			l le en D	Note: le :						
			User D							
Assessor Name:	Neil Ingham	D 0040		Strom					010943	
Software Name:	Stroma FSA			Softwa				versic	on: 1.0.4.6	
A dalage e	22-24 Prince (			Address		=tficient				
Address: 1. Overall dwelling dime		or wates Road	i, Londo	ii, invvo	3LG					
1. Overall awelling diffic	71310113.		Δre	a(m²)		Av He	ight(m)		Volume(m³	3)
Ground floor					(1a) x		2.97	(2a) =	156.15	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1	d)+(1e)+(1r	,	52.58	(4)			<b>」</b> ` '		`
Dwelling volume	, ( -, ( -, (	-, ( -, (	′	,2.00		)+(3c)+(3c	d)+(3e)+	(3n) =	156.15	(5)
2. Ventilation rate:									130.13	
2. Ventilation rate.	main	seconda	у	other		total			m³ per hou	r
Number of chimneys	heating 0	+ heating	<b>]</b> + [	0	] = [	0	X ·	40 =	0	(6a)
Number of open flues	0	+ 0	╡ + F	0	i = F	0	x	20 =	0	(6b)
Number of intermittent fa	ıns				_ _ _	3	x	10 =	30	
Number of passive vents	<b>;</b>				L	0	x	10 =	0	(7b)
Number of flueless gas fi					F	0	x	40 =	0	(7c)
Trainiber of naciess gas in						0			0	(/'C)
								Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fan	s = (6a) + (6b) + (7a)	7a)+(7b)+(	(7c) =		30		÷ (5) =	0.19	(8)
If a pressurisation test has b		intended, procee	d to (17),	otherwise o	continue fr	rom (9) to	(16)			_
Number of storeys in the	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			ine great	ler wall are	a (anter					
If suspended wooden			.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else en	ter 0							0	(13)
Percentage of windows	s and doors drau	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,	•		•	•	•	etre of e	envelope	area	5	(17)
If based on air permeabil	-								0.44	(18)
Air permeability value applie		test has been dor	ne or a de	gree air pe	rmeability	is being u	sed			<b>–</b> 1
Number of sides sheltere Shelter factor	ed			(20) = 1 -	i0 075 x (1	19)1 =			2	(19)
Infiltration rate incorporate	ting shelter facto	r		(21) = (18)					0.85	(20)
Infiltration rate modified f	•			(21) = (10)	/ X (20) =				0.38	(21)
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
			I Jui	ı Aug	oep	I OCI	INOV	l Dec	J	
Monthly average wind sp	4.9 4.4	-	20	2.7	4	4.3	4.5	4.7	1	
(22)m= 5.1 5	4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	I	
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		

Adjusted infiltr	ation rate	e (allowi	ng for sh	nelter an	nd wind s	speed) =	= (21a) x	(22a)m					
0.48	0.47	0.46	0.41	0.4	0.36	0.36	0.35	0.38	0.4	0.42	0.44	]	
Calculate effect		_	rate for t	he appli	cable ca	se						, 	
If mechanica			l' N. (0	OL ) (OO	\ <b>-</b> (		<b>1</b> 15/\	. (00)	\ (00.)			0	(23a
If exhaust air h									o) = (23a)			0	(23k
If balanced with		-	-	_								0	(230
a) If balance					i	<del>- ` `                                 </del>	<del>1                                    </del>	<del>í `</del>	<del>,                                    </del>	<del></del>	<del>' ' '</del>	) ÷ 100] 1	(0.4)
(24a)m= 0		0	0	0	0	0	0	0	0	0	0	]	(24a
b) If balance					1	<del></del>	<del> </del>	ŕ	<del>-                                    </del>	<del>-                                    </del>	1 .	1	(0.41)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	]	(24k
c) If whole h if (22b)n									.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)n					•		on from 0.5 + [(2		0.5]			_	
(24d)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6	]	(240
Effective air	change	rate - er	nter (24a	or (24k	o) or (24	c) or (24	1d) in bo	x (25)	!			•	
(25)m= 0.61	0.61	0.61	0.59	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.6	]	(25)
3. Heat losse	s and he	at loss	paramete	er:					,		,		
ELEMENT	Gros area	-	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-		A X k kJ/K
Doors Type 1					1.86	X	1.2	=	2.2344				(26)
Doors Type 2					1.86	x	1.2	=	2.2344				(26)
Windows Type	e 1				0.412	2 1	/[1/( 1.45 )-	+ 0.04] =	0.56				(27)
Windows Type	e 2				3.378	3 x1	/[1/( 1.45 )-	+ 0.04] =	4.63				(27)
Windows Type	3				2.137	, ×1	/[1/( 1.45 )-	+ 0.04] =	2.93	Ħ			(27)
Windows Type	e 4				1.71		/[1/( 1.45 )-	+ 0.04] =	2.34	=			(27)
Floor					52.57	5 X	0.15	=	7.8862	<u></u>		$\neg$	(28)
Walls Type1	12.7	7	7.51		5.25	x	0.17		0.89	F i			(29)
Walls Type2	20.1		3.85	=	16.3	=	0.3		4.89	<b>=</b>		3	(29)
Walls Type3	32.5		0		32.51	=	0.24		7.68	<b>=</b>		7	(29)
Roof	6.75		0		6.75	=	0.12		0.81	<b>=</b>		<b>-</b>	(30)
Total area of e					124.7	=	0.12		0.01				(31)
* for windows and			effective wi	ndow U-va			g formula 1	!/[(1/U-valu	ue)+0.04] a	as given in	paragrapi	h 3.2	(0.)
** include the area									, -	-			
Fabric heat los	ss, W/K =	= S (A x	U)				(26)(30	) + (32) =				37.09	(33)
Heat capacity	Cm = S(	Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	7905.5	(34)
Thermal mass	parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	ative Value	: Medium		250	(35)
For design assess can be used inste				construct	ion are no	t known p	recisely the	e indicative	e values of	TMP in T	able 1f		
Thermal bridge				using Ap	pendix l	<						18.71	(36)
if details of therma	al bridging	are not kn	own (36) =	= 0.15 x (3	31)								

Total fabric he	at loss							(33) +	(36) =			55.81	(37)
Ventilation hea		alculated	l monthl	V					, ,	25)m x (5)		35.61	(01)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 31.68	31.45	31.22	30.17	29.97	29.05	29.05	28.88	29.4	29.97	30.37	30.79		(38)
Heat transfer of	coefficier	nt, W/K			<u> </u>	l.		(39)m	= (37) + (37)	38)m			
(39)m= 87.49	87.26	87.03	85.98	85.78	84.86	84.86	84.69	85.21	85.78	86.18	86.6		
Heat loss para	meter (H	HLP), W	m²K			•			Average = = (39)m ÷	Sum(39) <sub>1.</sub>	12 /12=	85.97	(39)
(40)m= 1.66	1.66	1.66	1.64	1.63	1.61	1.61	1.61	1.62	1.63	1.64	1.65		
Number of day	s in mor	nth (Tab	le 1a)			•		,	Average =	Sum(40) <sub>1</sub> .	12 /12=	1.64	(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 occu if TFA > 13.9 if TFA £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.(	0013 x (¯	ΓFA -13.		77		(42)
Annual averag Reduce the annua not more that 125	je hot wa al average	hot water	usage by	$5\%$ if the $\alpha$	lwelling is	designed i			se target o		.14		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in	n litres per	day for ea			ctor from	Table 1c x							
(44)m= 83.76	80.71	77.67	74.62	71.57	68.53	68.53	71.57	74.62	77.67	80.71	83.76		
Energy content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600			m(44) <sub>112</sub> = ables 1b, 1		913.72	(44)
(45)m= 124.21	108.63	112.1	97.73	93.78	80.92	74.99	86.05	87.08	101.48	110.77	120.29		
		<u> </u>	<u> </u>	<u> </u>	<u> </u>	!			Γotal = Su	m(45) <sub>112</sub> =	=	1198.03	(45)
If instantaneous w	/ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,	) to (61)	T	Г		•	
(46)m= 18.63 Water storage	16.3	16.82	14.66	14.07	12.14	11.25	12.91	13.06	15.22	16.62	18.04		(46)
Storage volum		includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	, ,		•			_							, ,
Otherwise if no	stored	hot wate	er (this in	cludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (	47)			
Water storage					(1.14.4)	/ I \						Ī	
a) If manufact				or is kno	wn (kvvr	n/day):					0		(48)
Temperature fa							(40) (40)				0		(49)
Energy lost fro b) If manufact		_	-		or is not	known:	(48) x (49)	=			0		(50)
Hot water stora	age loss	factor fr	om Tabl								0		(51)
Volume factor	•		011 4.0								0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)
Energy lost fro	m water	storage	, kWh/ye	ear			(47) x (51)	x (52) x (	53) =		0		(54)
Enter (50) or (	(54) in (5	55)									0		(55)

Water storage	loss cal	culated f	for each	month			((56)m = (	55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	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= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	•	•			59)m = (	(58) ÷ 36	55 × (41)	m				•	
(modified by	factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month (	(61)m =	(60) ÷ 36	65 × (41)	)m						
(61)m= 18.42	16.54	18.16	17.4	17.86	17.14	17.62	17.78	17.28	18.04	17.65	18.37		(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= 142.63	125.18	130.26	115.14	111.64	98.06	92.61	103.83	104.36	119.52	128.43	138.66		(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 (	3)		_			
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter											
(64)m= 142.63	125.18	130.26	115.14	111.64	98.06	92.61	103.83	104.36	119.52	128.43	138.66		
							Outp	out from wa	ater heate	r (annual)₁	12	1410.3	(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= 45.9	40.26	41.81	36.85	35.65	31.19	20.24	00.00						(CE)
(00)		41.01	30.03	35.65	31.19	29.34	33.06	33.27	38.25	41.24	44.59		(65)
include (57)		<u> </u>			<u> </u>	<u> </u>		<u> </u>				eating	(65)
` '	m in cald	culation o	of (65)m	only if c	<u> </u>	<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>		<u> </u>				eating	(65)
include (57)	m in cald	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>		<u> </u>				eating	(65)
include (57)  5. Internal game	m in cald ains (see as (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	rom com	munity h	eating	(66)
include (57)  5. Internal games  Metabolic gain  Jan	m in cald ains (see as (Table Feb 88.3	E Table 5 5), Wat Mar 88.3	of (65)m 5 and 5a ts Apr 88.3	only if constant of the consta	ylinder i: Jun 88.3	Jul 88.3	Aug 88.3	or hot w	ater is fr	om com	munity h	eating	
include (57)  5. Internal games and the second seco	m in cald ains (see as (Table Feb 88.3	E Table 5 5), Wat Mar 88.3	of (65)m 5 and 5a ts Apr 88.3	only if constant of the consta	ylinder i: Jun 88.3	Jul 88.3	Aug 88.3	or hot w	ater is fr	om com	munity h	eating	
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6	m in calcular in c	E Table 5 E Table 5 E 5), Wat Mar 88.3 ted in Ap	of (65)m and 5a ts Apr 88.3 ppendix 7.99	May 88.3 L, equati	Jun 88.3 ion L9 o	Jul 88.3 r L9a), a	Aug 88.3 Iso see	Sep 88.3 Table 5	Oct 88.3	Nov 88.3	Dec 88.3	eating	(66)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains	m in calcular in c	E Table 5 E Table 5 E 5), Wat Mar 88.3 ted in Ap	of (65)m and 5a ts Apr 88.3 ppendix 7.99	May 88.3 L, equati	Jun 88.3 ion L9 o	Jul 88.3 r L9a), a	Aug 88.3 Iso see	Sep 88.3 Table 5	Oct 88.3	Nov 88.3	Dec 88.3	eating	(66)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games	m in calconains (see Feb 88.3 (calcular 12.97 ins (calcular 155.51	Example 5 to the collection of	ts Apr 88.3 ppendix 7.99 Appendix 142.92	May 88.3 L, equati 5.97 dix L, eq	Jun 88.3 ion L9 o 5.04 uation L	Jul 88.3 r L9a), a 5.45 13 or L1	Aug 88.3 Iso see 7.08 3a), also	Sep 88.3 Table 5 9.5 see Ta 117.58	Oct 88.3 12.06 ble 5 126.14	Nov 88.3	Dec 88.3	eating	(66) (67)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92	m in calconains (see Feb 88.3 (calcular 12.97 ins (calcular 155.51	Example 5 to the collection of	ts Apr 88.3 ppendix 7.99 Appendix 142.92	May 88.3 L, equati 5.97 dix L, eq	Jun 88.3 ion L9 o 5.04 uation L	Jul 88.3 r L9a), a 5.45 13 or L1	Aug 88.3 Iso see 7.08 3a), also	Sep 88.3 Table 5 9.5 see Ta 117.58	Oct 88.3 12.06 ble 5 126.14	Nov 88.3	Dec 88.3	eating	(66) (67)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92  Cooking gains  (69)m= 31.83	m in calcular in calcular (calcular 155.51 (calcular 31.83	Evaluation of Ev	of (65)m s and 5a ts Apr 88.3 opendix 7.99 Append 142.92 opendix 31.83	May 88.3 L, equati 5.97 dix L, equat 132.1 L, equat	Jun 88.3 ion L9 of 5.04 uation L 121.94 ion L15	Jul 88.3 r L9a), a 5.45 13 or L1 115.15 or L15a)	Aug 88.3 Iso see 7.08 3a), also 113.55	Sep 88.3 Table 5 9.5 see Ta 117.58	Oct 88.3  12.06 ble 5 126.14	Nov 88.3 14.08	Dec 88.3	eating	(66) (67) (68)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92  Cooking gains	m in calcular in calcular (calcular 155.51 (calcular 31.83	Evaluation of Ev	of (65)m s and 5a ts Apr 88.3 opendix 7.99 Append 142.92 opendix 31.83	May 88.3 L, equati 5.97 dix L, equat 132.1 L, equat	Jun 88.3 ion L9 of 5.04 uation L 121.94 ion L15	Jul 88.3 r L9a), a 5.45 13 or L1 115.15 or L15a)	Aug 88.3 Iso see 7.08 3a), also 113.55	Sep 88.3 Table 5 9.5 see Ta 117.58	Oct 88.3  12.06 ble 5 126.14	Nov 88.3 14.08	Dec 88.3	eating	(66) (67) (68)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92  Cooking gains  (69)m= 31.83  Pumps and fames  (70)m= 10	m in calc ains (see as (Table Feb 88.3 (calcula 12.97 ins (calc 155.51 (calcula 31.83 as gains	ted in Aputed in	of (65)m ts Apr 88.3 ppendix 7.99 Appendix 142.92 ppendix 31.83 5a)	only if constructions:  May 88.3 L, equati 5.97 dix L, equati 132.1 L, equati 31.83	Jun 88.3 ion L9 of 5.04 uation L 121.94 iion L15 31.83	Jul 88.3 r L9a), a 5.45 13 or L1 115.15 or L15a) 31.83	Aug 88.3 Iso see 7.08 3a), also 113.55 , also se 31.83	Sep 88.3 Table 5 9.5 see Ta 117.58 ee Table 31.83	Oct 88.3  12.06 ble 5 126.14 5 31.83	Nov 88.3 14.08 136.96	Dec 88.3 15.01 147.13	eating	(66) (67) (68) (69)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92  Cooking gains  (69)m= 31.83  Pumps and fain	m in calc ains (see as (Table Feb 88.3 (calcula 12.97 ins (calc 155.51 (calcula 31.83 as gains	ted in Aputed in	of (65)m ts Apr 88.3 ppendix 7.99 Appendix 142.92 ppendix 31.83 5a)	only if constructions:  May 88.3 L, equati 5.97 dix L, equati 132.1 L, equati 31.83	Jun 88.3 ion L9 of 5.04 uation L 121.94 iion L15 31.83	Jul 88.3 r L9a), a 5.45 13 or L1 115.15 or L15a) 31.83	Aug 88.3 Iso see 7.08 3a), also 113.55 , also se 31.83	Sep 88.3 Table 5 9.5 see Ta 117.58 ee Table 31.83	Oct 88.3  12.06 ble 5 126.14 5 31.83	Nov 88.3 14.08 136.96	Dec 88.3 15.01 147.13	eating	(66) (67) (68) (69)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92  Cooking gains  (69)m= 31.83  Pumps and fames  (70)m= 10  Losses e.g. even  (71)m= -70.64	m in calcons (Table Feb 88.3 (Calcula 12.97 ins (Calcula 31.83 ns gains 10 raporatio -70.64	ted in Ap 10.55 ulated in Ap 151.49 tted in Ap 151.49 tted in Ap 10.64	of (65)m s and 5a ts Apr 88.3 ppendix 7.99 Append 142.92 ppendix 31.83 5a) 10 tive valu	only if construction only if c	Jun 88.3 ion L9 of 5.04 uation L 121.94 ion L15 31.83	Jul 88.3 r L9a), a 5.45 13 or L1 115.15 or L15a) 31.83	Aug 88.3 Iso see 7.08 3a), also 113.55 , also se 31.83	Sep 88.3 Table 5 9.5 see Ta 117.58 ee Table 31.83	Oct 88.3  12.06 ble 5 126.14 5 31.83	Nov 88.3 14.08 136.96	Dec 88.3 15.01 147.13 31.83	eating	(66) (67) (68) (69)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92  Cooking gains  (69)m= 31.83  Pumps and fames  (70)m= 10  Losses e.g. even	m in calcons (Table Feb 88.3 (Calcula 12.97 ins (Calcula 31.83 ns gains 10 raporatio -70.64	ted in Ap 10.55 ulated in Ap 151.49 tted in Ap 151.49 tted in Ap 10.64	of (65)m s and 5a ts Apr 88.3 ppendix 7.99 Append 142.92 ppendix 31.83 5a) 10 tive valu	only if construction only if c	Jun 88.3 ion L9 of 5.04 uation L 121.94 ion L15 31.83	Jul 88.3 r L9a), a 5.45 13 or L1 115.15 or L15a) 31.83	Aug 88.3 Iso see 7.08 3a), also 113.55 , also se 31.83	Sep 88.3 Table 5 9.5 see Ta 117.58 ee Table 31.83	Oct 88.3  12.06 ble 5 126.14 5 31.83	Nov 88.3 14.08 136.96	Dec 88.3 15.01 147.13 31.83	eating	(66) (67) (68) (69)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92  Cooking gains  (69)m= 31.83  Pumps and fames  (70)m= 10  Losses e.g. even  (71)m= -70.64  Water heating  (72)m= 61.7	m in calc ains (see as (Table Feb 88.3 (calcula 12.97 ins (calcula 31.83 as gains 10 vaporatic -70.64 gains (T	ted in Ap 10.55 rulated in Ap 10.55 rulated in Ap 10.65 rulated in	of (65)m s and 5a ts Apr 88.3 ppendix 7.99 Appendix 31.83 5a) 10 tive valu -70.64	only if constructions	Jun 88.3 ion L9 of 5.04 uation L 121.94 ion L15 31.83  10 le 5) -70.64	Jul 88.3 r L9a), a 5.45 13 or L1 115.15 or L15a) 31.83	Aug 88.3 Iso see 7.08 3a), also 113.55 , also se 31.83	Sep 88.3 Table 5 9.5 see Ta 117.58 ee Table 31.83 10 -70.64	Oct 88.3  12.06 ble 5 126.14 5 31.83  10  -70.64	Nov 88.3 14.08 136.96 31.83	Dec 88.3 15.01 147.13 31.83 10 -70.64 59.93	eating	(66) (67) (68) (69) (70) (71)
include (57)  5. Internal games  Metabolic gain  Jan  (66)m= 88.3  Lighting gains  (67)m= 14.6  Appliances games  (68)m= 153.92  Cooking gains  (69)m= 31.83  Pumps and fames  (70)m= 10  Losses e.g. even  (71)m= -70.64  Water heating	m in calc ains (see as (Table Feb 88.3 (calcula 12.97 ins (calcula 31.83 as gains 10 vaporatic -70.64 gains (T	ted in Ap 10.55 rulated in Ap 10.55 rulated in Ap 10.65 rulated in	of (65)m s and 5a ts Apr 88.3 ppendix 7.99 Appendix 31.83 5a) 10 tive valu -70.64	only if constructions	Jun 88.3 ion L9 of 5.04 uation L 121.94 ion L15 31.83  10 le 5) -70.64	Jul 88.3 r L9a), a 5.45 13 or L1 115.15 or L15a) 31.83	Aug 88.3 Iso see 7.08 3a), also 113.55 , also se 31.83	Sep 88.3 Table 5 9.5 see Ta 117.58 ee Table 31.83 10 -70.64	Oct 88.3  12.06 ble 5 126.14 5 31.83  10  -70.64	Nov 88.3 14.08 136.96 31.83	Dec 88.3 15.01 147.13 31.83 10 -70.64 59.93	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 Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	X	2.14	x	10.63	x	0.63	x	0.7	] =	6.94	(74)
North	0.9x	0.77	x	1.71	x	10.63	x	0.63	x	0.7	=	5.56	(74)
North	0.9x	0.77	x	2.14	x	20.32	x	0.63	x	0.7	=	13.27	(74)
North	0.9x	0.77	x	1.71	x	20.32	x	0.63	x	0.7	=	10.62	(74)
North	0.9x	0.77	x	2.14	x	34.53	x	0.63	x	0.7	=	22.55	(74)
North	0.9x	0.77	x	1.71	x	34.53	x	0.63	x	0.7	=	18.05	(74)
North	0.9x	0.77	x	2.14	x	55.46	X	0.63	x	0.7	=	36.22	(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	2.14	x	74.72	X	0.63	x	0.7	=	48.8	(74)
North	0.9x	0.77	x	1.71	x	74.72	X	0.63	x	0.7	=	39.05	(74)
North	0.9x	0.77	x	2.14	x	79.99	x	0.63	x	0.7	=	52.24	(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	2.14	x	74.68	X	0.63	x	0.7	=	48.77	(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	2.14	x	59.25	x	0.63	x	0.7	=	38.69	(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	2.14	x	41.52	x	0.63	X	0.7	=	27.11	(74)
North	0.9x	0.77	x	1.71	x	41.52	x	0.63	x	0.7	] =	21.7	(74)
North	0.9x	0.77	x	2.14	x	24.19	x	0.63	x	0.7	] <b>=</b>	15.8	(74)
North	0.9x	0.77	x	1.71	x	24.19	x	0.63	x	0.7	<u> </u>	12.64	(74)
North	0.9x	0.77	x	2.14	x	13.12	x	0.63	x	0.7	=	8.57	(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	2.14	x	8.86	X	0.63	x	0.7	=	5.79	(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	0.41	x	46.75	X	0.63	x	0.7	=	5.89	(78)
South	0.9x	0.77	x	3.38	x	46.75	x	0.63	x	0.7	=	48.26	(78)
South	0.9x	0.77	x	0.41	x	76.57	x	0.63	x	0.7	=	9.64	(78)
South	0.9x	0.77	x	3.38	x	76.57	x	0.63	x	0.7	=	79.05	(78)
South	0.9x	0.77	x	0.41	x	97.53	x	0.63	x	0.7	=	12.28	(78)
South	0.9x	0.77	x	3.38	x	97.53	X	0.63	x	0.7	=	100.69	(78)
South	0.9x	0.77	x	0.41	x	110.23	x	0.63	x	0.7	=	13.88	(78)
South	0.9x	0.77	x	3.38	x	110.23	x	0.63	x	0.7	=	113.8	(78)
South	0.9x	0.77	x	0.41	x	114.87	x	0.63	x	0.7	=	14.46	(78)
South	0.9x	0.77	x	3.38	x	114.87	X	0.63	X	0.7	=	118.59	(78)
South	0.9x	0.77	x	0.41	x	110.55	x	0.63	x	0.7	=	13.92	(78)
South	0.9x	0.77	X	3.38	x	110.55	x	0.63	x	0.7	j =	114.13	(78)
South	0.9x	0.77	X	0.41	x	108.01	x	0.63	x	0.7	j =	13.6	(78)
South	0.9x	0.77	X	3.38	x	108.01	x	0.63	x	0.7	] =	111.51	(78)
South	0.9x	0.77	X	0.41	x	104.89	x	0.63	X	0.7	] =	13.21	(78)

South	0.9x	0.77	X	3.3	38	X	1	04.89	X		0.63	x	0.7	=	108.29	(78)
South	0.9x	0.77	X	0.4	11	x	10	01.89	x		0.63	x [	0.7	=	12.83	(78)
South	0.9x	0.77	X	3.3	38	x	1	01.89	x		0.63	x	0.7	=	105.18	(78)
South	0.9x	0.77	X	0.4	11	x	8	2.59	x		0.63	x [	0.7	=	10.4	(78)
South	0.9x	0.77	X	3.3	38	x	8	2.59	X		0.63	x [	0.7	=	85.26	(78)
South	0.9x	0.77	X	0.4	11	x	5	5.42	x		0.63	x	0.7	=	6.98	(78)
South	0.9x	0.77	X	3.3	38	x	5	5.42	x		0.63	x	0.7	=	57.21	(78)
South	0.9x	0.77	X	0.4	11	x	4	40.4	x		0.63	x	0.7		5.09	(78)
South	0.9x	0.77	x	3.3	38	x	4	40.4	x		0.63	_ x [	0.7	_ =	41.71	(78)
																_
Solar g	ains in	watts, ca	alculated	for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m			_	
(83)m=	66.65	112.58	153.57	192.89	220.89	22	22.08	212.9	191	.15	166.82	124.1	79.61	57.21		(83)
Total g	ains – i	nternal a	nd solar	(84)m =	= (73)m	+ (8	33)m	, watts	_						_	
(84)m=	356.36	400.46	431.3	454.47	466.37	45	51.87	432.42	415	5.7	399.6	373.21	347.43	338.77		(84)
7. Me	an inter	nal temp	erature	(heating	season	)										
Temp	erature	during h	eating p	eriods ir	n the livi	ng a	area	from Tab	ole 9	, Th	1 (°C)				21	(85)
Utilisa	ation fac	tor for g	ains for I	iving are	ea, h1,m	(se	ee Ta	ble 9a)								_
	Jan	Feb	Mar	Apr	May	Ι,	Jun	Jul	Α	ug	Sep	Oct	Nov	Dec	7	
(86)m=	1	0.99	0.99	0.98	0.94	(	0.86	0.73	0.7	77	0.91	0.98	0.99	1	1	(86)
Mean	interna	l temper	ature in l	living ar	ea T1 (fo	ollo	w ste	ns 3 to 7	in T	able	e 9c)		•		-	
(87)m=	19.19	19.35	19.63	20.02	20.41	_	0.75	20.91	20.	$\overline{}$	20.63	20.14	19.6	19.17	7	(87)
Tomn	oraturo	during h	eating n	oriode ir	rest of	dw	alling	from Ta	hla (		 -2 (°C)		1	<u>I</u>	_	
(88)m=	19.57	19.57	19.57	19.59	19.59		19.6	19.6	19.	$\overline{}$	19.6	19.59	19.58	19.58	7	(88)
						L			l						_	` '
(89)m=	ition fac	tor for g	0.98	0.96	welling, 0.91		m (se ).77	0.56	9a) 0.	<u>.                                      </u>	0.85	0.97	0.99	1	٦	(89)
(09)111=	ı	0.99	0.96	0.90	0.91		). / /	0.56	0.0	0	0.00	0.97	0.99	!		(09)
ı		l temper	1		r	Ť	<u> </u>	r	<del>i                                     </del>	$\overline{}$			1	1	7	>
(90)m=	17.22	17.46	17.86	18.43	18.98	1	9.42	19.57	19.	56	19.29	18.6	17.83	17.19	_	(90)
											I	LA = LIVII	ng area ÷ (4	+) =	0.46	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling	g) = fl	LA × T1	+ (1	– fL	A) × T2				_	
(92)m=	18.12	18.32	18.67	19.16	19.64	2	0.03	20.18	20.	16	19.9	19.3	18.64	18.1		(92)
		nent to th			<del></del>	_		r e		$\overline{}$					7	,:
(93)m=	17.97	18.17	18.52	19.01	19.49	1	9.88	20.03	20.	01	19.75	19.15	18.49	17.95		(93)
•		iting requ											>			
		mean int factor fo				ned	at ste	ep 11 of	Tabl	e 9b	o, so tha	t Ti,m=(	76)m an	d re-cal	culate	
	Jan	Feb	Mar	Apr	May	П	Jun	Jul	Δ	ug	Sep	Oct	Nov	Dec	7	
ا Utilisa		tor for g			Iviay	<u> </u>	-	<u> </u>		ug	ООР		1101		J	
(94)m=	0.99	0.99	0.98	0.96	0.91	(	).79	0.62	0.6	66	0.86	0.96	0.99	0.99	7	(94)
		hmGm ,	W = (94	l)m x (8	4)m					!					_	
(95)m=	353.79	395.75	422.41	435.55	423.35	35	57.35	267	274	.23	344.09	358.97	343.17	336.75	7	(95)
Month	nly aver	age exte	rnal tem	perature	from T	able	e 8						•		_	
(96)m=	4.3	4.9	6.5	8.9	11.7	1	14.6	16.6	16	.4	14.1	10.6	7.1	4.2		(96)
Heat I	oss rate	e for mea	an intern	al tempe	erature,	Lm	, W =	=[(39)m	x [(9	3)m-	- (96)m	]			<b>-</b> -	
(97)m=	1196.19	1158.29	1046.43	869.13	667.97	44	47.63	291.08	306	.01	481.84	733.76	981.47	1190.5		(97)

(98)m=   626.74   512.43	ement fo	1								005.40		
	464.27	312.18	182	0	0	0 Tota	0 I per vear	278.84 (kWh/year	459.57	635.19	3471.22	(98)
Space heating require	ement in	k\/\/h/m²	/vear			1014	i poi youi	(ittring oai)	) – Gam(G	0)15,912	66.02	(99)
			•	rotomo i	adudina	mioro C	·UD/			L	00.02	
9a. Energy requiremer  Space heating:	its – mai	ividual ni	eaung sy	/stems ii	ncluaing	micro-C	·nP)					
Fraction of space hea	at from so	econdar	//supple	mentary	system					Γ	0	(201)
Fraction of space hea	at from m	nain syst	em(s)			(202) = 1 -	- (201) =			Ī	1	(202)
Fraction of total heati	ng from	main sys	stem 1			(204) = (20	02) × [1 –	(203)] =		Ī	1	(204)
Efficiency of main spa	ace heat	ing syste	em 1							Ī	90.2	(206
Efficiency of seconda	ry/supple	ementar	y heating	g system	n, %					Ī	0	(208
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	<del></del> ear
Space heating require	ement (c	alculated	d above)									
626.74 512.43	464.27	312.18	182	0	0	0	0	278.84	459.57	635.19		
211)m = {[(98)m x (20												(211
694.84 568.1	514.71	346.09	201.77	0	0	0	0	309.14	509.51	704.2		٦.
						lota	I (kWh/yea	ar) =Sum(2	211) <sub>15,1012</sub>		3848.36	(211
Space heating fuel (s = {[(98)m x (201)] } x 1		• / ·	month									
$\frac{215}{m} = 0 \qquad 0$	00 + (20	0	0	0	0	0	0	0	0	0		
,						Tota	I (kWh/yea	ar) =Sum(2	215) <sub>15,1012</sub>	=	0	(215
Water heating										_		_
Output from water hea	<del></del>											
142.63   125.18	130.26	115.14	111.64	98.06	92.61	103.83	104.36	119.52	128.43	138.66		7,040
Efficiency of water hea			00.00	87.3	87.3	87.3	87.3	89.31	89.55	89.67	87.3	(216 (217
217)m 90.65 90.62		1 20 / 1			07.5			09.51	09.55	89.07		(217
217)m= 89.65 89.62	89.55	89.4	89.08	07.0		67.3	00					
Fuel for water heating,	kWh/mo	onth	69.06	07.0		67.5	0.10					
Fuel for water heating, 219)m = (64)m x 100	kWh/mo	onth	125.33	112.33	106.08	118.93	119.54	133.82	143.41	154.64		
Fuel for water heating, 219)m = (64)m x 100 (219)m = 159.1   139.68	kWh/mo ) ÷ (217)	onth m			106.08	118.93		19a) <sub>112</sub> =			1587.12	
Fuel for water heating, 219)m = (64)m x 100 219)m = 159.1 139.68	kWh/mo ) ÷ (217) 145.47	onth m 128.79	125.33		106.08	118.93	119.54	19a) <sub>112</sub> =	143.41 <b>Wh/year</b>		kWh/yea	
Fuel for water heating, 219)m = (64)m x 100 219)m = 159.1 139.68  Annual totals  Space heating fuel use	kWh/mo 0 ÷ (217) 145.47	onth m 128.79	125.33		106.08	118.93	119.54	19a) <sub>112</sub> =			<b>kWh/yea</b> 3848.36	
Fuel for water heating, 219)m = (64)m x 100 219)m = 159.1 139.68  Annual totals  Space heating fuel use Vater heating fuel use	kWh/mo 0 ÷ (217) 145.47 ed, main	onth m 128.79 system	125.33	112.33	106.08	118.93	119.54	19a) <sub>112</sub> =			kWh/yea	
Fuel for water heating, 219)m = (64)m x 100 219)m = 159.1 139.68  Annual totals  Space heating fuel use Water heating fuel use	kWh/mo 0 ÷ (217) 145.47 ed, main	onth m 128.79 system	125.33	112.33	106.08	118.93	119.54	19a) <sub>112</sub> =			<b>kWh/yea</b> 3848.36	
Fuel for water heating, 219)m = (64)m x 100 219)m = 159.1 139.68  Annual totals  Space heating fuel use Water heating fuel use	kWh/mo 0 ÷ (217) 145.47 ed, main ed ans and	onth m 128.79 system	125.33	112.33	106.08	118.93	119.54	19a) <sub>112</sub> =			<b>kWh/yea</b> 3848.36	
Fuel for water heating, 219)m = (64)m x 100 219)m = 159.1 139.68  Annual totals  Space heating fuel use Water heating fuel use Electricity for pumps, for	ed, main ans and :	onth m 128.79 system	125.33	112.33	106.08	118.93	119.54	19a) <sub>112</sub> =		[ [ [	<b>kWh/yea</b> 3848.36	(230
Fuel for water heating, 219)m = (64)m x 100 219)m = 159.1 139.68  Annual totals  Space heating fuel use Water heating fuel use Electricity for pumps, for central heating pump	kWh/mo 0 ÷ (217) 145.47 ed, main ed ans and :	system	125.33 1 keep-hot	112.33	106.08	118.93 Tota	119.54 I = Sum(2 <sup>-</sup>	19a) <sub>112</sub> =	Wh/year	120	<b>kWh/yea</b> 3848.36	(219 r) (230 (230 (231 (231
Fuel for water heating, 219)m = (64)m x 100 219)m = 159.1 139.68  Annual totals  Space heating fuel use 21 21 21 21 21 21 21 21 21 21 21 21 21	kWh/mo 0 ÷ (217) 145.47 ed, main ed ans and :	system	125.33 1 keep-hot	112.33	106.08	118.93 Tota	119.54 I = Sum(2 <sup>-</sup>	19a) <sub>112</sub> = <b>k\</b>	Wh/year	120	<b>kWh/yea</b> 3848.36 1587.12	(230

Energy

kWh/year

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**Emissions** 

kg CO2/year

**Emission factor** 

kg CO2/kWh

Space heating (main system 1)	(211) x	0.216	=	831.25	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	342.82	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1174.06	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	85.64	(267)
Electricity for lighting	(232) x	0.519	=	133.86	(268)
Total CO2, kg/year	sum	of (265)(271) =		1393.56	(272)
Dwelling CO2 Emission Rate	(272	) ÷ (4) =		26.51	(273)
EI rating (section 14)				81	(274)

		l loor [	Details:						
Assessor Name:	Neil Ingham	USEI I	Strom	a Num	her:		STRC	0010943	
Software Name:	Stroma FSAP 2012		Softwa					on: 1.0.4.6	
		Property							
Address :	22 Prince of Wales Roa	ad, London,	NW5 3LC	<b>;</b>					
1. Overall dwelling dime	ensions:								
		Are	a(m²)		Av. He	eight(m)		Volume(m	3)
Ground floor			55.49	(1a) x	2	2.96	(2a) =	164.52	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+.	(1n)	55.49	(4)					
Dwelling volume				(3a)+(3b	)+(3c)+(3c	d)+(3e)+	(3n) =	164.52	(5)
2. Ventilation rate:									
	main secon heating hear	ndary ting	other		total			m³ per hou	ır
Number of chimneys	0 +	0 +	0	] = [	0	X	40 =	0	(6a)
Number of open flues	0 +	0 +	0	j = F	0	x	20 =	0	(6b)
Number of intermittent fa	ans			, F	3	X	10 =	30	(7a)
Number of passive vents				L	0	x	10 =		(7b)
•				L			40 =	0	=
Number of flueless gas f	ires				0	X :	40 =	0	(7c)
							Air ch	nanges per he	our
Infiltration due to chimne	ys, flues and fans = (6a)+(	6b)+(7a)+(7b)+	(7c) =	Γ	30		÷ (5) =	0.18	(8)
	peen carried out or is intended, p			ontinue fr			. (=)	0.10	(-/
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber fram			•	ruction			0	(11)
if both types of wall are p deducting areas of openi	resent, use the value correspon	ding to the grea	ter wall are	a (after					
•	floor, enter 0.2 (unsealed)	or 0.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, er	iter 0.05, else enter 0							0	(13)
Percentage of window	s and doors draught stripp	oed						0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	100] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
•	q50, expressed in cubic r	•	•	•	etre of e	envelope	area	5	(17)
•	lity value, then $(18) = [(17) \div$							0.43	(18)
Number of sides shelter	es if a pressurisation test has be	en done or a de	gree air pe	meability	is being u	sed			(19)
Shelter factor	<del>5</del> u		(20) = 1 -	0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18	x (20) =				0.37	(21)
Infiltration rate modified	_							0.0.	` ′
Jan Feb	<del>-                                    </del>	Jun Jul	Aug	Sep	Oct	Nov	Dec	]	
Monthly average wind sp	peed from Table 7	•	•		•	•	•	_	
(22)m= 5.1 5		3.8 3.8	3.7	4	4.3	4.5	4.7	]	
		•	•		-	•	•	-	
Wind Factor $(22a)m = (2a)m =$	<del></del>	05   655	T		1 4 6 5	1 4 4 5	1 445	1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0	0.95	0.92	1	1.08	1.12	1.18	]	

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.47	0.46	0.45	0.4	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43	]	
Calculate effe		-	rate for t	he appli	cable ca	se			!	ı			
If mechanic			anadin NL (O	10h) (00	-) <b></b> /-	t <sup>2</sup> (	N/C\\ _++b_=	i (00h	(00-)			0	(23:
If exhaust air h		0		, ,	,	. `	,, .	,	)) = (23a)			0	(23)
If balanced with		-	-	_					<b></b> (		. (00.)	0	(23
a) If balance	1	1		i	1	<del>,                                    </del>	<del>1                                    </del>	ŕ	<del>-                                    </del>	<del></del>	<del>' ' '</del>	i ÷ 100] I	(24
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0	J	(240
b) If balance (24b)m= 0	ea mech	anicai ve	entilation 0	without	neat red		VIV) (240 1 0	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2a)$	26)m + (2   0	230)	0	1	(24
		<u> </u>	<u> </u>	<u> </u>					0	U	0	J	(24)
c) If whole h				•	•				.5 × (23b	<b>)</b>			
(24c)m = 0	0.07	0	0	0	0	0	0	0	0	0	0	]	(24
d) If natural	ventilatio	on or wh	ole hous	L nositiv	ve input	l ventilati	on from	oft				J	
							0.5 + [(2		0.5]				
(24d)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(24
Effective air	change	rate - er	nter (24a	or (24l	b) or (24	c) or (24	ld) in bo	x (25)				•	
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59	]	(25
3. Heat losse	s and he	at loss i	naramet	or.	•								
ELEMENT	Gros	SS	Openin	gs	Net Ar		U-val		AXU	✓	k-value		A X k
Doors Type 1	area	(1112)	m	l <del>*</del>	A ,r		W/m2		(W/I	<u> </u>	KJ/IIII	^	kJ/K
• •					1.86	=	1.2	=	2.2344	=			(26)
Doors Type 2	- 1				1.86	号 ,	1.2	=	2.2344	=			(26
Windows Type					1.502	= ,	/[1/( 1.45 )·	_	2.06	<b>=</b>			(27
Windows Type					3.139	= .	/[1/( 1.45 )		4.3	╡			(27
Windows Type					3.379		/[1/( 1.45 )		4.63	_			(27
Windows Type	e 4				0.412	<u>2</u>	/[1/( 1.45 )· 	+ 0.04] =	0.56	╝.			(27
Floor					55.48	8 ×	0.15	=	8.3232				(28)
Walls Type1	12.7	73	5.65	5	7.08	X	0.17	=	1.2				(29
Walls Type2	35.2	29	0		35.29	) x	0.24	=	8.34				(29
Walls Type3	22.0	)2	6.5		15.52	2 x	0.3	=	4.66				(29
Roof	6.4	7	0		6.47	X	0.12	=	0.78				(30)
Total area of e	elements	s, m²			132								(31
* for windows and ** include the area						lated using	g formula 1	/[(1/U-valu	ıе)+0.04] а	ns given in	paragraph	1 3.2	
Fabric heat los	ss, W/K	= S (A x	U)				(26)(30	) + (32) =				39.32	(33
Heat capacity	Cm = S	(A x k )						((28).	(30) + (32	2) + (32a).	(32e) =	8343.6	8 (34
Thermal mass	parame	eter (TMF	c = Cm +	: TFA) ir	n kJ/m²K			Indica	tive Value	Medium		250	(35
For design assess				construct	tion are no	t known p	recisely the	e indicative	e values of	TMP in T	able 1f		
Thermal bridg	es · S (I	x Y) cal	culated i	usina Ar	nendix l	K						40.0	(26
memai bilug	00.01		oulutou .	uoning / ip	pondix i	`						19.8	(36

Total fabric heat loss							(33) +	(36) =			59.12	(37)
Ventilation heat loss	calculated	d monthl	V				` '	` '	25)m x (5)		39.12	(01)
Jan Feb		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 33.11 32.87	32.65	31.58	31.38	30.45	30.45	30.28	30.81	31.38	31.79	32.21		(38)
Heat transfer coeffici	ent, W/K		l.				(39)m	= (37) + (37)	38)m			
(39)m= 92.23 91.99	91.77	90.7	90.5	89.57	89.57	89.4	89.93	90.5	90.91	91.33		
Heat loss parameter	(HLP), W	/m²K	•	•	•	•		Average = = (39)m ÷	Sum(39) <sub>1.</sub>	12 /12=	90.7	(39)
(40)m= 1.66 1.66	1.65	1.63	1.63	1.61	1.61	1.61	1.62	1.63	1.64	1.65		
Number of days in m	onth (Tab	le 1a)		•			,	Average =	Sum(40) <sub>1</sub> .	12 /12=	1.63	(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 heating en	ergy requ	irement:								kWh/ye	ear:	
Assumed occupancy if TFA > 13.9, N = if TFA £ 13.9, N =	, N 1 + 1.76 ×		(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x ( <sup>-</sup>	ΓFA -13.		85		(42)
Annual average hot was Reduce the annual average not more that 125 litres per	e hot water	usage by	5% if the $c$	lwelling is	designed i			se target o		.18		(43)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres p	er day for e	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m= 85.99 82.87	79.74	76.61	73.49	70.36	70.36	73.49	76.61	79.74	82.87	85.99		
Energy content of hot wat	er used - ca	lculated m	onthly = 4.	190 x Vd,ı	m x nm x E	OTm / 3600			m(44) <sub>112</sub> = ables 1b, 1		938.12	(44)
(45)m= 127.53 111.54	115.09	100.34	96.28	83.08	76.99	88.35	89.4	104.19	113.73	123.5		
								Γotal = Su	m(45) <sub>112</sub> =		1230.02	(45)
If instantaneous water hea	ting at poin	·	hot water	r storage),	enter 0 in	boxes (46 <sub>)</sub>	) to (61)				Ī	
(46)m= 19.13 16.73 Water storage loss:	17.26	15.05	14.44	12.46	11.55	13.25	13.41	15.63	17.06	18.53		(46)
Storage volume (litre	s) includir	ng any so	olar or W	WHRS	storage	within sa	ame ves	sel		0		(47)
If community heating	•	•			_							, ,
Otherwise if no store Water storage loss:			_			• •	ers) ente	er '0' in (	47)			
a) If manufacturer's	declared l	oss facto	or is kno	wn (kWl	n/day):					0		(48)
Temperature factor for	om Table	2b								0		(49)
Energy lost from wat	er storage	e, kWh/ye	ear			(48) x (49)	) =			0		(50)
b) If manufacturer's Hot water storage los		-								0		(51)
If community heating		on 4.3										
Volume factor from T		. Oh								0		(52)
Temperature factor for						(47) (54)	v (FO) == (	<b>-</b> 2)		0		(53)
Energy lost from wate Enter (50) or (54) in	_	, KVVN/Y	ear			(47) x (51)	x (52) X (	o3) =		0		(54) (55)
(55) 51 (57) 111	(30)									0	I	(30)

Water storage	loss cal	culated t	for each	month			((56)m = (	55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If 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= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circui	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circui	,	•			59)m = (	(58) ÷ 36	55 × (41)	m				•	
(modified by	factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month (	(61)m =	(60) ÷ 36	65 × (41)	)m						
(61)m= 18.5	16.61	18.23	17.46	17.92	17.19	17.66	17.83	17.34	18.1	17.73	18.45		(61)
Total heat req	uired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × (	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 146.03	128.15	133.33	117.81	114.2	100.27	94.65	106.17	106.74	122.29	131.46	141.95		(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	al lines if	FGHRS	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 w	ater hea	ter											
(64)m= 146.03	128.15	133.33	117.81	114.2	100.27	94.65	106.17	106.74	122.29	131.46	141.95		
	-						Outp	out from wa	ater heate	r (annual) <sub>1</sub>	12	1443.04	(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= 47.03	41.24	42.83	37.73	36.49	31.92	30.02	22.02	34.06	39.17	40.05			(65)
			37.73	30.43	31.92	30.02	33.83	34.06	39.17	42.25	45.68		(65)
include (57)	m in cal				<u> </u>			<u> </u>		<u> </u>		eating	(65)
include (57) 5. Internal g		culation (	of (65)m	only if c	<u> </u>			<u> </u>		<u> </u>		eating	(65)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>			<u> </u>		<u> </u>		eating	(65)
` '	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>			<u> </u>		<u> </u>		eating	(65)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. Internal g  Metabolic gain	ains (see ns (Table Feb 92.58	e Table 5 e 5), Wat Mar 92.58	of (65)m 5 and 5a ts Apr 92.58	only if constant of the consta	ylinder i: Jun 92.58	Jul 92.58	Aug 92.58	or hot w Sep 92.58	ater is fr	om com	munity h	eating	
5. Internal g Metabolic gain  Jan  (66)m= 92.58	ains (see ns (Table Feb 92.58	e Table 5 e 5), Wat Mar 92.58	of (65)m 5 and 5a ts Apr 92.58	only if constant of the consta	ylinder i: Jun 92.58	Jul 92.58	Aug 92.58	or hot w Sep 92.58	ater is fr	om com	munity h	eating	
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains	res (Table Feb 92.58 (calcula 13.48	Table 5 2 5), Wat Mar 92.58 ted in Ap	of (65)m and 5a ts Apr 92.58 ppendix 8.3	May 92.58 L, equat	Jun 92.58 ion L9 o	Jul 92.58 r L9a), a	Aug 92.58 Iso see	Sep 92.58 Table 5	Oct 92.58	Nov 92.58	Dec 92.58	eating	(66)
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17	res (Table Feb 92.58 (calcula 13.48	Table 5 2 5), Wat Mar 92.58 ted in Ap	of (65)m and 5a ts Apr 92.58 ppendix 8.3	May 92.58 L, equat	Jun 92.58 ion L9 o	Jul 92.58 r L9a), a	Aug 92.58 Iso see	Sep 92.58 Table 5	Oct 92.58	Nov 92.58	Dec 92.58	eating	(66)
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga	res (Table Feb 92.58 (calcula 13.48 tins (calcula 163.12	culation of Table 5 (a) Wat Mar 92.58 (b) 10.96 (c) culated in 158.9	ts Apr 92.58 ppendix 8.3 Appendix 149.91	only if construction only if c	Jun 92.58 ion L9 of 5.24 uation L	Jul 92.58 r L9a), a 5.66 13 or L1	Aug 92.58 Iso see 7.35 3a), also	Sep 92.58 Table 5 9.87 see Ta	Oct 92.58  12.53 ble 5 132.31	Nov 92.58	Dec 92.58	eating	(66) (67)
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44	res (Table Feb 92.58 (calcula 13.48 tins (calcula 163.12	culation of Table 5 (a) Wat Mar 92.58 (b) 10.96 (c) culated in 158.9	ts Apr 92.58 ppendix 8.3 Appendix 149.91	only if construction only if c	Jun 92.58 ion L9 of 5.24 uation L	Jul 92.58 r L9a), a 5.66 13 or L1	Aug 92.58 Iso see 7.35 3a), also	Sep 92.58 Table 5 9.87 see Ta	Oct 92.58  12.53 ble 5 132.31	Nov 92.58	Dec 92.58	eating	(66) (67)
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44  Cooking gains	res (Table Feb 92.58 (calcula 13.48 lins (calcula 163.12 s (calcula 32.26	culation of Table 5 2 5), Wat Mar 92.58 ted in Ap 10.96 culated in 158.9 atted in A 32.26	of (65)m s and 5a ts Apr 92.58 ppendix 8.3 Appendix 149.91 ppendix 32.26	May 92.58 L, equat 6.2 dix L, eq 138.56 L, equat	Jun 92.58 ion L9 of 5.24 uation L 127.9	Jul 92.58 r L9a), a 5.66 13 or L1 120.78 or L15a)	Aug 92.58 Iso see 7.35 3a), also 119.1	Sep 92.58 Table 5 9.87 See Ta 123.32 ee Table	Oct 92.58  12.53 ble 5 132.31	Nov 92.58 14.63	Dec 92.58	eating	(66) (67) (68)
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44  Cooking gains  (69)m= 32.26	res (Table Feb 92.58 (calcula 13.48 lins (calcula 163.12 s (calcula 32.26	culation of Table 5 2 5), Wat Mar 92.58 ted in Ap 10.96 culated in 158.9 atted in A 32.26	of (65)m s and 5a ts Apr 92.58 ppendix 8.3 Appendix 149.91 ppendix 32.26	May 92.58 L, equat 6.2 dix L, eq 138.56 L, equat	Jun 92.58 ion L9 of 5.24 uation L 127.9	Jul 92.58 r L9a), a 5.66 13 or L1 120.78 or L15a)	Aug 92.58 Iso see 7.35 3a), also 119.1	Sep 92.58 Table 5 9.87 See Ta 123.32 ee Table	Oct 92.58  12.53 ble 5 132.31	Nov 92.58 14.63	Dec 92.58	eating	(66) (67) (68)
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44  Cooking gains  (69)m= 32.26  Pumps and fa  (70)m= 10	reb 92.58 (calcula 13.48 ins (calcula 32.26 rs gains 10	Mar 92.58 ted in Ap 10.96 ulated in Ap 158.9 ated in A 32.26 (Table §	of (65)m and 5a ts Apr 92.58 ppendix 8.3 Appendix 149.91 ppendix 32.26 5a)	only if constructions only if constructions only if constructions on the construction of the construction	Jun 92.58 ion L9 of 5.24 uation L 127.9 ion L15 32.26	Jul 92.58 r L9a), a 5.66 13 or L1 120.78 or L15a) 32.26	Aug 92.58 Iso see 7.35 3a), also 119.1 , also se 32.26	Sep 92.58 Table 5 9.87 see Ta 123.32 ee Table 32.26	Oct 92.58  12.53 ble 5 132.31 5 32.26	Nov 92.58 14.63 143.66	Dec 92.58 15.6 154.32	eating	(66) (67) (68) (69)
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44  Cooking gains  (69)m= 32.26  Pumps and fa	reb 92.58 (calcula 13.48 ins (calcula 32.26 rs gains 10	Mar 92.58 ted in Ap 10.96 ulated in Ap 158.9 ated in A 32.26 (Table §	of (65)m and 5a ts Apr 92.58 ppendix 8.3 Appendix 149.91 ppendix 32.26 5a)	only if constructions only if constructions only if constructions on the construction of the construction	Jun 92.58 ion L9 of 5.24 uation L 127.9 ion L15 32.26	Jul 92.58 r L9a), a 5.66 13 or L1 120.78 or L15a) 32.26	Aug 92.58 Iso see 7.35 3a), also 119.1 , also se 32.26	Sep 92.58 Table 5 9.87 see Ta 123.32 ee Table 32.26	Oct 92.58  12.53 ble 5 132.31 5 32.26	Nov 92.58 14.63 143.66	Dec 92.58 15.6 154.32	eating	(66) (67) (68) (69)
Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44  Cooking gains  (69)m= 32.26  Pumps and fa  (70)m= 10  Losses e.g. e	res (Table Feb 92.58 (calcula 13.48 fins (calcula 32.26 fins gains 10 raporatio -74.07	culation of Table 5 2 5), Wat Mar 92.58 ted in Ap 10.96 culated in 158.9 ated in A 32.26 (Table 5 10 on (negar	of (65)m s and 5a ts Apr 92.58 ppendix 8.3 Appendix 149.91 ppendix 32.26 5a) 10 tive valu	only if construction only if c	Jun 92.58 ion L9 of 5.24 uation L 127.9 ion L15 32.26  10 le 5)	Jul 92.58 r L9a), a 5.66 13 or L1 120.78 or L15a) 32.26	Aug 92.58 Iso see 7.35 3a), also 119.1 , also se 32.26	Sep 92.58 Table 5 9.87 See Ta 123.32 ee Table 32.26	Oct 92.58  12.53 ble 5 132.31 5 32.26	Nov 92.58 14.63 143.66 32.26	Dec 92.58 15.6 154.32 32.26	eating	(66) (67) (68) (69)
5. Internal g  Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44  Cooking gains  (69)m= 32.26  Pumps and fa  (70)m= 10  Losses e.g. et  (71)m= -74.07	res (Table Feb 92.58 (calcula 13.48 fins (calcula 32.26 fins gains 10 raporatio -74.07	culation of Table 5 2 5), Wat Mar 92.58 ted in Ap 10.96 culated in 158.9 ated in A 32.26 (Table 5 10 on (negar	of (65)m s and 5a ts Apr 92.58 ppendix 8.3 Appendix 149.91 ppendix 32.26 5a) 10 tive valu	only if construction only if c	Jun 92.58 ion L9 of 5.24 uation L 127.9 ion L15 32.26  10 le 5)	Jul 92.58 r L9a), a 5.66 13 or L1 120.78 or L15a) 32.26	Aug 92.58 Iso see 7.35 3a), also 119.1 , also se 32.26	Sep 92.58 Table 5 9.87 See Ta 123.32 ee Table 32.26	Oct 92.58  12.53 ble 5 132.31 5 32.26	Nov 92.58 14.63 143.66 32.26	Dec 92.58 15.6 154.32 32.26	eating	(66) (67) (68) (69)
Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44  Cooking gains  (69)m= 32.26  Pumps and fa  (70)m= 10  Losses e.g. et  (71)m= -74.07  Water heating	res (Table Feb 92.58 (calcula 13.48 dins (calcula 32.26 de res gains 10 de res res res res res res res res res re	culation of the culation of th	of (65)m s and 5a ts Apr 92.58 ppendix 8.3 Appendix 149.91 ppendix 32.26 5a) 10 tive valu -74.07	only if constructions	Jun 92.58 ion L9 of 5.24 uation L 127.9 ion L15 32.26  10 le 5) -74.07	Jul 92.58 r L9a), a 5.66 13 or L1 120.78 or L15a) 32.26	Aug 92.58 Iso see 7.35 3a), also 119.1 , also se 32.26 10	Sep 92.58 Table 5 9.87 See Ta 123.32 See Table 32.26  10  -74.07	Oct 92.58  12.53 ble 5 132.31 5 32.26  10  -74.07	Nov 92.58 14.63 143.66 32.26 10 -74.07	Dec 92.58  15.6  154.32  32.26  10  -74.07	eating	(66) (67) (68) (69) (70)
Metabolic gain  Jan  (66)m= 92.58  Lighting gains  (67)m= 15.17  Appliances ga  (68)m= 161.44  Cooking gains  (69)m= 32.26  Pumps and fa  (70)m= 10  Losses e.g. et  (71)m= -74.07  Water heating  (72)m= 63.21	res (Table Feb 92.58 (calcula 13.48 dins (calcula 32.26 de res gains 10 de res res res res res res res res res re	culation of the culation of th	of (65)m s and 5a ts Apr 92.58 ppendix 8.3 Appendix 149.91 ppendix 32.26 5a) 10 tive valu -74.07	only if constructions	Jun 92.58 ion L9 of 5.24 uation L 127.9 ion L15 32.26  10 le 5) -74.07	Jul 92.58 r L9a), a 5.66 13 or L1 120.78 or L15a) 32.26	Aug 92.58 Iso see 7.35 3a), also 119.1 , also se 32.26 10	Sep 92.58 Table 5 9.87 See Ta 123.32 See Table 32.26  10  -74.07	Oct 92.58  12.53 ble 5 132.31 5 32.26  10  -74.07	Nov 92.58 14.63 143.66 32.26 10 -74.07	Dec 92.58  15.6  154.32  32.26  10  -74.07	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 Factor Table 6d	r	Area m²	Flux Table 6a			g_ Table 6b		FF Table 6c			
North	0.9x	0.77	X	1.5	x	10.63	x	0.63	x	0.7	=	4.88	(74)
North	0.9x	0.77	x	3.14	x	10.63	x	0.63	x	0.7	=	10.2	(74)
North	0.9x	0.77	x	1.5	x	20.32	x	0.63	x	0.7	=	9.33	(74)
North	0.9x	0.77	x	3.14	x	20.32	x	0.63	x	0.7	=	19.49	(74)
North	0.9x	0.77	x	1.5	x	34.53	x	0.63	x	0.7	=	15.85	(74)
North	0.9x	0.77	x	3.14	x	34.53	x	0.63	x	0.7	=	33.13	(74)
North	0.9x	0.77	x	1.5	x	55.46	x	0.63	x	0.7	=	25.46	(74)
North	0.9x	0.77	x	3.14	x	55.46	X	0.63	x	0.7	=	53.21	(74)
North	0.9x	0.77	x	1.5	X	74.72	X	0.63	x	0.7	=	34.3	(74)
North	0.9x	0.77	x	3.14	X	74.72	X	0.63	x	0.7	=	71.68	(74)
North	0.9x	0.77	X	1.5	x	79.99	X	0.63	X	0.7	=	36.72	(74)
North	0.9x	0.77	X	3.14	X	79.99	X	0.63	x	0.7	=	76.73	(74)
North	0.9x	0.77	X	1.5	X	74.68	X	0.63	X	0.7	=	34.28	(74)
North	0.9x	0.77	X	3.14	x	74.68	x	0.63	x	0.7	=	71.64	(74)
North	0.9x	0.77	X	1.5	x	59.25	X	0.63	x	0.7	=	27.2	(74)
North	0.9x	0.77	X	3.14	X	59.25	x	0.63	x	0.7	=	56.84	(74)
North	0.9x	0.77	X	1.5	x	41.52	x	0.63	x	0.7	=	19.06	(74)
North	0.9x	0.77	X	3.14	x	41.52	X	0.63	x	0.7	=	39.83	(74)
North	0.9x	0.77	X	1.5	X	24.19	X	0.63	X	0.7	=	11.1	(74)
North	0.9x	0.77	X	3.14	X	24.19	X	0.63	x	0.7	=	23.21	(74)
North	0.9x	0.77	X	1.5	x	13.12	X	0.63	x	0.7	=	6.02	(74)
North	0.9x	0.77	X	3.14	X	13.12	X	0.63	x	0.7	=	12.58	(74)
North	0.9x	0.77	X	1.5	X	8.86	X	0.63	x	0.7	=	4.07	(74)
North	0.9x	0.77	X	3.14	X	8.86	X	0.63	x	0.7	=	8.5	(74)
South	0.9x	0.77	X	3.38	X	46.75	X	0.63	X	0.7	=	48.28	(78)
South	0.9x	0.77	X	0.41	X	46.75	X	0.63	X	0.7	=	5.89	(78)
South	0.9x	0.77	X	3.38	X	76.57	X	0.63	X	0.7	=	79.07	(78)
South	0.9x	0.77	X	0.41	X	76.57	X	0.63	X	0.7	=	9.64	(78)
South	0.9x	0.77	X	3.38	x	97.53	X	0.63	X	0.7	=	100.72	(78)
South	0.9x	0.77	X	0.41	X	97.53	X	0.63	X	0.7	=	12.28	(78)
South	0.9x	0.77	X	3.38	x	110.23	X	0.63	X	0.7	=	113.84	(78)
South	0.9x	0.77	X	0.41	X	110.23	X	0.63	X	0.7	=	13.88	(78)
South	0.9x	0.77	X	3.38	X	114.87	X	0.63	X	0.7	=	118.62	(78)
South	0.9x	0.77	X	0.41	x	114.87	X	0.63	X	0.7	=	14.46	(78)
South	0.9x	0.77	X	3.38	X	110.55	X	0.63	X	0.7	=	114.16	(78)
South	0.9x	0.77	X	0.41	x	110.55	x	0.63	X	0.7	=	13.92	(78)
South	0.9x	0.77	X	3.38	x	108.01	x	0.63	X	0.7	] =	111.54	(78)
South	0.9x	0.77	X	0.41	x	108.01	x	0.63	X	0.7	=	13.6	(78)
South	0.9x	0.77	X	3.38	x	104.89	X	0.63	X	0.7	=	108.32	(78)

	_															_
South	0.9x	0.77	Х	0.4	1	X	10	04.89	X		0.63	X	0.7	=	13.21	(78)
South	0.9x	0.77	Х	3.3	38	x	10	01.89	X		0.63	x	0.7	=	105.21	(78)
South	0.9x	0.77	X	0.4	1	x	10	01.89	X		0.63	x	0.7	=	12.83	(78)
South	0.9x	0.77	X	3.3	38	x	8	2.59	X		0.63	x	0.7	=	85.28	(78)
South	0.9x	0.77	Х	0.4	<b>1</b> 1	x	8	2.59	X		0.63	x	0.7	=	10.4	(78)
South	0.9x	0.77	X	3.3	38	x	5	5.42	x		0.63	x	0.7	=	57.23	(78)
South	0.9x	0.77	X	0.4	<b>1</b> 1	x	5	5.42	x		0.63	x [	0.7	=	6.98	(78)
South	0.9x	0.77	X	3.3	38	x	4	10.4	x		0.63	x	0.7	=	41.72	(78)
South	0.9x	0.77	X	0.4	<b>1</b> 1	x	4	10.4	X		0.63	x	0.7	=	5.09	(78)
Solar	gains in	watts, ca	alculated	d for eac	h month				(83)m	= Su	ım(74)m .	(82)m			_	
(83)m=	69.25	117.53	161.98	206.38	239.06	24	11.53	231.06	205.	.56	176.93	129.99	82.81	59.38	]	(83)
Total g	ains – i	nternal a	nd sola	r (84)m =	= (73)m	+ (8	33)m	, watts					-		_	
(84)m=	369.85	416.27	450.17	477.77	493.65	47	79.77	458.61	438.	.27	418.2	388.26	360.55	351.46	]	(84)
7. Me	an inter	nal temp	erature	(heating	season	)										
		during h		`		<b>_</b>	area f	rom Tab	ole 9.	Th1	(°C)				21	(85)
-		tor for g	٠.			_			,		( - /					` ′
Otilloc	Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	Δι	ug	Sep	Oct	Nov	Dec	٦	
(86)m-				<del></del>		_			_	<del>-  </del>			_		4	(86)
(86)m= 1 0.99 0.99 0.98 0.94 0.86 0.73 0.77 0.92 0.98 0.99 1 (86)												(00)				
Mean		l temper		<del></del>	<u> </u>	_							1		¬	
(87)m=	19.19	19.35	19.63	20.02	20.41	20	0.75	20.91	20.8	88	20.63	20.13	19.59	19.16		(87)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)																
(88)m=	19.57	19.57	19.57	19.59	19.59	1	19.6	19.6	19.6	61	19.6	19.59	19.59	19.58	7	(88)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)																
(89)m=	1	0.99	0.98	0.97	0.91		).77	0.55	0.6	6	0.85	0.97	0.99	1	٦	(89)
													ı		_	
		l temper				Ť	<u> </u>		<del>i                                     </del>	$\overline{}$		<u> </u>	1	<u> </u>	٦	(00)
(90)m=	17.21	17.45	17.86	18.43	18.99	19	9.42	19.57	19.5	56	19.29	18.59	17.82	17.18		(90)
											t	LA = Livii	ng area ÷ (4	4) =	0.46	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling	g) = fl	_A × T1	+ (1 -	– fL	A) × T2					
(92)m=	18.12	18.33	18.68	19.17	19.65	20	0.03	20.19	20.1	17	19.91	19.3	18.64	18.1	7	(92)
Apply	adjustr	nent to tl	ne mear	interna	temper	atu	re fro	m Table	4e, \	whe	re appro	priate			_	
(93)m=	17.97	18.18	18.53	19.02	19.5	19	9.88	20.04	20.0	02	19.76	19.15	18.49	17.95	7	(93)
8. Sp	ace hea	ting requ	uiremen													
Set T	i to the i	mean int	ernal te	mperatu	e obtair	ned	at ste	ep 11 of	Table	e 9b	, so tha	t Ti,m=(	76)m an	d re-cal	culate	
		factor fo						•				,			_	
	Jan	Feb	Mar	Apr	May	,	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:											_	
(94)m=	0.99	0.99	0.98	0.96	0.91	0	).79	0.62	0.6	6	0.86	0.96	0.99	0.99	7	(94)
Usefu	ıl gains,	hmGm ,	W = (9	4)m x (8	4)m										_	
(95)m=	367.33	411.61	441.22	458.14	447.9	37	78.62	282.63	289.	.75	361.29	374.06	356.37	349.48	7	(95)
Month	nly aver	age exte	rnal tem	perature	from T	able	e 8						-	•	-	
(96)m=	4.3	4.9	6.5	8.9	11.7	1	14.6	16.6	16.	.4	14.1	10.6	7.1	4.2	]	(96)
Heat	loss rate	e for mea	an interr	nal tempe	erature,	Lm	, W =	=[(39)m :	x [(93	3)m-	- (96)m	]	•	•	-	
(97)m=	1261.14	1221.25	1103.6	917.47	705.68	47	73.34	307.95	323.	.64	508.81	774.08	1035.24	1255.62	<u>?</u> ]	(97)
				•		•			•				•	•	-	

Space heating require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)	)m – (95	)m] x (4 <sup>-</sup>	1)m			
(98)m= 664.99 544.08	492.81	330.71	191.79	0	0	0	0	297.62	488.79	674.17		
						Tota	l per year	(kWh/year	) = Sum(9	8) <sub>15,912</sub> =	3684.95	(98)
Space heating requirement in kWh/m²/year											66.41	(99)
9a. Energy requirements – Individual heating systems including micro-CHP)												
Space heating:												7,004
Fraction of space heat from secondary/supplementary system											0	(201)
Fraction of space heat from main system(s) (202) = 1 - (201) =											1	(202)
Fraction of total heating		-				(204) = (204)	02) <b>x</b> [1 –	(203)] =		Ļ	1	(204)
Efficiency of main spa					0.4					Ļ	90.2	(206)
Efficiency of secondar					i			_			0	(208)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heating require 664.99 544.08	492.81	330.71	191.79	0	0	0	0	297.62	488.79	674.17		
$(211)m = \{[(98)m \times (20)]\}$												(211)
737.24 603.19	546.35	366.64	212.63	0	0	0	0	329.95	541.89	747.41		(=1.1)
<u> </u>						Tota	l (kWh/yea	ar) =Sum(2	211) <sub>15,1012</sub>	=	4085.32	(211)
Space heating fuel (se	econdar	y), kWh/	month							L		
= {[(98)m x (201)] } x 1	00 ÷ (20	8)							T			
(215)m= 0 0	0	0	0	0	0	0 Tata	0	0	0	0		7(045)
Total (kWh/year) =Sum(215) <sub>15,1012</sub> =											0	(215)
Water heating Output from water heat	ter (calc	ulated a	bove)									
146.03 128.15	133.33	117.81	114.2	100.27	94.65	106.17	106.74	122.29	131.46	141.95		
Efficiency of water hea	ter										87.3	(216)
(217)m= 89.66 89.63	89.57	89.42	89.1	87.3	87.3	87.3	87.3	89.34	89.57	89.68		(217)
Fuel for water heating, $(219)m = (64)m \times 100$												
(219)m= $162.86$ $142.97$	148.86	131.75	128.17	114.86	108.42	121.62	122.27	136.89	146.76	158.29		
						Tota	I = Sum(2	19a) <sub>112</sub> =			1623.72	(219)
Annual totals								k\	Wh/year	. –	kWh/yea	 r
Space heating fuel use	d, main	system	1								4085.32	╛
Water heating fuel use	d										1623.72	
Electricity for pumps, fa	ans and	electric	keep-ho	t								
central heating pump:									120		(230c	
boiler with a fan-assisted flue									45		(230e	
Total electricity for the above, kWh/year sum of (230a)(230g) =											165	(231)
Electricity for lighting										267.97	(232)	

Energy

kWh/year

**Emissions** 

kg CO2/year

**Emission factor** 

kg CO2/kWh

Space heating (main system 1)	(211) x	0.216	=	882.43	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	350.72	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1233.15	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	85.64	(267)
Electricity for lighting	(232) x	0.519	=	139.07	(268)
Total CO2, kg/year	sum	of (265)(271) =		1457.86	(272)
Dwelling CO2 Emission Rate	(272	(4) ÷ (4) =		26.27	(273)
EI rating (section 14)				81	(274)