.9x	0.77	x	1.98	x	41.52	X	0.63	X	0.7	=	25.12	(74)
North	0.9x	0.77	x	2.99	x	41.52	x	0.63	x	0.7	=	37.94	(74)
North	0.9x	0.77	x	1.09	x	41.52	x	0.63	x	0.7	=	13.83	(74)
North	0.9x	0.77	x	1.63	x	24.19	x	0.63	x	0.7	=	12.05	(74)
North	0.9x	0.77	x	1.98	x	24.19	x	0.63	x	0.7	=	14.64	(74)
North	0.9x	0.77	X	2.99	×	24.19	×	0.63	x	0.7	=	22.1	(74)

North	٥.٠٠/		1	4.00	۱.,	04.40	1 .,	0.00	۱.,		1	0.00	7(74)
North	0.9x	0.77	X	1.09	X	24.19	X	0.63	X	0.7] = 1	8.06	(74)
North	0.9x	0.77] X	1.63	X	13.12	X	0.63	X	0.7] = 1	6.53	(74)
North	0.9x	0.77] X]	1.98	X	13.12	X 	0.63	X	0.7] = 1	7.94	= (74)
North	0.9x	0.77] X	2.99	X I	13.12	X 1	0.63	X	0.7] = 1	11.99	(74)
North	0.9x	0.77] X	1.09	X	13.12	X	0.63	X	0.7] = 1	4.37	(74)
	0.9x	0.77	X	1.63	X	8.86	X	0.63	X	0.7] = 1	4.42	= (74)
North	0.9x	0.77	X	1.98	X I	8.86	X 1	0.63	X	0.7] =	5.36	(74)
North	0.9x	0.77	X	2.99	X	8.86	X	0.63	X	0.7] =	8.1	(74)
North	0.9x	0.77] X]	1.09	X	8.86	X	0.63	X	0.7] =	2.95	(74)
East	0.9x	0.77] X]	1.98	X	19.64	X	0.63	X	0.7] =	11.88	(76)
East	0.9x	0.77	X	4.91	X	19.64	X	0.63	X	0.7] = 1	29.47	(76)
East	0.9x	0.77	X	1.98	X	19.64	X	0.63	X	0.7] =	11.88	<u> </u> (76)
East	0.9x	0.77	X	1.98	X	38.42	X	0.63	X	0.7] =	23.25	(76)
East	0.9x	0.77	X	4.91	Х	38.42	X	0.63	X	0.7	=	57.65	(76)
East	0.9x	0.77	X	1.98	X	38.42	X	0.63	X	0.7] =	23.25	(76)
East	0.9x	0.77	X	1.98	X	63.27	X	0.63	X	0.7	=	38.29	(76)
East	0.9x	0.77	X	4.91	X	63.27	X	0.63	X	0.7	=	94.95	(76)
East	0.9x	0.77	X	1.98	X	63.27	X	0.63	X	0.7	=	38.29	(76)
East	0.9x	0.77	X	1.98	X	92.28	X	0.63	X	0.7	=	55.84	(76)
East	0.9x	0.77	X	4.91	X	92.28	X	0.63	X	0.7	=	138.47	(76)
East	0.9x	0.77	X	1.98	X	92.28	X	0.63	X	0.7	=	55.84	(76)
East	0.9x	0.77	X	1.98	X	113.09	X	0.63	X	0.7	=	68.43	(76)
East	0.9x	0.77	X	4.91	X	113.09	X	0.63	X	0.7] =	169.7	(76)
East	0.9x	0.77	X	1.98	x	113.09	X	0.63	x	0.7	=	68.43	(76)
East	0.9x	0.77	X	1.98	x	115.77	X	0.63	X	0.7	=	70.05	(76)
East	0.9x	0.77	X	4.91	x	115.77	X	0.63	x	0.7	=	173.72	(76)
East	0.9x	0.77	X	1.98	X	115.77	X	0.63	X	0.7	=	70.05	(76)
East	0.9x	0.77	X	1.98	X	110.22	X	0.63	X	0.7	=	66.69	(76)
East	0.9x	0.77	X	4.91	X	110.22	X	0.63	X	0.7	=	165.39	(76)
East	0.9x	0.77	X	1.98	X	110.22	X	0.63	X	0.7	=	66.69	(76)
East	0.9x	0.77	X	1.98	X	94.68	X	0.63	X	0.7	=	57.29	(76)
East	0.9x	0.77	X	4.91	X	94.68	X	0.63	X	0.7	=	142.07	(76)
East	0.9x	0.77	X	1.98	x	94.68	X	0.63	X	0.7	=	57.29	(76)
East	0.9x	0.77	X	1.98	x	73.59	X	0.63	x	0.7	=	44.53	(76)
East	0.9x	0.77	X	4.91	x	73.59	x	0.63	X	0.7	=	110.43	(76)
East	0.9x	0.77	X	1.98	х	73.59	x	0.63	x	0.7	=	44.53	(76)
East	0.9x	0.77	x	1.98	x	45.59	x	0.63	x	0.7	<u> </u>	27.59	(76)
East	0.9x	0.77	X	4.91	x	45.59	x	0.63	x	0.7] =	68.41	(76)
East	0.9x	0.77	x	1.98	x	45.59	x	0.63	x	0.7	=	27.59	(76)
East	0.9x	0.77	x	1.98	x	24.49	x	0.63	x	0.7	=	14.82	(76)
East	0.9x	0.77	x	4.91	x	24.49	×	0.63	X	0.7] =	36.75	(76)

East	0.9x	0.77	1 x	4.00	1 ,	24.40	x	0.00	x	0.7	1 =	44.00	(76)
East	0.9x	0.77	1	1.98] X] v	24.49	 	0.63		0.7] 1	14.82	」(76) (76)
East	0.9x	0.77] X] v	1.98] X] v	16.15	X	0.63	X	0.7] =] _	9.77	(76) (76)
East	0.9x	0.77] ×] •	4.91] X] v	16.15	x x	0.63	x	0.7] =] ₌	9.77	(76) (76)
South	0.9x	0.77] X] v	1.98] X] v	16.15	l I	0.63		0.7] 1		」 ⁽⁷⁶⁾ (78)
South	0.9x	0.77] x] x	1.63] X] v	46.75	X	0.63	X	0.7] = 1 _	23.29	(78)
South	0.9x	0.77] ^] x	1.09] x] x	46.75	x x	0.63	X	0.7] =] ₌	15.57	」 ⁽⁷⁸⁾ [78)
South	0.9x	0.77] ^] _x	1.22]]	46.75 46.75	^ x	0.63	X	0.7] -] =	17.15	」 ⁽⁷⁸⁾
South	0.9x	0.77] ^] x	1.98] x] x	46.75	^ x	0.63	X	0.7] -] =	28.29	(78)
South	0.9x	0.77] ^] x	1.63] ^] x	76.57	^ x	0.63	X	0.7] -] =	38.14	(78)
South	0.9x	0.77] ^] x	1.09] ^] x	76.57	^ x	0.63	X	0.7] =	25.51	(78)
South	0.9x	0.77] ^] x	1.09] ^] x	76.57	^ x	0.63	X	0.7] -] =	28.08	(78)
South	0.9x	0.77] ^] x	1.22] ^] _x	76.57	^ x	0.63	X	0.7]	28.55	(78)
South	0.9x	0.77] ^] x	1.98] ^] x	76.57	^ x	0.63	X	0.7] -] =	46.33	(78)
South	0.9x	0.77] ^] x	1.63] ^] x	97.53	l ^	0.63	X	0.7]	48.59	(78)
South	0.9x	0.77] ^] x	1.09] ^] x	97.53	l ^	0.63	X	0.7]	32.49	(78)
South	0.9x	0.77] ^] x	1.09] ^] x	97.53	l ^	0.63	X	0.7]	35.77	(78)
South	0.9x	0.77] ^] x	1.22	」^ lx	97.53	l x	0.63	X	0.7]	36.37	(78)
South	0.9x	0.77] ^] x	1.98	l x	97.53	l x	0.63	X	0.7]	59.02	(78)
South	0.9x	0.77) ^] x	1.63] ^] x	110.23	l x	0.63	X	0.7]	54.91	(78)
South	0.9x	0.77]	1.09]	110.23	X	0.63	x	0.7]] =	36.72	(78)
South	0.9x	0.77)	1.2]	110.23	l x	0.63	X	0.7]] ₌	40.43	(78)
South	0.9x	0.77)	1.22)	110.23	X	0.63	x	0.7]] ₌	41.1	(78)
South	0.9x	0.77] x	1.98] x	110.23	X	0.63	x	0.7]]	66.7	(78)
South	0.9x	0.77]] x	1.63]]	114.87	X	0.63	X	0.7]] _	57.22	(78)
South	0.9x	0.77	X	1.09]] x	114.87	X	0.63	X	0.7]] _	38.27	(78)
South	0.9x	0.77) X	1.2	X	114.87	X	0.63	X	0.7] =	42.13	(78)
South	0.9x	0.77	X	1.22	X	114.87	X	0.63	x	0.7	=	42.83	(78)
South	0.9x	0.77	X	1.98	X	114.87	X	0.63	x	0.7	i =	69.51	(78)
South	0.9x	0.77	X	1.63	X	110.55	X	0.63	X	0.7	=	55.07	(78)
South	0.9x	0.77	X	1.09	X	110.55	X	0.63	X	0.7	=	36.83	(78)
South	0.9x	0.77	x	1.2	x	110.55	x	0.63	X	0.7	=	40.54	(78)
South	0.9x	0.77	x	1.22	x	110.55	х	0.63	x	0.7	j =	41.22	(78)
South	0.9x	0.77	х	1.98	x	110.55	x	0.63	x	0.7	j =	66.89	(78)
South	0.9x	0.77	x	1.63	x	108.01	x	0.63	x	0.7	j =	53.81	(78)
South	0.9x	0.77	x	1.09	x	108.01	х	0.63	x	0.7	j =	35.98	(78)
South	0.9x	0.77	×	1.2	×	108.01	x	0.63	x	0.7	j =	39.61	(78)
South	0.9x	0.77	x	1.22	x	108.01	x	0.63	x	0.7] =	40.27	(78)
South	0.9x	0.77	x	1.98	x	108.01	x	0.63	x	0.7	j =	65.36	(78)
South	0.9x	0.77	x	1.63	x	104.89	x	0.63	x	0.7] =	52.25	(78)
South	0.9x	0.77	x	1.09	х	104.89	x	0.63	X	0.7] =	34.94	(78)

Cauth			_					7							— ,,
South	0.9x	0.77	×	1.2	=	X	104.89	X		0.63	_	0.7	=	38.47	(78)
South	0.9x	0.77	X	1.22	2	X	104.89	X	(0.63	_ X	0.7	_ =	39.11	(78)
South	0.9x	0.77	X	1.98	3	X	104.89	X	(0.63	X	0.7	=	63.47	(78)
South	0.9x	0.77	X	1.63	3	X	101.89	X	(0.63	x	0.7	=	50.75	(78)
South	0.9x	0.77	X	1.09)	X	101.89	X	(0.63	x	0.7	=	33.94	(78)
South	0.9x	0.77	X	1.2		X	101.89	X	(0.63	x	0.7		37.37	(78)
South	0.9x	0.77	X	1.22	2	X	101.89	X	(0.63	x [0.7	=	37.99	(78)
South	0.9x	0.77	X	1.98	3	X	101.89	X	(0.63	x	0.7	=	61.65	(78)
South	0.9x	0.77	X	1.63	3	X	82.59	X	(0.63	x	0.7	=	41.14	(78)
South	0.9x	0.77	X	1.09)	X	82.59	X	(0.63	x	0.7	=	27.51	(78)
South	0.9x	0.77	X	1.2		X	82.59	X	(0.63	x	0.7	=	30.29	(78)
South	0.9x	0.77	X	1.22	2	X	82.59	X	(0.63	x	0.7	=	30.79	(78)
South	0.9x	0.77	X	1.98	3	x	82.59	X	(0.63	x	0.7	=	49.97	(78)
South	0.9x	0.77	X	1.63	3	x	55.42	X	(0.63	x	0.7	=	27.61	(78)
South	0.9x	0.77	X	1.09)	x	55.42	X	(0.63	x [0.7	=	18.46	(78)
South	0.9x	0.77	X	1.2		x	55.42	X	(0.63	x [0.7	=	20.32	(78)
South	0.9x	0.77	X	1.22	2	x	55.42	X	(0.63	x	0.7	=	20.66	(78)
South	0.9x	0.77	X	1.98	3	x	55.42	X	(0.63	x	0.7	=	33.53	(78)
South	0.9x	0.77	X	1.63	3	X	40.4	X	(0.63	_ x [0.7	=	20.12	(78)
South	0.9x	0.77	X	1.09)	X	40.4	X	(0.63	x [0.7	=	13.46	(78)
South	0.9x	0.77	X	1.2		X	40.4	X	(0.63	x	0.7	=	14.82	(78)
South	0.9x	0.77	X	1.22	2	X	40.4	X	(0.63	x	0.7	=	15.06	(78)
South	0.9x	0.77	X	1.98	3	X	40.4	X	(0.63	x	0.7	=	24.45	(78)
	_					•		_							
Solar g	ains in	watts, calc	ulated	for each	month)		(83)m	n = Sum	n(74)m	.(82)m			•	
(83)m=	179.96		464.9	620.37	732.12		12.36 709.31	624	.13 5	518.76	360.14	217.8	152.52		(83)
				<u>` </u>	` '	Ť	33)m , watts							1	
(84)m=	637.28	773.67 9	05.23	1036.66	1123.83	11	10.47 1062.16	983	.24 8	390.25	755.89	641.46	597.28		(84)
7. Me	an inter	nal temper	ature (heating	seasor	1)									
Temp	erature	during hea	ating pe	eriods in	the liv	ing	area from Ta	ble 9	, Th1	(°C)				21	(85)
Utilisa	tion fac	tor for gair	ns for li	ving area	a, h1,n	า (ร	ee Table 9a)							•	
	Jan	Feb	Mar	Apr	May		Jun Jul	A	ug	Sep	Oct	Nov	Dec		
(86)m=	1	0.99	0.97	0.89	0.74	(0.39	0.4	14	0.7	0.94	0.99	1		(86)
Mean	interna	l temperatu	ure in li	ving are	a T1 (f	ollo	w steps 3 to	7 in T	able s	9c)					
(87)m=	19.97	20.17	20.45	20.75	20.93	2	0.99 21	2	1 .	20.96	20.7	20.28	19.94		(87)
Temp	erature	during hea	atina pe	eriods in	rest of	dw	elling from Ta	able 9	9. Th2	(°C)				•	
(88)m=	20.05		20.05	20.07	20.07	_	0.08 20.08	20.		20.07	20.07	20.06	20.06]	(88)
l Itilies	tion fac	tor for gair	ne for r	act of du	مرااام	h2	m (see Table	02)		!		1		J	
(89)m=	1		0.96	0.86	0.68	_	0.31	9a) 0.3	36 T	0.62	0.92	0.99	1]	(89)
	-	<u> </u>				1		1				1		J	` '
(90)m=	18.68	· -	ure in t	ne rest c	20.01	-	T2 (follow sto	eps 3		n Table	9C) 19.74	19.14	18.64	1	(90)
(30)111=	10.00	10.91	10.01	19.19	20.01	<u></u>	20.00	1 20.	00			ng area ÷ (4		0.42	(90)
												5 = . · · · · ·	,	0.42	(01)

N.A	-1 (/			P > - 6		. /4 (1	A) TO					
Mean intern (92)m= 19.22	al temper	19.82	20.19	ole dwel	ling) = fi 20.46	LA × 11 20.46	+ (1 – fL 20.46	A) × 12	20.14	19.61	19.19		(92)
` /		l .								19.01	19.19		(92)
Apply adjust (93)m= 19.22	19.47	19.82	20.19	20.39	20.46	20.46	20.46	20.43	20.14	19.61	19.19		(93)
8. Space he				20.39	20.40	20.40	20.40	20.43	20.14	19.01	19.19		(00)
Set Ti to the	mean in	ternal ter	mperatur		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisatio	Feb	Mar			Jun	Jul	Λιια	Sep	Oct	Nov	Dec		
Utilisation fa			Apr	May	Jun	Jui	Aug	Sep	Oct	INOV	Dec		
(94)m= 0.99	0.98	0.95	0.87	0.7	0.5	0.35	0.39	0.65	0.92	0.99	1		(94)
Useful gains		. W = (94	L 4)m x (8₄	L 4)m		<u> </u>	<u> </u>						
(95)m= 633.48	i e	864.04	900.03	789.47	551.92	367.31	384.88	581.35	693.3	632.36	594.69		(95)
Monthly ave	rage exte	ernal tem	perature	from Ta	able 8		!						
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss ra	te for me	an intern	al tempe	erature, l	_m , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1473.6	1434.54	1307.01	1092.5	838.76	557.86	367.95	386.12	605.93	920.52	1213.89	1462.24		(97)
Space heati	ng requir	ement fo	r each m	nonth, k\	Vh/mon	th = 0.02	24 x [(97)m – (95)m] x (4 ⁻	1)m			
(98)m= 625.05	452.52	329.57	138.58	36.67	0	0	0	0	169.05	418.7	645.46		_
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2815.6	(98)
Space heati	ng requir	ement in	kWh/m²	/year								29.73	(99)
9a. Energy re	quireme	nts – Indi	ividual h	eating sy	/stems i	ncluding	micro-C	CHP)					
Space heat	ing:					<u> </u>							
Fraction of s	space hea	at from s	econdar	y/supple	mentary	system						0	(201)
					•	•							
Fraction of s	space hea	at from m	nain syst	em(s)		-	(202) = 1	- (201) =				1	(202)
Fraction of s	•		-	, ,			(202) = 1	- (201) = 02) × [1 -	(203)] =				╡ .
	otal heati	ng from	main sys	stem 1			(202) = 1		(203)] =			1	(202)
Fraction of t	otal heati main spa	ng from ace heat	main sys	stem 1 em 1			(202) = 1		(203)] =			1	(202)
Fraction of t Efficiency of	otal heati main spa	ng from ace heat	main sys	stem 1 em 1			(202) = 1		(203)] =	Nov	Dec	1 1 93.5	(202) (204) (206) (208)
Fraction of t Efficiency of Efficiency of	otal heati main spa seconda Feb ng require	ng from ace heat ary/supple Mar ement (c	main systementary Apr alculatee	stem 1 em 1 y heating May	g system Jun	ո, %	(202) = 1 · (204) = (2	02) × [1 –		Nov	Dec	1 1 93.5 0	(202) (204) (206) (208)
Fraction of t Efficiency of Efficiency of Jan	otal heati main spa seconda Feb ng requir	ng from ace heat ary/supple Mar	main sys ing syste ementar Apr	stem 1 em 1 y heating May	g system Jun	ո, %	(202) = 1 · (204) = (2	02) × [1 –		Nov 418.7	Dec 645.46	1 1 93.5 0	(202) (204) (206) (208)
Fraction of t Efficiency of Efficiency of Jan Space heati	otal heati main spa seconda Feb ng require 452.52	ng from ace heat ary/supple Mar ement (c	main systementary Apr Apr alculated	stem 1 em 1 y heating May d above) 36.67	g system Jun	n, % Jul	(202) = 1 - (204) = (2	02) × [1 –	Oct			1 1 93.5 0	(202) (204) (206) (208)
Fraction of t Efficiency of Efficiency of Jan Space heati	otal heati main spa seconda Feb ng require 452.52	ng from ace heat ary/supple Mar ement (c	main systementary Apr Apr alculated	stem 1 em 1 y heating May d above) 36.67	g system Jun	n, % Jul	(202) = 1 · (204) = (2 Aug	02) × [1 – Sep 0	Oct 169.05	418.7	645.46	1 1 93.5 0	(202) (204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9	otal heati main spa seconda Feb ng requir 5 452.52	ng from ace heat ary/supple Mar ement (c 329.57	main systementary Apr Alculated 138.58	stem 1 em 1 y heating May d above) 36.67	g system Jun 0	n, % Jul o	(202) = 1 · (204) = (2 Aug	02) × [1 -	Oct 169.05	418.7	645.46	1 1 93.5 0	(202) (204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5	otal heati main spa seconda Feb ng requir 452.52 8)m x (20 483.98	mg from ace heat ary/supple Mar ement (c 329.57 04)] } x 1 352.49	main systementary Apr calculated 138.58 00 ÷ (20 148.21	stem 1 em 1 y heating May d above) 36.67 06) 39.22	g system Jun 0	n, % Jul o	(202) = 1 · (204) = (2 Aug	02) × [1 – Sep 0	Oct 169.05	418.7	645.46	1 1 93.5 0 kWh/ye	(202) (204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5 Space heati = {[(98)m x (2)	otal heati main spans seconda Feb ng require 452.52 8)m x (20 483.98 ng fuel (s	mg from ace heat ary/supple Mar ement (c 329.57)4)] } x 1 352.49 secondar 00 ÷ (20	main systementary Apr alculated 138.58 00 ÷ (20 148.21	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month	g system Jun 0	n, % Jul 0	(202) = 1 - (204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 169.05 180.8 ar) =Sum(2	418.7 447.81 211) _{15,1012}	645.46	1 1 93.5 0 kWh/ye	(202) (204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5	otal heati main spa seconda Feb ng requir 452.52 8)m x (20 483.98	mg from ace heat ary/supple Mar ement (c 329.57 04)] } x 1 352.49	main systementary Apr calculated 138.58 00 ÷ (20 148.21	stem 1 em 1 y heating May d above) 36.67 06) 39.22	g system Jun 0	n, % Jul o	(202) = 1 - (204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 169.05 180.8 ar) =Sum(2	418.7 447.81 211) _{15,1012}	645.46	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5 Space heati = {[(98)m x (2) (215)m= 0	otal heati main spanses seconda Feb ng require 452.52 8)m x (20 483.98 ng fuel (second) } x 1	mg from ace heat ary/supple Mar ement (c 329.57)4)] } x 1 352.49 secondar 00 ÷ (20	main systementary Apr alculated 138.58 00 ÷ (20 148.21	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month	g system Jun 0	n, % Jul 0	(202) = 1 - (204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 169.05 180.8 ar) =Sum(2	418.7 447.81 211) _{15,1012}	645.46	1 1 93.5 0 kWh/ye	(202) (204) (206) (208) ar
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5} Space heati = {[(98)m x (2) (215)m= 0	otal heati main spa seconda Feb ng requir 5 452.52 8)m x (20 483.98 ng fuel (s 201)] } x 1	ng from ace heat ary/supple Mar ement (c 329.57)4)] } x 1 352.49 econdar 00 ÷ (20 0	main systementary Apr calculated 138.58 00 ÷ (20 148.21 y), kWh/ 8) 0	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month	g system Jun 0	n, % Jul 0	(202) = 1 - (204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 169.05 180.8 ar) =Sum(2	418.7 447.81 211) _{15,1012}	645.46	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5 Space heati = {[(98)m x (2) (215)m= 0 Water heating	otal heati main spa seconda Feb ng require 452.52 8)m x (20 483.98 ng fuel (second)] } x 1 0 ng water hea	mg from ace heat ary/supple Mar ement (c 329.57)4)] } x 1 352.49 secondar 00 ÷ (20 0	main systementary Apr alculated 138.58 00 ÷ (20 148.21 y), kWh/ 8) 0	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month 0	g system Jun 0	o 0	(202) = 1 · (204) = (2 Aug 0 Tota Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 169.05 180.8 ar) =Sum(2	418.7 447.81 211) _{15,1012}	645.46	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5} Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from y 206.4	otal heati main spanses seconda Feb ng require 452.52 8)m x (20 483.98 ng fuel (second)] } x 1 0 ng water heati	ng from ace heat ary/supple Mar ement (c 329.57 04)] } x 1 352.49 econdar 00 ÷ (20 0 0 deter (calc 190.82	main systementary Apr calculated 138.58 00 ÷ (20 148.21 y), kWh/ 8) 0	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month	g system Jun 0	n, % Jul 0	(202) = 1 - (204) = (2 Aug 0 Tota	02) × [1 – Sep 0 I (kWh/yea	Oct 169.05 180.8 ar) =Sum(2	418.7 447.81 211) _{15,1012}	645.46	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5 Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from y 206.4 Efficiency of y	otal heati main sparse seconda Feb ng require 452.52 8)m x (20 483.98 ng fuel (second)] } x 1 0 ng water heati	mg from ace heat ary/supple Mar ement (c 329.57)4)] } x 1 352.49 secondar 00 ÷ (20 0)	main systementary Apr alculated 138.58 00 ÷ (20 148.21 y), kWh/ 8) 0 ulated al 170.83	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month 0	g system Jun 0 0	o 0 0 143.07	(202) = 1 · (204) = (2 Aug 0 Tota 157.3	02) × [1 – Sep 0 0 I (kWh/yea 157.12	Oct 169.05 180.8 ar) =Sum(2 0 177.15	418.7 447.81 211) _{15,1012} 0 215) _{15,1012}	645.46 690.33 = 0 =	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5} Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from v 206.4 Efficiency of v (217)m= 87.58	otal heati main spa seconda Feb ng requir 5 452.52 8)m x (20 483.98 ng fuel (s 201)] } x 1 0 ng water heati 181.85 water heati	mg from ace heat ary/supple Mar ement (c 329.57 a)4)] } x 1 352.49 econdar 00 ÷ (20 0 ater (calc 190.82 ater 86.26	main systementary Apr calculated 138.58 00 ÷ (20 148.21 y), kWh/8) 0 ulated al 170.83	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month 0	g system Jun 0	o 0	(202) = 1 · (204) = (2 Aug 0 Tota Tota	02) × [1 – Sep 0 0 I (kWh/yea	Oct 169.05 180.8 ar) =Sum(2	418.7 447.81 211) _{15,1012}	645.46	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5 Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from y 206.4 Efficiency of y	otal heati main spa seconda Feb ng require 452.52 8)m x (20 483.98 ng fuel (s 201)] } x 1 0 ng water heating 181.85 r heating,	mg from ace heat ary/supple Mar ement (c 329.57)4)] } x 1 352.49 econdar 00 ÷ (20 0)	main systementary Apr calculated 138.58 00 ÷ (20 148.21 y), kWh/8) 0 ulated al 170.83	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month 0	g system Jun 0 0	o 0 0 143.07	(202) = 1 · (204) = (2 Aug 0 Tota 157.3	02) × [1 – Sep 0 0 I (kWh/yea 157.12	Oct 169.05 180.8 ar) =Sum(2 0 177.15	418.7 447.81 211) _{15,1012} 0 215) _{15,1012}	645.46 690.33 = 0 =	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5} Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from v 206.4 Efficiency of v (217)m= 87.58 Fuel for wate	otal heating the string requires the string requires to the string r	mg from ace heat ary/supple Mar ement (c 329.57)4)] } x 1 352.49 econdar 00 ÷ (20 0)	main systementary Apr calculated 138.58 00 ÷ (20 148.21 y), kWh/8) 0 ulated al 170.83	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month 0	g system Jun 0 0	o 0 0 143.07	(202) = 1 - (204) = (2 Aug 0 Tota 157.3 79.8	02) × [1 – Sep 0 0 I (kWh/yea 157.12 79.8	Oct 169.05 180.8 180.8 0 ar) =Sum(2 177.15 84.69	418.7 447.81 211) _{15,1012} 0 215) _{15,1012}	645.46 690.33 = 0 =	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211) (211)
Fraction of t Efficiency of Efficiency of Jan Space heati 625.05 (211)m = {[(9) 668.5} Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from v 206.4 Efficiency of v (217)m= 87.58 Fuel for wate (219)m = (64	otal heating the string requires the string requires to the string r	mg from ace heat ary/supple Mar ement (c 329.57) (a) (a) (b) (c) (c) (c) (c) (c) (d) (d) (d) (e) (e) (e) (e) (e) (e) (e) (e) (e) (e	main systementary Apr alculated 138.58 00 ÷ (20 148.21 y), kWh/ 8) 0 ulated al 170.83 84.26 onth m	stem 1 em 1 y heating May d above) 36.67 06) 39.22 month 0	g system Jun 0 0 149.2	o o o o o o o o o o o o o o o o o o o	(202) = 1 - (204) = (2 Aug 0 Tota 157.3 79.8	02) × [1 – Sep 0 0 I (kWh/yea 157.12	Oct 169.05 180.8 180.8 0 ar) =Sum(2 177.15 84.69	418.7 447.81 211) _{15,1012} 0 215) _{15,1012} 187.61	645.46 690.33 = 0 = 201.36	1 93.5 0 kWh/ye	(202) (204) (206) (208) ar (211) (211)

Americal totals		LAND become	15\A/lb/5 co.o.v
Annual totals Space heating fuel used, main system 1		kWh/year	kWh/year 3011.34
Water heating fuel used			2488.33
Electricity for pumps, fans and electric keep-hot			
central heating pump:		3	0 (230c)
boiler with a fan-assisted flue		4	5 (230e)
Total electricity for the above, kWh/year	sum of (230a	a)(230g) =	75 (231)
Electricity for lighting			389.61 (232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216 =	650.45 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	537.48 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1187.93 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	202.21 (268)
Total CO2, kg/year	sum	of (265)(271) =	1429.06 (272)

TER =

(273)

21.99

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.26 Printed on 02 September 2020 at 17:37:01

Project Information:

Assessed By: John Simpson (STRO006273) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 74.4m² Site Reference: Plot Reference: AC 410 Maitland Park Estate

AC 410, Aspen Court, Maitland Park Estate, London, NW3 2EH Address:

Client Details:

Name: Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

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

Dwelling Carbon Dioxide Emission Rate (DER) 7.52 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 51.4 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.5 kWh/m²

OK

2 Fabric U-values

Element Highest Average 0.12 (max. 0.70) External wall 0.12 (max. 0.30) OK Party wall 0.00 (max. 0.20) OK Floor (no floor) Roof 0.10 (max. 0.20) 0.10 (max. 0.35) OK

Openings 1.40 (max. 2.00) 1.40 (max. 3.30)

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.00 (design value)

Maximum **OK** 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

Space heating controls Charging system linked to use of community heating,

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

OK

Regulations Compliance Report

Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.53	
Maximum	1.5	OK
MVHR efficiency:	90%	
Minimum	70%	OK
Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
ased on:		
Overshading:	Average or unknown	
Windows facing: North	2.24m²	
Windows facing: East	2.71m²	
Windows facing: East	6.73m²	
Windows facing: South	2.24m²	
Windows facing: South	1.5m²	
Windows facing: South	2.71m²	
Windows facing: East	2.71m²	
Windows facing: North	2.71m²	
Windows facing: North	1.5m²	
Ventilation rate:	3.00	
Blinds/curtains:	None	
0 Key features		
Air permeablility	2.0 m³/m²h	
Roofs U-value	0.1 W/m²K	
External Walls U-value	0.12 W/m²K	
Party Walls U-value	0 W/m²K	
Community heating, heat from electric heat pump Photovoltaic array		

			User D	Votoilo:						
A Manus	Labor O'com		USELL		- 11			OTDO	000070	
Assessor Name:	John Simps Stroma FSA			Strom					006273	
Software Name:	Stroma FS/		Du	Softwa				versio	n: 1.0.4.26	
A 1 1	AC 440 Ass		Property)			
Address:		en Court, Mait	iano Pan	k Estate,	London	, INVV3 2	ZEH			
Overall dwelling dime	ensions.		Δ = α	n/m²\		Av. Ua	iabt/m)		Valuma/m³	11
Ground floor				a(m²) 74.4	(1a) x		eight(m) 2.6	(2a) =	Volume(m ³	(3a)
Total floor area TFA = (1	a)+(1h)+(1c)+(1d)+(1e)+ (1		74.4	(4)				100.44	()
	a) ((15) ((15) (14)1(10)1(1	''/	74.4)+(3c)+(3c	d)+(3e)+	(3n) =	400.44	7(5)
Dwelling volume					(3a)+(3b)+(30)+(30	u)+(3e)+	(311) =	193.44	(5)
2. Ventilation rate:	main	seconda	ıry	other		total			m³ per hou	ır
Number of chimneys	heating	heating	, 		7 = 6		x	40 =	-	(6a)
•	0	d	ᆜ	0		0			0	= ' '
Number of open flues	0	+ 0	+	0	_ = <u>[</u>	0		20 =	0	(6b)
Number of intermittent fa	ans					0	Х	10 =	0	(7a)
Number of passive vents	3					0	Х	10 =	0	(7b)
Number of flueless gas f	ires					0	х	40 =	0	(7c)
					_					
					_			Air ch	nanges per ho	our —
Infiltration due to chimne						0		÷ (5) =	0	(8)
If a pressurisation test has l			ed to (17),	otherwise (continue fr	om (9) to	(16)			–
Number of storeys in t Additional infiltration	ne aweiling (ns)					[(0)	1100 1	0	(9)
Structural infiltration: 0	25 for steel or	timber frame o	or 0 35 fo	r macanı	ny coneti	uction	[(9])-1]x0.1 =	0	(10)
if both types of wall are p					•	uction			0	(11)
deducting areas of openi			J		`					
If suspended wooden		` '	0.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	iter 0.05, else e	nter 0							0	(13)
Percentage of window	s and doors dra	aught stripped							0	(14)
Window infiltration				0.25 - [0.2	` '	_			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed	d in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	2	(17)
If based on air permeabi	lity value, then	$(18) = [(17) \div 20] +$	(8), otherw	ise (18) = ((16)				0.1	(18)
Air permeability value applie	es if a pressurisation	n test has been do	one or a de	gree air pe	rmeability	is being u	ised			_
Number of sides sheltered	ed								1	(19)
Shelter factor				(20) = 1 -		[9)] =			0.92	(20)
Infiltration rate incorpora	_			(21) = (18) x (20) =				0.09	(21)
Infiltration rate modified	 	'	1	Γ,			1		1	
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp							1		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 = (2	2)m ÷ 4									
(00)	.	1.00	1 0 05	0.00			T		1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

d) If natural ventilation or whole house positive input ventilation from loft if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5] 24d)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Adjusted infiltra	ation rate (a	llowing for s	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
If mechanical ventilation: 0.5 (23) (15 m) advants at heat pump using Appendix N. ((23b) = (23a) × Fm/ (equation (NS)), otherwise (23b) = (23a) (23a) (25a	0.12	0.12 0.	11 0.1	0.1	0.09	0.09	0.09	0.09	0.1	0.1	0.11]	
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (NS)), otherwise (23b) = (23a) If balanced with heat recovery; efficiency in % allowing for in-use factor (from Table 4h) =			•	he appli	cable ca	se	!		!			•	
it balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =)2h) _ (22¢	a) v Emy (auation (VEVV otho	nuina (22h) - (22a)				===
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) x [1 - (23c) + 100] 24a)m 0.24 0.23 0.23 0.22 0.22 0.21 0.21 0.2 0.21 0.22 0.22) = (23a)				
24s)m 0.24 0.23 0.23 0.22 0.22 0.21 0.21 0.2 0.21 0.22 0.22		·	•	ŭ		`		•	Ola) (001.) [4 (00)		(230
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) 24b)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	· ·				1		- ^ `	í `	r ´ `		- ` ` `) ÷ 100]]	(24:
24b)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	` '	ļļ	<u> </u>	ļ	ļ	<u> </u>	ļ	ļ.	ļ	<u> </u>	0.23]	(240
o, If whole house extract ventilation or positive input ventilation from outside if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b) 24d)m	<i>'</i>				1	- 	r ´`	í `	, ´ ` `		1 0	1	(24)
## 16 (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b) ## 24dom									0	0	0]	(24)
24e)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0									5 v (23h)			
d) If natural ventilation or whole house positive input ventilation from loft if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5] 24d)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<u> </u>	<u>`</u>		ŕ	í –	· · · · ·	ŕ	í 	<u> </u>		0	1	(24
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5] Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) 25/m= 0.24 0.23 0.23 0.22 0.22 0.21 0.21 0.2 0.21 0.22 0.22 0.23 (25) 3. Heat losses and heat loss parameter. ELEMENT Gross area (m²)	(=)											J	`
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) 25)m= 0.24 0.23 0.23 0.22 0.22 0.21 0.21 0.2 0.21 0.22 0.22 0.23 (25) 3. Heat losses and heat loss parameter. ELEMENT Gross Area (m²) Openings Area (m²) M²	,			•	•				0.5]				
3. Heat losses and heat loss parameter: ELEMENT Gross Openings area (m²)	(24d)m= 0	0	0 0	0	0	0	0	0	0	0	0]	(240
3. Heat losses and heat loss parameter: ELEMENT Gross Openings A, m² W/m2K (W/K) k-value kJ/m²-K kJ/K Vindows Type 1	Effective air	change rate	e - enter (24a	n) or (24k	o) or (24	c) or (24	d) in bo	x (25)	!			•	
Net Area U-value A X U k-value KJ/m²-K KJ/K	(25)m= 0.24	0.23 0.	23 0.22	0.22	0.21	0.21	0.2	0.21	0.22	0.22	0.23]	(25)
Net Area U-value A X U k-value KJ/m²-K KJ/K	2 Heat lease	s and bast l		O.K.I	•		•	•	•			•	
Vindows Type 1 2.24 x1/[1/(1.4) + 0.04] = 2.97 Vindows Type 2 2.71 x1/[1/(1.4) + 0.04] = 3.59 Vindows Type 3 Vindows Type 4 2.24 x1/[1/(1.4) + 0.04] = 2.97 Vindows Type 5 Vindows Type 5 1.5 x1/[1/(1.4) + 0.04] = 1.99 Vindows Type 6 2.71 x1/[1/(1.4) + 0.04] = 3.59 Vindows Type 7 2.71 x1/[1/(1.4) + 0.04] = 3.59 Vindows Type 8 Vindows Type 8 2.71 x1/[1/(1.4) + 0.04] = 3.59 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 Vindows Type 9 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 Vindows Type 9 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 Vindows Type 9 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 Vindows Type 9 Vindows Type 9 Vindows Type 9 Vindows Type 9 Vindows Type 9 (27 Vindows Type 9 (28 Vindows Type 9 (29 Vindows Type 9 (27 Vindows Type 8 (27 Vindows Type 9 (27 Vindows Type 8 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Type 19 (27 Vindows Ty	ELEMENT	Gross	Openir	igs									
Vindows Type 2 Vindows Type 3 6.73 x1/[1/(1.4) + 0.04] = 8.92 Vindows Type 4 2.24 x1/[1/(1.4) + 0.04] = 2.97 (27 Vindows Type 5 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 6 2.71 x1/[1/(1.4) + 0.04] = 3.59 (27 Vindows Type 7 Vindows Type 7 2.71 x1/[1/(1.4) + 0.04] = 3.59 (27 Vindows Type 8 2.71 x1/[1/(1.4) + 0.04] = 3.59 (27 Vindows Type 8 2.71 x1/[1/(1.4) + 0.04] = 3.59 (27 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 9 (27 Vindows Type 9 (28 Vindows Type 9 (29 Vindows Type 9 (27		•) n	1 ²	A ,r				(W/l	K)	kJ/m²-	K	kJ/K
Vindows Type 3 (27 Vindows Type 4 (224 Vindows Type 5 (27 Vindows Type 6 (27) Vindows Type 6 (27) Vindows Type 7 (27) Vindows Type 7 (28) Vindows Type 8 (27) Vindows Type 8 (27) Vindows Type 9 (27) Vindows Type 9 (28) Vindows Type 9 (29) Vindows Type 9 (20) Vindows Type 9 (20) Vindows Type 9 (21) Vindows Type 9 (22) Vindows Type 9 (23) Vindows Type 9 (24) Vindows Type 9 (25) Vindows Type 9 (26) Vindows Type 9 (27) Vindows Type 9 (28) Vindows Type 9 (29) Vindows Type 9 (20) Vindows Type 9 (27) Vindows Type 9 (28) Vindows Type 9 (29) Vindows Type 9 (20) Vindows Type 9 (27) Vindows Type 9 (28) Vindows Type 9 (29) Vindows Type 9 (20) Vindows Type 9 (27) Vindows Type 9 (28) Vindows Type 9 (29) Vindows Type 9 (20) Vindows Type 9 (27) Vindows Type 9 (27) Vindows Type 9 (28) Vindows Type 9 (29) Vindows Type 9 (20) (20) Vindows Type 9 (27) Vindows Type 9 (28) Vindows Type 9 (29) Vindows Type 9 (20) (20) Vindows Type 9 (27) Vindows Type 9 (27) Vindows Type 9 (27) Vindows Type 9 (27) Vindows Type 9 (28) Vindows Type 9 (29) Vindows Type 9 (20) (20) Vindows Type 9 (27) Vindow	• •				2.24	=			2.97	_			(27)
Vindows Type 4 Vindows Type 5 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 6 2.71 x1/[1/(1.4) + 0.04] = 3.59 (27 Vindows Type 7 2.71 x1/[1/(1.4) + 0.04] = 3.59 (27 Vindows Type 8 Vindows Type 8 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 3.59 (27 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4) + 0.04] = 1.99 (27 Vindows Type 9 (28 Vindows Type 9 (29 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (28 Vindows Type 9 (29 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (28 Vindows Type 9 (29 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (28 Vindows Type 9 (29 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (28 Vindows Type 9 (29 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (27 Vindows Type 9 (28 Vindows Type 9 (29 Vindows Type 9 (27 Vindows Type	Windows Type	2			2.71	x1	/[1/(1.4)+	0.04] =	3.59	_			(27)
Vindows Type 5 Vindows Type 6 2.71 x1/[1/(1.4)+0.04] = 1.99 (27 Vindows Type 7 2.71 x1/[1/(1.4)+0.04] = 3.59 (27 Vindows Type 8 2.71 x1/[1/(1.4)+0.04] = 3.59 (27 Vindows Type 8 2.71 x1/[1/(1.4)+0.04] = 3.59 (27 Vindows Type 9 1.5 x1/[1/(1.4)+0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4)+0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4)+0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4)+0.04] = 1.99 (27 Vindows Type 9 1.5 x1/[1/(1.4)+0.04] = 1.99 (27 Vindows Type 9 (27 Vind	Windows Type	9 3			6.73	x1	/[1/(1.4)+	0.04] =	8.92				(27)
Vindows Type 6 Vindows Type 7 Vindows Type 8 Vindows Type 8 Vindows Type 9 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 8 Vindows Type 9 Vindows Type 19 Vin	Windows Type	. 4			2.24	x1	/[1/(1.4)+	0.04] =	2.97				(27)
Vindows Type 7 Vindows Type 8 2.71 Vin(1.4) + 0.04] = 3.59 (27 Vindows Type 8 2.71 Vin(1.4) + 0.04] = 3.59 (27 Vindows Type 9 1.5 Vin(1.4) + 0.04] = 1.99 (27 Valls 66.82 25.05 41.77 X 0.12 5.01 (29 Cotal area of elements, m² 141.22 Varity wall for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 45.66 (33 Chermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35 Cot design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f an be used instead of a detailed calculation.	Windows Type	5			1.5	х1	/[1/(1.4)+	0.04] =	1.99				(27)
Vindows Type 8 2.71 $\times 1/[1/(1.4) + 0.04] = 3.59$ (27 Valls 66.82 25.05 41.77 $\times 0.12 = 5.01$ (29 Coof 74.4 0 74.4 $\times 0.1 = 7.44$ (30 Total area of elements, m² 141.22 (31 for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value) + 0.04]$ as given in paragraph 3.2 include the areas on both sides of internal walls and partitions fabric heat loss, W/K = S (A x U) feat capacity Cm = S(A x k) (18)(30) + (32) = (29 (29 (29 (29 (29 (29 (29 (2	Windows Type	e 6			2.71	x1	/[1/(1.4)+	0.04] =	3.59				(27)
Vindows Type 9 1.5 $\times 1/[1/(1.4) + 0.04] = 1.99$ (27 Valls 66.82 25.05 41.77 \times 0.12 = 5.01 (29 Roof 74.4 0 74.4 \times 0.1 = 7.44 (30 Total area of elements, m ² 141.22 (31 Party wall 44.62 \times 0 = 0 (32 for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value) + 0.04]$ as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A \times U) (29 Heat capacity Cm = S(A \times K) ((28)(30) + (32) = (34) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m ² K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f and be used instead of a detailed calculation.	Windows Type	e 7			2.71	x1	/[1/(1.4)+	0.04] =	3.59				(27)
Valls 66.82 25.05 41.77 \times 0.12 $=$ 5.01 (29) (30)	Windows Type	e 8			2.71	x1	/[1/(1.4)+	0.04] =	3.59				(27)
Roof 74.4 0 74.4 x 9.1 = 7.44 9.1 = 9.1	Windows Type	9			1.5	x1	/[1/(1.4)+	0.04] =	1.99	=			(27)
Roof 74.4 0 74.4 x 10.1 = 7.44 10.1 = 10.1 10.1 = 10.1	Walls	66.82	25.0	5	41.77	, x	0.12	─	5.01	= [(29)
Total area of elements, m ² 141.22 2 arty wall 2 for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions * abric heat loss, W/K = S (A x U) (26)(30) + (32) = 45.66 (33) * Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 0 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) * or design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f and be used instead of a detailed calculation.	Roof	74.4	1	=	74.4	x		= :	7.44	F i		=	
Party wall for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) deat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (32 (32 (33 (34 (35) (35) (36 (37 (37 (38) (38 (38) (38) (38) (39 (39 (39 (39 (39 (39 (39 (3													
for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = (28)(30) + (32) + (32a)(32e) = (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f and be used instead of a detailed calculation.						=	<u> </u>		Ω				
Fabric heat loss, W/K = S (A x U) $ (26)(30) + (32) = $	* for windows and				alue calcul					as given in	paragraph		(02
Heat capacity $Cm = S(A \times k)$ $((28)(30) + (32) + (32a)(32e) = 0$ (34) Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f an be used instead of a detailed calculation.				ıs anu par	นแบกร		(26)(30) + (32) =				45.00	(33)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f an be used instead of a detailed calculation.			` '				(==)(30		(30) + (3)	2) + (32a)	(32e) -		==
For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f an be used instead of a detailed calculation.		,	•	· TE^\ ir	n k 1/m2k/			., ,	, , ,	, , ,	(526) =		===
an be used instead of a detailed calculation.		•	•	•			ecisaly th				ahle 1f	250	(35)
Thermal bridges : S (L x Y) calculated using Appendix K	ŭ			. 5011311401	.S.1 010 110	. ποντιρι	colocity and	, maioanve	, valaco di	. IVII III I	adio II		
$_{ m I}$	Thermal bridge	es : S (L x Y) calculated	using Ap	pendix I	<						11.37	(36)

Carlotte back at the co		are not kn	OWII (30) -	- 0.00 X (0	,			(0.0)	(0.0)		ı		–
Γotal fabric he		. 4						(33) +	` '	05) (5)	l	57.03	(37)
/entilation he	1									25)m x (5)			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
38)m= 15.03	14.88	14.73	14	13.85	13.11	13.11	12.96	13.41	13.85	14.14	14.44		(38)
leat transfer	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
39)m= 72.06	71.91	71.76	71.03	70.88	70.14	70.14	69.99	70.43	70.88	71.17	71.47		_
Heat loss para	ameter (F	HLP). W/	m²K						Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	70.99	(39)
40)m= 0.97	0.97	0.96	0.95	0.95	0.94	0.94	0.94	0.95	0.95	0.96	0.96		
,						<u> </u>	<u> </u>		Average =	Sum(40) _{1.}	12 /12=	0.95	(40)
Number of day	ys in mor	nth (Tab	le 1a)			_							_
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
						•				•			
4. Water hea	ting ener	av reani	rement:								kWh/ye	ear:	
	, mrg on o	97 . 0 9 0											
Assumed occi			F.4		.40 / T F	- 40.0	١٥١١ ٥ ٥		FFA 40		35		(42
if TFA > 13. if TFA £ 13.		+ 1./6 x	[1 - exp	(-0.0003	49 x (11	-A -13.9)2)] + 0.(0013 x (FA -13.	9)			
Annual averag	•	ater usac	ae in litre	s per da	ıv Vd.av	erage =	(25 x N)	+ 36		80	.97		(43
Reduce the annu	ial average	hot water	usage by	5% if the a	welling is	designed t			e target o		.57		(
ot more that 125	5 litres per p	person per	day (all w	ater use, l	not and co	ld)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
lot water usage	in litres per	day for ea	ch month	Vd,m = fa	ctor from T	Table 1c x	(43)						
44)m= 98.96	95.36	91.77	88.17	84.57	80.97	80.97	84.57	88.17	91.77	95.36	98.96		
							- /			m(44) ₁₁₂ =		1079.59	(44
Energy content of	not water	usea - cai			190 x va,r	n x nm x L	1 m / 3600		tn (see Ta		c, 1a)		
45)m= 146.76	128.36	132.45	115.47	110.8	95.61	88.6	101.67	102.88	119.9	130.88	142.13		_
finstantaneous v	water heati	na at naint	of uso (no	hot water	etorago)	ontor O in	haves (16		Γotal = Su	m(45) ₁₁₂ =	=	1415.52	(45
						1	DOXES (40)	10 (01)					
46)m= 22.01	19.25	19.87	17.32	16.62	1 1191								
Vater storage	J IUGG.				14.34	13.29	15.25	15.43	17.99	19.63	21.32		(46
_		includin	a anv so	olar or W									
Storage volun	ne (litres)		•		WHRS	storage	within sa				21.32		
Storage volun	ne (litres) heating a	nd no ta	nk in dw	elling, e	/WHRS nter 110	storage litres in	within sa	ıme ves	sel				•
Storage volun f community I Otherwise if n	ne (litres) heating a o stored	nd no ta	nk in dw	elling, e	/WHRS nter 110	storage litres in	within sa	ıme ves	sel				
Storage volun f community I Otherwise if n Vater storage	ne (litres) heating a to stored e loss:	nd no ta hot wate	nk in dw er (this in	relling, e icludes i	/WHRS nter 110 nstantar	storage litres in neous co	within sa	ıme ves	sel	47)			(47
Storage volum f community I Otherwise if n Vater storage a) If manufac	ne (litres) heating a to stored e loss: eturer's de	nd no ta hot wate	nk in dw er (this in	relling, e icludes i	/WHRS nter 110 nstantar	storage litres in neous co	within sa	ıme ves	sel	47)	0		(48
Storage volum f community I Otherwise if n Water storage a) If manufac Temperature 1	ne (litres) heating a to stored loss: eturer's de	nd no ta hot wate eclared le m Table	nk in dw er (this in oss facto 2b	velling, e ocludes i or is kno	/WHRS nter 110 nstantar	storage litres in neous co n/day):	within sa	ers) ente	sel	47)	0 0		(48)
Nater storage Storage volum f community I Otherwise if n Nater storage a) If manufac Femperature f Energy lost fro b) If manufac	ne (litres) heating a to stored to loss: turer's de factor fro turer's de	nd no ta hot wate eclared le m Table storage eclared c	nk in dw er (this in oss facto 2b , kWh/ye	relling, e cludes i or is kno ear oss facto	/WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	within sa (47) ombi boil	ers) ente	sel	47)	0		(48)
Storage volum f community I Otherwise if n Nater storage a) If manufac Femperature f Energy lost fro b) If manufac Hot water stor	ne (litres) heating a to stored le loss: turer's de factor froi om water turer's de rage loss	nd no ta hot wate eclared lo m Table storage eclared of factor fr	nk in dw er (this in oss facto 2b , kWh/ye cylinder I om Tabl	relling, e cludes i or is kno ear oss facto	/WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	within sa (47) ombi boil	ers) ente	sel	47)	0 0		(48 (49 (50
Storage volum f community I Otherwise if n Nater storage a) If manufac Temperature f Energy lost fro b) If manufac Hot water stor f community I	ne (litres) heating a to stored to loss: turer's de factor from water turer's de rage loss heating s	nd no ta hot wate eclared lo m Table storage eclared of factor fr ee section	nk in dw er (this in oss facto 2b , kWh/ye cylinder I om Tabl	relling, e cludes i or is kno ear oss facto	/WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	within sa (47) ombi boil	ers) ente	sel	47)	0 0 0 10 02		(48 (49 (50
Storage volum f community I Otherwise if n Vater storage a) If manufac Femperature f Energy lost fro b) If manufac Hot water stor f community I Volume factor	ne (litres) heating a lo stored e loss: cturer's de factor froi om water cturer's de rage loss heating s r from Tal	nd no ta hot wate eclared le m Table storage eclared of factor fr ee section	nk in dw er (this in oss facto 2b , kWh/ye cylinder I om Tabl on 4.3	relling, e cludes i or is kno ear oss facto	/WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	within sa (47) ombi boil	ers) ente	sel	47)	0 0 0 10 02 03		(48 (49 (50 (51
Storage volum f community I Otherwise if n Vater storage a) If manufac Temperature f Energy lost fro b) If manufac Hot water stor f community I Volume factor Temperature f	ne (litres) heating a to stored e loss: eturer's de factor from water eturer's de rage loss heating s r from Tal factor from	nd no ta hot wate eclared le m Table storage eclared of factor fr ee section ble 2a m Table	nk in dw er (this in oss facto 2b , kWh/ye cylinder I om Tabl on 4.3	relling, e icludes i or is kno ear oss facto e 2 (kWl	/WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	within sa (47) ombi boil (48) x (49)	ers) ente	sel er 'O' in (47) 1 0.	0 0 0 10 02 03 .6		(48) (47) (48) (50) (51) (52) (53)
Storage volum f community hotherwise if nowater storage a) If manuface Femperature for the storage lost from the storage storage for the stora	ne (litres) heating a lo stored e loss: eturer's de factor froi om water eturer's de rage loss heating s r from Tal factor froi om water	eclared less to rage eclared of factor free section ble 2a m Table estorage	nk in dw er (this in oss facto 2b , kWh/ye cylinder I om Tabl on 4.3	relling, e icludes i or is kno ear oss facto e 2 (kWl	/WHRS nter 110 nstantar wn (kWh	storage litres in neous co n/day): known:	within sa (47) ombi boil	ers) ente	sel er 'O' in (47) 1 0. 1. 0.	0 0 0 10 02 03		(48) (49) (50) (51)

Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)ı	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 cylinder contain	s dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	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)
Primary circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	/ factor fi	rom Tab	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(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 each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 202.04	178.28	187.73	168.97	166.08	149.11	143.88	156.95	156.38	175.18	184.37	197.4		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additiona	I lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter	-		-	-	-	-		-	-		
(64)m= 202.04	178.28	187.73	168.97	166.08	149.11	143.88	156.95	156.38	175.18	184.37	197.4		
	!						Outp	out from wa	ater heate	r (annual)₁	12	2066.36	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	_
(65)m= 93.02	82.62	88.26	04.40	04.00	74.50		- ` ´ 	-		<u> </u>	<u> </u>		(0.0)
(00)	00-	00.20	81.19	81.06	74.59	73.68	78.03	77	84.09	86.31	91.48		(65)
` '	ļ	<u> </u>				<u> </u>	!	<u> </u>				eating	(65)
include (57)	m in cald	culation o	of (65)m	only if c		<u> </u>	!	<u> </u>				eating	(65)
include (57) 5. Internal ga	m in cald	culation of Table 5	of (65)m and 5a	only if c		<u> </u>	!	<u> </u>				eating	(65)
include (57)	m in cald	culation of Table 5	of (65)m and 5a ts	only if c	ylinder is	<u> </u>	dwelling	or hot w				eating	(65)
include (57) 5. Internal g	m in cald ains (see as (Table	culation of Table 5	of (65)m and 5a	only if c		s in the o	!	<u> </u>	ater is fr	rom com	munity h	eating	(66)
include (57) 5. Internal gain Metabolic gain Jan	m in cald ains (see as (Table Feb 117.4	E Table 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 117.4	only if constant of the consta	ylinder is Jun 117.4	Jul	Aug	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal gain Metabolic gain Jan (66)m= 117.4	m in cald ains (see as (Table Feb 117.4	E Table 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 117.4	only if constant of the consta	ylinder is Jun 117.4	Jul	Aug	or hot w	ater is fr	om com	munity h	eating	
include (57) 5. Internal games Metabolic gair Jan (66)m= 117.4 Lighting gains (67)m= 18.48	m in calcains (see as (Table Feb 117.4 (calcula 16.42	ETable 5 E Table 5 E 5), Wat Mar 117.4 ted in Ap	of (65)m 6 and 5a ts Apr 117.4 opendix	May 117.4 L, equati 7.56	Jun 117.4 ion L9 or	Jul 117.4 r L9a), a	Aug 117.4 Iso see	Sep 117.4 Table 5	Oct 117.4	Nov	Dec	eating	(66)
include (57) 5. Internal gain Metabolic gain Jan (66)m= 117.4 Lighting gains	m in calcains (see as (Table Feb 117.4 (calcula 16.42	ETable 5 E Table 5 E 5), Wat Mar 117.4 ted in Ap	of (65)m 6 and 5a ts Apr 117.4 opendix	May 117.4 L, equati 7.56	Jun 117.4 ion L9 or	Jul 117.4 r L9a), a	Aug 117.4 Iso see	Sep 117.4 Table 5	Oct 117.4	Nov	Dec	eating	(66)
include (57) 5. Internal gain Metabolic gain Jan (66)m= 117.4 Lighting gains (67)m= 18.48 Appliances gains (68)m= 207.34	m in calc	Table 5 2 5), Wat Mar 117.4 ted in Ap 13.35 ulated in	ts Apr 117.4 ppendix 10.11 Appendix 192.53	only if c May 117.4 L, equati 7.56 dix L, eq 177.96	Jun 117.4 ion L9 of 6.38 uation L	Jul 117.4 r L9a), a 6.89 13 or L1	Aug 117.4 Iso see 8.96 3a), also	Sep 117.4 Table 5 12.03 see Tal 158.39	Oct 117.4 15.27 ble 5 169.93	Nov 117.4	Dec 117.4	eating	(66) (67)
include (57) 5. Internal graph of the following serior of the following serio	m in calc	Table 5 2 5), Wat Mar 117.4 ted in Ap 13.35 ulated in	ts Apr 117.4 ppendix 10.11 Appendix 192.53	only if c May 117.4 L, equati 7.56 dix L, eq 177.96	Jun 117.4 ion L9 of 6.38 uation L	Jul 117.4 r L9a), a 6.89 13 or L1	Aug 117.4 Iso see 8.96 3a), also	Sep 117.4 Table 5 12.03 see Tal 158.39	Oct 117.4 15.27 ble 5 169.93	Nov 117.4	Dec 117.4	eating	(66) (67)
include (57) 5. Internal graph of the following gains (66)m= 117.4 Lighting gains (67)m= 18.48 Appliances gains (68)m= 207.34 Cooking gains (69)m= 34.74	m in calcular ins (calcular calcular calcular 34.74	Table 5 2 5), Wat Mar 117.4 ted in Ap 13.35 ulated in 204.07 ated in A 34.74	of (65)m s and 5a ts Apr 117.4 opendix 10.11 n Append 192.53 opendix 34.74	only if controls: May 117.4 L, equati 7.56 dix L, equati 177.96 L, equati	Jun 117.4 ion L9 or 6.38 uation L 164.26 ion L15	Jul 117.4 r L9a), a 6.89 13 or L1 155.12 or L15a)	Aug 117.4 Iso see 8.96 3a), also 152.96	Sep 117.4 Table 5 12.03 See Tal 158.39 ee Table	Oct 117.4 15.27 ble 5 169.93	Nov 117.4 17.82	Dec 117.4 19 198.19	eating	(66) (67) (68)
include (57) 5. Internal games Metabolic gain Jan (66)m= 117.4 Lighting gains (67)m= 18.48 Appliances games (68)m= 207.34 Cooking gains	m in calcular ins (calcular calcular calcular 34.74	Table 5 2 5), Wat Mar 117.4 ted in Ap 13.35 ulated in 204.07 ated in A 34.74	of (65)m s and 5a ts Apr 117.4 opendix 10.11 n Append 192.53 opendix 34.74	only if controls: May 117.4 L, equati 7.56 dix L, equati 177.96 L, equati	Jun 117.4 ion L9 or 6.38 uation L 164.26 ion L15	Jul 117.4 r L9a), a 6.89 13 or L1 155.12 or L15a)	Aug 117.4 Iso see 8.96 3a), also 152.96	Sep 117.4 Table 5 12.03 See Tal 158.39 ee Table	Oct 117.4 15.27 ble 5 169.93	Nov 117.4 17.82	Dec 117.4 19 198.19	eating	(66) (67) (68)
include (57) 5. Internal graph of the following gains (66)m= 117.4 Lighting gains (67)m= 18.48 Appliances gains (68)m= 207.34 Cooking gains (69)m= 34.74 Pumps and fair (70)m= 0	m in calc ains (see as (Table Feb 117.4 (calcula 16.42 ins (calcula 209.49 (calcula 34.74 as gains	ted in Ap 204.07 ated in Ap 34.74 (Table 5	of (65)m and 5a ts Apr 117.4 ppendix 10.11 Appendix 192.53 ppendix 34.74 5a) 0	only if controls: May 117.4 L, equati 7.56 dix L, equati 177.96 L, equati 34.74	Jun 117.4 ion L9 or 6.38 uation L 164.26 ion L15 34.74	Jul 117.4 r L9a), a 6.89 13 or L1 155.12 or L15a) 34.74	Aug 117.4 Iso see 8.96 3a), also 152.96), also se 34.74	Sep 117.4 Table 5 12.03 see Ta 158.39 ee Table 34.74	Oct 117.4 15.27 ble 5 169.93 5 34.74	Nov 117.4 17.82 184.5	Dec 117.4 19 198.19	eating	(66) (67) (68) (69)
include (57) 5. Internal graph of the following serior of the following serio	m in calc ains (see as (Table Feb 117.4 (calcula 16.42 ins (calcula 209.49 (calcula 34.74 as gains	ted in Ap 204.07 ated in Ap 34.74 (Table 5	of (65)m and 5a ts Apr 117.4 ppendix 10.11 Appendix 192.53 ppendix 34.74 5a) 0	only if controls: May 117.4 L, equati 7.56 dix L, equati 177.96 L, equati 34.74	Jun 117.4 ion L9 or 6.38 uation L 164.26 ion L15 34.74	Jul 117.4 r L9a), a 6.89 13 or L1 155.12 or L15a) 34.74	Aug 117.4 Iso see 8.96 3a), also 152.96), also se 34.74	Sep 117.4 Table 5 12.03 see Ta 158.39 ee Table 34.74	Oct 117.4 15.27 ble 5 169.93 5 34.74	Nov 117.4 17.82 184.5	Dec 117.4 19 198.19	eating	(66) (67) (68) (69)
include (57) 5. Internal graph of the first state	m in calcons (Table Feb 117.4 (calcula 16.42 ins (calcula 34.74 ins gains 0 vaporatio 1-93.92	ted in Ap 13.35 culated in Ap 204.07 cted in Ap 34.74 (Table 5 on (negating)	of (65)m s and 5a ts Apr 117.4 ppendix 10.11 Append 192.53 ppendix 34.74 5a) 0 tive valu	only if constructions: May 117.4 L, equation 7.56 dix L, equation 177.96 L, equation 34.74 0 es) (Tab	Jun 117.4 ion L9 of 6.38 uation L 164.26 ion L15 34.74 0	Jul 117.4 r L9a), a 6.89 13 or L1 155.12 or L15a) 34.74	Aug 117.4 Iso see 8.96 3a), also 152.96 , also se 34.74	Sep 117.4 Table 5 12.03 see Tal 158.39 ee Table 34.74	Oct 117.4 15.27 ble 5 169.93 5 34.74	Nov 117.4 17.82 184.5	Dec 117.4 19 198.19 34.74	eating	(66) (67) (68) (69)
include (57) 5. Internal graph of the following spans (66)m= 117.4 Lighting gains (67)m= 18.48 Appliances ga (68)m= 207.34 Cooking gains (69)m= 34.74 Pumps and fa (70)m= 0 Losses e.g. even	m in calcons (Table Feb 117.4 (calcula 16.42 ins (calcula 34.74 ins gains 0 vaporatio 1-93.92	ted in Ap 13.35 culated in Ap 204.07 cted in Ap 34.74 (Table 5 on (negating)	of (65)m s and 5a ts Apr 117.4 ppendix 10.11 Append 192.53 ppendix 34.74 5a) 0 tive valu	only if constructions: May 117.4 L, equation 7.56 dix L, equation 177.96 L, equation 34.74 0 es) (Tab	Jun 117.4 ion L9 of 6.38 uation L 164.26 ion L15 34.74 0	Jul 117.4 r L9a), a 6.89 13 or L1 155.12 or L15a) 34.74	Aug 117.4 Iso see 8.96 3a), also 152.96 , also se 34.74	Sep 117.4 Table 5 12.03 see Tal 158.39 ee Table 34.74	Oct 117.4 15.27 ble 5 169.93 5 34.74	Nov 117.4 17.82 184.5	Dec 117.4 19 198.19 34.74	eating	(66) (67) (68) (69)
include (57) 5. Internal grant Jan (66)m= 117.4 Lighting gains (67)m= 18.48 Appliances ga (68)m= 207.34 Cooking gains (69)m= 34.74 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -93.92 Water heating (72)m= 125.03	m in calc ains (see as (Table Feb 117.4 (calcula 16.42 ins (calcula 209.49 a (calcula 34.74 as gains 0 vaporatic -93.92 gains (T	culation of Table 5 2 5), Wat Mar 117.4 ted in Ap 13.35 tulated in 204.07 tted in Ap 34.74 (Table 5 0 on (negation -93.92) Table 5) 118.63	of (65)m ts Apr 117.4 ppendix 10.11 n Appendix 34.74 5a) 0 tive valu -93.92	only if construction only if c	Jun 117.4 ion L9 of 6.38 uation L 164.26 ion L15 34.74 0 le 5) -93.92	Jul 117.4 r L9a), a 6.89 13 or L1 155.12 or L15a) 34.74	Aug 117.4 Iso see 8.96 3a), also 152.96), also se 34.74 0	Sep 117.4 Table 5 12.03 see Tal 158.39 ee Table 34.74	Oct 117.4 15.27 ble 5 169.93 5 34.74 0 -93.92	Nov 117.4 17.82 184.5 34.74 0	Dec 117.4 19 198.19 34.74 0 -93.92	eating	(66) (67) (68) (69) (70) (71)
include (57) 5. Internal graph of the first state	m in calc ains (see as (Table Feb 117.4 (calcula 16.42 ins (calcula 209.49 a (calcula 34.74 as gains 0 vaporatic -93.92 gains (T	culation of Table 5 2 5), Wat Mar 117.4 ted in Ap 13.35 ulated in 204.07 ated in Ap 34.74 (Table 5 0 on (negation -93.92) Table 5) 118.63	of (65)m ts Apr 117.4 ppendix 10.11 n Appendix 34.74 5a) 0 tive valu -93.92	only if construction only if c	Jun 117.4 ion L9 of 6.38 uation L 164.26 ion L15 34.74 0 le 5) -93.92	Jul 117.4 r L9a), a 6.89 13 or L1 155.12 or L15a) 34.74	Aug 117.4 Iso see 8.96 3a), also 152.96), also se 34.74 0	Sep 117.4 Table 5 12.03 See Tal 158.39 See Table 34.74 0 -93.92	Oct 117.4 15.27 ble 5 169.93 5 34.74 0 -93.92	Nov 117.4 17.82 184.5 34.74 0	Dec 117.4 19 198.19 34.74 0 -93.92	eating	(66) (67) (68) (69) (70) (71)

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

Orienta	tion:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	2.24	x	10.63	x	0.4	x	0.8	=	5.28	(74)
North	0.9x	0.77	x	2.71	x	10.63	x	0.4	x	0.8	=	6.39	(74)
North	0.9x	0.77	х	1.5	x	10.63	x	0.4	x	0.8	=	3.54	(74)
North	0.9x	0.77	x	2.24	x	20.32	х	0.4	x	0.8	=	10.09	(74)
North	0.9x	0.77	x	2.71	x	20.32	x	0.4	x	0.8	=	12.21	(74)
North	0.9x	0.77	x	1.5	x	20.32	X	0.4	x	0.8	=	6.76	(74)
North	0.9x	0.77	x	2.24	x	34.53	x	0.4	x	0.8	=	17.15	(74)
North	0.9x	0.77	x	2.71	x	34.53	x	0.4	x	0.8	=	20.75	(74)
North	0.9x	0.77	x	1.5	x	34.53	x	0.4	x	0.8	=	11.49	(74)
North	0.9x	0.77	x	2.24	x	55.46	x	0.4	x	0.8	=	27.55	(74)
North	0.9x	0.77	x	2.71	x	55.46	x	0.4	x	0.8	=	33.33	(74)
North	0.9x	0.77	x	1.5	x	55.46	x	0.4	x	0.8	=	18.45	(74)
North	0.9x	0.77	x	2.24	x	74.72	x	0.4	x	0.8	=	37.11	(74)
North	0.9x	0.77	x	2.71	x	74.72	x	0.4	x	0.8	=	44.9	(74)
North	0.9x	0.77	x	1.5	x	74.72	x	0.4	x	0.8	=	24.85	(74)
North	0.9x	0.77	x	2.24	x	79.99	x	0.4	x	0.8	=	39.73	(74)
North	0.9x	0.77	x	2.71	x	79.99	x	0.4	x	0.8	=	48.07	(74)
North	0.9x	0.77	x	1.5	x	79.99	x	0.4	x	0.8	=	26.61	(74)
North	0.9x	0.77	x	2.24	x	74.68	x	0.4	x	0.8	=	37.1	(74)
North	0.9x	0.77	x	2.71	x	74.68	x	0.4	x	0.8	=	44.88	(74)
North	0.9x	0.77	x	1.5	x	74.68	x	0.4	x	0.8	=	24.84	(74)
North	0.9x	0.77	x	2.24	x	59.25	x	0.4	x	0.8	=	29.43	(74)
North	0.9x	0.77	x	2.71	x	59.25	x	0.4	X	0.8	=	35.61	(74)
North	0.9x	0.77	x	1.5	x	59.25	x	0.4	X	0.8	=	19.71	(74)
North	0.9x	0.77	X	2.24	x	41.52	X	0.4	X	0.8	=	20.62	(74)
North	0.9x	0.77	x	2.71	x	41.52	X	0.4	X	0.8	=	24.95	(74)
North	0.9x	0.77	X	1.5	x	41.52	X	0.4	X	0.8	=	13.81	(74)
North	0.9x	0.77	X	2.24	x	24.19	X	0.4	X	0.8	=	12.02	(74)
North	0.9x	0.77	x	2.71	x	24.19	X	0.4	X	0.8	=	14.54	(74)
North	0.9x	0.77	X	1.5	x	24.19	X	0.4	X	0.8	=	8.05	(74)
North	0.9x	0.77	X	2.24	x	13.12	X	0.4	X	0.8	=	6.52	(74)
North	0.9x	0.77	x	2.71	x	13.12	X	0.4	X	0.8	=	7.88	(74)
North	0.9x	0.77	X	1.5	x	13.12	X	0.4	X	0.8	=	4.36	(74)
North	0.9x	0.77	X	2.24	x	8.86	X	0.4	X	0.8	=	4.4	(74)
North	0.9x	0.77	x	2.71	x	8.86	X	0.4	X	0.8	=	5.33	(74)
North	0.9x	0.77	x	1.5	x	8.86	x	0.4	X	0.8	=	2.95	(74)
East	0.9x	0.77	x	2.71	x	19.64	x	0.4	x	0.8	=	11.8	(76)
East	0.9x	0.77	x	6.73	x	19.64	x	0.4	x	0.8	=	29.31	(76)
East	0.9x	0.77	x	2.71	×	19.64	x	0.4	X	0.8	=	11.8	(76)

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East	0.9x	0.77	X	2.71	X	38.42	X	0.4	X	0.8	=	23.09	(76)
East	0.9x	0.77	X	6.73	X	38.42	X	0.4	X	0.8	=	57.34	(76)
East	0.9x	0.77	X	2.71	X	38.42	X	0.4	X	0.8	=	23.09	(76)
East	0.9x	0.77	X	2.71	X	63.27	X	0.4	x	0.8	=	38.03	(76)
East	0.9x	0.77	X	6.73	X	63.27	X	0.4	X	0.8	=	94.43	(76)
East	0.9x	0.77	X	2.71	X	63.27	X	0.4	X	0.8	=	38.03	(76)
East	0.9x	0.77	X	2.71	X	92.28	X	0.4	X	0.8	=	55.46	(76)
East	0.9x	0.77	X	6.73	x	92.28	x	0.4	x	0.8	=	137.72	(76)
East	0.9x	0.77	X	2.71	X	92.28	X	0.4	x	0.8	=	55.46	(76)
East	0.9x	0.77	X	2.71	x	113.09	x	0.4	x	0.8] =	67.97	(76)
East	0.9x	0.77	X	6.73	x	113.09	x	0.4	x	0.8	=	168.78	(76)
East	0.9x	0.77	X	2.71	X	113.09	X	0.4	x	0.8] =	67.97	(76)
East	0.9x	0.77	X	2.71	x	115.77	x	0.4	x	0.8	=	69.57	(76)
East	0.9x	0.77	X	6.73	x	115.77	x	0.4	x	0.8	=	172.78	(76)
East	0.9x	0.77	X	2.71	x	115.77	x	0.4	x	0.8	=	69.57	(76)
East	0.9x	0.77	X	2.71	x	110.22	X	0.4	x	0.8	=	66.24	(76)
East	0.9x	0.77	X	6.73	x	110.22	x	0.4	x	0.8	=	164.49	(76)
East	0.9x	0.77	X	2.71	x	110.22	x	0.4	x	0.8	=	66.24	(76)
East	0.9x	0.77	X	2.71	x	94.68	X	0.4	x	0.8	=	56.9	(76)
East	0.9x	0.77	X	6.73	x	94.68	x	0.4	x	0.8	=	141.3	(76)
East	0.9x	0.77	X	2.71	x	94.68	X	0.4	x	0.8] =	56.9	(76)
East	0.9x	0.77	X	2.71	х	73.59	X	0.4	x	0.8	=	44.22	(76)
East	0.9x	0.77	X	6.73	x	73.59	X	0.4	x	0.8	=	109.83	(76)
East	0.9x	0.77	X	2.71	x	73.59	x	0.4	x	0.8	=	44.22	(76)
East	0.9x	0.77	X	2.71	x	45.59	x	0.4	x	0.8	=	27.4	(76)
East	0.9x	0.77	X	6.73	x	45.59	x	0.4	x	0.8] =	68.04	(76)
East	0.9x	0.77	X	2.71	X	45.59	x	0.4	x	0.8] =	27.4	(76)
East	0.9x	0.77	X	2.71	x	24.49	x	0.4	x	0.8	=	14.72	(76)
East	0.9x	0.77	X	6.73	x	24.49	x	0.4	x	0.8	=	36.55	(76)
East	0.9x	0.77	X	2.71	x	24.49	x	0.4	x	0.8	=	14.72	(76)
East	0.9x	0.77	X	2.71	x	16.15	X	0.4	x	0.8	=	9.71	(76)
East	0.9x	0.77	X	6.73	x	16.15	X	0.4	X	0.8	=	24.1	(76)
East	0.9x	0.77	X	2.71	x	16.15	X	0.4	x	0.8	=	9.71	(76)
South	0.9x	0.77	X	2.24	х	46.75	X	0.4	x	0.8	=	23.22	(78)
South	0.9x	0.77	X	1.5	х	46.75	X	0.4	X	0.8	=	15.55	(78)
South	0.9x	0.77	X	2.71	х	46.75	x	0.4	x	0.8] =	28.1	(78)
South	0.9x	0.77	X	2.24	x	76.57	x	0.4	x	0.8] =	38.03	(78)
South	0.9x	0.77	X	1.5	x	76.57	X	0.4	x	0.8] =	25.47	(78)
South	0.9x	0.77	X	2.71	x	76.57	x	0.4	x	0.8] =	46.01	(78)
South	0.9x	0.77	X	2.24	x	97.53	x	0.4	x	0.8	j =	48.45	(78)
South	0.9x	0.77	X	1.5	x	97.53	x	0.4	x	0.8	j =	32.44	(78)
	_		_		-		- '		•		-		_

South 0.9x 0.77 x 2.71 x 97.53 x 0.4 x 0.8 = 58.61 South 0.9x 0.77 x 2.24 x 110.23 x 0.4 x 0.8 = 54.76 South 0.9x 0.77 x 1.5 x 110.23 x 0.4 x 0.8 = 56.67 South 0.9x 0.77 x 2.71 x 110.23 x 0.4 x 0.8 = 66.25 South 0.9x 0.77 x 2.24 x 114.87 x 0.4 x 0.8 = 57.06 South 0.9x 0.77 x 2.71 x 114.87 x 0.4 x 0.8 = 57.06 South 0.9x 0.77 x 2.71 x 114.87 x 0.4 x 0.8 = 54.91
South 0.9x 0.77 x 1.5 x 110.23 x 0.4 x 0.8 = 36.67 South 0.9x 0.77 x 2.71 x 110.23 x 0.4 x 0.8 = 66.25 South 0.9x 0.77 x 2.24 x 114.87 x 0.4 x 0.8 = 57.06 South 0.9x 0.77 x 1.5 x 114.87 x 0.4 x 0.8 = 57.06 South 0.9x 0.77 x 2.71 x 114.87 x 0.4 x 0.8 = 38.21 South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 54.91
South 0.9x 0.77 x 2.71 x 110.23 x 0.4 x 0.8 = 66.25 South 0.9x 0.77 x 2.24 x 114.87 x 0.4 x 0.8 = 57.06 South 0.9x 0.77 x 1.5 x 114.87 x 0.4 x 0.8 = 57.06 South 0.9x 0.77 x 1.5 x 114.87 x 0.4 x 0.8 = 69.03 South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 69.03 South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 2.71 x 110.55 x 0.4 x 0.8 = 53.65
South 0.9x 0.77 x 2.24 x 114.87 x 0.4 x 0.8 = 57.06 South 0.9x 0.77 x 1.5 x 114.87 x 0.4 x 0.8 = 38.21 South 0.9x 0.77 x 2.71 x 114.87 x 0.4 x 0.8 = 69.03 South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 69.03 South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 2.71 x 110.55 x 0.4 x 0.8 = 53.65
South 0.9x 0.77 x 1.5 x 114.87 x 0.4 x 0.8 = 38.21 South 0.9x 0.77 x 2.71 x 114.87 x 0.4 x 0.8 = 69.03 South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 36.77 South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 53.65 South 0.9x 0.77 x 1.5 x 108.01 x 0.4 x 0.8 = 53.65
South 0.9x 0.77 x 2.71 x 114.87 x 0.4 x 0.8 = 69.03 South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 2.71 x 110.55 x 0.4 x 0.8 = 36.77 South 0.9x 0.77 x 2.24 x 108.01 x 0.4 x 0.8 = 53.65 South 0.9x 0.77 x 2.24 x 108.01 x 0.4 x 0.8 = 53.65 South 0.9x 0.77 x 2.71 x 108.01 x 0.4 x 0.8 = 64.91
South 0.9x 0.77 x 2.24 x 110.55 x 0.4 x 0.8 = 54.91 South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 36.77 South 0.9x 0.77 x 2.71 x 110.55 x 0.4 x 0.8 = 66.44 South 0.9x 0.77 x 2.24 x 108.01 x 0.4 x 0.8 = 53.65 South 0.9x 0.77 x 1.5 x 108.01 x 0.4 x 0.8 = 35.93 South 0.9x 0.77 x 2.71 x 108.01 x 0.4 x 0.8 = 64.91 South 0.9x 0.77 x 2.24 x 104.89 x 0.4 x 0.8 = 52.11 South 0.9x 0.77 x 2.21 x 104.89 x 0
South 0.9x 0.77 x 1.5 x 110.55 x 0.4 x 0.8 = 36.77 South 0.9x 0.77 x 2.71 x 110.55 x 0.4 x 0.8 = 66.44 South 0.9x 0.77 x 2.24 x 108.01 x 0.4 x 0.8 = 53.65 South 0.9x 0.77 x 1.5 x 108.01 x 0.4 x 0.8 = 53.65 South 0.9x 0.77 x 2.71 x 108.01 x 0.4 x 0.8 = 64.91 South 0.9x 0.77 x 2.24 x 104.89 x 0.4 x 0.8 = 52.11 South 0.9x 0.77 x 2.71 x 104.89 x 0.4 x 0.8 = 52.11 South 0.9x 0.77 x 2.71 x 104.89 x 0
South 0.9x 0.77 x 2.71 x 110.55 x 0.4 x 0.8 = 66.44 South 0.9x 0.77 x 2.24 x 108.01 x 0.4 x 0.8 = 53.65 South 0.9x 0.77 x 1.5 x 108.01 x 0.4 x 0.8 = 35.93 South 0.9x 0.77 x 2.71 x 108.01 x 0.4 x 0.8 = 64.91 South 0.9x 0.77 x 2.24 x 104.89 x 0.4 x 0.8 = 52.11 South 0.9x 0.77 x 1.5 x 104.89 x 0.4 x 0.8 = 53.04 South 0.9x 0.77 x 2.71 x 104.89 x 0.4 x 0.8 = 63.04 South 0.9x 0.77 x 2.24 x 101.89 x 0
South 0.9x 0.77 x 2.24 x 108.01 x 0.4 x 0.8 = 53.65 South 0.9x 0.77 x 1.5 x 108.01 x 0.4 x 0.8 = 35.93 South 0.9x 0.77 x 2.71 x 108.01 x 0.4 x 0.8 = 64.91 South 0.9x 0.77 x 2.24 x 104.89 x 0.4 x 0.8 = 52.11 South 0.9x 0.77 x 1.5 x 104.89 x 0.4 x 0.8 = 34.89 South 0.9x 0.77 x 2.71 x 104.89 x 0.4 x 0.8 = 63.04 South 0.9x 0.77 x 2.24 x 101.89 x 0.4 x 0.8 = 50.61
South 0.9x 0.77 x 1.5 x 108.01 x 0.4 x 0.8 = 35.93 South 0.9x 0.77 x 2.71 x 108.01 x 0.4 x 0.8 = 64.91 South 0.9x 0.77 x 2.24 x 104.89 x 0.4 x 0.8 = 52.11 South 0.9x 0.77 x 1.5 x 104.89 x 0.4 x 0.8 = 34.89 South 0.9x 0.77 x 2.71 x 104.89 x 0.4 x 0.8 = 63.04 South 0.9x 0.77 x 2.24 x 101.89 x 0.4 x 0.8 = 50.61
South 0.9x 0.77 x 2.71 x 108.01 x 0.4 x 0.8 = 64.91 South 0.9x 0.77 x 2.24 x 104.89 x 0.4 x 0.8 = 52.11 South 0.9x 0.77 x 1.5 x 104.89 x 0.4 x 0.8 = 34.89 South 0.9x 0.77 x 2.71 x 104.89 x 0.4 x 0.8 = 63.04 South 0.9x 0.77 x 2.24 x 101.89 x 0.4 x 0.8 = 50.61
South 0.9x 0.77 x 2.24 x 104.89 x 0.4 x 0.8 = 52.11 South 0.9x 0.77 x 1.5 x 104.89 x 0.4 x 0.8 = 34.89 South 0.9x 0.77 x 2.71 x 104.89 x 0.4 x 0.8 = 63.04 South 0.9x 0.77 x 2.24 x 101.89 x 0.4 x 0.8 = 50.61
South 0.9x 0.77 x 1.5 x 104.89 x 0.4 x 0.8 = 34.89 South 0.9x 0.77 x 2.71 x 104.89 x 0.4 x 0.8 = 63.04 South 0.9x 0.77 x 2.24 x 101.89 x 0.4 x 0.8 = 50.61
South 0.9x 0.77 x 2.71 x 104.89 x 0.4 x 0.8 = 63.04 South 0.9x 0.77 x 2.24 x 101.89 x 0.4 x 0.8 = 50.61
South 0.9x 0.77 x 2.24 x 101.89 x 0.4 x 0.8 = 50.61
Courtle 2.2
South 0.9x 0.77 x 1.5 x 101.89 x 0.4 x 0.8 = 33.89
South 0.9x 0.77 x 2.71 x 101.89 x 0.4 x 0.8 = 61.23
South 0.9x 0.77 x 2.24 x 82.59 x 0.4 x 0.8 = 41.02
South 0.9x 0.77 x 1.5 x 82.59 x 0.4 x 0.8 = 27.47
South 0.9x 0.77 x 2.71 x 82.59 x 0.4 x 0.8 = 49.63
South 0.9x 0.77 x 2.24 x 55.42 x 0.4 x 0.8 = 27.53
South 0.9x 0.77 x 1.5 x 55.42 x 0.4 x 0.8 = 18.43
South 0.9x 0.77 x 2.71 x 55.42 x 0.4 x 0.8 = 33.3
South 0.9x 0.77 x 2.24 x 40.4 x 0.4 x 0.8 = 20.07
South 0.9x 0.77 x 1.5 x 40.4 x 0.4 x 0.8 = 13.44
South 0.9x 0.77 x 2.71 x 40.4 x 0.4 x 0.8 = 24.28
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m
(83)m= 135 242.1 359.38 485.65 575.89 584.46 558.28 489.87 403.39 275.56 164.01 113.98
Total gains – internal and solar (84)m = (73)m + (83)m , watts
(84)m= 544.07 649.18 753.66 859.27 928.58 916.92 877.54 814.89 738.98 632 544.43 512.35
7. Mean internal temperature (heating season)
Temperature during heating periods in the living area from Table 9, Th1 (°C)
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 0.98 0.95 0.85 0.68 0.49 0.35 0.39 0.64 0.91 0.99 1
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)
(87)m= 20.14 20.32 20.58 20.84 20.96 21 21 21 20.98 20.79 20.41 20.1
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)
(88)m= 20.11 20.11 20.11 20.12 20.12 20.13 20.13 20.13 20.13 20.12 20.12 20.12

Litilio	ation for	tor for a	ains for	roct of d	wolling	h2 m (cc	o Tabla	00)						
(89)m=	0.99	0.98	0.94	0.82	0.62	0.42	0.28	0.32	0.56	0.88	0.98	0.99		(89)
, ,		<u>!</u>	ature in	ļ	<u> </u>	<u> </u>	<u>!</u>	<u> </u>						` '
(90)m=	18.96	19.24	19.6	19.94	20.09	20.13	20.13	20.13	20.11	19.9	19.37	18.91		(90)
, ,		!							l f	LA = Livin	g area ÷ (4	1) =	0.4	(91)
Moon	intorno	Ltompor	oturo (fo	r tha wh	olo duro	lling) – fl	I A T1	. /1 fl	۸) T2					
(92)m=	19.44	19.68	ature (fo	20.3	20.44	20.48	20.48	20.48	20.46	20.26	19.79	19.39		(92)
			he mean									10100		,
(93)m=	19.44	19.68	19.99	20.3	20.44	20.48	20.48	20.48	20.46	20.26	19.79	19.39		(93)
8. Sp	ace hea	ting requ	uirement											
			ernal ter			ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut		r	or gains						_					
1 14:1: -	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	0.99	0.98	ains, hm _{0.94}	0.83	0.65	0.45	0.31	0.35	0.59	0.89	0.98	0.99		(94)
		l	, W = (9 ⁴			0.43	0.51	0.55	0.59	0.09	0.90	0.99		(34)
(95)m=	539.13	634.08	705.93	711.18	599.16	410.35	272.13	285.41	438.71	559.95	532.81	508.91		(95)
		<u> </u>	rnal tem				<u> </u>	<u> </u>						
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	1090.82	1062.5	968.39	810.04	619.72	412.38	272.31	285.78	448.3	684.49	903.07	1085.8		(97)
Spac	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=	410.45	287.9	195.27	71.18	15.3	0	0	0	0	92.65	266.59	429.21		_
								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	1768.54	(98)
Spac	e heatin	g require	ement in	kWh/m²	² /year								23.77	(99)
9b. En	ergy red	quiremer	nts – Cor	mmunity	heating	scheme								
		-	ace hea	• .		-		• .	-		unity sch	neme.		_
Fraction	n of spa	ace heat	from se	condary,	/supplen	nentary l	heating ((Table 1	1) '0' if n	one			0	(301)
Fraction	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-		y obtain he							up to four	other heat	sources; ti	he latter	_
			s, geotherr			rom powe	r stations.	See Appe	ndix C.					7(2020)
			Commun		•								1	(303a)
		•	heat fro		•						02) x (303	a) =	1	(304a)
Factor	for cont	trol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ting sys	tem			1	(305)
Distrib	ution los	ss factor	(Table 1	2c) for o	commun	ity heatii	ng syste	m					1.1	(306)
Space	heating	g											kWh/year	·
Annua	l space	heating	requiren	nent									1768.54	
Space	heat fro	m Com	munity h	eat pum	р				(98) x (30	04a) x (30	5) x (306) =	=	1945.39	(307a)
Efficie	ncy of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space	heating	require	ment fro	m secon	dary/su	plemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
												!		_

Water heating Annual water heating requirement		I	2066.36	7
If DHW from community scheme:		l I		⊣ ¬
Water heat from Community heat pump	(64) x (303a) x	(305) x (306) =	2272.99	(310a)
Electricity used for heat distribution	0.01 × [(307a)(307	7e) + (310a)(310e)] =	42.18	(313)
Cooling System Energy Efficiency Ratio			0	(314)
Space cooling (if there is a fixed cooling system, if not enter	$= (107) \div (314)$) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from	om outside		156.35	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	156.35	(331)
Energy for lighting (calculated in Appendix L)			326.44	(332)
Electricity generated by PVs (Appendix M) (negative quantity	')		-769.49	(333)
Electricity generated by wind turbine (Appendix M) (negative	quantity)		0	(334)
12b. CO2 Emissions – Community heating scheme				
	Energy	Emission factor	Emissions	
	kWh/year	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and water heating (not CH Efficiency of heat source 1 (%)	-	_		(367a)
Efficiency of heat source 1 (%) If there is CHP u	P)	_		(367a) (367)
Efficiency of heat source 1 (%) If there is CHP u	P) using two fuels repeat (363) to	(366) for the second fuel	319	_
Efficiency of heat source 1 (%) CO2 associated with heat source 1 [(307)	P) using two fuels repeat (363) to b)+(310b)] x 100 ÷ (367b) x	0.52 = 0.52 =	319 686.31	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 [(307) Electrical energy for heat distribution	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x	0.52 = 0.52 =	319 686.31 21.89	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37 (309) x	0.52 = 0.52 = 2) =	319 686.31 21.89 708.21	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary)	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37 (309) x	0.52 = 0.52 = 0.52 = 0.52 = 0 = 0.52	319 686.31 21.89 708.21	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantal	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37 (309) x aneous heater (312) x (373) + (374) + (375) =	0.52 = 0.52 = 0.52 = 0.52 = 0 = 0.52	319 686.31 21.89 708.21 0	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantation Total CO2 associated with space and water heating	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37 (309) x aneous heater (312) x (373) + (374) + (375) =	0.52 = 0.	319 686.31 21.89 708.21 0	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantated total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dward control con	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37 (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x (332))) x	0.52 = 0.	319 686.31 21.89 708.21 0 0 708.21 81.14	(367) (372) (373) (374) (375) (376) (378)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantated total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dward co2 associated with electricity for lighting Energy saving/generation technologies (333) to (334) as approximately associated with space and water heating	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37 (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x (332))) x	0.52 = 0.	319 686.31 21.89 708.21 0 708.21 81.14 169.42	(367) (372) (373) (374) (375) (376) (378) (379)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community systems CO2 associated with space heating (secondary) CO2 associated with water from immersion heater or instantated total CO2 associated with space and water heating CO2 associated with electricity for pumps and fans within dward co2 associated with electricity for lighting Energy saving/generation technologies (333) to (334) as applied to the condition of the con	P) using two fuels repeat (363) to (b)+(310b)] x 100 ÷ (367b) x [(313) x (363)(366) + (368)(37 (309) x aneous heater (312) x (373) + (374) + (375) = relling (331)) x (332))) x	0.52 = 0.	319 686.31 21.89 708.21 0 708.21 81.14 169.42	(367) (372) (373) (374) (375) (376) (378) (379)

			User D	Votoilo:						
A N1			USer L					OTDO	22222	
Assessor Name:	John Simps			Strom					006273	
Software Name:	Stroma FS/			Softwa				Versic	n: 1.0.4.26	
			i i	Address						
Address :	•	en Court, Maitl	and Parl	k Estate,	London	, NW3 2	2EH			
1. Overall dwelling dime	ensions:									
			Area	a(m²)	1	Av. He	ight(m)	_	Volume(m ³	<u>-</u>
Ground floor				74.4	(1a) x	:	2.6	(2a) =	193.44	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	74.4	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	193.44	(5)
2. Ventilation rate:										
	main heating	seconda heating	ry	other		total			m³ per hou	ır
Number of chimneys	0	+ 0] + [0] = [0	×	40 =	0	(6a)
Number of open flues	0	+ 0		0	Ī = Ē	0	x	20 =	0	(6b)
Number of intermittent fa	ans					3	x	10 =	30	(7a)
Number of passive vents	3				Ē	0	×	10 =	0	(7b)
Number of flueless gas f	ires				Ė	0	x	40 =	0	(7c)
					_					
					_			Air ch	anges per ho	our —
Infiltration due to chimne	•				Ļ	30		÷ (5) =	0.16	(8)
If a pressurisation test has b			ed to (17), o	otherwise (continue fr	om (9) to	(16)			–
Number of storeys in t	ne aweiling (ns)							0	(9)
Additional infiltration	05 (Carlora Carros	. 0 05 (-				[(9])-1]x0.1 =	0	(10)
Structural infiltration: 0					•	uction			0	(11)
if both types of wall are p deducting areas of openi			o tne great	er wall are	a (arter					
If suspended wooden	floor, enter 0.2	(unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	iter 0.05, else e	enter 0							0	(13)
Percentage of window	s and doors dra	aught stripped							0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expresse	d in cubic metre	es per ho	our per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeabi	lity value, then	$(18) = [(17) \div 20] + ($	(8), otherw	ise (18) = ((16)				0.41	(18)
Air permeability value applie	es if a pressurisatio	n test has been do	ne or a de	gree air pe	rmeability	is being u	sed			
Number of sides sheltered	ed								1	(19)
Shelter factor				(20) = 1 -	[0.075 x ([*]	19)] =			0.92	(20)
Infiltration rate incorpora	ting shelter fact	tor		(21) = (18) x (20) =				0.37	(21)
Infiltration rate modified	for monthly win	d speed					•		•	
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table	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 <i>∸</i> 4									
(00)	-,··· · ·	1.09 0.05	0.05	1 0 00	Ι,	1.00	T 440	1 440	1	

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

0.48	0.47	0.46	0.41	0.4	d wind s	0.36	0.35	0.37	0.4	0.42	0.44	1		
Calculate effe	I ' I		1 -	l -			0.00	0.57	0.4	0.42	0.44	J		
If mechanic	al ventila	tion:											0	(2
If exhaust air h	eat pump u	ising App	endix N, (2	(3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)				0	(2
If balanced with	h heat reco	very: effic	ciency in %	allowing f	for in-use f	actor (fron	n Table 4h) =					0	(2
a) If balance	ed mecha	anical ve	entilation	with he	at recove	ery (MVI	HR) (24a	a)m = (22)	2b)m + (2	23b) × [1 – (23c)) ÷ 100	0]	
4a)m= 0	0	0	0	0	0	0	0	0	0	0	0	_		(2
b) If balance	1		1	i	1		- 	i `	'		1	1		,
4b)m= 0	0	0	0	0	0	0	0	0	0	0	0]		(2
c) If whole h	nouse ext n < 0.5 ×			•	•				5 v (23h	١				
4c)m = 0	0.5 x	0	0	0	0	0	0 - (221	0	0	0	0	1		(2
d) If natural	السنسا											J		\
,	n = 1, the			•					0.5]					
1d)m= 0.61	0.61	0.61	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6	1		(2
Effective air	change	rate - er	nter (24a	or (24b	o) or (24	c) or (24	d) in bo	x (25)				-		
5)m= 0.61	0.61	0.61	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6	1		(
. Heat losse	s and he	at loss i	naramet	≏r·								-		
LEMENT	Gros		Openin		Net Ar	ea	U-val	ue	AXU		k-value	e		ΑΧk
	area	(m²)	· m		A ,r	n²	W/m2	2K	(W/ł	<)	kJ/m²-	K		kJ/K
indows Type		(m²)			A ,r	 	W/m2 +(1.4) / [1]/		(W/ł	<) 	kJ/m²-	K		
	e 1	(m²)				x1		0.04] =		<) 	kJ/m²•	K		(:
indows Type	e 1 e 2	(m²)			1.66	x1 x1	/[1/(1.4)+	0.04] = 0.04] =	2.2	<) 	kJ/m²-	K		(2
indows Type indows Type	e 1 e 2 e 3	(m²)			2.01	x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+	0.04] = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$	2.2	<) 	kJ/m²-	K		(: (:
indows Type indows Type indows Type	e 1 e 2 e 3 e 4	(m²)			1.66 2.01 5	x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$	2.2 2.66 6.63	() 	kJ/m²-	K		(; (; (;
indows Type indows Type indows Type indows Type	e 1 e 2 e 3 e 4 e 5	(m²)			1.66 2.01 5 1.66	x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [2.2 2.66 6.63 2.2	<)	kJ/m²-	K		kJ/K (; (; (; (; (; (; (; (; (; (; (; (; (;
indows Type indows Type indows Type indows Type indows Type	e 1 e 2 e 3 e 4 e 5 e 6	(m²)			1.66 2.01 5 1.66 1.11	x1 x1 x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [2.2 2.66 6.63 2.2 1.47	<)	kJ/m²-	K		()
indows Type indows Type indows Type indows Type indows Type indows Type	e 1 e 2 e 3 e 4 e 5 e 6 e 7	(m²)			1.66 2.01 5 1.66 1.11 2.01	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix}$	2.2 2.66 6.63 2.2 1.47 2.66	<)	kJ/m²-	K		() () () () ()
indows Type indows Type indows Type indows Type indows Type indows Type indows Type	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8	(m²)			1.66 2.01 5 1.66 1.11 2.01	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix}$	2.2 2.66 6.63 2.2 1.47 2.66 2.66	9 	kJ/m²-	K		(; (; (;
indows Type indows Type indows Type indows Type indows Type indows Type indows Type indows Type	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8			,Ž	1.66 2.01 5 1.66 1.11 2.01 2.01 2.01	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix}$	2.2 2.66 6.63 2.2 1.47 2.66 2.66	9 	kJ/m²-	ĸ		() () () () () ()
indows Type indows Type indows Type indows Type indows Type indows Type indows Type indows Type alls	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8	2	m	,Ž	1.66 2.01 5 1.66 1.11 2.01 2.01 2.01 1.11	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [2.2 2.66 6.63 2.2 1.47 2.66 2.66 2.66	9 	kJ/m²-	K		()
indows Type indows Type indows Type indows Type indows Type indows Type indows Type alls	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8 e 9	2	18.5	,Ž	1.66 2.01 5 1.66 1.11 2.01 2.01 1.11 48.24	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = [0.04]	2.2 2.66 6.63 2.2 1.47 2.66 2.66 2.66 1.47 8.68	9 	kJ/m²-	K		
indows Type indows Type indows Type indows Type indows Type indows Type indows Type indows Type alls oof	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8 e 9	2	18.5	,Ž	1.66 2.01 5 1.66 1.11 2.01 2.01 2.01 1.11 48.24 74.4 141.2	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	0.04] = [0.04]	2.2 2.66 6.63 2.2 1.47 2.66 2.66 2.66 1.47 8.68 9.67	9 	kJ/m²-	K		
indows Type indows	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8 e 9 66.85 74.4 elements,	2 , m² ows, use e	18.50	8 indow U-va	1.66 2.01 5 1.66 1.11 2.01 2.01 2.01 1.11 48.24 74.4 141.2 44.62	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18	0.04] = [0.04]	2.2 2.66 6.63 2.2 1.47 2.66 2.66 2.66 1.47 8.68 9.67					
indows Type indows Type indows Type indows Type indows Type indows Type indows Type indows Type indows Type alls oof otal area of e arty wall or windows and include the area	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8 e 9 66.8 74.4 elements,	2 , m² ows, use e sides of ir	18.50 0	8 indow U-va	1.66 2.01 5 1.66 1.11 2.01 2.01 2.01 1.11 48.24 74.4 141.2 44.62	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(0.04] = [0.04]	2.2 2.66 6.63 2.2 1.47 2.66 2.66 2.66 1.47 8.68 9.67					
indows Type indows	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8 e 9 66.8 74.4 elements,	2 , m ² ows, use e sides of in = S (A x	18.50 0	8 indow U-va	1.66 2.01 5 1.66 1.11 2.01 2.01 2.01 1.11 48.24 74.4 141.2 44.62	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18	$0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix}$	2.2 2.66 6.63 2.2 1.47 2.66 2.66 2.66 1.47 8.68 9.67 0 ue)+0.04] a	s given in	paragrapl		42.99	
indows Type indows Type indows Type indows Type indows Type indows Type indows Type alls	e 1 e 2 e 3 e 4 e 5 e 6 e 7 e 8 e 9 66.83 74.4 elements, d roof windo	2 , m ² ows, use e sides of ir = S (A x A x k)	18.50 0 effective winternal wall	8 Indow U-vals and par	1.66 2.01 5 1.66 1.11 2.01 2.01 2.01 1.11 48.24 74.4 141.2 44.62 alue calculatitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.4)+ /[1/($0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix}$	2.2 2.66 6.63 2.2 1.47 2.66 2.66 2.66 1.47 8.68 9.67		paragrapl			

	eat loss							(33) +	(36) =			51.04	(3
entilation he	at loss ca	alculated	l monthly	/				(38)m	= 0.33 × (25)m x (5)			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8)m= 39.2	38.92	38.64	37.34	37.1	35.96	35.96	35.75	36.4	37.1	37.59	38.1		(3
eat transfer	coefficier	nt, W/K						(39)m	= (37) + (3	38)m			
9)m= 90.24	89.96	89.68	88.38	88.14	87	87	86.79	87.44	88.14	88.63	89.14		
		\							Average =	` '	12 /12=	88.38	(3
eat loss para	1 	 						· ,	= (39)m ÷				
0)m= 1.21	1.21	1.21	1.19	1.18	1.17	1.17	1.17	1.18	1.18	1.19	1.2		$\neg \alpha$
umber of da	vs in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.19	(4
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
1)m= 31	28	31	30	31	30	31	31	30	31	30	31		(4
,				-									·
1 \ \	tion and										kWh/ye		
1. Water hea	ung ener	igy requi	rement:								KVVN/ye	ear:	
ssumed occ											35		(4
if TFA > 13.		+ 1.76 x	[1 - exp	(-0.0003	49 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.	9)			
if TFA £ 13.	,	ator upoc	ao in litro	o por de	w Vd ow	orogo –	(25 v NI)	. 26					
nnual averaç educe the annu									se target o).97		(4
t more that 125	_				_	_			J				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
ot water usage				,									
4)m= 98.96	95.36	91.77	88.17	84.57	80.97	80.97	84.57	88.17	91.77	95.36	98.96		
<i>'</i>								-	L Γotal = Su	M(44) ₁₁₂ =	<u> </u>	1079.59	(₄
ergy content o	f hot water	used - cald	culated mo	onthly $= 4$.	190 x Vd,n	n x nm x D	0Tm / 3600			. ,			
	128.36	132.45	115.47	110.8	95.61	88.6	101.67	102.88	119.9	130.88	142.13		
5)m= 146.76							!			(1-)	!		– 1,
5)m= 146.76								_	Total = Su	m(45) ₁₁₂ =	=	1415.52	(4
´	vater heatir	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,		Γotal = Su	m(45) ₁₁₂ =	=	1415.52	(2
nstantaneous v	water heatir	ng at point 19.87	of use (no	hot water	storage),	enter 0 in 13.29	boxes (46)		Total = Su 17.99	m(45) ₁₁₂ =	21.32	1415.52	
nstantaneous v 6)m= 22.01 ater storage	19.25 loss:	19.87	17.32	16.62	14.34	13.29	15.25	to (61) 15.43	17.99			1415.52	_
nstantaneous v s)m= 22.01 ater storage	19.25 loss:	19.87	17.32	16.62	14.34	13.29	15.25	to (61) 15.43	17.99	19.63		1415.52	(4
nstantaneous v S)m= 22.01 ater storage orage volun community I	19.25 loss: ne (litres) neating a	19.87 includin	17.32 ng any so	16.62 olar or W	14.34 /WHRS :	13.29 storage litres in	15.25 within sa (47)	15.43 15.43 nme vess	17.99 sel	19.63	21.32	1415.52	(4
nstantaneous voime 22.01 ater storage voluncommunity I	19.25 e loss: ne (litres) neating a o stored	19.87 includin	17.32 ng any so	16.62 olar or W	14.34 /WHRS :	13.29 storage litres in	15.25 within sa (47)	15.43 15.43 nme vess	17.99 sel	19.63	21.32	1415.52	(4
nstantaneous v S)m= 22.01 ater storage orage volun community I therwise if n ater storage	19.25 e loss: ne (litres) neating a o stored e loss:	19.87 includin and no ta hot wate	17.32 ng any so ank in dw er (this in	16.62 Dlar or W relling, e	14.34 /WHRS : nter 110	13.29 storage litres in neous co	15.25 within sa (47)	15.43 15.43 nme vess	17.99 sel	19.63	21.32	1415.52	(4
nstantaneous voices (a) (a) (b) (m) (a) (a) (a) (a) (a) (a) (a) (a) (a) (a	19.25 ne (litres) neating a o stored e loss: turer's de	19.87 including the indicate the including t	17.32 Ing any so ank in dwer (this in oss factors)	16.62 Dlar or W relling, e	14.34 /WHRS : nter 110	13.29 storage litres in neous co	15.25 within sa (47)	15.43 15.43 nme vess	17.99 sel	19.63	21.32 150	1415.52	(4
nstantaneous value 22.01 ater storage volunt community la	19.25 ne (litres) neating a o stored e loss: turer's de	19.87 including the indicate the indicate the including th	17.32 Ing any so ank in dwer (this in oss factor 2b	olar or Welling, encludes i	14.34 /WHRS : nter 110	storage litres in neous co n/day):	15.25 within sa (47) embi boild	15.43 15.43 nme vess ers) ente	17.99 sel	19.63 47)	21.32 150 39 54	1415.52	(2
nstantaneous voices programments or storage volumes community leading therwise if nater storage of the manufact of the manufac	19.25 ne (litres) neating a o stored e loss: turer's de factor from	19.87 including and no tath hot water eclared to make storage	17.32 Ing any so ank in dwer (this in oss factor 2b In the control of the contr	olar or Welling, encludes in the control of the con	14.34 /WHRS : nter 110 nstantan	storage litres in neous co n/day):	15.25 within sa (47)	15.43 15.43 nme vess ers) ente	17.99 sel	19.63 47)	21.32 150	1415.52	(4 (4 (4
nstantaneous voices programments if nater storage of the storage o	19.25 e loss: ne (litres) neating a o stored e loss: turer's de factor froi om water turer's de	19.87 including and no tale hot water eclared to m Table eclared color	17.32 Ing any so ank in dwer (this in oss factor 2b In kWh/ye cylinder I	16.62 Dlar or Warelling, eacludes in the control of the control o	14.34 /WHRS : nter 110 nstantan wn (kWh	13.29 storage litres in neous con/day):	15.25 within sa (47) embi boild	15.43 15.43 nme vess ers) ente	17.99 sel	19.63 47) 1. 0.	21.32 150 39 54	1415.52	(4)
nstantaneous value 22.01 ater storage volume community I herwise if nater storage If manuface imperature in the properties of the properti	19.25 ne (litres) neating a o stored e loss: turer's de factor froi om water turer's de	19.87 Including the including	17.32 Ing any so ank in dwer (this in oss factor 2b) RykWh/ye cylinder I com Tabl	olar or Warelling, eacludes in the control of the c	14.34 /WHRS : nter 110 nstantan wn (kWh	13.29 storage litres in neous con/day):	15.25 within sa (47) embi boild	15.43 15.43 nme vess ers) ente	17.99 sel	19.63 47) 1. 0.	21.32 150 39 54	1415.52	(4)
nstantaneous ()m= 22.01 ater storage orage volun community I herwise if n ater storage If manufac amperature argy lost fro If manufac ot water stor	19.25 ne (litres) neating a o stored e loss: turer's de factor from water turer's de rage loss neating s	19.87 including and no tale hot water eclared to make eclared to eclared control from the eclar	17.32 Ing any so ank in dwer (this in oss factor 2b) RykWh/ye cylinder I com Tabl	olar or Warelling, eacludes in the control of the c	14.34 /WHRS : nter 110 nstantan wn (kWh	13.29 storage litres in neous con/day):	15.25 within sa (47) embi boild	15.43 15.43 nme vess ers) ente	17.99 sel	19.63 47) 1. 0.	21.32 150 39 54	1415.52	(4)
nstantaneous (instantaneous (19.25 e loss: ne (litres) neating a o stored e loss: turer's de factor froi om water turer's de rage loss neating se from Tal	19.87 including and no tale hot water eclared to storage eclared of factor from the eclared to factor from the eclared to ble 2a	17.32 Ing any so ank in dwer (this in oss factor 2b) In k Wh/ye cylinder I from Tablon 4.3	olar or Warelling, eacludes in the control of the c	14.34 /WHRS : nter 110 nstantan wn (kWh	13.29 storage litres in neous con/day):	15.25 within sa (47) embi boild	15.43 15.43 nme vess ers) ente	17.99 sel	19.63 47) 1. 0.	21.32 150 39 54 75	1415.52	(4) (4) (4) (5) (5)
instantaneous v	19.25 ne (litres) neating a o stored le loss: turer's de factor froi turer's de rage loss neating si from Talifactor froi factor 19.87 including and no tale hot water eclared to make eclared to factor from the eclared to factor fr	ng any so ank in dw er (this in oss facto 2b e, kWh/ye cylinder I from Tabl on 4.3	olar or Welling, encludes in the control of the con	14.34 /WHRS : nter 110 nstantan wn (kWh	storage litres in neous co n/day): known:	15.25 within sa (47) embi boild	15.43 15.43 1me vess ers) ente	17.99 sel er 'O' in (19.63 47) 1. 0.	21.32 150 39 54 75 0	1415.52	(4) (4) (4) (5) (5) (5) (5) (5) (5) (5) (5)	

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

Orientation	on:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	1.66	x	10.63	x	0.63	x	0.7	=	5.39	(74)
North	0.9x	0.77	x	2.01	X	10.63	X	0.63	x	0.7	=	6.53	(74)
North	0.9x	0.77	x	1.11	X	10.63	X	0.63	x	0.7	=	3.61	(74)
North	0.9x	0.77	x	1.66	x	20.32	x	0.63	x	0.7	=	10.31	(74)
North	0.9x	0.77	x	2.01	X	20.32	X	0.63	x	0.7	=	12.48	(74)
North	0.9x	0.77	x	1.11	X	20.32	X	0.63	x	0.7	=	6.89	(74)
North	0.9x	0.77	x	1.66	X	34.53	x	0.63	x	0.7	=	17.52	(74)
North	0.9x	0.77	x	2.01	x	34.53	x	0.63	x	0.7	=	21.21	(74)
North	0.9x	0.77	x	1.11	x	34.53	x	0.63	x	0.7	=	11.71	(74)
North	0.9x	0.77	x	1.66	x	55.46	x	0.63	x	0.7	=	28.14	(74)
North	0.9x	0.77	x	2.01	X	55.46	x	0.63	X	0.7	=	34.07	(74)
North	0.9x	0.77	x	1.11	x	55.46	x	0.63	x	0.7	=	18.82	(74)
North	0.9x	0.77	x	1.66	X	74.72	X	0.63	X	0.7	=	37.9	(74)
North	0.9x	0.77	x	2.01	X	74.72	x	0.63	X	0.7	=	45.9	(74)
North	0.9x	0.77	x	1.11	x	74.72	x	0.63	x	0.7	=	25.35	(74)
North	0.9x	0.77	x	1.66	x	79.99	x	0.63	x	0.7	=	40.58	(74)
North	0.9x	0.77	x	2.01	X	79.99	x	0.63	X	0.7	=	49.13	(74)
North	0.9x	0.77	x	1.11	x	79.99	x	0.63	x	0.7	=	27.13	(74)
North	0.9x	0.77	x	1.66	x	74.68	x	0.63	x	0.7	=	37.88	(74)
North	0.9x	0.77	x	2.01	x	74.68	x	0.63	x	0.7	=	45.87	(74)
North	0.9x	0.77	x	1.11	x	74.68	x	0.63	x	0.7	=	25.33	(74)
North	0.9x	0.77	x	1.66	x	59.25	x	0.63	x	0.7	=	30.06	(74)
North	0.9x	0.77	x	2.01	X	59.25	X	0.63	x	0.7	=	36.39	(74)
North	0.9x	0.77	x	1.11	X	59.25	X	0.63	x	0.7	=	20.1	(74)
North	0.9x	0.77	X	1.66	X	41.52	X	0.63	X	0.7	=	21.06	(74)
North	0.9x	0.77	x	2.01	X	41.52	X	0.63	X	0.7	=	25.5	(74)
North	0.9x	0.77	x	1.11	X	41.52	X	0.63	X	0.7	=	14.08	(74)
North	0.9x	0.77	X	1.66	X	24.19	X	0.63	X	0.7	=	12.27	(74)
North	0.9x	0.77	x	2.01	x	24.19	x	0.63	x	0.7	=	14.86	(74)
North	0.9x	0.77	X	1.11	X	24.19	X	0.63	X	0.7	=	8.21	(74)
North	0.9x	0.77	x	1.66	x	13.12	x	0.63	x	0.7	=	6.65	(74)
North	0.9x	0.77	x	2.01	x	13.12	x	0.63	x	0.7	=	8.06	(74)
North	0.9x	0.77	x	1.11	X	13.12	X	0.63	X	0.7	=	4.45	(74)
North	0.9x	0.77	x	1.66	x	8.86	x	0.63	x	0.7	=	4.5	(74)
North	0.9x	0.77	x	2.01	X	8.86	X	0.63	X	0.7	=	5.45	(74)
North	0.9x	0.77	x	1.11	X	8.86	X	0.63	x	0.7	=	3.01	(74)
East	0.9x	0.77	x	2.01	x	19.64	X	0.63	x	0.7	=	12.06	(76)
East	0.9x	0.77	x	5	x	19.64	X	0.63	x	0.7	=	30.01	(76)
East	0.9x	0.77	x	2.01	x	19.64	x	0.63	x	0.7] =	12.06	(76)

	_		_										_
East	0.9x	0.77	X	2.01	X	38.42	X	0.63	X	0.7	=	23.6	(76)
East	0.9x	0.77	X	5	X	38.42	X	0.63	X	0.7	=	58.71	(76)
East	0.9x	0.77	X	2.01	X	38.42	X	0.63	X	0.7	=	23.6	(76)
East	0.9x	0.77	X	2.01	X	63.27	X	0.63	X	0.7	=	38.87	(76)
East	0.9x	0.77	X	5	X	63.27	X	0.63	X	0.7	=	96.69	(76)
East	0.9x	0.77	X	2.01	X	63.27	x	0.63	X	0.7	=	38.87	(76)
East	0.9x	0.77	X	2.01	X	92.28	x	0.63	X	0.7	=	56.69	(76)
East	0.9x	0.77	X	5	x	92.28	x	0.63	x	0.7	=	141.01	(76)
East	0.9x	0.77	X	2.01	x	92.28	x	0.63	x	0.7	=	56.69	(76)
East	0.9x	0.77	X	2.01	x	113.09	x	0.63	x	0.7	=	69.47	(76)
East	0.9x	0.77	x	5	x	113.09	x	0.63	x	0.7	=	172.81	(76)
East	0.9x	0.77	X	2.01	x	113.09	x	0.63	x	0.7	=	69.47	(76)
East	0.9x	0.77	x	2.01	x	115.77	x	0.63	x	0.7	=	71.12	(76)
East	0.9x	0.77	x	5	x	115.77	x	0.63	x	0.7	=	176.9	(76)
East	0.9x	0.77	X	2.01	x	115.77	x	0.63	x	0.7	=	71.12	(76)
East	0.9x	0.77	x	2.01	x	110.22	x	0.63	x	0.7	=	67.71	(76)
East	0.9x	0.77	X	5	x	110.22	x	0.63	x	0.7	=	168.42	(76)
East	0.9x	0.77	X	2.01	x	110.22	x	0.63	x	0.7	=	67.71	(76)
East	0.9x	0.77	X	2.01	x	94.68	x	0.63	x	0.7	=	58.16	(76)
East	0.9x	0.77	X	5	x	94.68	x	0.63	x	0.7	=	144.67	(76)
East	0.9x	0.77	X	2.01	x	94.68	X	0.63	x	0.7	=	58.16	(76)
East	0.9x	0.77	x	2.01	x	73.59	x	0.63	x	0.7	=	45.2	(76)
East	0.9x	0.77	X	5	x	73.59	x	0.63	x	0.7	=	112.45	(76)
East	0.9x	0.77	X	2.01	x	73.59	X	0.63	x	0.7	=	45.2	(76)
East	0.9x	0.77	X	2.01	x	45.59	x	0.63	x	0.7	=	28	(76)
East	0.9x	0.77	X	5	x	45.59	x	0.63	x	0.7	=	69.66	(76)
East	0.9x	0.77	X	2.01	x	45.59	x	0.63	x	0.7	=	28	(76)
East	0.9x	0.77	x	2.01	x	24.49	x	0.63	x	0.7	=	15.04	(76)
East	0.9x	0.77	X	5	x	24.49	x	0.63	x	0.7	=	37.42	(76)
East	0.9x	0.77	X	2.01	x	24.49	x	0.63	x	0.7	=	15.04	(76)
East	0.9x	0.77	X	2.01	x	16.15	x	0.63	x	0.7	=	9.92	(76)
East	0.9x	0.77	X	5	x	16.15	x	0.63	x	0.7	=	24.68	(76)
East	0.9x	0.77	X	2.01	x	16.15	x	0.63	x	0.7	=	9.92	(76)
South	0.9x	0.77	x	1.66	x	46.75	x	0.63	x	0.7	=	23.72	(78)
South	0.9x	0.77	X	1.11	x	46.75	x	0.63	x	0.7	=	15.86	(78)
South	0.9x	0.77	x	2.01	x	46.75	x	0.63	x	0.7	j =	28.72	(78)
South	0.9x	0.77	x	1.66	x	76.57	x	0.63	x	0.7	j =	38.84	(78)
South	0.9x	0.77	x	1.11	x	76.57	x	0.63	x	0.7	j =	25.97	(78)
South	0.9x	0.77	x	2.01	x	76.57	x	0.63	x	0.7	j =	47.03	(78)
South	0.9x	0.77	x	1.66	x	97.53	x	0.63	x	0.7	j =	49.48	(78)
South	0.9x	0.77	x	1.11	x	97.53	x	0.63	x	0.7	=	33.09	(78)

	_								_			_					
South	0.9x	0.77	Х	2.0	1	X	9	7.53	X	0.	63	X	0.7		=	59.91	(78)
South	0.9x	0.77	X	1.60	6	x	1	10.23	x	0.	63	x	0.7		=	55.92	(78)
South	0.9x	0.77	X	1.1	1	x	1	10.23	X	0.	63	x	0.7		=	37.39	(78)
South	0.9x	0.77	X	2.0	1	x	1	10.23	x	0.	63	x	0.7		=	67.72	(78)
South	0.9x	0.77	x	1.60	6	x	1	14.87	x	0.	63	x	0.7		=	58.28	(78)
South	0.9x	0.77	х	1.1	1	X	1	14.87	x	0.	63	x	0.7		=	38.97	(78)
South	0.9x	0.77	x	2.0	1	x	1	14.87	x	0.	63	x	0.7		=	70.56	(78)
South	0.9x	0.77	х	1.60	6	X	1	10.55	х	0.	63	x	0.7		=	56.08	(78)
South	0.9x	0.77	х	1.1	1	X	1	10.55	X	0.	63	x	0.7		=	37.5	(78)
South	0.9x	0.77	x	2.0	1	x	1	10.55	x	0.	63	x	0.7		=	67.91	(78)
South	0.9x	0.77	x	1.60	6	x	1	08.01	x	0.	63	x	0.7		=	54.8	(78)
South	0.9x	0.77	x	1.1	1	x	1	08.01	x	0.	63	x	0.7		=	36.64	(78)
South	0.9x	0.77	x	2.0	1	x	1	08.01	x	0.	63	x	0.7		=	66.35	(78)
South	0.9x	0.77	x	1.60	6	x	1	04.89	x	0.	63	x	0.7		=	53.21	(78)
South	0.9x	0.77	X	1.1	1	x	1	04.89	x	0.	63	x	0.7		=	35.58	(78)
South	0.9x	0.77	x	2.0	1	x	1	04.89	x	0.	63	x	0.7		=	64.43	(78)
South	0.9x	0.77	X	1.60	6	x	1	01.89	x	0.	63	x	0.7		=	51.69	(78)
South	0.9x	0.77	X	1.1	1	x	1	01.89	x	0.	63	x	0.7		=	34.56	(78)
South	0.9x	0.77	x	2.0	1	x	1	01.89	x	0.	63	x	0.7		=	62.59	(78)
South	0.9x	0.77	x	1.60	6	x	8	2.59	x	0.	63	x	0.7		=	41.9	(78)
South	0.9x	0.77	x	1.1	1	X	8	2.59	x	0.	63	x	0.7		=	28.02	(78)
South	0.9x	0.77	х	2.0	1	X	8	2.59	х	0.	63	x	0.7		=	50.73	(78)
South	0.9x	0.77	x	1.60	6	X	5	5.42	x	0.	63	x	0.7		=	28.11	(78)
South	0.9x	0.77	x	1.1	1	X	5	5.42	x	0.	63	x	0.7		=	18.8	(78)
South	0.9x	0.77	х	2.0	1	X	5	5.42	х	0.	63	x	0.7		=	34.04	(78)
South	0.9x	0.77	х	1.60	6	X	4	10.4	x	0.	63	x	0.7		=	20.49	(78)
South	0.9x	0.77	x	1.1	1	X	4	40.4	x	0.	63	x	0.7		=	13.7	(78)
South	0.9x	0.77	х	2.0	1	X	4	40.4	x	0.	63	x	0.7		=	24.82	(78)
									_								
Solar g		watts, calc	ulated	for each		_			`	n = Sum(74)m	.(82)m				ı	
(83)m=	137.97		67.34	496.44	588.71		97.47	570.71	500	.77 41	2.34	281.65	167.63	116.4	49		(83)
Ĭ		nternal and		` 		·										l	
(84)m=	540.71	648.19 7	755.28	863.73	935.06	92	23.59	883.63	819	.45 74	1.59	631.76	541.71	508.5	52		(84)
7. Me	an inter	nal temper	ature	(heating	seasor	n)											
Temp	erature	during hea	ating p	eriods in	the liv	ng	area	from Tal	ole 9	, Th1 (^c	C)					21	(85)
Utilisa	tion fac	tor for gair	ns for I	iving are	a, h1,n) (s	ee Ta	ble 9a)								ı	
	Jan	Feb	Mar	Apr	May		Jun	Jul	А	ug :	Sep	Oct	Nov	De	C		
(86)m=	1	0.99	0.97	0.91	0.77	(0.58	0.43	0.4	18 C	.74	0.94	0.99	1			(86)
Mean	interna	l temperati	ure in I	iving are	a T1 (f	ollo	w ste	ps 3 to 7	7 in T	able 9	c)						
(87)m=	19.79	19.99 2	20.29	20.64	20.88	2	0.98	21	20.	99 2	0.93	20.6	20.13	19.7	6		(87)
Temp	erature	during hea	ating p	eriods in	rest of	dw	elling	from Ta	able 9	 9, Th2	(°C)				_		
(88)m=	19.91		19.92	19.93	19.93	_	9.94	19.94	19.		9.94	19.93	19.93	19.9	2		(88)
		•							•				•			ı	

Litilicati	ion fact	tor for a	aine for I	rest of d	volling l	n2 m (sc	o Tabla	00)						
(89)m=	0.99	0.98	0.96	0.88	0.71	0.49	0.33	0.37	0.65	0.92	0.99	1		(89)
` ′ ∟	!		<u> </u>	<u> </u>			<u> </u>		<u> </u>	<u> </u>	0.99	'		(00)
	nternal	18.61	19.04	the rest	of dwelli	ng 12 (fo	ollow ste	ps 3 to 1	7 in Tabl	e 9c) 19.49	18.82	18.28		(90)
(90)111=	10.32	10.01	19.04	19.55	19.02	19.93	19.94	19.94	!	LA = Livin		ļ	0.4	(91)
											g a.oa . (.,	0.4	(31)
			<u> </u>	r the wh			i e	<u> </u>		1		1		(22)
` ′	18.91	19.17	19.54	19.98	20.25	20.35	20.37	20.37	20.31	19.94	19.35	18.88		(92)
· · · · · · -							 		ere appro	. 	40.05	40.00		(02)
` /	18.91	19.17	19.54	19.98	20.25	20.35	20.37	20.37	20.31	19.94	19.35	18.88		(93)
			uirement				44 . (T-1-1- 0		. T' /:	70\		lata.	
				nperatur using Ta		ed at ste	ep 11 of	Table 9	o, so tha	it 11,m=(76)m an	d re-calc	ulate	
L	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisati			ains, hm	ı:					•					
(94)m=	0.99	0.98	0.95	0.88	0.73	0.53	0.37	0.42	0.68	0.92	0.98	0.99		(94)
			· ·	4)m x (84	·					1				
` ′	536.33	636.12	720.38	758.35	683.1	489.27	326.39	341.71	505.91	581.03	532.47	505.37		(95)
				perature								1		(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)
_							-`` /-		– (96)m		4005.00	4200 57		(07)
· ' '			1169.84		753.44	500.56	327.91	344.42	542.87	822.97	1085.69	1308.57		(97)
	neating _{582.12}	435.12	334.39	158.99	52.33	0	$\ln = 0.02$	24 X [(97))m – (95 0	180	398.32	597.58		
(90)111=	302.12	455.12	334.39	156.99	32.33			<u> </u>	l per year	<u> </u>		L	2738.86	(98)
Space	heating	a roquir	omont in	kWh/m²	!/vear			TOla	ii pei yeai	(KVVII/yeai) = Sum(9	O)15,912 =](99)
		- ·			•							l	36.81	
9a. Ener			nts – Indi	ividual h	eating sy	/stems i	ncluding	micro-C	CHP)					
Space Fraction		_	at from so	econdar	//sunnle	mentarv	evetem					i	0	(201)
	•			nain syst		mornary	•	(202) = 1 -	- (201) =			 	1	(202)
	•			•	` '			` /	, ,	(202)] _				╡ .
			•	main sys				(204) = (2	02) x [1 –	(203)] =		ļ	1	(204)
	•			ing syste								ļ	93.5	(206)
Efficien	ncy of s	econda	ry/suppl	ementar	y heating	g system	า, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space	heating	g require	ement (c	alculate	d above)									
ţ	582.12	435.12	334.39	158.99	52.33	0	0	0	0	180	398.32	597.58		
(211)m =	= {[(98)	m x (20	(4)] } x 1	00 ÷ (20	06)									(211)
(622.59	465.37	357.64	170.04	55.97	0	0	0	0	192.52	426.01	639.12		
_	-		_	-	-		-	Tota	I (kWh/yea	ar) =Sum(2	211),,,,5,10,12	=	2929.26	(211)
Space	heating	g fuel (s	econdar	y), kWh/	month							'		_
= {[(98 <u>)</u> n	n x (20	1)] } x 1	00 ÷ (20	8)										
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		_
								Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	F	0	(215)

Water heating								
Output from water heater (calculated above) 193.35 170.44 179.05 160.57 157.4 1	140.7 135.19	148.26	147.98	166.5	175.97	188.72		
Efficiency of water heater	I	!		!			79.8	(216
(217)m= 87.57 87.21 86.46 84.79 82.23	79.8 79.8	79.8	79.8	85.02	86.93	87.68		(217
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m								
· · · · · · · · · · · · · · · · · · ·	76.32 169.42	185.79	185.43	195.83	202.43	215.24		
	-	Tota	l = Sum(2	19a) ₁₁₂ =			2334.59	(219
Annual totals kWh/year						kWh/year	_	
Space heating fuel used, main system 1							2929.26	_
Water heating fuel used							2334.59	
Electricity for pumps, fans and electric keep-hot								
central heating pump:						30		(230
boiler with a fan-assisted flue						45		(230
Total electricity for the above, kWh/year sum of (230a)(230g) =						75	(231	
Electricity for lighting							326.44	(232
12a. CO2 emissions – Individual heating system	s including mi	cro-CHP						
	Energy kWh/year			Emission factor kg CO2/kWh			Emissions kg CO2/yea	ır
Space heating (main system 1)	(211) x			0.2	16	=	632.72	(261
Space heating (secondary)	(215) x			0.5	19	=	0	(263
Water heating	(219) x			0.2	16	=	504.27	(264
Space and water heating	(261) + (262)	+ (263) + (264) =				1136.99	(265
Electricity for pumps, fans and electric keep-hot	(231) x			0.5	19	=	38.93	(267
Electricity for lighting	(232) x			0.5	19	=	169.42	(268
Total CO2, kg/year			sum o	of (265)(2	271) =		1345.34	(272

TER =

(273)

26.49