Assessor Name:				lloor F	Notoile:						
## Acade Section Secti		•									
Area(m²)	Address :	Flat 1 16 Rochest									
Area(m/*)			er mews	, LOND	311 , 1 111	30B					
Number of chimneys	<u> </u>					(1a) x		_ , ,	(2a) =	· ·	<u> </u>
Number of chimneys	Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1	e)+(1r	n)	60.44	(4)			_		
Number of chimneys				· L)+(3c)+(3c	d)+(3e)+	.(3n) =	169.23	(5)
Number of chimneys	2. Ventilation rate:										
Number of intermittent fans 2		heating	heating	·] = [x	40 =		_
Number of intermittent fans 2	Number of open flues	0 +	0	╡ + F	0	i	0	x	20 =	0	(6b)
Number of passive vents	Number of intermittent fa	ans				J	2	x	10 =	20	=
Number of flueless gas fires						F		x	10 =		Ⅎ``
Air changes per hour	•					Ļ					= ' '
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20	Number of flueless gas	illes					0	^	+0 =	0	(7c)
If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns)									Air ch	nanges per ho	our
Number of storeys in the dwelling (ns) Additional infiltration (19)-1)x0.1 = 0 (10) (10)	Infiltration due to chimne	eys, flues and fans = (6a)+(6b)+(7	7 a)+(7b)+((7c) =	Г	20		÷ (5) =	0.12	(8)
Additional infiltration	If a pressurisation test has	been carried out or is intend	led, procee	d to (17),	otherwise o	continue fr	om (9) to	(16)			_
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) ÷ 100] = Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20] + (8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.78 (20) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	•	the dwelling (ns)								0	(9)
if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) ÷ 100] = 0 Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.78 (20) Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0.21 Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4								[(9)	-1]x0.1 =	0	⊣ `′
If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) ± 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ± 20]+(8), otherwise (18) = (16) (17) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.78 (20) Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0.21 (21) Infiltration rate modified for monthly wind speed 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	if both types of wall are p	present, use the value corre				•	ruction			0	(11)
Percentage of windows and doors draught stripped Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0.25 - [0.2 \times$	If suspended wooden	floor, enter 0.2 (unsea	aled) or 0	.1 (seale	ed), else	enter 0				0	(12)
Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0 $ Infiltration rate $ (8) + (10) + (11) + (12) + (13) + (15) = 0 $ Infiltration rate $ (8) + (10) + (11) + (12) + (13) + (15) = 0 $ Infiltration rate $ (8) + (10) + (11) + (12) + (13) + (15) = 0 $ Infiltration rate incorporating shelter factor $ (20) = 1 - [0.075 \times (19)] = 0.78 $ Infiltration rate modified for monthly wind speed $ (20) = 1 - [0.075 \times (19)] = 0.78 $ Infiltration rate modified for monthly wind speed $ (21) = (18) \times (20) = 0.21 $ Infiltration rate modified 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 \div 4 $	•									0	(13)
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.27 (18) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78$ (20) Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.21$ (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor $(22a)m = (22)m \div 4$	J	vs and doors draught s	stripped		0.05 10.0	(4.4)	001			0	= ' '
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = $ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = $ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$. (15) -			= ' '
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$ $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ $(21) = (18) \times (20) =$ 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 $(22a)m = (22)m \div 4$		aEO overegoed in ou	hia matra	o por be					oroo		= ' '
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78 (20)$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.21 (21)$ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$				•	•	•	elle oi e	rivelope	area		= ' '
Number of sides sheltered Shelter factor $ (20) = 1 - [0.075 \times (19)] = 0.78 $ (20) Infiltration rate incorporating shelter factor $ (21) = (18) \times (20) = 0.21 $ (21) Infiltration rate modified for monthly wind speed	·	•					is being u	sed		0.27	(10)
Infiltration rate incorporating shelter factor	Number of sides shelter	ed			-					3	(19)
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	Shelter factor				(20) = 1 -	[0.075 x (1	9)] =			0.78	(20)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	Infiltration rate incorpora	ating shelter factor			(21) = (18) x (20) =				0.21	(21)
Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	Infiltration rate modified	for monthly wind spee	d		•			•	•	•	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind Factor (22a)m = (22)m ÷ 4	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									
	<u> </u>		0.95	0.95	0.92	1	1.08	1.12	1.18]	

Adjusted infiltra	ation rate	(allowi	na for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.27	0.26	0.25	0.23	0.22	0.2	0.2	0.19	0.21	0.22	0.23	0.24]	
Calculate effec		•	rate for t	he appli	cable ca	ise		!	!	•		J	_
If mechanica			andiv NL (O	12h) (22a	a) Franc (a	aguatian (I	VIEVV otho	muiaa (22h) (225)			0	(23a)
If exhaust air he		•	•	, ,	,			•) = (23a)			0	(23b)
If balanced with		-	-	_					OL) (4 (00.)	0	(23c)
a) If balance	ed mecna	nicai ve	ntilation	with nea	at recove	ery (MV)	TR) (248	$\frac{a)m = (2)}{0}$	2b)m + (0	$\frac{(230) \times [}{0}$	$\frac{1 - (23c)}{0}$) ÷ 100]]	(24a)
` '		-											(Z+a)
b) If balance	o mecha	nicai ve	ntilation 0	without 0	neat red		0 (24)	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	26)m + (0	230)	0	1	(24b)
c) If whole h	<u> </u>			ļ	<u> </u>	<u> </u>		<u> </u>]	(215)
,	n < 0.5 ×			•	•				.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural	ventilatio	n or wh	ole hous	e positiv	ve input	ventilatio	on from	loft	<u>!</u>	<u>!</u>	ļ	ı	
,	n = 1, the			•	•				0.5]			_	
(24d)m= 0.54	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	0.53	0.53		(24d)
Effective air	change r	ate - en	iter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)				_	
(25)m= 0.54	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.52	0.52	0.53	0.53		(25)
3. Heat losse	s and hea	at loss p	paramete	er:									
ELEMENT	Gross area (_	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		X k /K
Windows Type	e 1												
					10.8	x1	/[1/(1.2)+	0.04] =	12.37				(27)
Windows Type					2.88	_	/[1/(1.2)+ /[1/(1.2)+		12.37				(27) (27)
Windows Type Windows Type	2					x1		0.04] =					` ,
•	2				2.88	x1	/[1/(1.2)+	0.04] =	3.3		75	4533	(27)
Windows Type	2		15.78	8	2.88	x1 x1 4 x	/[1/(1.2)+ /[1/(1.2)+	0.04] =	3.3		75	4533 2917.:	(27) (27) (28)
Windows Type Floor	e 2 e 3		15.76	8	2.88 2.1 60.44	x1 x1 4 x x x	/[1/(1.2)+ /[1/(1.2)+ 	0.04] =	3.3 2.4 6.044			= ==	(27) (27) (28) (29)
Windows Type Floor Walls Type1	64.4	1		8	2.88 2.1 60.44 48.62	x1 x1 4 x 2 x 4 x	/[1/(1.2)+ /[1/(1.2)+ 	0.04] =	3.3 2.4 6.044 11.18		60	2917.2	(27) (27) (28) (29) (29)
Windows Type Floor Walls Type1 Walls Type2	64.4 21.84 11.05	ļ 5	0	8	2.88 2.1 60.44 48.62 21.84 11.05	x1 x1 x1 x x x x x x x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+ 0.1 0.23 0.19	0.04] =	3.3 2.4 6.044 11.18 4.16		60	2917.	(27) (27) (28) (29) (29)
Windows Type Floor Walls Type1 Walls Type2 Roof	64.4 21.84 11.05	ļ 5	0	8	2.88 2.1 60.44 48.62 21.84	x1 x1 x1 x x x x x x x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+	0.04] =	3.3 2.4 6.044 11.18 4.16		60	2917.	(27) (27) (28) 2 (29) 4 (29) (30) (31)
Windows Type Floor Walls Type1 Walls Type2 Roof Total area of e	64.4 21.84 11.05	ļ 5	0	8	2.88 2.1 60.44 48.62 21.84 11.05	x1 x1 x x1 x x x x x x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+ 0.1 0.23 0.19	0.04] =	3.3 2.4 6.044 11.18 4.16 1.44		60 60 9	2917.1 1310.4 99.45	(27) (27) (28) (29) (4) (29) (30) (31) (32)
Windows Types Floor Walls Type1 Walls Type2 Roof Total area of e	64.4 21.84 11.05 elements,	ļ 5	0	8	2.88 2.1 60.44 48.62 21.84 11.05 157.7	x1 x1 x1 x x1 x x x x x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+	0.04] =	3.3 2.4 6.044 11.18 4.16 1.44		60 60 9 45	2917.1 1310.4 99.45	(27) (27) (28) (29) (4) (29) (30) (31) (32) (32b)
Windows Types Floor Walls Type1 Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and	64.4 21.84 11.05 1 roof windo	m ² ws, use e	0 0	indow U-va	2.88 2.1 60.44 48.62 21.84 11.05 157.7 13.44 49.35 66.64 alue calcul	x1 x1 x1 x1 x x1 x x1 x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+	0.04] = 0.04] = = = = =	3.3 2.4 6.044 11.18 4.16 1.44	as given in	60 60 9 45 30 9	2917.2 1310.4 99.45 604.8 1481.	(27) (27) (28) (29) (4) (29) (30) (31) (32) (7) (32b)
Windows Types Floor Walls Type1 Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall **	64.4 21.84 11.05 Elements,	m ² ws, use e	0 0	indow U-va	2.88 2.1 60.44 48.62 21.84 11.05 157.7 13.44 49.35 66.64 alue calcul	x1 x1 x1 x1 x x1 x x1 x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+	= 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = =	3.3 2.4 6.044 11.18 4.16 1.44	as given in	60 60 9 45 30 9	2917.2 1310.4 99.45 604.8 1481.	(27) (27) (28) (29) (4) (29) (30) (31) (32) (32b)
Windows Types Floor Walls Type1 Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area	64.4 21.84 11.05 21.84 17.05 21.84 17.05 21.84 17.05 21.84 2	m ² ws, use e sides of in	0 0	indow U-va	2.88 2.1 60.44 48.62 21.84 11.05 157.7 13.44 49.35 66.64 alue calcul	x1 x1 x1 x1 x x1 x x1 x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+ 0.1 0.23 0.19 0.13	= 0.04] = = 0.04] = = = = = = = =	3.3 2.4 6.044 11.18 4.16 1.44 0	as given in [2] + (32a).	60 60 9 45 30 9	2917.1 1310.4 99.45 604.8 1481. 599.70	(27) (27) (28) (29) (4) (29) (30) (31) (32) (7) (32b) (32c)
Windows Types Floor Walls Type1 Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area Fabric heat los	64.4 21.84 11.05 elements, 7 roof windo as on both s ss, W/K = Cm = S(A	ws, use e sides of in a S (A x A x k)	0 0 offective winternal walk	indow U-va	2.88 2.1 60.44 48.62 21.84 11.05 157.7 13.44 49.38 66.64 alue calcultitions	x1 x1 x1 x x1 x x x x x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+ 0.1 0.23 0.19 0.13	= 0.04] = = 0.04] = = = = = = = =	3.3 2.4 6.044 11.18 4.16 1.44 0		60 60 9 45 30 9	2917.1 1310.4 99.45 604.8 1481.1 599.70	(27) (27) (28) (29) (4) (29) (30) (31) (32) (7) (32b) (6) (32c)
Windows Types Floor Walls Type1 Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area Fabric heat los Heat capacity	64.4 21.84 11.05 elements, roof windo as on both s ss, W/K = Cm = S(A parameter sments whee	ws, use e sides of in S (A x A x k) er (TMF	o offective winternal walk U) of the control of the	indow U-ve ls and pan	2.88 2.1 60.44 48.62 21.84 11.05 157.7 13.44 49.39 66.64 alue calculatitions	x1 x1 x1 x1 x x1 x x x x x x x x x x x	/[1/(1.2)+ /[1/(1.2)+	= 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = =	3.3 2.4 6.044 11.18 4.16 1.44 0 0 ue)+0.04] & & & & & & & & & & & & & & & & & & &	2) + (32a).	60 9 45 30 9 paragraph (32e) =	2917.3 1310.4 99.45 604.8 1481. 599.70 7.3.2	(27) (27) (28) (2 (29) (4 (29) (30) (31) (32) (7 (32b) (6 (32c) (33) (34)
Windows Types Floor Walls Type1 Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	64.4 21.84 21.84 11.05 elements, roof windo as on both s as, W/K = Cm = S(A parameter and of a deta	ws, use esides of interest the decided calculary	o o o o o o o o o o o o o o o o o o o	indow U-vals and pand	2.88 2.1 60.44 48.62 21.84 11.05 157.7 13.44 49.33 66.64 alue calculatitions	x1 x	/[1/(1.2)+ /[1/(1.2)+	= 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = =	3.3 2.4 6.044 11.18 4.16 1.44 0 0 ue)+0.04] & & & & & & & & & & & & & & & & & & &	2) + (32a).	60 9 45 30 9 paragraph (32e) =	2917.3 1310.4 99.45 604.8 1481. 599.70 7.3.2	(27) (27) (28) (2 (29) (4 (29) (30) (31) (32) (7 (32b) (6 (32c) (33) (34)
Windows Types Floor Walls Type1 Walls Type2 Roof Total area of e Party wall Party ceiling Internal wall ** * for windows and ** include the area Fabric heat loss Heat capacity Thermal mass For design assess can be used instead	64.4 21.84 11.05 elements, roof windo as on both s ss, W/K = Cm = S(A paramet sments whe ad of a deta es : S (L x al bridging a	ws, use e sides of in S (A x A x k) er (TMF ere the dec ailed calcu x Y) calc	o o o o o o o o o o o o o o o o o o o	TFA) ir construct	2.88 2.1 60.44 48.62 21.84 11.05 157.7 13.44 49.35 66.64 alue calculatitions n kJ/m²K ion are not	x1 x	/[1/(1.2)+ /[1/(1.2)+	= 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = =	3.3 2.4 6.044 11.18 4.16 1.44 0 0 ue)+0.04] & & & & & & & & & & & & & & & & & & &	2) + (32a).	60 9 45 30 9 paragraph (32e) =	2917.3 1310.4 99.45 604.8 1481. 599.70 13.2 40.89 11546.31 191.04	(27) (27) (28) (29) (4) (29) (30) (31) (32) (7) (32b) (6) (32c) (33) (34) (35)

Ventila	ation hea	at loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	29.88	29.81	29.73	29.39	29.32	29.01	29.01	28.96	29.13	29.32	29.45	29.59		(38)
Heat tr	ransfer c	coefficier	nt, W/K	-	-	-	-	-	(39)m	= (37) + (3	38)m	-		
(39)m=	82.92	82.84	82.77	82.42	82.35	82.05	82.05	81.99	82.16	82.35	82.49	82.62		
Heat lo	oss para	meter (H	HLP), W/	/m²K				-		Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	82.42	(39)
(40)m=	1.37	1.37	1.37	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.37		
Numbe	er of day	s in moi	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.36	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ater heat	ing ene	rgy requi	irement:								kWh/ye	ear:	
Assum	ned occu	ıpancy, l	N								1.	99		(42)
	A > 13.9 A £ 13.9		+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	ΓFA -13.				
	l averag									se target o		.56		(43)
not more	e that 125	litres per p	person per	day (all w	ater use, l	hot and co	ld)			-				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ir	n litres per	day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)			•			
(44)m=	89.71	86.45	83.19	79.93	76.66	73.4	73.4	76.66	79.93	83.19	86.45	89.71		
Energy (content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x D	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		978.69	(44)
(45)m=	133.04	116.36	120.07	104.68	100.44	86.68	80.32	92.17	93.27	108.69	118.65	128.84		
If instan	ntaneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1283.22	(45)
(46)m=	19.96	17.45	18.01	15.7	15.07	13	12.05	13.82	13.99	16.3	17.8	19.33		(46)
	storage													
_	ge volum	` ,		•			•		ame ves	sel	0			(47)
Otherv	munity h wise if no storage	stored			_			. ,	ers) ente	er '0' in (47)			
	nanufact		eclared l	oss facto	or is kno	wn (kWł	n/day):				0.	54		(48)
Tempe	erature fa	actor fro	m Table	2b								0		(49)
Energy	y lost fro	m water	storage	, kWh/ye	ear			(48) x (49)) =			0		(50)
,	nanufact ater stora			-								0		(54)
	munity h	_			C Z (KVV	11/11116/06	iy <i>)</i>					0		(51)
	e factor	•										0		(52)
	erature fa	actor fro	m Table	2b								0		(53)
								(47) x (51)	v (EQ) v (53) -				(EA)
Tempe	y lost fro	m water	storage	, kWh/ye	ear			(47) X (31)	X (52) X (00) –		0		(54)
Tempe Energy			_	, kWh/ye	ear			(47) X (31)) X (52) X (00) =		32		
Tempe Energy Enter	y lost fro	(54) in (5	55)	•				((56)m = (, , ,	,				(54) (55)

If cylinder contains dedic	ated solar sto	orage, (57)	m = (56)m	x [(50) – ([H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 10.04 9.0	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04		(57)
Primary circuit loss	(annual) fro	om Table	e 3	-	-	-	-	-		0		(58)
Primary circuit loss	calculated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(modified by factor	r from 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 calculat	ed for each	month ((61)m =	(60) ÷ 36	65 × (41))m					_	
(61)m= 35.43 30.8	4 32.85	30.55	30.28	28.05	28.99	30.28	30.55	32.85	33.04	35.43		(61)
Total heat required	for water h	eating ca	alculated	for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 178.52 156.	162.97	144.95	140.77	124.45	119.35	132.49	133.53	151.59	161.41	174.32		(62)
Solar DHW input calcula								r contribut	ion to wate	er heating)		
(add additional lines	if FGHRS	and/or \	//WHRS	applies	, see Ap	pendix (3)				•	
(63)m = 0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 26.35 21.8	4 20.18	14.83	10.09	6.24	5.78	6.64	6.72	15.8	21.19	26.36		(63) (G2
Output from water h	eater										_	
(64)m= 151.08 133.	17 141.74	129.1	129.64	117.21	112.5	124.78	125.76	134.7	139.18	146.86		_
						Outp	out from wa	ater heate	r (annual) ₁	12	1586.02	(64)
Heat gains from wa	er heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	د [(46)m	+ (57)m	+ (59)m]	
(65)m= 61.13 53.6	6 56.17	50.22	49	43.61	41.99	46.25	46.42	52.39	55.49	59.73		(65)
` '		1										
include (57)m in	alculation	of (65)m	only if c	ylinder i	s in the o	L dwelling	or hot w	ater is fr	om com	munity h	ı neating	
		. ,	-	ylinder i	s in the o	dwelling	or hot w	rater is fr	om com	munity h	i leating	
include (57)m in o	see Table t	5 and 5a	-	ylinder is	s in the o	dwelling	or hot w	ater is fr	rom com	munity h	neating	
include (57)m in o	see Table s	5 and 5a	-	ylinder is Jun	s in the o	dwelling Aug	or hot w	ater is fr	om com	munity h	neating	
include (57)m in 6 5. Internal gains (Metabolic gains (Ta	ble 5), War b Mar	5 and 5a):		r					_	neating	(66)
include (57)m in 6 5. Internal gains (Metabolic gains (Ta	ble 5), War b Mar	5 and 5a tts Apr 99.7): May 99.7	Jun 99.7	Jul 99.7	Aug 99.7	Sep 99.7	Oct	Nov	Dec	neating	(66)
include (57)m in 6 5. Internal gains (Metabolic gains (Ta Jan Fe (66)m= 99.7 99.	ble 5), War b Mar 99.7 ulated in A	5 and 5a tts Apr 99.7): May 99.7	Jun 99.7	Jul 99.7	Aug 99.7	Sep 99.7	Oct	Nov	Dec	neating	(66)
include (57)m in of the first state of the first st	ble 5), War b Mar 99.7 ulated in A	tts Apr 99.7 ppendix 8.49	May 99.7 L, equat 6.34	Jun 99.7 ion L9 o	Jul 99.7 r L9a), a 5.79	Aug 99.7 Iso see 7.52	Sep 99.7 Table 5	Oct 99.7	Nov 99.7	Dec 99.7	neating	, ,
include (57)m in 6 5. Internal gains (Ta Jan Fe (66)m= 99.7 99. Lighting gains (calc (67)m= 15.52 13.7	ble 5), War b Mar 99.7 ulated in A 11.21 alculated ir	tts Apr 99.7 ppendix 8.49	May 99.7 L, equat 6.34	Jun 99.7 ion L9 o	Jul 99.7 r L9a), a 5.79	Aug 99.7 Iso see 7.52	Sep 99.7 Table 5	Oct 99.7	Nov 99.7	Dec 99.7	neating	, ,
include (57)m in of the first state of the first st	ble 5), War b Mar 99.7 ulated in A 8 11.21 alculated in	Apr 99.7 ppendix 8.49 n Appendix 161.62	May 99.7 L, equat 6.34 dix L, eq	Jun 99.7 ion L9 of 5.36 uation L	Jul 99.7 r L9a), a 5.79 13 or L1	Aug 99.7 Iso see 7.52 3a), also	Sep 99.7 Table 5 10.09 see Ta 132.96	Oct 99.7 12.82 ble 5 142.65	Nov 99.7	Dec 99.7	neating	(67)
include (57)m in of the first state of the first st	ble 5), War b Mar 99.7 ulated in A 11.21 alculated ir 171.31 ulated in A	Apr 99.7 ppendix 8.49 n Appendix 161.62	May 99.7 L, equat 6.34 dix L, eq	Jun 99.7 ion L9 of 5.36 uation L	Jul 99.7 r L9a), a 5.79 13 or L1	Aug 99.7 Iso see 7.52 3a), also	Sep 99.7 Table 5 10.09 see Ta 132.96	Oct 99.7 12.82 ble 5 142.65	Nov 99.7	Dec 99.7	neating	(67)
include (57)m in of the first section of the first	ble 5), War b Mar 99.7 ulated in A 8 11.21 alculated in 36 171.31 ulated in A 7 32.97	Apr 99.7 ppendix 8.49 Appendix 161.62 ppendix 32.97	May 99.7 L, equat 6.34 dix L, eq 149.39 L, equat	Jun 99.7 ion L9 of 5.36 uation L 137.89	Jul 99.7 r L9a), a 5.79 13 or L1 130.21 or L15a)	Aug 99.7 Iso see 7.52 3a), also 128.41), also se	Sep 99.7 Table 5 10.09 see Ta 132.96 ee Table	Oct 99.7 12.82 ble 5 142.65	Nov 99.7 14.96	Dec 99.7 15.95 166.37	neating	(67) (68)
include (57)m in of the first state of the first st	ble 5), War b Mar 99.7 ulated in A 8 11.21 alculated in 36 171.31 ulated in A 7 32.97	Apr 99.7 ppendix 8.49 Appendix 161.62 ppendix 32.97	May 99.7 L, equat 6.34 dix L, eq 149.39 L, equat	Jun 99.7 ion L9 of 5.36 uation L 137.89	Jul 99.7 r L9a), a 5.79 13 or L1 130.21 or L15a)	Aug 99.7 Iso see 7.52 3a), also 128.41), also se	Sep 99.7 Table 5 10.09 see Ta 132.96 ee Table	Oct 99.7 12.82 ble 5 142.65	Nov 99.7 14.96	Dec 99.7 15.95 166.37	neating	(67) (68)
include (57)m in of the first section of the first	ble 5), War b Mar 99.7 ulated in A 11.21 alculated ir 171.31 ulated in A 7 32.97 ns (Table s	161.62 ppendix 32.97 3	May 99.7 L, equat 6.34 dix L, eq 149.39 L, equat 32.97	Jun 99.7 ion L9 of 5.36 uation L 137.89 tion L15 32.97	Jul 99.7 r L9a), a 5.79 13 or L1 130.21 or L15a) 32.97	Aug 99.7 Iso see 7.52 3a), also 128.41), also se 32.97	Sep 99.7 Table 5 10.09 see Ta 132.96 ee Table 32.97	Oct 99.7 12.82 ble 5 142.65 5 32.97	Nov 99.7 14.96 154.88	Dec 99.7 15.95 166.37 32.97	neating	(67) (68) (69)
include (57)m in of the first state of the first st	ble 5), War b Mar 99.7 ulated in A 11.21 alculated ir 66 171.31 ulated in A 7 32.97 ns (Table s 3	161.62 ppendix 32.97 3	May 99.7 L, equat 6.34 dix L, eq 149.39 L, equat 32.97	Jun 99.7 ion L9 of 5.36 uation L 137.89 tion L15 32.97	Jul 99.7 r L9a), a 5.79 13 or L1 130.21 or L15a) 32.97	Aug 99.7 Iso see 7.52 3a), also 128.41), also se 32.97	Sep 99.7 Table 5 10.09 see Ta 132.96 ee Table 32.97	Oct 99.7 12.82 ble 5 142.65 5 32.97	Nov 99.7 14.96 154.88	Dec 99.7 15.95 166.37 32.97	neating	(67) (68) (69)
include (57)m in of the first state of the first st	ble 5), War b Mar 99.7 ulated in A 11.21 alculated ir 6 171.31 ulated in A 7 32.97 ns (Table s 3 ation (nega	Apr 99.7 ppendix 8.49 161.62 ppendix 32.97 5a) 3	May 99.7 L, equat 6.34 dix L, eq 149.39 L, equat 32.97	Jun 99.7 ion L9 of 5.36 uation L 137.89 tion L15 32.97	Jul 99.7 r L9a), a 5.79 13 or L1 130.21 or L15a) 32.97	Aug 99.7 Iso see 7.52 3a), also 128.41), also se 32.97	Sep 99.7 Table 5 10.09 See Ta 132.96 ee Table 32.97	Oct 99.7 12.82 ble 5 142.65 5 32.97	Nov 99.7 14.96 154.88 32.97	Dec 99.7 15.95 166.37 32.97	neating	(67) (68) (69) (70)
include (57)m in 6 5. Internal gains (Ta Jan Fe (66)m= 99.7 99. Lighting gains (calc (67)m= 15.52 13.7 Appliances gains (c (68)m= 174.05 175. Cooking gains (calc (69)m= 32.97 32.9 Pumps and fans ga (70)m= 3 3 Losses e.g. evapora (71)m= -79.76 -79.	ble 5), War b Mar 7 99.7 ulated in A 8 11.21 alculated ir 36 171.31 ulated in A 7 32.97 ns (Table 5) ation (negation (negation (negation (negation (negation (Table 5)))	Apr 99.7 ppendix 8.49 161.62 ppendix 32.97 5a) 3	May 99.7 L, equat 6.34 dix L, eq 149.39 L, equat 32.97	Jun 99.7 ion L9 of 5.36 uation L 137.89 tion L15 32.97	Jul 99.7 r L9a), a 5.79 13 or L1 130.21 or L15a) 32.97	Aug 99.7 Iso see 7.52 3a), also 128.41), also se 32.97	Sep 99.7 Table 5 10.09 See Ta 132.96 ee Table 32.97	Oct 99.7 12.82 ble 5 142.65 5 32.97	Nov 99.7 14.96 154.88 32.97	Dec 99.7 15.95 166.37 32.97	neating	(67) (68) (69) (70)
include (57)m in or 5. Internal gains (Table Jan Fee George Georg	ble 5), War b Mar 99.7 ulated in A 11.21 alculated ir 171.31 ulated in A 7 32.97 ns (Table s 16 -79.76 s (Table 5) 5 75.5	tts	May 99.7 L, equat 6.34 dix L, eq 149.39 L, equat 32.97 3 es) (Tab	Jun 99.7 ion L9 of 5.36 uation L 137.89 tion L15 32.97 3 ole 5) -79.76	Jul 99.7 r L9a), a 5.79 13 or L1 130.21 or L15a) 32.97	Aug 99.7 Iso see 7.52 3a), also 128.41), also se 32.97 3	Sep 99.7 Table 5 10.09 see Ta 132.96 ee Table 32.97 3 -79.76	Oct 99.7 12.82 ble 5 142.65 5 32.97 3 -79.76	Nov 99.7 14.96 154.88 32.97 3	Dec 99.7 15.95 166.37 32.97 3 -79.76	neating	(67) (68) (69) (70) (71)
include (57)m in 6 5. Internal gains (Ta Jan Fe (66)m= 99.7 99. Lighting gains (calc (67)m= 15.52 13.7 Appliances gains (c (68)m= 174.05 175. Cooking gains (calc (69)m= 32.97 32.9 Pumps and fans ga (70)m= 3 3 Losses e.g. evapora (71)m= -79.76 -79. Water heating gains (72)m= 82.16 79.8	ble 5), War b Mar 99.7 ulated in A 11.21 alculated ir 6 171.31 ulated in A 7 32.97 ns (Table 5) 6 -79.76 c (Table 5) 75.5	tts	May 99.7 L, equat 6.34 dix L, eq 149.39 L, equat 32.97 3 es) (Tab	Jun 99.7 ion L9 of 5.36 uation L 137.89 tion L15 32.97 3 ole 5) -79.76	Jul 99.7 r L9a), a 5.79 13 or L1 130.21 or L15a) 32.97	Aug 99.7 Iso see 7.52 3a), also 128.41), also se 32.97 3	Sep 99.7 Table 5 10.09 see Ta 132.96 ee Table 32.97 3 -79.76	Oct 99.7 12.82 ble 5 142.65 5 32.97 3 -79.76	Nov 99.7 14.96 154.88 32.97 3	Dec 99.7 15.95 166.37 32.97 3 -79.76	neating	(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.

Orientation: Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b	-	FF Table 6c		Gains (W)	
Southwest _{0.9x} 0.77	X	2.1	x	36.79	1	0.63	x [0.8		26.99	(79)
Southwest _{0.9x} 0.77	X	2.1	x	62.67	ĺ	0.63		0.8	<u> </u>	45.97	(79)
Southwest _{0.9x} 0.77	X	2.1	x	85.75	i	0.63		0.8	-	62.9	(79)
Southwest _{0.9x} 0.77	X	2.1	x	106.25	j	0.63	_ x [0.8	= i	77.93	(79)
Southwest _{0.9x} 0.77	X	2.1	x	119.01	ĺ	0.63	×	0.8	<u> </u>	87.29	(79)
Southwest _{0.9x} 0.77	X	2.1	x	118.15	ĺ	0.63	_ x [0.8	=	86.66	(79)
Southwest _{0.9x} 0.77	X	2.1	x	113.91	ĺ	0.63	= x [0.8	<u> </u>	83.55	(79)
Southwest _{0.9x} 0.77	X	2.1	x	104.39	ĺ	0.63	x [0.8	=	76.57	(79)
Southwest _{0.9x} 0.77	X	2.1	x	92.85]	0.63	_ x [0.8	=	68.1	(79)
Southwest _{0.9x} 0.77	X	2.1	x	69.27		0.63	x [0.8	=	50.81	(79)
Southwest _{0.9x} 0.77	X	2.1	x	44.07]	0.63	x	0.8	=	32.32	(79)
Southwest _{0.9x} 0.77	X	2.1	x	31.49		0.63	x	0.8	=	23.1	(79)
Northwest 0.9x 0.77	X	10.8	х	11.28	х	0.63	x [0.8	=	42.56	(81)
Northwest 0.9x 0.77	X	2.88	х	11.28	x	0.63	x [0.8	=	11.35	(81)
Northwest 0.9x 0.77	X	10.8	х	22.97	х	0.63	x	0.8	=	86.63	(81)
Northwest 0.9x 0.77	X	2.88	x	22.97	х	0.63	x	0.8	=	23.1	(81)
Northwest 0.9x 0.77	X	10.8	x	41.38	x	0.63	x [0.8	=	156.09	(81)
Northwest 0.9x 0.77	X	2.88	х	41.38	х	0.63	x	0.8	=	41.62	(81)
Northwest 0.9x 0.77	X	10.8	x	67.96	x	0.63	x	0.8	=	256.34	(81)
Northwest 0.9x 0.77	X	2.88	x	67.96	x	0.63	x	0.8	=	68.36	(81)
Northwest 0.9x 0.77	X	10.8	x	91.35	х	0.63	x	0.8	=	344.57	(81)
Northwest _{0.9x} 0.77	X	2.88	x	91.35	x	0.63	x [0.8	=	91.89	(81)
Northwest _{0.9x} 0.77	X	10.8	x	97.38	x	0.63	x [0.8	=	367.35	(81)
Northwest 0.9x 0.77	X	2.88	x	97.38	x	0.63	x [0.8	=	97.96	(81)
Northwest 0.9x 0.77	X	10.8	X	91.1	x	0.63	x [0.8	=	343.65	(81)
Northwest 0.9x 0.77	X	2.88	x	91.1	x	0.63	x [0.8	= [91.64	(81)
Northwest 0.9x 0.77	X	10.8	x	72.63	x	0.63	x [0.8	=	273.96	(81)
Northwest 0.9x 0.77	X	2.88	x	72.63	x	0.63	x [0.8	=	73.06	(81)
Northwest 0.9x 0.77	X	10.8	x	50.42	x	0.63	x [0.8	=	190.19	(81)
Northwest 0.9x 0.77	X	2.88	x	50.42	x	0.63	x [0.8	=	50.72	(81)
Northwest 0.9x 0.77	X	10.8	x	28.07	X	0.63	x	0.8	=	105.87	(81)
Northwest 0.9x 0.77	X	2.88	x	28.07	x	0.63	x [0.8	=	28.23	(81)
Northwest 0.9x 0.77	X	10.8	x	14.2	X	0.63	x [0.8	=	53.55	(81)
Northwest 0.9x 0.77	X	2.88	x	14.2	X	0.63	x [0.8	=	14.28	(81)
Northwest 0.9x 0.77	X	10.8	x	9.21	X	0.63	x [0.8	=	34.76	(81)
Northwest 0.9x 0.77	X	2.88	x	9.21	X	0.63	x	0.8	=	9.27	(81)
Solar gains in watts, calcula	$\overline{}$		_	1	_	n = Sum(74)m .		1.			1551
(83)m= 80.9 155.71 260.0		402.63 523.79		51.97 518.83	423	.58 309.02	184.91	100.16	67.12		(83)
Total gains – internal and so		` 	`		677	E0 E70 40	466.7	400.07	205.04		(84)
(84)m= 408.54 481.1 574.	03	698.39 801.29	2 8	11.69 767.18	677	.58 572.46	466.7	402.97	385.64		(04)

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 0.99 0.76 0.59 0.45 0.52 0.78 0.95 0.98 0.99	(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	۱٬۰۰۰
(86)m= 0.99 0.98 0.96 0.9 0.76 0.59 0.45 0.52 0.78 0.95 0.98 0.99	
	(86)
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)	
(87)m= 19.59 19.75 20.04 20.42 20.72 20.86 20.91 20.9 20.76 20.36 19.9 19.55	(87)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)	
(88)m= 19.78 19.79 19.79 19.79 19.8 19.8 19.8 19.79 19.79 19.79 19.79	(88)
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)	
(89)m= 0.99 0.98 0.95 0.87 0.71 0.5 0.34 0.4 0.7 0.92 0.98 0.99	(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)	
(90)m= 17.92 18.15 18.57 19.1 19.48 19.64 19.68 19.67 19.55 19.03 18.38 17.87	(90)
$fLA = Living area \div (4) = 0.45$	(91)
Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$	
(92)m= 18.66 18.87 19.23 19.69 20.03 20.19 20.23 20.22 20.09 19.62 19.06 18.62	(92)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate	
(93)m= 18.51 18.72 19.08 19.54 19.88 20.04 20.08 20.07 19.94 19.47 18.91 18.47	(93)
8. Space heating requirement	
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Utilisation factor for gains, hm:	
(94)m= 0.99 0.97 0.94 0.86 0.71 0.52 0.37 0.43 0.71 0.92 0.97 0.99	(94)
Useful gains, hmGm , W = (94)m x (84)m (95)m= 402.45 468.35 541.79 601.66 569.13 421.51 280.25 291.77 405.93 428.15 392.86 380.9	(95)
(95)m= 402.45 468.35 541.79 601.66 569.13 421.51 280.25 291.77 405.93 428.15 392.86 380.9 Monthly average external temperature from Table 8	(93)
(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= 1178.51 1144.59 1040.99 876.8 673.81 446.31 285.39 300.91 479.81 730.77 973.93 1178.98	(97)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m	
(98)m= 577.38 454.43 371.41 198.1 77.88 0 0 0 0 225.14 418.37 593.77	_
Total per year (kWh/year) = Sum(98) _{15,912} =	(98)
Space heating requirement in kWh/m²/year 48.25	(99)
9a. Energy requirements – Individual heating systems including micro-CHP)	
	_
Space heating: Fraction of space heat from secondary/supplementary system 0	(201)
Fraction of space heat from secondary/supplementary system 0	(201)
Fraction of space heat from secondary/supplementary system O Fraction of space heat from main system(s) (202) = 1 - (201) = 1	(202)
Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) $(202) = 1 - (201) = 1$ Fraction of total heating from main system 1 $(204) = (202) \times [1 - (203)] = 1$	(202)
Fraction of space heat from secondary/supplementary system O Fraction of space heat from main system(s) (202) = 1 - (201) = 1	(202)

Space heating requirement (calculated above)														
S77.38	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
(211)m = -[[(98)m x (2041]] + (210)m) x 100 + (206)	Space heatin	g require	ement (c	alculate	d above))				T	ı		i	
Space heating fuel (secondary), kWh/month Space heating fuel used, main system 1 Space heating fuel used, main system 1 Space heating fuel used, main system 1 Space heating fuel used, kWh/year Space	577.38	454.43	371.41	198.1	77.88	0	0	0	0	225.14	418.37	593.77		
Space heating fuel (secondary), kWh/month Space Space heating fuel (secondary), kWh/month Space Spac											1	ı	ı	(211)
Space heating fuel (secondary), kWh/month = (((98)m) x ((201)) + (214) m x 100 ÷ (208)	619.51	487.59	398.51	212.55	83.57	0	0	_						٦,,,,,
	0 1 "			\ 1\A#				Tota	ıı (KVVII/yea	ar) =5um(2	2) _{15,1012}	<u></u>	3129.29	(211)
Cation Color Cation Ca	•	•		• / ·										
Water heating Coutput from water heater Colculated above 151.08 33.47 141.74 129.1 129.64 117.21 112.5 124.78 125.76 134.7 139.18 146.86						0	0	0	0	0	0	0		
Comparison Co		Į.	!	Į.			<u> </u>	Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	<u> </u>	0	(215)
151.08 133.47 141.74 129.1 129.64 117.21 112.5 124.78 125.76 134.7 139.18 146.86 217 m=	Water heating	3												_
Efficiency of water heater						·					 		I	
C217 m=		l		129.1	129.64	117.21	112.5	124.78	125.76	134.7	139.18	146.86		7,
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m (219)m = (64)m x 100 ÷ (217)m (219)m = (171.88 152.21 162.61 150.25 155.04 146.33 140.45 155.78 157 156.39 159.15 166.89 Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: Space heating fuel used Electricity for the above, kWh/year Sum of (230a)(230g) =				05.00	00.04	00.4	00.4	00.4	00.4	00.40	07.45	00	80.1	
C19 m		l		l	83.61	80.1	80.1	80.1	80.1	86.13	87.45	88		(217)
Caliphine		•												
Annual totals Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-hot central heating pump: central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year Energy kWh/year Energy kWh/year Space heating (main system 1) Space heating (secondary) Water heating (211) x (211	` ′				155.04	146.33	140.45	155.78	157	156.39	159.15	166.89		
Space heating fuel used, main system 1 3129,29 Water heating fuel used 1873,98 Electricity for pumps, fans and electric keep-hot central heating pump: 30 (230c) boiler with a fan-assisted flue 45 (230e) Total electricity for the above, kWh/year sum of (230a)(230g) = 75 (231) Electricity for lighting 274.03 (232) Energy kWh/year Emission factor kg CO2/kWh Emissions kg CO2/year Space heating (main system 1) (211) x 0.216 = 675.93 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 404.78 (264) Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267) Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Tota</td> <td>ıl = Sum(2</td> <td>19a)₁₁₂ =</td> <td></td> <td></td> <td>1873.98</td> <td>(219)</td>								Tota	ıl = Sum(2	19a) ₁₁₂ =			1873.98	(219)
Water heating fuel used 1873.98										k'	Wh/year	•		¬
Electricity for pumps, fans and electric keep-hot central heating pump: central heating pump: boiler with a fan-assisted flue Total electricity for the above, kWh/year sum of (230a)(230g) = Total electricity for lighting Total electricity for lighting Energy kWh/year Energy kWh/year Energy kWh/year Space heating (main system 1) (211) x 0.216 = 675.93 (281) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating Space and water heating (241) + (262) + (263) + (264) = Energy kWh/year (231) x 0.519 = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 142.22 (268) Total CO2, kg/year Sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate				system	1								3129.29	╣
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 274.03 (232) 12a. CO2 emissions – Individual heating systems including micro-CHP Emergy kWh/year Emission factor kg CO2/kWh Emissions kg CO2/year Space heating (main system 1) (211) x 0.216 = 675.93 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 404.78 (264) Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267) Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate	Water heating	fuel use	ed										1873.98	
boiler with a fan-assisted flue	Electricity for p	oumps, f	ans and	electric	keep-ho	t								
Total electricity for the above, kWh/year sum of (230a)(230g) = 75 (231) Electricity for lighting 274.03 (232) 12a. CO2 emissions – Individual heating systems including micro-CHP Energy kWh/year kg CO2/kWh kg CO2/kWh kg CO2/year Space heating (main system 1) (211) × 0.216 = 675.93 (261) Space heating (secondary) (215) × 0.519 = 0 (263) Water heating (219) × 0.216 = 404.78 (264) Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) × 0.519 = 38.93 (267) Electricity for lighting (232) × 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate	central heatir	ng pump	:									30		(230c)
Electricity for lighting Energy kWh/year kg CO2/kWh kg CO2/kWh Space heating (main system 1) Space heating (secondary) Water heating Space and water heating (219) x (219) x (219) x (219) x (210) x (210	boiler with a f	an-assis	sted flue									45		(230e)
Late CO2 emissions - Individual heating systems including micro-CHP	Total electricity	y for the	above, I	kWh/yea	r			sum	of (230a).	(230g) =			75	(231)
Energy kWh/year Emission factor kg CO2/kWh Emissions kg CO2/year Space heating (main system 1) (211) x 0.216 = 675.93 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 404.78 (264) Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267) Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate (272) ÷ (4) = 20.88 (273)	Electricity for I	ighting											274.03	(232)
kWh/year kg CO2/kWh kg CO2/year Space heating (main system 1) (211) x 0.216 = 675.93 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 404.78 (264) Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267) Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate (272) ÷ (4) = 20.88 (273)	12a. CO2 em	issions ·	– Individ	ual heat	ing syste	ems inclu	uding mi	cro-CHF)					
kWh/year kg CO2/kWh kg CO2/year Space heating (main system 1) (211) x 0.216 = 675.93 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 404.78 (264) Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267) Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate (272) ÷ (4) = 20.88 (273)						En	orav			Emico	ion fac	tor	Emissions	
Space heating (main system 1) (211) x 0.216 = 675.93 (261) Space heating (secondary) (215) x 0.519 = 0 (263) Water heating (219) x 0.216 = 404.78 (264) Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267) Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate (272) ÷ (4) = 20.88 (273)												loi		
Water heating (219) x 0.216 = 404.78 (264) Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267) Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate (272) ÷ (4) = 20.88 (273)	Space heating	(main s	ystem 1)		(21	1) x			0.2	16	=	675.93	(261)
Space and water heating (261) + (262) + (263) + (264) = 1080.71 (265) Electricity for pumps, fans and electric keep-hot (231) x 0.519 = 38.93 (267) Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate (272) ÷ (4) = 20.88 (273)	Space heating	(second	dary)			(21	5) x			0.5	19	=	0	(263)
Electricity for pumps, fans and electric keep-hot (231) x	Water heating					(219	9) x			0.2	16	=	404.78	(264)
Electricity for lighting (232) x 0.519 = 142.22 (268) Total CO2, kg/year sum of (265)(271) = 1261.86 (272) Dwelling CO2 Emission Rate (272) ÷ (4) = 20.88 (273)	Space and wa	ter heati	ng			(26	1) + (262)	+ (263) + ((264) =				1080.71	(265)
Total CO2, kg/year $sum of (265)(271) = 1261.86$ (272) Dwelling CO2 Emission Rate $(272) \div (4) = 20.88$ (273)	Electricity for p	oumps, f	ans and	electric	keep-ho	t (23	1) x			0.5	19	=	38.93	(267)
Dwelling CO2 Emission Rate (272) ÷ (4) = 20.88 (273)	Electricity for I	ighting				(232	2) x			0.5	19	=	142.22	(268)
20.00 (2.0)	Total CO2, kg/	/year							sum o	of (265)(2	271) =		1261.86	(272)
El rating (section 14)	Dwelling CO2	Emissi	on Rate	!					(272)	÷ (4) =			20.88	(273)
	El rating (secti	on 14)											84	(274)

			User D) otoilo						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 20		0002943 on: 1.0.1.9							
Address :	Flat 2, 16, Rochest		· ·	Address						
1. Overall dwelling dim		or mone	LOND	314, 1400	008					
. . .			Are	a(m²)		Av. He	ight(m)		Volume(m	3)
Ground floor					(1a) x		2.8	(2a) =	243.54	(3a)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1	e)+(1r	n) ====	36.98	(4)			_		
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	243.54	(5)
2. Ventilation rate:										
		secondar 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	+ [0] = [0	x :	20 =	0	(6b)
Number of intermittent f	ans					2	×	10 =	20	(7a)
Number of passive vent	S				Ē	0	x	10 =	0	(7b)
Number of flueless gas	fires				F	0	x -	40 =	0	(7c)
					_					
								Air ch	nanges per h	our —
Infiltration due to chimne	•					20		÷ (5) =	0.08	(8)
Number of storeys in	been carried out or is intend the dwelling (ns)	iea, procee	a to (17),	otnerwise (continue tr	om (9) to	(16)			(9)
Additional infiltration	the dwelling (113)						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber	frame or	0 35 fo	r masoni	v constr	ruction	[(0)	1]XO.1 =	0	(11)
	present, use the value corre				•	action.			0	(\/
•	nings); if equal user 0.35		4 / 1	1\	0					– , .
·	floor, enter 0.2 (unsea	aled) or 0	.1 (seale	ed), else	enter 0				0	(12)
• •	nter 0.05, else enter 0 vs and doors draught s	tripped							0	(13)
Window infiltration	vs and doors draught s	unpped		0.25 - [0.2	x (14) ÷ 1	001 =			0	(14)
Infiltration rate				(8) + (10)			+ (15) =		0	(15)
	e, q50, expressed in cu	bic metre	s per ho	. , , ,	, , ,	, , ,	, ,	area	3	(17)
If based on air permeab			•	•	•				0.23	(18)
·	ies if a pressurisation test ha					is being u	sed			` ′
Number of sides shelter	red								3	(19)
Shelter factor				(20) = 1 -	[0.075 x (1	9)] =			0.78	(20)
Infiltration rate incorpora	ating shelter factor			(21) = (18)) x (20) =				0.18	(21)
Infiltration rate modified	for monthly wind spee	d							1	
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									
(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]	
			ь			ь			_	

0.23	ation rate (a 0.22 0.	.22	0.2	0.19	0.17	0.17	0.17	0.18	0.19	0.2	0.21]	
alculate effec		-	ate for t	he appli	cable ca	se	I		<u>!</u>		Į.	J	
If mechanica												0	(2
If exhaust air he									o) = (23a)			0	(2
If balanced with				_								0	(2
a) If balance					1	- 	, 	í `	1 	<u> </u>	````	÷ 100]	
24a)m= 0		0	0	0	0	0	0	0	0	0	0		(:
b) If balance					1	, 	- 	í `	 			1	
(4b)m= 0	I	0	0	0	0	0	0	0	0	0	0		(:
c) If whole h if (22b)n	ouse extrac n < 0.5 × (23			•	•				.5 × (23b)	_	_	
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)m	ventilation on the second to t				•				0.5]				
44d)m= 0.53	0.53 0.	.52	0.52	0.52	0.51	0.51	0.51	0.52	0.52	0.52	0.52		(2
Effective air	change rate	e - en	ter (24a	or (24h	o) or (24	c) or (24	d) in bo	x (25)				_	
5)m= 0.53	0.53 0.	.52	0.52	0.52	0.51	0.51	0.51	0.52	0.52	0.52	0.52		(
B. Heat losse	s and heat I	oss p	aramete	er:									
LEMENT	Gross area (m²	·)	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/ł	<)	k-value kJ/m²-l		A X k kJ/K
indows Type	: 1				5.6	_x 1	/[1/(1.2)+	0.04] =	6.41				(
/indows Type	2				8.12	_X 1	/[1/(1.2)+	0.04] =	9.3				(
/indows Type	3				1.96	x1	/[1/(1.2)+	0.04] =	2.24				(
/indows Type	4				2.8	_x 1	/[1/(1.2)+	0.04] =	3.21				(:
loor					86.98	3 X	0.1	=	8.69800	1	75	652	23.5
/alls Type1	81.48	7	20.4	4	61.04	1 x	0.23	-	14.04	=	60	366	52.4
/alls Type2	19.88	Ī	0		19.88	3 x	0.19	-	3.79	=	60	119	92.8
loof	34.85	Ī	0		34.85	x	0.13	-	4.53	=	9	313	3.65
otal area of e		」 2			223.1	=							(;
arty wall	ŕ				13.44	=	0		0	\neg	45	60	4.8
arty ceiling					52.13	=					30	\dashv \models	63.9
nternal wall **						=					9	= =	
for windows and	roof windows	USA A	ffective wi	ndow I I-ve	136.6 alue calcul		a formula 1	1/[(1/Ll-vali	ue)+0 041 a	ıs given i			9.76
include the area							, .c.maia i	van	5 ₇ . 0.0 + ₁ a	g.v O.i II	. paragrapi	.	
abric heat los	s, $W/K = S$	(A x l	U)				(26)(30) + (32) =				54.46	(
eat capacity	Cm = S(A x)	k)						((28).	(30) + (32	2) + (32a)	(32e) =	15090.81	(
	narameter	(TMP) = Cm -	- TFA) ir	n kJ/m²K	•		= (34)) ÷ (4) =			173.5	(
hermal mass	parameter	(
	: ments where t	he det	ails of the	construct	ion are no	t known pi	ecisely the	e indicative	e values of	TMP in 1	Table 1f		

Total fabric heat loss					(33) +	(36) =		ı	00.0	(37)
Ventilation heat loss calculated	l monthly					, ,	25)m x (5)		66.6	(37)
Jan Feb Mar	Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 42.3 42.22 42.14	41.76 41.69	41.36	41.36	41.29	41.49	41.69	41.83	41.98		(38)
Heat transfer coefficient, W/K			ļ.	!	(39)m	= (37) + (3	38)m			
(39)m= 108.9 108.82 108.74	108.36 108.29	107.96	107.96	107.89	108.09	108.29	108.43	108.58		
Harther was a sector (III B) W/	21 <i>C</i>					_	Sum(39) ₁ .	12 /12=	108.36	(39)
Heat loss parameter (HLP), W/ (40)m= 1.25 1.25 1.25	1.25 1.25	1.24	1.24	1.24	(40)m	= (39)m ÷	1.25	1.25		
(40)III= 1.23 1.23 1.23	1.25	1.24	1.24	1.24			Sum(40) ₁ .	l	1.25	(40)
Number of days in month (Tabl	le 1a)				,	wordge =	Cum(40)1.	12712—	1.20	()
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 energy requi	rement:							kWh/ye	ear:	
Assumed occupancy, N							2	58		(42)
if TFA > 13.9, N = 1 + 1.76 x	[1 - exp(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		36		(42)
if TFA £ 13.9, N = 1				(O.F. N.I.)	. 00					
Annual average hot water usage Reduce the annual average hot water	, ,		_	` ,		se target o		.52		(43)
not more that 125 litres per person per	• •	•	-			J				
Jan Feb Mar	Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres per day for ea	ach month Vd,m = fa	actor from	Table 1c x	(43)	-					
(44)m= 105.08 101.26 97.44	93.61 89.79	85.97	85.97	89.79	93.61	97.44	101.26	105.08		
For a second and a filter to a second and a second		400 - 1/-/		T / 0000			m(44) ₁₁₂ =		1146.3	(44)
Energy content of hot water used - calc										
(45)m= 155.83 136.29 140.64	122.61 117.65	101.52	94.07	107.95	109.24	127.31	138.97	150.91		7(45)
If instantaneous water heating at point	of use (no hot wate	r storage),	enter 0 in	boxes (46)		l otal = Sui	m(45) ₁₁₂ =		1502.98	(45)
(46)m= 23.37 20.44 21.1	18.39 17.65	15.23	14.11	16.19	16.39	19.1	20.85	22.64		(46)
Water storage loss:			<u> </u>							, ,
Storage volume (litres) including	g any solar or W	VWHRS	storage	within sa	ame ves	sel	0			(47)
If community heating and no ta	•			` '						
Otherwise if no stored hot water	er (this includes i	instantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage loss: a) If manufacturer's declared lo	nee factor ie kno	wn (k\//k	J(day).					54		(48)
Temperature factor from Table		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ı, day).							(49)
Energy lost from water storage				(48) x (49)	_			0		(50)
b) If manufacturer's declared of	•	or is not		(40) X (43)	_			0		(30)
Hot water storage loss factor fr	•							0		(51)
If community heating see section	on 4.3									
Volume factor from Table 2a	2h						-	0		(52)
Temperature factor from Table				(47) (7:)	(50)	- 0)		0		(53)
Energy lost from water storage Enter (50) or (54) in (55)	, kvvn/year			(47) x (51)	x (52) x (o3) =		0		(54)
							^	32		(55)

Water storage los	ss calc	ulated f	or each	month			((56)m = (55) × (41)	m				
(56)m= 10.04	9.07	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04		(56)
If cylinder contains de	edicated	solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	lix H	
(57)m= 10.04	9.07	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04]	(57)
Primary circuit los	ss (anr	nual) fro	m Table	3							0]	(58)
Primary circuit los	ss calc	culated f	or each	month (59)m = ((58) ÷ 36	55 × (41)	m					
(modified by fa	ctor fro	om Tabl	e H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)	-		
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calcu	lated f	or each	month ((61)m =	(60) ÷ 36	65 × (41))m					_	
(61)m= 39.49 3	35.67	38.48	35.78	35.46	32.86	33.95	35.46	35.78	38.48	38.22	39.49		(61)
Total heat require	ed for v	water he	eating ca	alculated	I for eacl	n month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 205.36 1	81.03	189.16	168.11	163.15	144.1	138.07	153.46	154.74	175.83	186.91	200.45		(62)
Solar DHW input calc	culated u	ising App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add additional lin	nes if F	GHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)				,	
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 30.69	24.2	21.73	15.88	11.31	7.31	6.77	7.77	7.87	16.55	23.81	31.06		(63) (G2)
Output from water	er heate	er										_	
(64)m= 173.54 1	55.79	166.27	151.1	150.7	135.68	130.1	144.5	145.69	158.07	161.95	168.24		_
							Outp	out from w	ater heate	r (annual) ₁	112	1841.61	(64)
Heat gains from	water h	neating,	kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	1] + 0.8	k [(46)m	+ (57)m	+ (59)m	[]	
(65)m= 69.72 6	61.49	64.42	57.49	56.02	49.75	47.8	52.79	53.04	59.99	63.54	68.09		(65)
include (57)m i	in calcı	ulation o	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	neating	
5. Internal gains	s (see	Table 5	and 5a):									
Metabolic gains (Table	5), Wat	ts									-	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m= 129.1 1	129.1	129.1	129.1	129.1	129.1	129.1	129.1	129.1	129.1	129.1	129.1		(66)
Lighting gains (ca	alculate	ed in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5				_	
(67)m= 20.81 1	18.48	15.03	11.38	8.51	7.18	7.76	10.09	13.54	17.19	20.06	21.39		(67)
Appliances gains	(calcu	ılated in	Append	dix L, eq	uation L	13 or L1	3a), alsc	see Ta	ble 5				
(68)m= 233.41 2	35.83	229.73	216.74	200.33	184.92	174.62	172.2	178.3	191.29	207.7	223.11		(68)
Cooking gains (c	alculat	ed in Ap	opendix	L, equat	ion L15	or L15a)	, also se	ee Table	5	-			
(69)m= 35.91 3	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91		(69)
Pumps and fans	gains ((Table 5	āa)										
(70)m= 3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses e.g. evap	oration	n (negat	ive valu	es) (Tab	le 5)				•		•	•	
(71)m= -103.28 -1	03.28	-103.28	-103.28	-103.28	-103.28	-103.28	-103.28	-103.28	-103.28	-103.28	-103.28	1	(71)
Water heating ga	ins (Ta	able 5)							•		•	1	
	91.5	86.58	79.85	75.29	69.09	64.25	70.96	73.67	80.63	88.25	91.51]	(72)
Total internal ga	ains =	!			(66)	m + (67)m	ı + (68)m +	+ (69)m +	(70)m + (7	1)m + (72))m	I	
<u>_</u>		396.07	372.69	348.86	325.92	311.36	317.98	330.24	353.84	380.74	400.74]	(73)
6. Solar gains:	1												

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

Orientation: Acces Table	s Factor 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southeast 0.9x 0.	.77	x	5.6	x	36.79	x	0.63	x	0.8	=	71.97	(77)
Southeast 0.9x 0.	.77	x	8.12	x	36.79	x	0.63	х	0.8	=	104.35	(77)
Southeast 0.9x 0.	.77	x	5.6	x	62.67	x	0.63	х	0.8	=	122.58	(77)
Southeast 0.9x 0.	.77	x	8.12	x	62.67	х	0.63	x	0.8] =	177.75	(77)
Southeast 0.9x 0.	.77	x	5.6	x	85.75	х	0.63	х	0.8	=	167.73	(77)
Southeast 0.9x 0.	.77	x	8.12	x	85.75	x	0.63	х	0.8	=	243.2	(77)
Southeast 0.9x 0	.77	x	5.6	x	106.25	x	0.63	х	0.8	=	207.82	(77)
Southeast 0.9x 0	.77	x	8.12	x	106.25	x	0.63	x	0.8	=	301.34	(77)
Southeast 0.9x 0	.77	x	5.6	x	119.01	x	0.63	х	0.8	=	232.78	(77)
Southeast 0.9x 0	.77	x	8.12	x	119.01	x	0.63	x	0.8	=	337.52	(77)
Southeast 0.9x 0.	.77	x	5.6	x	118.15	x	0.63	x	0.8	=	231.09	(77)
Southeast 0.9x 0.	.77	x	8.12	x	118.15	x	0.63	x	0.8	=	335.08	(77)
Southeast 0.9x 0	.77	x	5.6	x	113.91	x	0.63	x	0.8	=	222.8	(77)
Southeast 0.9x 0.	.77	x	8.12	x	113.91	x	0.63	x	0.8	=	323.06	(77)
Southeast 0.9x 0	.77	x	5.6	x	104.39	x	0.63	x	0.8	=	204.18	(77)
Southeast 0.9x 0	.77	x	8.12	x	104.39	x	0.63	x	0.8	=	296.06	(77)
Southeast 0.9x 0.	.77	x	5.6	x	92.85	x	0.63	x	0.8	=	181.61	(77)
Southeast 0.9x 0.	.77	x	8.12	x	92.85	x	0.63	x	0.8	=	263.34	(77)
Southeast 0.9x 0.	.77	x	5.6	x	69.27	x	0.63	x	0.8	=	135.48	(77)
Southeast 0.9x 0	.77	x	8.12	x	69.27	x	0.63	x	0.8	=	196.45	(77)
Southeast 0.9x 0.	.77	x	5.6	x	44.07	x	0.63	x	0.8	=	86.2	(77)
Southeast 0.9x 0.	.77	x	8.12	x	44.07	x	0.63	X	0.8	=	124.99	(77)
Southeast 0.9x 0.	.77	x	5.6	x	31.49	x	0.63	X	0.8	=	61.59	(77)
Southeast 0.9x 0.	.77	x	8.12	x	31.49	x	0.63	X	0.8	=	89.3	(77)
Southwest _{0.9x} 0.	.77	x	1.96	x	36.79		0.63	X	0.8	=	50.38	(79)
Southwest _{0.9x} 0.	.77	x	2.8	x	36.79		0.63	x	0.8	=	35.98	(79)
Southwest _{0.9x} 0.	.77	x	1.96	x	62.67		0.63	x	0.8	=	85.81	(79)
Southwest _{0.9x} 0.	.77	x	2.8	x	62.67		0.63	X	0.8	=	61.29	(79)
Southwest _{0.9x} 0	.77	x	1.96	X	85.75		0.63	X	0.8	=	117.41	(79)
Southwest _{0.9x} 0.	.77	x	2.8	x	85.75		0.63	X	0.8	=	83.86	(79)
Southwest _{0.9x} 0.	.77	x	1.96	x	106.25		0.63	X	0.8	=	145.47	(79)
Southwest _{0.9x} 0.	.77	x	2.8	x	106.25		0.63	x	0.8	=	103.91	(79)
Southwest _{0.9x} 0.	.77	x	1.96	x	119.01		0.63	X	0.8	=	162.94	(79)
Southwest _{0.9x} 0.	.77	x	2.8	x	119.01		0.63	X	0.8	=	116.39	(79)
Southwest _{0.9x} 0.	.77	x	1.96	x	118.15		0.63	x	0.8	=	161.76	(79)
Southwest _{0.9x} 0	.77	x	2.8	x	118.15		0.63	x	0.8	=	115.55	(79)
Southwest _{0.9x} 0	.77	x	1.96	x	113.91		0.63	x	0.8	=	155.96	(79)
Southwest _{0.9x} 0	.77	x	2.8	x	113.91		0.63	x	0.8	=	111.4	(79)
Southwest _{0.9x} 0.	.77	x	1.96	×	104.39		0.63	X	0.8	=	142.93	(79)

														_		_
Southwes	St _{0.9x} 0.7	7 ×	2.	8	X	10	04.39			0.63	X	0.8		= [102.09	(79)
Southwes	St <mark>0.9x</mark> 0.7	7 ×	1.9	96	X	9	2.85			0.63	x	0.8		= [127.13	(79)
Southwes	st <mark>0.9x</mark> 0.7	7 ×	2.	8	X	9	2.85			0.63	x	0.8		= [90.81	(79)
Southwes	st _{0.9x} 0.7	7 ×	1.9	96	x	6	9.27			0.63	x [0.8		= [94.84	(79)
Southwes	st _{0.9x} 0.7	7 ×	2.	8	x	6	9.27			0.63	x [0.8	:	= [67.74	(79)
Southwes	st _{0.9x} 0.7	7 ×	1.9	96	x	4	4.07			0.63	x [0.8	:	= [60.34	(79)
Southwes	st <mark>0.9x</mark> 0.7	7 ×	2.	8	x	4	4.07			0.63	x [0.8		= [43.1	(79)
Southwes	st <mark>o.9x</mark> 0.7	7 ×	1.9	96	x	3	1.49			0.63	x [0.8		= [43.11	(79)
Southwes	st _{0.9x} 0.7	7 ×	2.	8	x	3	1.49			0.63	x	0.8		= [30.79	(79)
Solar ga	ins in watts,	calculate	d for eac	h month				(83)m	ı = Sı	um(74)m .	(82)m					
(83)m= 2	262.68 447.43	612.2	758.54	849.63	84	43.49	813.21	745	.26	662.88	494.51	314.62	224.8	3		(83)
Total gai	ins – internal	and sola	r (84)m =	= (73)m	+ (8	33)m	, watts		•			•	•			
(84)m= 6	857.98	3 1008.27	1131.23	1198.5	11	69.41	1124.57	1063	3.23	993.12	848.35	695.36	625.5	4		(84)
7. Mear	n internal ten	nperature	(heating	season)											
	rature during	•	`		<i>'</i>	area f	from Tab	ole 9.	. Th′	1 (°C)				ſ	21	(85)
-	on factor for	•			-			,	,	. (-)				l		」 ` ′
Г	Jan Feb	Ť	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	De	c		
(86)m=	0.98 0.96	0.92	0.84	0.71	_	0.55	0.41	0.4	- 	0.66	0.88	0.97	0.99	-		(86)
Moon in	nternal temp	i	living or	oo T1 /f/	مالد	w cto	nc 2 to 7	l 7 in T	L	. 00)			l			
	19.72 19.95	1	20.54	20.76	_	0.88	20.91	20.9		20.83	20.53	20.05	19.66	<u>. </u>		(87)
` ' _	t		1	<u> </u>				L			20.00	20.00	10.00	لـــُـــ		(0.)
· -	rature during		1	1	_					<u> </u>		_		_		(22)
(88)m=	19.88	19.88	19.88	19.88	1	9.89	19.89	19.8	89	19.89	19.88	19.88	19.88	3		(88)
Utilisati	on factor for	gains for	rest of d	welling,	h2,	m (se	e Table	9a)								
(89)m=	0.98 0.95	0.9	0.8	0.65	C	0.47	0.31	0.3	35	0.58	0.84	0.96	0.98			(89)
Mean ir	nternal tempo	erature in	the rest	of dwelli	ina	T2 (fc	ollow ste	eps 3	to 7	' in Tabl	e 9c)					
	18.18 18.52		19.34	19.61	-	9.74	19.77	19.	$\overline{}$	19.7	19.33	18.67	18.1	1		(90)
` ' _	!		1	l .	I			<u> </u>	!	f	LA = Liv	ng area ÷ (4	4) =	ᅱ	0.33	(91)
						\ (1	A T 4	/4		A) TO				ı		
	nternal temp	<u> </u>	1	i	_				T			1	l	\neg		(00)
` ′	18.69 18.99		19.73	19.99		0.11	20.15	20.		20.07	19.72	19.12	18.62	2		(92)
· · · · · · · —	djustment to	1			_							1	·	_		(00)
` ' <u>L</u>	18.54 18.84	19.21	19.58	19.84	1	9.96	20	19.9	99	19.92	19.57	18.97	18.47			(93)
	e heating re	•										()				
	o the mean i sation factor		•		ned	at ste	ep 11 of	Tabl	e 9b	o, so tha	t Ti,m=	(76)m an	d re-c	alc	ulate	
	Jan Feb		Apr	May		Jun	Jul	Δι	ug	Sep	Oct	Nov	De	\Box		
L Utilisati	on factor for			Iviay		ouri	- Oui		ug į	ОСР	000	1101		<u> </u>		
_	0.97 0.94	0.89	0.79	0.65).47	0.32	0.3	36	0.58	0.83	0.95	0.98			(94)
` ′ _	gains, hmGn		1													
	655.21 805.3	<u> </u>	894.35	778.78	55	54.65	362.22	380	.96	578	705.32	657.81	610.7	2		(95)
	/ average ex		Į	l	<u> </u>				!			1	I			•
(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)
	ss rate for m											1	L			
_	550.63 1517.3	1		r	_	79.13	366.63	387	' T	629.15	971.64	1287.51	1549.3	33		(97)
· L	I	-	1		_			ь	!			1	<u> </u>			

Space heating require							<u> </u>	- `	ŕ			
(98)m= 666.19 478.48	364.42	189.65	76.47	0	0	0	0	198.14	453.38	698.33		7(00)
						Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	3125.07	(98)
Space heating require	ement in	kWh/m²	² /year								35.93	(99)
9a. Energy requiremer	ıts – Indi	vidual h	eating s	ystems i	ncluding	micro-C	CHP)					
Space heating: Fraction of space hea	t from se	econdar	v/supple	mentary	system					Γ	0	(201)
Fraction of space hea				,	-	(202) = 1	- (201) =				1	(202)
Fraction of total heating		-	, ,			(204) = (2	02) × [1 –	(203)] =		ļ	1	(204)
Efficiency of main spa	ce heat	ing syste	em 1							ř	93.2	(206)
Efficiency of seconda	ry/supple	ementar	y heatin	g system	ո, %					Ī	0	(208)
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	 ear
Space heating require	ement (c	alculate	d above)								
666.19 478.48	364.42	189.65	76.47	0	0	0	0	198.14	453.38	698.33		
(211) m = {[(98)m x (20	4)] + (21	0)m } x	100 ÷ (2	:06)		T	1	1	1			(211)
714.8 513.39	391.01	203.49	82.05	0	0	0	0	212.6	486.46	749.28		_
						Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	F	3353.08	(211)
Space heating fuel (s												
$= \{ [(98)m \times (201)] + (2^{-1}) \} $ $= (215)m = 0 \qquad 0$	0	0	208) 0	0	0	0	0	0	0	0		
	_						l (kWh/yea		215) _{15.1012}		0	(215)
Water heating										L		
Output from water hea		ulated a	bove)									
173.54 155.79	166.27	151.1	150.7	135.68	130.1	144.5	145.69	158.07	161.95	168.24		–
Efficiency of water hea		05.40	00.04	00.4	00.4	00.4	00.4	05.40	07.0	00.04	80.1	(216)
(217)m= 87.91 87.49	86.77	85.42	83.24	80.1	80.1	80.1	80.1	85.42	87.3	88.04		(217)
Fuel for water heating, (219)m = (64)m x 100												
(219)m= 197.4 178.06	191.62	176.88	181.04	169.39	162.43	180.39	181.88	185.04	185.51	191.08		
						Tota	I = Sum(2	19a) ₁₁₂ =			2180.74	(219)
Annual totals			4					k'	Wh/year	Г	kWh/yea	<u>r</u>
Space heating fuel use		system	1							Ĺ	3353.08	_
Water heating fuel use	d									L	2180.74	
Electricity for pumps, fa	ans and	electric	keep-ho	t								
central heating pump										30		(230
boiler with a fan-assis	ted flue									45		(230
Total electricity for the	above, k	«Wh/yea	r			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting										ŗ	367.49	(232)
										L		

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	=	724.26	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	471.04	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1195.3	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	190.73	(268)
Total CO2, kg/year	sum	of (265)(271) =		1424.96	(272)
Dwelling CO2 Emission Rate	(272)) ÷ (4) =		16.38	(273)
El rating (section 14)				86	(274)

			User_[Details:						
Assessor Name: Software Name:	Neil Ingham Stroma FSAP 20	012		Strom Softwa					0002943 on: 1.0.1.9	
			i i	Address						
Address :	Flat 3, 16, Roches	ster Mews	, LOND	ON, NW1	I 9JB					
1. Overall dwelling dime	ensions:		Λ	a/m²\		Av. Ha	: a.b.4/\		Value a/m	2)
Ground floor				a(m²) 50.12	(1a) x		ight(m) 2.8	(2a) =	Volume(m 3	(3a)
Total floor area TFA = (1	1a)+(1b)+(1c)+(1d)+(1e)+(1r	n)	50.12	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	140.34	(5)
2. Ventilation rate:										
Number of chimneys	heating	secondar heating	'y □ + □	other	7 ₌ [total		40 =	m³ per hou	_
ŕ		0	╛╘	0		0			0	(6a)
Number of open flues	0 +	0	_] + _	0] = [0		20 =	0	(6b)
Number of intermittent fa	ans					2	X '	10 =	20	(7a)
Number of passive vents	S					0	Χ.	10 =	0	(7b)
Number of flueless gas t	fires					0	X 4	40 =	0	(7c)
								Δir cl	nanges per ho	our
Infiltration due to chimne	ove fluor and fans –	(6a)+(6b)+(7	72)±(7h)±	(7c) –	Г					_
If a pressurisation test has					continue fr	20 rom (9) to 1		÷ (5) =	0.14	(8)
Number of storeys in t		, aca, p. 6666	u 10 (11),	ouror moo (onunae n	0111 (0) 10 ((10)		0	(9)
Additional infiltration	- · · ·						[(9)	-1]x0.1 =	0	(10)
Structural infiltration: (0.25 for steel or timbe	er frame or	0.35 fo	r masoni	ry constr	ruction			0	(11)
if both types of wall are p deducting areas of open	oresent, use the value corr	esponding to	the grea	ter wall are	a (after					
If suspended wooden	• / .	aled) or 0	.1 (seal	ed). else	enter 0				0	(12)
If no draught lobby, er	•	,	(,,					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	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	3	(17)
If based on air permeab	•								0.29	(18)
Air permeability value appli		nas been dor	ne or a de	gree air pe	rmeability	is being u	sed			–
Number of sides shelter Shelter factor	ea			(20) = 1 -	[0.075 x (1	19)] =			0.78	(19)
Infiltration rate incorpora	iting shelter factor			(21) = (18	•	,,			0.78	(21)
Infiltration rate modified	•	ed		. , ,	, , ,				0.23	(/
Jan Feb	Mar Apr Ma		Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind s		- .			<u>'</u>				4	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	1	
				1	•		•	1	4	
Wind Factor $(22a)m = (2a)m =$	'	T		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 infiltration rate (a	lowing for s	haltar an	d wind s	need) –	(21a) v	(22a)m					
· · · · · · · · · · · · · · · · · · ·	28 0.25	0.24	0.22	0.22	0.21	0.23	0.24	0.26	0.27	1	
Calculate effective air cha					J 0.21	0.20	V.2 1	0.20	0.27		
If mechanical ventilation										0	(23a)
If exhaust air heat pump using	Appendix N, (2	23b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23b)
If balanced with heat recovery	efficiency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				0	(23c)
a) If balanced mechanic	al ventilation	with he	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		(24a)
b) If balanced mechanic	al ventilation	without	heat red	covery (N	MV) (24b	m = (22)	2b)m + (23b)		,	
(24b)m= 0 0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole house extractif (22b)m $< 0.5 \times (23)$		•	•				5 × (23b	o)			
(24c)m= 0 0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural ventilation of if (22b)m = 1, then (•	•				0.5]		•	•	
(24d)m= 0.54 0.54 0.	54 0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.53	0.54]	(24d)
Effective air change rate	- enter (24a	a) or (24b	o) or (24	c) or (24	d) in box	· (25)		•		4	
(25)m= 0.54 0.54 0.	54 0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.53	0.54]	(25)
3. Heat losses and heat I	see paramet	or:			•			•		4	
ELEMENT Gross area (m²	Openir		Net Ar A ,r		U-valı W/m2		A X U (W/I		k-value		
Windows Type 1	• •	•	9.2		/[1/(1.2)+		10.53		10/111	10/1	(27)
Windows Type 2			9.72	ऱ .	/[1/(1.2)+	Ļ	11.13	=			(27)
] [40.6			=		= [╡ ,			¬`´
Malla Tara	18.9	2	38.2	=	0.23	=	8.79	_	60	2292](29)
	0		21.84	_	0.19	= [4.16		60	1310.4	(29)
Total area of elements, m ²			78.96	=				— r			(31)
Party wall			13.44		0	= [0		45	604.8	(32)
Party floor			50.12	2					40	2004.8	(32a)
Party ceiling			50.12	<u>2</u>				ļ	30	1503.6	(32b)
Internal wall **			66.64						9	599.76	(32c)
* for windows and roof windows, ** include the areas on both side				ated using	g formula 1	/[(1/U-valu	ie)+0.04] a	as given in	n paragrapl	h 3.2	
Fabric heat loss, W/K = S					(26)(30)	+ (32) =				34.61	(33)
Heat capacity Cm = S(A x	,					((28)	.(30) + (32	2) + (32a).	(32e) =	8315.36	(34)
Thermal mass parameter	TMP = Cm	÷ TFA) ir	n kJ/m²K			= (34)	÷ (4) =			165.91	(35)
For design assessments where t can be used instead of a detailed		e construct	ion are no	t known pr	recisely the	e indicative	values of	TMP in T	able 1f		J
Thermal bridges : S (L x Y	calculated	using Ap	pendix l	<						7.02	(36)
if details of thermal bridging are	ot known (36)	= 0.15 x (3	1)								_
Total fabric heat loss						(33) +	(36) =			41.63	(37)
Ventilation heat loss calcu	ated month	y				``	= 0.33 × ((25)m x (5	<u>)</u>	1	
Jan Feb M	lar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 25.09 25.02 24	 			1 0400				1 04 00		i .	(38)
(66)	94 24.6	24.53	24.23	24.23	24.17	24.35	24.53	24.66	24.8]	(30)
Heat transfer coefficient, V		24.53	24.23	24.23	24.17	<u> </u>	24.53 = (37) + (3	ļ	24.8]	(30)
Heat transfer coefficient, V		24.53	24.23 65.86	65.86	65.81	(39)m 65.98	<u> </u>	38)m 66.29	66.43	66.2β _{age 2}	_

Heat loss para	ımeter (I	HLP), W	/m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 1.33	1.33	1.33	1.32	1.32	1.31	1.31	1.31	1.32	1.32	1.32	1.33		
	!		<u>. </u>	<u>. </u>	<u>. </u>	!	!		Average =	Sum(40) ₁	12 /12=	1.32	(40)
Number of day	1	<u> </u>	<u> </u>						<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 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		69		(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 o		.42		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i	n litres pe	r day for ea		Vd,m = fa	ctor from	Table 1c x							
(44)m= 81.87	78.89	75.91	72.93	69.96	66.98	66.98	69.96	72.93	75.91	78.89	81.87		
					100 1/1		·			m(44) ₁₁₂ =		893.08	(44)
Energy content of													
(45)m= 121.4	106.18	109.57	95.52	91.66	79.09	73.29	84.1	85.11	99.19	108.27	117.57		7(45)
If instantaneous w	vater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1170.96	(45)
(46)m= 18.21	15.93	16.44	14.33	13.75	11.86	10.99	12.62	12.77	14.88	16.24	17.64		(46)
Water storage	l					<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 Water storage		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er 'O' in ((47)			
a) If manufact		eclared I	oss facto	or is kno	wn (kWł	n/day):				0.	54		(48)
Temperature f					•	, , ,					0		(49)
Energy lost fro				ear			(48) x (49)) =			0		(50)
b) If manufact			-										
Hot water stor	•			e 2 (kW	h/litre/da	ay)					0		(51)
If community he Volume factor	_		on 4.3								0		(52)
Temperature f			2b								0		(53)
Energy lost fro	m wate	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or		•								-	32		(55)
Water storage	loss cal	culated t	for each	month			((56)m = ((55) × (41)	m				
(56)m= 10.04	9.07	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04		(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= 10.04	9.07	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04		(57)
Primary circuit	loss (ar	nnual) fro	m Table	3							0		(58)
Primary circuit	•	•			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	factor f	rom Tab	le H5 if t	here is s	olar 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 cal	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	32.33	28.14	29.98	27.88	27.63	25.6	26.45	27.63	27.88	29.98	30.15	32.33		(61)
Total h	eat requ	uired for	water he	eating ca	alculated	for eacl	n month	(62)m	= 0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	163.78	143.39	149.59	133.12	129.33	114.41	109.79	121.78	122.7	139.21	148.14	159.95	[(62)
Solar Di	-IW input o	calculated	using App	endix G or	Appendix	H (negati	ve quantity	v) (enter	'0' if no sola	r contribut	ion to wate	er heating)	ı	
(add a	dditiona	l lines if	FGHRS	and/or V	WWHRS	applies	, see Ap	pendix	G)				_	
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	20.92	16.91	15.36	10.28	7.77	5.69	5.28	6.06	6.13	11.32	16.77	21.04		(63) (G2)
Output	from wa	ater hea	ter											
(64)m=	141.84	125.58	133.25	121.89	120.59	107.78	103.5	114.71	115.58	126.86	130.38	137.87		_
		-	-	-	-	-	-	Ou	tput from w	ater heate	r (annual) ₁	12	1479.83	(64)
Heat g	ains froi	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61)	m] + 0.8 x	k [(46)m	+ (57)m	+ (59)m	1	
(65)m=	56.48	49.6	51.96	46.51	45.42	40.47	39.02	42.91	43.04	48.51	51.31	55.21		(65)
inclu	ıde (57)ı	m in cald	culation of	of (65)m	only if c	ylinder i	s in the o	dwelling	g or hot w	ater is fr	om com	munity h	eating	
5. Int	ernal ga	ains (see	e Table 5	and 5a):									
Metab	olic gain	s (Table	5), Wat	ts									_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	84.68	84.68	84.68	84.68	84.68	84.68	84.68	84.68	84.68	84.68	84.68	84.68		(66)
Lightin	g gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso see	Table 5					
(67)m=	13.15	11.68	9.5	7.19	5.38	4.54	4.9	6.38	8.56	10.87	12.68	13.52		(67)
Applia	nces gai	ins (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), als	so see Ta	ble 5				
(68)m=	147.54	149.08	145.22	137	126.64	116.89	110.38	108.85	112.71	120.92	131.29	141.03		(68)
Cookir	ng gains	(calcula	ted in A	ppendix	L, equat	tion L15	or L15a)	, also s	see Table	5	-	-		
(69)m=	31.47	31.47	31.47	31.47	31.47	31.47	31.47	31.47	31.47	31.47	31.47	31.47		(69)
Pumps	and far	ns gains	(Table 5	<u>Б</u> а)		•			•				•	
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses	e.g. ev	aporatio	n (nega	tive valu	es) (Tab	le 5)			•				1	
(71)m=	-67.74	-67.74	-67.74	-67.74	-67.74	-67.74	-67.74	-67.74	-67.74	-67.74	-67.74	-67.74		(71)
Water	heating	gains (T	able 5)						•				•	
(72)m=	75.92	73.81	69.84	64.59	61.05	56.21	52.44	57.67	59.78	65.2	71.27	74.21		(72)
Total i	nternal	gains =				(66)	m + (67)m	+ (68)m	+ (69)m +	(70)m + (7	1)m + (72)	m	'	
(73)m=	288.02	285.97	275.96	260.19	244.46	229.05	219.13	224.3	232.45	248.39	266.64	280.17		(73)
6. So	lar gains	S:												
Solar g	ains are c	calculated	using sola	r flux from	Table 6a	and assoc	ated equa	tions to d	convert to th	e applicat	ole orientat	ion.		
Orienta		Access F		Area		Flu			g_ -	_	FF		Gains	
	_ _	Table 6d		m²		l al	ole 6a		Table 6b		able 6c		(W)	_
Southw	est _{0.9x}	0.77	Х	9.7	' 2	x 3	6.79		0.63	x	0.8	=	124.91	(79)
Southw	<u> </u>	0.77	Х	9.7	<u></u>	x 6	2.67		0.63	x	0.8	=	212.77	(79)
Southw	<u> </u>	0.77	х	9.7	' 2	x 8	5.75		0.63	x	0.8	=	291.12	(79)
Southw	est _{0.9x}	0.77	Х	9.7	72	x 1	06.25		0.63	х	0.8	=	360.72	(79)

								_						
Southwest _{0.9x}	0.77	X	9.7	2	X	1	19.01		0.63	X	0.8	=	404.03	(79)
Southwest _{0.9x}	0.77	X	9.7	2	x	1	18.15		0.63	x	0.8	=	401.11	(79)
Southwest _{0.9x}	0.77	X	9.7	2	x	1	13.91		0.63	x	0.8	=	386.71	(79)
Southwest _{0.9x}	0.77	X	9.7	2	x	10	04.39]	0.63	x	0.8	=	354.4	(79)
Southwest _{0.9x}	0.77	x	9.7	2	x	9	2.85	Ì	0.63	×	0.8	=	315.23	(79)
Southwest _{0.9x}	0.77	X	9.7	2	x	6	9.27	ĺ	0.63	×	0.8	=	235.16	(79)
Southwest _{0.9x}	0.77	X	9.7	2	x	4	4.07	ĺ	0.63	×	0.8	=	149.62	(79)
Southwest _{0.9x}	0.77	X	9.7	2	x	3	1.49	ĺ	0.63	×	0.8	=	106.9	(79)
Northwest 0.9x	0.77	X	9.2	2	x	1	1.28	x	0.63	x	0.8	=	36.26	(81)
Northwest 0.9x	0.77	X	9.2	2	x	2	2.97	x	0.63	×	0.8	=	73.8	(81)
Northwest 0.9x	0.77	X	9.2	2	x	4	1.38	x	0.63	x	0.8	=	132.96	(81)
Northwest 0.9x	0.77	X	9.2	2	x	6	7.96	х	0.63	×	0.8	=	218.36	(81)
Northwest 0.9x	0.77	X	9.2	2	x	9	1.35	x	0.63	×	0.8		293.52	(81)
Northwest 0.9x	0.77	х	9.2	2	x	9	7.38	х	0.63	x	0.8	=	312.93	(81)
Northwest 0.9x	0.77	Х	9.2	2	x	9	91.1	X	0.63	x	0.8	=	292.74	(81)
Northwest 0.9x	0.77	X	9.2	2	x	7	2.63	x	0.63	×	0.8	=	233.37	(81)
Northwest 0.9x	0.77	х	9.2	2	x	5	0.42	х	0.63	x	0.8	=	162.02	(81)
Northwest 0.9x	0.77	X	9.2	2	x	2	8.07	x	0.63	×	0.8	=	90.19	(81)
Northwest 0.9x	0.77	X	9.2	2	x		14.2	x	0.63	×	0.8	=	45.62	(81)
Northwest 0.9x	0.77	X	9.2	2	x	9	9.21	x	0.63	x	0.8	=	29.61	(81)
								='						
Solar gains in	watts, ca	lculated	for eacl	n mont	h			(83)m	n = Sum(74)m .	(82)m				
Solar gains in (83)m= 161.17	watts, ca	lculated 424.09	for eacl 579.08	n mont 697.55	$\overline{}$	14.04	679.45	(<mark>83</mark>)m		<mark>(82)m</mark> 325.3	1	136.51]	(83)
ĭ——	286.57	424.09	579.08	697.55	7			ÈΈ				136.51]	(83)
(83)m= 161.17	286.57 internal ar	424.09	579.08	697.55	7 + (ÈΈ	.77 477.24		5 195.23	136.51 416.67]	(83) (84)
(83)m= 161.17 Total gains –	286.57 internal ar 572.54	424.09 nd solar 700.05	579.08 (84)m = 839.27	697.55 : (73)m 942.02	7 1 + (8 2 9	83)m	, watts	587	.77 477.24	325.3	5 195.23	I]	` '
(83)m= 161.17 Total gains – (84)m= 449.19	286.57 internal ar 572.54 rnal tempo	424.09 nd solar 700.05 erature (579.08 (84)m = 839.27 (heating	697.55 (73)m 942.02 seaso	7 1 + (8 2 9	83)m 43.08	, watts 898.58	587 812	.77 477.24 .07 709.69	325.3	5 195.23	I	21	` '
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean inte	286.57 internal ar 572.54 rnal temper during he	424.09 and solar 700.05 erature (eating po	579.08 (84)m = 839.27 (heating eriods in	697.55 (73)m 942.02 seaso	n + (8 9 n)	83)m 43.08 area 1	, watts 898.58 from Tal	587 812	.77 477.24 .07 709.69	325.3	5 195.23	I	21	(84)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean inte	286.57 internal ar 572.54 rnal temper during he	424.09 and solar 700.05 erature (eating po	579.08 (84)m = 839.27 (heating eriods in	697.55 (73)m 942.02 seaso	7 1 + (3 2 9 n) ving m (s	83)m 43.08 area 1	, watts 898.58 from Tal	812	.77 477.24 .07 709.69	325.3	195.23 4 461.88	I	21	(84)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean inter Temperature Utilisation fa	286.57 internal ar 572.54 rnal temperaturing heat corfor gar	424.09 and solar 700.05 erature (eating points for li	579.08 (84)m = 839.27 (heating eriods in twing are	697.55 (73)m 942.02 seaso the lives, h1,r	7 + (3 9 9) ying m (s	83)m 43.08 area t ee Ta	, watts 898.58 from Tal ble 9a)	812	.77 477.24 .07 709.69 , Th1 (°C)	325.3 573.7	195.23 4 461.88 : Nov	416.67	21	(84)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean inte Temperature Utilisation fa Jan (86)m= 0.97	286.57 internal ar 572.54 rnal temper during he ctor for gar Feb 0.94	424.09 Ind solar 700.05 Perature (Peating peating for li Mar 0.87	579.08 (84)m = 839.27 (heating eriods in Apr 0.75	697.55 = (73)m 942.02 seaso the lives, h1, May 0.59	n) ving m (s	83)m 43.08 area f ee Ta Jun 0.43	, watts 898.58 from Tal ble 9a) Jul 0.32	587 812 ole 9 A	.77 477.24 .07 709.69 ., Th1 (°C) ug Sep .96 0.58	325.3 573.7 Oct	195.23 4 461.88 : Nov	416.67 Dec	21	(84)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean inte Temperature Utilisation fa	286.57 internal ar 572.54 rnal temper during he ctor for gar Feb 0.94	424.09 Ind solar 700.05 Perature (Peating peating for li Mar 0.87	579.08 (84)m = 839.27 (heating eriods in Apr 0.75	697.55 = (73)m 942.02 seaso the lives, h1, May 0.59	n) ying follo	83)m 43.08 area f ee Ta Jun 0.43	, watts 898.58 from Tal ble 9a) Jul 0.32	587 812 ole 9 A	.77 477.24 .07 709.69 ., Th1 (°C) ug Sep	325.3 573.7 Oct	195.23 4 461.88 Nov 0.95	416.67 Dec	21	(84)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean intermediate Temperature Utilisation far Jan (86)m= 0.97 Mean intermediate Temperature Utilisation far Jan (86)m= 19.68	286.57 internal ar 572.54 rnal temper during he ctor for gar Feb 0.94 al tempera 19.94	424.09 Ind solar 700.05 erature (eating peatins for li Mar 0.87 ature in l 20.27	579.08 (84)m = 839.27 (heating eriods in ving are 0.75 iving are 20.6	697.55 = (73)m 942.02 seaso the lives, h1,r May 0.59 ea T1 (20.81	n) ying m (s	83)m 43.08 area f ee Ta Jun 0.43 w ste	, watts 898.58 from Tal ble 9a) Jul 0.32 ps 3 to 7	587 812 ole 9 A 0.3 7 in T 20.	.77 477.24 .07 709.69 ., Th1 (°C) ug Sep 66 0.58 Table 9c) 91 20.84	325.3 573.7 Oct 0.83	195.23 4 461.88 Nov 0.95	416.67 Dec 0.98	21	(84)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean interest Temperature Utilisation fa (86)m= 0.97 Mean interna (87)m= 19.68 Temperature	286.57 internal ar 572.54 rnal temper during he ctor for gar Feb 0.94 al tempera 19.94	424.09 Ind solar 700.05 erature (eating peatins for li Mar 0.87 ature in l 20.27	579.08 (84)m = 839.27 (heating eriods in ving are 0.75 iving are 20.6	697.55 = (73)m 942.02 seaso the lives, h1,r May 0.59 ea T1 (20.81	n) ring m (s follo	83)m 43.08 area f ee Ta Jun 0.43 w ste	, watts 898.58 from Tal ble 9a) Jul 0.32 ps 3 to 7	587 812 ole 9 A 0.3 7 in T 20.	.77 477.24 .07 709.69 , Th1 (°C) ug Sep .6 0.58 Table 9c) 91 20.84 .9, Th2 (°C)	325.3 573.7 Oct 0.83	195.23 4 461.88 Nov 0.95	416.67 Dec 0.98	21	(84)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean interest Temperature Utilisation fa (86)m= 0.97 Mean interna (87)m= 19.68 Temperature (88)m= 19.82	286.57 internal ar 572.54 rnal temper during he ctor for gar lemper al temperar 19.94 e during he 19.82	d24.09 Ind solar roo.05 Perature (Peating points for li Mar 0.87 Pature in l 20.27 Peating points 19.82	579.08 (84)m = 839.27 (heating eriods in Apr 0.75 iving are 20.6 eriods in 19.82	697.55 (73)m 942.02 seaso the lives, h1,r May 0.59 ea T1 (20.81 rest of	n) ring m (s follo 2 f dw 1	area face Ta Jun 0.43 w ste 20.89 velling 9.83	, watts 898.58 from Tal ble 9a) Jul 0.32 ps 3 to 7 20.91 from Ta	812 812 812 A 0.3 7 in T 20.	.77 477.24 .07 709.69 ., Th1 (°C) ug Sep .6 0.58 .able 9c) .91 20.84 .9, Th2 (°C)	325.3 573.7 Oct 0.83 20.53	195.23 4 461.88 Nov 0.95	Dec 0.98	21	(84) (85) (86) (87)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean interpretation fared Jan (86)m= 0.97 Mean internation (87)m= 19.68 Temperature (88)m= 19.82 Utilisation fared	286.57 internal ar 572.54 rnal temper during he ctor for gar 19.94 rnal temperar 19.94	d24.09 Ind solar roo.05 erature (eating periods for li Mar 0.87 ature in l 20.27 eating periods for roots for roo	579.08 (84)m = 839.27 (heating eriods in ving are 20.6 eriods in 19.82 est of decrease of the street of the street of decrease of the street of the stree	697.55 = (73)m 942.02 seaso n the lives, h1,n May 0.59 ea T1 (20.81 n rest o 19.83 welling	n) n) ring m (s follo 2 f dw 1 f, h2,	83)m 43.08 area f ee Ta Jun 0.43 w ste 20.89 velling 9.83 ,m (se	from Talble 9a) Jul 0.32 ps 3 to 7 20.91 from Talble 9a	8122 812 812 812 812 812 812 812 812 812	.77 477.24 .07 709.69 ., Th1 (°C) ug Sep .66 0.58 .6able 9c) .91 20.84 .9, Th2 (°C) .83 19.83	325.3 573.7 Oct 0.83 20.53	195.23 4 461.88 Nov 0.95 3 20.03	Dec 0.98 19.62	21	(84) (85) (86) (87) (88)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean interpretation fare	286.57 internal ar 572.54 rnal temper during he ctor for gar 19.94 rnal temperar 19.94	d24.09 Ind solar roo.05 Perature (Peating points for lime of	579.08 (84)m = 839.27 (heating eriods in ving are 20.6 eriods in 19.82 est of do 0.71	697.55 = (73)m 942.02 seaso the lives, h1,r May 0.59 ea T1 (20.81 n rest o 19.83 welling 0.53	n) n) ring m (s follo 2 f dw 1 1 1 1 1 1 1 1 1 1 1 1 1	83)m 43.08 area f ee Ta Jun 0.43 ww ste 20.89 velling 9.83 ,m (se	, watts 898.58 from Tal ble 9a) Jul 0.32 ps 3 to 7 20.91 from Tal 19.83 ee Table 0.24	812 812 812 A 0.3 7 in T 20. 19. 9a) 0.2	.77 477.24 .07 709.69 ., Th1 (°C) .08 Sep .06 0.5809 20.8409 1 20.8409 19.8309 19.83	325.3 573.7 Oct 0.83 20.53	195.23 4 461.88 Nov 0.95	Dec 0.98	21	(84) (85) (86) (87)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean interest Temperature Utilisation fa (86)m= 0.97 Mean interna (87)m= 19.68 Temperature (88)m= 19.82 Utilisation fa (89)m= 0.96 Mean interna	286.57 internal ar 572.54 rnal temper during he ctor for gar 19.94 rnal temperar 19.82 rnal temperar 19.82 rnal temperar 19.92	d24.09 Ind solar roo.05 Perature (Peating points for li Mar 0.87 Peating points ature in l 20.27 Peating points 19.82 Peating points 1	579.08 (84)m = 839.27 (heating eriods in Apr 0.75 iving are 20.6 eriods in 19.82 est of do 0.71 he rest	697.55 = (73)m 942.02 seaso the livea, h1,t May 0.59 ea T1 (20.81 the livean rest of the	n) ring m (s follo 2 f dw 1 1 1 1 1 1 1 1 1 1 1 1 1	83)m 43.08 area f ee Ta Jun 0.43 w ste 20.89 velling 9.83 ,m (se 0.36	ywatts 898.58 from Table 9a) Jul 0.32 ps 3 to 7 20.91 from Ta 19.83 ee Table 0.24 collow ste	812 812 812 A 0.3 7 in T 20. 4 able 9 19. 9 a) 0.2	.77 477.24 .07 709.69 ., Th1 (°C) ug Sep .66 0.58 Table 9c) .91 20.84 .9, Th2 (°C) .83 19.83 .88 0.5 .to 7 in Tabl	325.3 573.7 Oct 0.83 20.53 19.83 0.79 e 9c)	195.23 4 461.88 Nov 0.95 20.03 19.82	Dec 0.98 19.62 19.82 0.97		(84) (85) (86) (87) (88) (89)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean interpretation fare	286.57 internal ar 572.54 rnal temper during he ctor for gar 19.94 rnal temperar 19.94	d24.09 Ind solar roo.05 Perature (Peating points for lime of	579.08 (84)m = 839.27 (heating eriods in ving are 20.6 eriods in 19.82 est of do 0.71	697.55 = (73)m 942.02 seaso the lives, h1,r May 0.59 ea T1 (20.81 n rest o 19.83 welling 0.53	n) ring m (s follo 2 f dw 1 1 1 1 1 1 1 1 1 1 1 1 1	83)m 43.08 area f ee Ta Jun 0.43 ww ste 20.89 velling 9.83 ,m (se	, watts 898.58 from Tal ble 9a) Jul 0.32 ps 3 to 7 20.91 from Tal 19.83 ee Table 0.24	812 812 812 A 0.3 7 in T 20. 19. 9a) 0.2	.77 477.24 .07 709.69 ., Th1 (°C) .08 Sep .06 0.58 .09 20.84 .09, Th2 (°C) .09 19.83 .05 19.83 .05 to 7 in Table .71 19.65	325.3 573.7 Oct 0.83 20.53 19.83 0.79 e 9c) 19.29	195.23 4 461.88 Nov 0.95 20.03 19.82 0.93	19.62 19.82 0.97		(84) (85) (86) (87) (88) (89)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean interest of the second of the secon	286.57 internal ar 572.54 rnal temper during he ctor for gar 19.94 rnal temperar 19.82 rnal temperar 19.82 rnal temperar 19.92	d24.09 Ind solar roo.05 Perature (Peating points for li Mar 0.87 Peating points ature in l 20.27 Peating points 19.82 Peating points 1	579.08 (84)m = 839.27 (heating eriods in Apr 0.75 iving are 20.6 eriods in 19.82 est of do 0.71 he rest	697.55 = (73)m 942.02 seaso the livea, h1,t May 0.59 ea T1 (20.81 the livean rest of the	n) ring m (s follo 2 f dw 1 1 1 1 1 1 1 1 1 1 1 1 1	83)m 43.08 area f ee Ta Jun 0.43 w ste 20.89 velling 9.83 ,m (se 0.36	ywatts 898.58 from Table 9a) Jul 0.32 ps 3 to 7 20.91 from Ta 19.83 ee Table 0.24 collow ste	812 812 812 A 0.3 7 in T 20. 4 able 9 19. 9 a) 0.2	.77 477.24 .07 709.69 ., Th1 (°C) .08 Sep .06 0.58 .09 20.84 .09, Th2 (°C) .09 19.83 .05 19.83 .05 to 7 in Table .71 19.65	325.3 573.7 Oct 0.83 20.53 19.83 0.79 e 9c) 19.29	195.23 4 461.88 Nov 0.95 20.03 19.82	19.62 19.82 0.97	21	(84) (85) (86) (87) (88) (89)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean intermodular Temperature Utilisation fa (86)m= 0.97 Mean intermodular 19.68 Temperature (88)m= 19.82 Utilisation fa (89)m= 0.96 Mean intermodular 18.08 Mean intermodular 18.08	286.57 internal ar 572.54 rnal tempore during he ctor for ga Red 19.94 red during he 19.82 ctor for ga 0.92 rd tempera 18.45	d24.09 Ind solar roo.05 Perature (Peating points for li Mar 0.87 Peating points 19.82 Peatin	579.08 (84)m = 839.27 (heating eriods in a seriods in a seriod in a	697.55 = (73)m 942.02 seaso a the livea, h1,r May 0.59 ea T1 (20.81 a rest of 19.83 welling 0.53 of dwe 19.6	7 1 + (3 2 9 9 n) ving m (s 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	83)m 43.08 area f ee Ta Jun 0.43 w ste 20.89 yelling 9.83 ,m (se 0.36 T2 (fo 9.69	rom Talble 9a) Jul 0.32 ps 3 to 7 20.91 from Tal 19.83 ee Table 0.24 collow ste	8122 812 812 812 812 812 812 812 812 812	.77 477.24 .07 709.69 ., Th1 (°C) ug Sep .66 0.58	325.3 573.7 Oct 0.83 20.53 19.83 0.79 e 9c) 19.29	195.23 4 461.88 Nov 0.95 3 20.03 19.82 0.93 18.6 ving area ÷ (-	19.62 19.82 0.97		(84) (85) (86) (87) (88) (89) (90) (91)
(83)m= 161.17 Total gains – (84)m= 449.19 7. Mean interest of the second of the secon	286.57 internal ar 572.54 rnal temper during he ctor for gar 19.94 rnal temperar 19.82 rnal temperar 19.2 rnal temperar 19.2	d24.09 Ind solar roo.05 erature (eating periods for li Mar 0.87 eture in l 20.27 eating periods for roo.85 ature in t 18.92 eture (for 19.6)	579.08 (84)m = 839.27 (heating eriods in ving are 20.6 eriods in 19.82 est of do 0.71 he rest 19.36 r the wh 19.99	697.55 (73)m 942.02 seaso the lives, h1,r May 0.59 ea T1 (20.81 rest o 19.83 welling 0.53 of dwe 19.6	n) ring m (s follo 2 f dw 1 1 elling 2	83)m 43.08 area f ee Ta Jun 0.43 w ste 20.89 yelling 9.83 m (se 0.36 T2 (fe 9.69	, watts 898.58 from Tal ble 9a) Jul 0.32 ps 3 to 7 20.91 from Ta 19.83 pe Table 0.24 ollow ste 19.71 A × T1 20.31	8122	.77 477.24 .07 709.69 ., Th1 (°C) ug Sep .66 0.58 .7able 9c) .91 20.84 .9, Th2 (°C) .83 19.83 .7able 7 in Table .7d 19.65	325.3 573.7 Oct 0.83 20.53 19.83 0.79 e 9c) 19.29 LA = Li	195.23 4 461.88 Nov 0.95 20.03 19.82 0.93 18.6 ving area ÷ (-	19.62 19.82 0.97		(84) (85) (86) (87) (88) (89)

(00)	10.05	10.45	10.01	00.00		00.40		00.4	10.70	10.17	40.00	l	(02)
(93)m= 18.73	19.05	19.45	19.84	20.06	20.14	20.16	20.16	20.1	19.76	19.17	18.66		(93)
8. Space hea						44 -4	Table O	41	4 T: /	70)	-11-		
Set Ti to the the utilisation			•		ied at ste	ep 11 oi	rable 9i	o, so tha	t 11,m=(76)m an	d re-caid	culate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac		1										l	
(94)m= 0.96	0.91	0.84	0.71	0.54	0.38	0.26	0.3	0.52	0.79	0.92	0.96		(94)
Useful gains,	1	` ` `	, ,	 	l		T	I			l		(05)
(95)m= 429.2	523.76	588.6	595.3	509.82	355.54	232.73	244.11	368.54	453.08	427.19	401.51		(95)
Monthly aver		1		r	r	40.0	1 40 4	444	40.0	7.4	1.0	1	(06)
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rat (97)m= 962.95	942.91	861.92	724.23	552.92	365.09	=[(39)m 234.66	247.4	- (96)m	606.29	799.97	960.81		(97)
Space heating	l .			L	l		l .	l		<u> </u>	960.61		(91)
(98)m= 397.11	281.67	203.35	92.83	32.06	0	0.02	0	0	113.99	268.4	416.12		
(50)111	201.07	200.00	32.00	32.00				l per year				1805.53	(98)
							TOTA	ii pei yeai	(KVVII/yeai) = Sum(9	O)15,912 =	1005.55	╡``
Space heating	ig require	ement in	kWh/m²	² /year								36.02	(99)
9a. Energy red	quiremer	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space heati	•												_
Fraction of sp	pace hea	at from se	econdar	y/supple	mentary	system						0	(201)
Fraction of sp	pace hea	at from m	ain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of to	tal heati	ng from i	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficiency of	main spa	ace heat	ing syste	em 1								93.2	(206)
Efficiency of	seconda	ry/supple	ementar	y heating	g system	ո, %						0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heating	g require	ement (c	alculate	d above))							1	
397.11	281.67	203.35	92.83	32.06	0	0	0	0	113.99	268.4	416.12		
(211)m = {[(98	3)m x (20)4)] + (21	0)m } x	100 ÷ (2	(06)								(211)
426.09	302.22	218.18	99.6	34.4	0	0	0	0	122.3	287.98	446.48		
		-			-	-	Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	1	1937.27	(211)
Space heating	ig fuel (s	econdar	y), kWh/	month							'		
$= \{[(98) \text{m x } (26)]\}$	01)] + (2	14) m } x	100 ÷ (208)									
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		_
							Tota	I (kWh/yea	ar) =Sum(2	215) _{15,1012}	_	0	(215)
Water heating	g												
Output from w	T											I	
141.84	125.58	133.25	121.89	120.59	107.78	103.5	114.71	115.58	126.86	130.38	137.87		7
Efficiency of w	1						,	1			1	80.1	(216)
(217)m= 87.3	86.82	85.91	84.17	82.03	80.1	80.1	80.1	80.1	84.58	86.63	87.46		(217)
Fuel for water	•												
(219)m = (64) (219)m = 162.47	1) ÷ (217) 155.1	m 144.8	147	134.55	129.22	143.21	144.29	149.98	150.51	157.65		
(210)111-102.47	1 177.04	100.1	1.77.0	171	107.00	120.22		I = Sum(2		1 100.01	107.00	1763.43	(219)
Annual totals							. 0 10	20.11(2		Whkee			」 `
Space heating		ed, main	system	1					K	Wh/year		kWh/year 1937.27	7
,	,	,	,										_

Water heating fuel used				1763.43	
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (2	230a)(230g) =		75	(231)
Electricity for lighting				232.3	(232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	Energy kWh/year	Emission fa kg CO2/kWh		Emissions kg CO2/ye	
Space heating (main system 1)	(211) x	0.216	=	418.45	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	380.9	(264)
Space and water heating	(261) + (262) + (263) + (264)	=		799.35	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	120.56	(268)
Total CO2, kg/year	S	sum of (265)(271) =		958.84	(272)

El rating (section 14)

(274)

			User I	Details:						
Assessor Name:	Neil Inghar	n		Strom	a Num	ber:		STRO	002943	
Software Name:	Stroma FS			Softwa				Versio	n: 1.0.1.9	
			Property							
Address :	Flat 4, 16, R	ochester Me	· · ·							
Overall dwelling dime			,	J. 1, 1111	. 552					
J			Are	a(m²)		Av. He	eight(m)		Volume(m ³	3)
Ground floor				50.61	(1a) x		2.8	(2a) =	141.71	, (3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+	.(1n) 	50.61	(4)			_		
Dwelling volume			`)+(3c)+(3c	d)+(3e)+	(3n) =	141.71	(5)
2. Ventilation rate:										
2. Ventilation rate.	main	secon		other		total			m³ per hou	ır
Number of chimneys	heating 0	heatin	<u>ig</u> + [0] = [0	x	40 =	0	(6a)
Number of open flues	0	+ 0		0	i = F	0	x	20 =	0	(6b)
Number of intermittent fa	ans					2	x	10 =	20	
Number of passive vents	S				F	0	x	10 =	0	 (7b)
Number of flueless gas f					L F	0	×	40 =	0	(7c)
g					L				Ů	(. •)
								Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fa	ans = (6a)+(6b)+(7a)+(7b)+	(7c) =	Γ	20		÷ (5) =	0.14	(8)
If a pressurisation test has l	been carried out or	is intended, pro	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	0.25 for steel or	timber frame	or 0.35 fc	r mason	ry consti	ruction			0	(11)
if both types of wall are p deducting areas of openi			ng 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	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	3	(17)
If based on air permeabi	lity value, then	$(18) = [(17) \div 2]$	0]+(8), otherv	vise (18) =	(16)				0.29	(18)
Air permeability value applie	es if a pressurisatio	on test has been	done or a de	gree air pe	rmeability	is being u	ised			
Number of sides sheltered	ed								3	(19)
Shelter factor				(20) = 1 -	[0.075 x (19)] =			0.78	(20)
Infiltration rate incorpora	ting shelter fac	tor		(21) = (18) x (20) =				0.23	(21)
Infiltration rate modified	for monthly win	d speed								
Jan Feb	Mar Apr	May Ju	ın 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 Easter (22a) (2	(2)m · 4									
Wind Factor $(22a)m = (2a)m =$, - 4	100 00	F 0.05	1 0 00	 	T	Т	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

Adjusted infilt	ration rate	(allowir	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m						
0.29	0.28	0.28	0.25	0.24	0.21	0.21	0.21	0.23	0.24	0.25	0.27			
Calculate effe		•	ate for t	he appli	cable ca	se			!			·		٦,,,,
If mechanic			ndiv N (2	2h) _ (22a) Em. (a	auation (N	JEN otho	nuico (22h) - (22a)				0	(23a
If exhaust air I) = (23a)				0	_](23b
If balanced wi		-	-	_					21.) (4	201) [4 (00.)		0	(230
a) If balanc	1	- i				<u> </u>	- ^ ` `	í `	 		i i	÷ 100] I		(24a
(24a)m= 0	0 1	0	0	0	0	0	0	0	0 (0	0			(246
b) If balanc	T T	r					- ^ `	``	r `		Ι ,	l		(24h
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0			(24b
c) If whole	house extr m < 0.5 ×			•	•				5 v (23h	١				
(24c)m = 0	0.5 2	0	0	0	0	0	0	0	0	0	0]		(240
d) If natural												J		
,	m = 1, the			•	•				0.5]					
(24d)m= 0.54	0.54	0.54	0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.53	0.54			(240
Effective ai	r change r	ate - en	ter (24a	or (24b	o) or (24	c) or (24	d) in box	(25)	-		-	•		
(25)m= 0.54	0.54	0.54	0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.53	0.54			(25)
3. Heat loss	os and has	at loce n	aramata	or:					•		•	•		
ELEMENT	es and nea Gross	·	Openin		Net Ar	6 2	U-valı	IA.	AXU		k-value	۵	ΑX	k
ELEIVIEINI	area (m		A,r		W/m2		(W/ł	()	kJ/m²-ł		kJ/k	
Windows Typ	e 1				16.8	х1.	/[1/(1.2)+	0.04] =	19.24					(27)
Windows Typ	e 2				3.78	x1.	/[1/(1.2)+	0.04] =	4.33					(27)
Walls Type1	56.56	;	24.36	3	32.2	x	0.23	=	7.41	=	60	7 [1932	(29)
Walls Type2	19.88		0		19.88	x	0.19	=	3.79	=	60	=	1192.8] (29)
Roof	35.7		0	=	35.7	x	0.13	=	4.64	=	9	≓ i	321.3] (30)
Total area of		m²			112.1	4								(31) (31)
Party wall	,				13.44		0		0	– [45	— г	604.8	(32)
Party floor					50.61	=	<u> </u>		U		40	-	2024.4](32a
Party ceiling						=				L		북 ¦		╡
, ,	*				14.91	_				L	30	- 	447.3](32b
Internal wall *			ee - e:		43.12		. fa	/5/4/11) . 0 0 41 -	_ 	9		388.08	(320
* for windows an ** include the are						ated using	TOTTIUIA I	/[(I/ U- VaIU	ie)+0.04j a	s giveri iri	paragrapr	1 3.2		
Fabric heat lo	ss, W/K =	S (A x	U)				(26)(30)	+ (32) =				43	3.73	(33)
Heat capacity	/ Cm = S(A	Axk)						((28).	(30) + (32	!) + (32a).	(32e) =	691	0.68	(34)
Thermal mass	s paramete	er (TMP	e Cm ÷	- TFA) ir	n kJ/m²K			= (34)	÷ (4) =			130	6.55	(35)
For design asses				construct	ion are not	t known pr	ecisely the	indicative	e values of	TMP in Ta	able 1f			_ ^
Thermal bridg	ges : S (L x	(Y) cald	culated u	using Ap	pendix ł	<						9.	66	(36)
if details of therm Total fabric he	nal bridging a	,		• .	•			(33) +	(36) =					_
		loulotod	monthly	,						25)m v (F)	\	53	5.39	(37)
Ventilation he	 	- t			ميرا	1, ,1	۸۰۰۰		= 0.33 × (2		i	l		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	l		

Signe 25.32 25.24 25.17 24.82 24.76 24.46 24.46 24.47 24.57 24.58 24.50 25.02 (38)	(38)m= 25.32 2	5.24	25.17	24.82	24.76	24.46	24.46	24.4	24.57	24.76	24.89	25.02		(38)
139 12 158	` '			24.02	24.70	24.40	24.40	24.4			l	25.02		(30)
Average = Sum(38), \(\text{ 2} \) 12				78 21	78 14	77 85	77 85	77 79			1	78 41		
(40) (41)	(66)	0.00	70.00	70.21	70.11	77.00	11.00	77.70				<u> </u>	78.21	(39)
Average Sum(40)	Heat loss parame	eter (H	ILP), W/	m²K										_
Number of days in month (Table 1a) Man	(40)m= 1.56	1.55	1.55	1.55	1.54	1.54	1.54	1.54			<u> </u>	igsquare		_
	Number of days i	n mon	ith (Tabl	le 1a)					/	Average =	Sum(40) ₁ .	12 /12=	1.55	(40)
4. Water heating energy requirement: **Notice of the string energy requirement in the string energy en					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Assumed occupancy, N					•			— <u> </u>			-	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) Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Not more than 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	4. Water heating	gener	gy requi	rement:								kWh/ye	ear:	
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 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Not more than 125 litres per person per day (all water use, hot and cold) Lan 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)me 82.24 79.25 76.26 73.27 70.28 67.29 67.29 70.28 73.27 76.26 79.25 82.24 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) 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) 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) 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) 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) 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) 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) 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) Float Sum(45)	Assumed essure	nov N	ı									1		(40)
Annual average hot water usage in litres per day Vd, average = (25 x N) + 36	if TFA > 13.9, N	N = 1 -		[1 - exp	(-0.0003	49 x (TF	A -13.9)2)] + 0.0	0013 x (ΓFA -13.		71		(42)
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	,		ter usac	ae in litre	s per da	ıv Vd.av	erage =	(25 x N)	+ 36		74	.77		(43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Reduce the annual av	verage i	hot water	usage by	5% if the a	welling is	designed t			se target o		···		, ,
Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 82.24 79.25 76.26 73.27 70.28 67.29 67.29 70.28 73.27 76.26 79.25 82.24 Total = Sum(44)e = 897.21 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables tb, 1c, 1d) (45)m= 121.97 106.67 110.08 95.97 92.08 79.46 73.63 84.49 85.5 99.64 108.77 118.12 Total = Sum(45)e = 1176.38 (45) It instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 18.29 16 16.51 14.4 13.81 11.92 11.04 12.67 12.83 14.95 16.32 17.72 (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: 1 energy lost from Water storage, kWh/year (48) x (49) = 0 (50) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) Energy lost from Table 2b (50) Energy lost from Table 2a (50) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Energy lost from water storage loss calculated for each month (56) Energy lost from water storage loss calculated for each month (56) Energy lost from water st		· ·		,			,				·			
(44)m= 82.24 79.25 76.26 73.27 70.28 67.29 70.28 73.27 76.26 79.25 82.24					,				Sep	Oct	Nov	Dec		
Total = Sum(44) v = 897.21 (44)		<u>,</u>						. /	73 27	76.26	79 25	82 24		
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=	(44)111- 02.24 1	9.23	70.20	13.21	70.20	07.29	07.29	70.20				L	897.21	\ (44)
Total = Sum(45) 1 176.38 (45) 18.29 16 16.51 14.4 13.81 11.92 11.04 12.67 12.83 14.95 16.32 17.72 (46) 17.72 18.29 16 16.51 14.4 13.81 11.92 11.04 12.67 12.83 14.95 16.32 17.72 (46) 18.29 16 16.51 14.4 13.81 11.92 11.04 12.67 12.83 14.95 16.32 17.72 (46) 17.72 18.29	Energy content of hot	t water i	used - cal	culated mo	onthly $= 4$.	190 x Vd,n	n x nm x D	OTm / 3600			` '	L		」 `′
## Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ## Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ## Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ## Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel ## O	(45)m= 121.97 10	06.67	110.08	95.97	92.08	79.46	73.63	84.49	85.5	99.64	108.77	118.12		
(46)me 18.29 16 16.51 14.4 13.81 11.92 11.04 12.67 12.83 14.95 16.32 17.72 (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): 0.54 (48) Colspan="6">Colspan="	If instantaneous water	r hootin	a ot noint	of upo (no	, bot water	· otorogol	antar O in	havea (16		Γotal = Su	m(45) ₁₁₂ =	=	1176.38	(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) 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): 0.54 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) × (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: 0 (51) Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 0 (52) Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54) Enter (50) or (54) in (55) 0.32 (55) Water storage loss calculated for each month ((56)m = (55) × (41)m (56)														(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): 0.54 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) × (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: 0 (51) Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 0 (52) Temperature factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54) Enter (50) or (54) in (55) 0.32 (55) Water storage loss calculated for each month ((56)m = (55) × (41)m (56) (56)m= 10.04 9.07 10.04 9.72 10.04 10.04 9.72 10.04 <t< td=""><td>` '</td><td></td><td>16.51</td><td>14.4</td><td>13.81</td><td>11.92</td><td>11.04</td><td>12.67</td><td>12.83</td><td>14.95</td><td>16.32</td><td>17.72</td><td></td><td>(46)</td></t<>	` '		16.51	14.4	13.81	11.92	11.04	12.67	12.83	14.95	16.32	17.72		(46)
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: (48) a) If manufacturer's declared loss factor is known (kWh/day): 0.54 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) × (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: 0 (51) Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 0 (52) Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54) Enter (50) or (54) in (55) 0.32 (55) Water storage loss calculated for each month ((56)m = (55) × (41)m (56)m = (55) × (41)m (56)m = 10.04 9.07 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04	· ·		includin	g any so	olar or W	/WHRS	storage	within sa	ame ves	sel	0			(47)
Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0.54 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 0 (52) Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) x (51) x (52) x (53) = 0 (54) Enter (50) or (54) in (55) 0.32 (55) Water storage loss calculated for each month ((56)m = (55) x (41)m (56)m = (55) x (41)m (56)m = 10.04 9.07 10.04 9.07 10.04 9.72 10.04 9.72 10.04 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04	If community hea	ting a	nd no ta	nk in dw	elling, e	nter 110	litres in	(47)						
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 Energy lost from water storage, kWh/year Enter (50) or (54) in (55) Water storage loss calculated for each month ((56)m= 10.04 9.07 10.04 9.72 10.04 9.72 10.04 10.04 9.72 10.04 9.72 10.04 9.72 10.04 (56)			not wate	er (this in	ıcludes i	nstantan	eous co	mbi boil	ers) ente	er '0' in (47)			
Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year $(48) \times (49) = 0$ (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 0 0 0 0 0 0 0 0 0	_		clared l	nee facto	or is kno	wn (k\N/h	/dav/)·					<i>-</i> 1		(48)
Energy lost from water storage, kWh/year (48) × (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54) Enter (50) or (54) in (55) 0.32 (55) Water storage loss calculated for each month ((56)m = (55) × (41)m) (56)m= 10.04 9.07 10.04 9.72 10.04 9.72 10.04 10.04 9.72 10.04 9.72 10.04 (56)	•) 10 KHO	WII (ICVVI	i/day).							
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= $\begin{bmatrix} 10.04 & 9.07 & 10.04 & 9.72 & 10.04 & 9.7$	•				ear			(48) x (49)	=					
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= 10.04 9.07 10.04 9.72 10.04 9.72 10.04 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 (56)			-	-		or is not		(-) (-)				<u> </u>		(00)
Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53) Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$ 0 (54) Enter (50) or (54) in (55) 0.32 (55) Water storage loss calculated for each month $((56)m = (55) \times (41)m$ (56) (56)m= 10.04 9.07 10.04 9.72 10.04 9.72 10.04 9.72 10.04 (56)	•				e 2 (kWl	n/litre/da	y)					0		(51)
Temperature factor from Table 2b	•	-		on 4.3										(52)
Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) = 0$ (54) Enter (50) or (54) in (55) 0.32 (55) Water storage loss calculated for each month $((56)m = (55) \times (41)m$ (56) $m = 10.04 9.07 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 (56)$				2b							—			
Enter (50) or (54) in (55) 0.32 (55) Water storage loss calculated for each month ((56)m = (55) × (41)m (56)m= 10.04 9.07 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 (56)	-				ear			(47) x (51)	x (52) x (53) =				
(56)m= 10.04 9.07 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 (56)	••		_	,				, , , , ,	, , ,	•				
	Water storage los	ss calc	culated f	or each	month			((56)m = (55) × (41)r	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	(56)m= 10.04 S	9.07	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04		(56)
	If cylinder contains de	edicated	l 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= 10.04 9.07 10.04 9.72 10.04 9.72 10.04 9.72 10.04 9.72 10.04 (57)	(57)m= 10.04 S	9.07	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04		(57)

	imary 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) 30m												
Primary c	ircuit loss (a	innual) fro	om Table	e 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 heating and a cylinder thermostat) (59)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0												
(modifie	ed by factor	from Tab	le H5 if t	here is	solar wa	ter heati	ng and a	cylinde	r thermo	stat)	-	_	
(59)m=	0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi los	s calculated	d for each	month	(61)m =	(60) ÷ 30	65 × (41)m						
				ì ´	`	· ` `	Í – –	28	30.12	30.29	32.48		(61)
Total hea	t required fo	r water h	eating ca	alculated	for eac	h month	(62)m =	: 0.85 × ((45)m +	(46)m +	(57)m +	ı (59)m + (61)m	
_					1		`		` 	ì	`		(62)
Solar DHW	input calculate	d using App	endix G o	r Appendix	ι κ Η (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	r heating)	l	
											0,		
(63)m=	0 0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS 2	1.86 17.21	15.6	10.85	8.31	5.72	5.3	6.08	6.16	11.53	17.24	22.13	ı	(63) (G2
Output fro	m water he	ater											
· —		1	121.89	120.6	108.23	103.94	115.2	116.07	127.24	130.55	137.47		
` ′	l		!	!		!	ļ	out from w	L ater heate	<u> </u>	12	1482.35	(64)
Heat gain	s from wate	r heating	kWh/m	onth 0.2	5 ′ [0 85	x (45)m	ı + (61)m	nl + 0.8 x	([(46)m	+ (57)m	+ (59)m	1	_
						``	` ´ ´		-`` 	- ` ´ 	- ` ´]	(65)
		lculation	l	l	l	l	l	<u>l</u>	l	l	munity h	l neating	` '
	` '		. ,	-	Jylli Idei I		awciiiig	OI HOLW	ator is ii	OIII COIII	indinity i	icating	
).									
			Ĭ .	May	Lun	l 11		Con	Oct	Nov	l Doo]	
				<u> </u>	 	_	Ť		_	+			(66)
` ′	!		ļ		<u> </u>			<u> </u>	65.4	65.4	03.4		(00)
	<u> </u>		·		1	· ·		r —	1 40 00	10.70	1 40 04	1	(67)
` '		_	ļ		ļ			<u> </u>		12.79	13.64		(07)
· · · —			- 									1	(00)
` '			l	<u> </u>	l	<u> </u>				132.42	142.25		(68)
	<u> </u>	1		· ·	1	·		i	1	1	i	1	(22)
(69)m= 3	1.54 31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.54	31.54		(69)
· · · ·	nd fans gain	s (Table :	5a)	1		1	1		1	1	1	1	
(70)m=	3 3	3	3	3	3	3	3	3	3	3	3		(70)
Losses e.	g. evaporat	on (nega	tive valu	es) (Tab	ole 5)					,		•	
(71)m= -6	8.32 -68.32	-68.32	-68.32	-68.32	-68.32	-68.32	-68.32	-68.32	-68.32	-68.32	-68.32		(71)
Water hea	ating gains (Table 5)										_	
(72)m= 70	6.22 74.1	70.11	64.84	61.28	56.42	52.64	57.89	60.01	65.45	71.55	74.5		(72)
Total inte	rnal gains	=			(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	(1)m + (72))m		
(73)m= 28	39.93 287.87	277.79	261.91	246.05	230.53	220.54	225.73	233.94	250	268.38	282.01		(73)
6. Solar	gains:												
Solar gains	s are calculate	d using sola	r flux from	Table 6a	and assoc	iated equa	ations to co	onvert to th	ne applicat	ole orientat	tion.		
Orientatio	n: Access		Area		Flu		.	g_ Table Ch	_	FF		Gains	
	Table 6	u 	m²		1 a	ble 6a	, <u> </u>	able 6b	_ _ =	able 6c		(W)	_
Southeast	0.9x 0.7	7 ×	16	.8	x 3	86.79	x	0.63	×	0.8	=	215.9	(77)

		_		,		-						_
Southeast 0.9x	0.77	×	16.8	X	62.67	X	0.63	× [0.8	=	367.75	(77)
Southeast 0.9x	0.77	X	16.8	X	85.75	X	0.63	x	0.8	=	503.18	(77)
Southeast _{0.9x}	0.77	X	16.8	X	106.25	X	0.63	x	0.8	=	623.46	(77)
Southeast _{0.9x}	0.77	X	16.8	X	119.01	X	0.63	x	0.8	=	698.33	(77)
Southeast _{0.9x}	0.77	X	16.8	X	118.15	X	0.63	х	0.8	=	693.28	(77)
Southeast 0.9x	0.77	X	16.8	X	113.91	X	0.63	x	0.8	=	668.39	(77)
Southeast 0.9x	0.77	X	16.8	X	104.39	X	0.63	x	0.8	=	612.54	(77)
Southeast 0.9x	0.77	X	16.8	X	92.85	X	0.63	x [0.8	=	544.83	(77)
Southeast _{0.9x}	0.77	X	16.8	X	69.27	X	0.63	x	0.8	=	406.45	(77)
Southeast 0.9x	0.77	X	16.8	x	44.07	X	0.63	x [0.8	=	258.6	(77)
Southeast _{0.9x}	0.77	X	16.8	X	31.49	X	0.63	x [0.8	=	184.76	(77)
Southwest _{0.9x}	0.77	X	3.78	X	36.79		0.63	x	0.8	=	97.15	(79)
Southwest _{0.9x}	0.77	X	3.78	X	62.67		0.63	х	0.8	=	165.49	(79)
Southwest _{0.9x}	0.77	X	3.78	X	85.75		0.63	x [0.8	=	226.43	(79)
Southwest _{0.9x}	0.77	X	3.78	X	106.25		0.63	x	0.8	=	280.56	(79)
Southwest _{0.9x}	0.77	X	3.78	X	119.01		0.63	x	0.8	=	314.25	(79)
Southwest _{0.9x}	0.77	X	3.78	X	118.15]	0.63	x	0.8	=	311.97	(79)
Southwest _{0.9x}	0.77	X	3.78	X	113.91		0.63	x	0.8	=	300.78	(79)
Southwest _{0.9x}	0.77	X	3.78	X	104.39		0.63	х	0.8	=	275.64	(79)
Southwest _{0.9x}	0.77	X	3.78	x	92.85		0.63	x	0.8	=	245.18	(79)
Southwest _{0.9x}	0.77	X	3.78	X	69.27		0.63	×	0.8	=	182.9	(79)
Southwest _{0.9x}	0.77	×	3.78	x	44.07	Ī	0.63	_ x	0.8	_ =	116.37	(79)
Southwest _{0.9x}	0.77	×	3.78	x	31.49	Ī	0.63	x	0.8	_ =	83.14	(79)
-												<u> </u>
Solar gains in	watts, calcu	ulated	for each mon	th		(83)m	n = Sum(74)m .	(82)m				
(83)m= 313.05	533.24 72	29.61	904.02 1012.	57 10	005.25 969.17	888	.18 790.01	589.35	374.96	267.91		(83)
Total gains – i	nternal and		· , , , , ,	`		,			_		•	
(84)m= 602.98	821.11 10	007.4	1165.92 1258.	63 12	235.78 1189.71	1113	3.91 1023.95	839.35	643.35	549.92		(84)
7. Mean inter	nal tempera	ature (heating seas	on)								
Temperature	during hea	ting pe	eriods in the I	ving	area from Tal	ble 9	, Th1 (°C)				21	(85)
Utilisation fac	ctor for gain	s for li	ving area, h1	,m (s	ee Table 9a)							_
Jan	Feb	Mar	Apr Ma	у	Jun Jul	А	ug Sep	Oct	Nov	Dec		
(86)m= 0.93	0.86).77	0.65 0.51		0.38 0.28	0.3	0.48	0.71	0.88	0.94		(86)
Mean interna	ıl temperatu	ıre in li	ving area T1	(follo	w steps 3 to	7 in T	able 9c)					
(87)m= 19.43	19.8 2	0.18	20.52 20.74	1 2	20.84 20.88	20.	87 20.8	20.48	19.88	19.34		(87)
Temperature	during hea	tina ne	eriods in rest	of dw	elling from Ta	able 9	7 Th2 (°C)		•			
(88)m= 19.65		9.65	19.65 19.69		19.66 19.66	19.		19.65	19.65	19.65		(88)
Litilization for	tor for goin	o for r	oot of dwallin	 . h2	m (ooo Toblo	. 00)		l	.!	l		
(89)m= 0.91		0.73	0.6 0.45		m (see Table) 0.31 0.2	9a) 0.2	22 0.4	0.66	0.86	0.93		(89)
` '	<u> </u>				I			l	1 0.00	I 5.00	1	()
		-		Ť	T2 (follow ste	i			40.07	17.5	1	(00)
(90)m= 17.62	18.15	8.66	19.1 19.3	· _	19.47 19.5	19		19.07	18.27 ng area ÷ (4	17.5 4) –	0.00	(90)
							'	_	g aroa → (ʻ	., –	0.63	(91)

N.A		/ /					. /4 (1	۸\ <u> </u>					
Mean inter		19.62	19.99	20.22	20.34	20.37	+ (1 – IL 20.37	20.29	19.96	19.28	18.66		(92)
` '										19.20	10.00		(32)
Apply adju	1	19.47	19.84	20.07	20.19	20.22	20.22	20.14	19.81	19.13	18.51		(93)
8. Space h				20.07	20.13	20.22	20.22	20.14	13.01	13.13	10.51		(00)
Set Ti to th				ro obtain	and at et	on 11 of	Table 0	h so tha	t Ti m_/	76\m an	d re-calc	ulato	
the utilisat					ieu at sti	ер птог	i abie si	b, 50 iiia	t 11,111—(r O)III aii	u re-caic	uiate	
Ja		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation		jains, hm	•										
(94)m= 0.9	0.82	0.73	0.61	0.47	0.34	0.23	0.26	0.43	0.67	0.85	0.92		(94)
Useful gai	ns, hmGm	, W = (94	4)m x (84	4)m	•	•		•					
(95)m= 542.	38 675.94	733.99	706.67	592.69	416.7	277.08	290.17	436.31	560.01	543.76	503.51		(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	rate for me	an intern	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m= 1126	.13 1111.9	1018.92	855.93	654.4	434.87	281.85	296.83	471.03	719.55	941.98	1121.81		(97)
Space hea	ting requir	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 434.	31 292.97	211.99	107.47	45.92	0	0	0	0	118.7	286.72	460.02		_
							Tota	ıl per year	(kWh/year) = Sum(9	8) _{15,912} =	1958.1	(98)
Space hea	iting requir	ement in	kWh/m²	² /year								38.69	(99)
9a. Energy	requireme	nts – Indi	vidual h	eating s	vstems i	ncludina	micro-C	CHP)					
Space hea					,	_ · · · · <u>J</u>		,					
Fraction of	•	at from se	econdar	y/supple	mentary	system						0	(201)
Fraction of													
i idolloli o	space nea	at from m	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
	•	at from m ina from i	-	, ,				- (201) = 02) × [1 -	(203)] =				╡ .
Fraction of	total heat	ing from	main sys	stem 1				, ,	(203)] =			1	(204)
Fraction of Efficiency	total heat	ing from a	main syste	stem 1 em 1	a evetom			, ,	(203)] =			93.2	(204)
Fraction of Efficiency	total heation of main spoof seconda	ing from a	main sysing syste	stem 1 em 1 y heating	· ·	n, %	(204) = (2	02) × [1 –	, ,,			93.2	(204) (206) (208)
Fraction of Efficiency Efficiency Ja	f total heati of main sp of seconda n Feb	ing from ace heating from the heating from the heating from the heating from the heat	main systemater systementar Apr	stem 1 em 1 y heating May	Jun			, ,	(203)] =	Nov	Dec	93.2	(204) (206) (208)
Fraction of Efficiency Efficiency Ja Space hea	total heation for main sport secondary Tebuting requires	ing from ace heating ary/supplement (c	main systementar Apr alculate	stem 1 em 1 y heating May d above	Jun	n, % Jul	(204) = (2	02) × [1 –	Oct			93.2	(204) (206) (208)
Efficiency Efficiency Ja Space hea	f total heating from the front front from the front from the front from the front from the front front from the front front from the front from the front front from the front front from the front from the front front from the front front from the front from the front front from the front front front from the front front front from the front	ace heating from Mar ement (c	main systementar Apr alculated	stem 1 em 1 y heating May d above 45.92	Jun) 0	n, %	(204) = (2	02) × [1 –	, ,,	Nov 286.72	Dec 460.02	93.2	(204) (206) (208) ar
Fraction of Efficiency Efficiency Ja Space hea 434. (211)m = {[f total heati of main sp of seconda n Feb ating requir 31 292.97	ing from ace heating mary/supplement (compared 211.99 (21)] + (21	main systementar Apr alculatee 107.47 0)m} x	stem 1 em 1 y heating May d above 45.92 100 ÷ (2	Jun) 0	n, % Jul 0	(204) = (2 Aug	02) × [1 –	Oct 118.7	286.72	460.02	93.2	(204) (206) (208)
Efficiency Efficiency Ja Space hea	f total heati of main sp of seconda n Feb ating requir 31 292.97	ace heating from Mar ement (c	main systementar Apr alculated	stem 1 em 1 y heating May d above 45.92	Jun) 0	n, % Jul	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 118.7	286.72	460.02 493.58	1 93.2 0 kWh/ye	(204) (206) (208) ar
Fraction of Efficiency Efficiency Ja Space hea 434. (211)m = {[i	f total heating from the following requires t	mary/supplement (c 211.99 227.46	main systementar Apr alculated 107.47 0)m } x	stem 1 em 1 y heating May d above 45.92 100 ÷ (2 49.27	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 –	Oct 118.7	286.72	460.02 493.58	93.2	(204) (206) (208) ar
Fraction of Efficiency Efficiency Ja Space hea 434. (211)m = {[i 466]}	f total heating from the second and	mary/supplement (compared 211.99 compared 227.46 compared 227.	main systementar Apr alculated 107.47 0)m } x 115.31	stem 1 em 1 y heating May d above 45.92 100 ÷ (2 49.27	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 – Sep 0	Oct 118.7	286.72	460.02 493.58	1 93.2 0 kWh/ye	(204) (206) (208) ar
Fraction of Efficiency Efficiency Space head 434. (211)m = {[466] Space head 466 Space head 466	f total heating feed in Februing requires 292.97 (98) m x (20 314.34 atting fuel (\$ (201)] + (2	mare heating from Marement (con 211.99 (21.99 (227.46)) + (21 (2	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ 100 ÷ (stem 1 em 1 y heating May d above 45.92 100 ÷ (2 49.27	Jun) 0 206) 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 kWh/yea	Oct 118.7 127.36 ar) =Sum(2	286.72 307.64 211) _{15,1012}	460.02	1 93.2 0 kWh/ye	(204) (206) (208) ar
Fraction of Efficiency Efficiency Ja Space hea 434. (211)m = {[i 466]}	f total heating from the second and	mary/supplement (compared 211.99 compared 227.46 compared 227.	main systementar Apr alculated 107.47 0)m } x 115.31	stem 1 em 1 y heating May d above 45.92 100 ÷ (2 49.27	Jun) 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) x [1 - Sep 0	Oct 118.7 127.36 ar) =Sum(2	286.72 307.64 211) _{15,1012}	460.02	1 93.2 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of Efficiency Efficiency Space head 434. (211)m = {[i 466]} Space head 466 Space head 466 Space head 466 (215)m = 0	f total heating from the following of secondary from the following requires the following from the following	mare heating from Marement (con 211.99 (21.99 (227.46)) + (21 (2	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ 100 ÷ (stem 1 em 1 y heating May d above 45.92 100 ÷ (2 49.27	Jun) 0 206) 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 – Sep 0 0 kWh/yea	Oct 118.7 127.36 ar) =Sum(2	286.72 307.64 211) _{15,1012}	460.02	1 93.2 0 kWh/ye	(204) (206) (208) ar
Fraction of Efficiency Efficiency Ja Space hea 434. (211)m = {[460 Space hea = {[(98)m x (215)m= 0 Water heat	f total heating from the following from the following requires the following from the fol	mace heating from the area heating ary/supple ary/suppl	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ 100 ÷ (1)	stem 1 em 1 y heating May d above; 45.92 100 ÷ (2 49.27 month 208) 0	Jun) 0 206) 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) x [1 - Sep 0	Oct 118.7 127.36 ar) =Sum(2	286.72 307.64 211) _{15,1012}	460.02	1 93.2 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of Efficiency Efficiency Space head 434. (211)m = {[i 466]} Space head 466 Space head 466 Space head 466 Water head Output from	f total heating from the following from the following fuel (\$\frac{1}{2}\text{0}\text{1} \text{1} \text{1} \text{1} \text{1} \text{2} \text{1} \text{1} \text{2} \text{2} \text{2} \text{3} \text{1} \text{3} \text{4} \text{5} \text{4} \text{5} \text{6} \text{5} \text{6} \text{7} \text{7} \text{6} \text{7} \text{6} \text{7} \text{6} \text{7} \text{6} \text{7} \text{6} \text{7} \text{7} \text{6} \text{7} \text{7} \text{6} \text{7} \text{7} \text{6} \text{7} \text{7} \text{7} \text{7} \text{6} \text{7} \tex	mare heating from the mark (colors are h	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ 100 ÷ (i	stem 1 em 1 y heating May d above 45.92 100 ÷ (2 49.27 month 208) 0	Jun) 0 206) 0	n, % Jul 0	(204) = (2 Aug 0 Tota 0 Tota	02) x [1 - Sep 0 0 0 1 (kWh/yea	Oct 118.7 127.36 ar) =Sum(2 0 ar) =Sum(2	286.72 307.64 211) _{15,1012} 0	460.02	1 93.2 0 kWh/ye	(204) (206) (208) ar (211)
Fraction of Efficiency Efficiency Ja Space head 434. (211)m = {[i definition of the color of t	f total heating from the following from the followi	mary/supplement (color) 211.99 04)] + (21 227.46 secondary 14) m } x 0 atter (calciliates)	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ 100 ÷ (1)	stem 1 em 1 y heating May d above; 45.92 100 ÷ (2 49.27 month 208) 0	Jun) 0 206) 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) x [1 - Sep 0	Oct 118.7 127.36 ar) =Sum(2	286.72 307.64 211) _{15,1012}	460.02	1 93.2 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of Efficiency Efficiency Jacob Paragraphic Space head 434. (211)m = {[i 46i 46i 46i 46i 46i 46i 46i 46i 46i 46	f total heating of main spoof secondaring requirements of the secondaring requirements of the secondaring requirements of the secondaring fuel (secondaring	mare heating from ace heating from ace heating from arry/supple ar	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ 100 ÷ (1) 0	stem 1 em 1 y heating d above 45.92 100 ÷ (2 49.27 month 208) 0	Jun) 0 206) 0 108.23	n, % Jul 0 0	(204) = (2 Aug 0 Tota 115.2	02) x [1 - Sep 0 0 0 1 (kWh/yea 116.07	Oct 118.7 127.36 ar) =Sum(2 0 ar) =Sum(2	286.72 307.64 211) _{15,1012} 0 215) _{15,1012}	460.02 493.58 = 0 =	1 93.2 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of Efficiency Efficiency Ja Space hea 434. (211)m = {[i] 460 Space hea = {[(98)m x (215)m= 0 Water heat Output from 141. Efficiency of (217)m= 87.4	f total heating from the second and	mace heating ary/supple Mar ement (c 211.99 04)] + (21 227.46 eccondary 14) m } x 0 exter (calculation 133.65 exter 86.01	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ x 100 ÷ (x) 0 ulated al 121.89	stem 1 em 1 y heating May d above 45.92 100 ÷ (2 49.27 month 208) 0	Jun) 0 206) 0	n, % Jul 0	(204) = (2 Aug 0 Tota 0 Tota	02) x [1 - Sep 0 0 0 1 (kWh/yea	Oct 118.7 127.36 ar) =Sum(2 0 ar) =Sum(2	286.72 307.64 211) _{15,1012} 0	460.02	1 93.2 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of Efficiency Efficiency Ja Space hea 434. (211)m = {[i] 466 Space hea = {[(98)m x (215)m= 0 Water heat Output from 141. Efficiency o (217)m= 87.4 Fuel for war	f total heating from the second and	mace heating from a mace heating ary/supple	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ x 100 ÷ (x) 0 ulated al 121.89 84.54 onth	stem 1 em 1 y heating d above 45.92 100 ÷ (2 49.27 month 208) 0	Jun) 0 206) 0 108.23	n, % Jul 0 0	(204) = (2 Aug 0 Tota 115.2	02) x [1 - Sep 0 0 0 1 (kWh/yea 116.07	Oct 118.7 127.36 ar) =Sum(2 0 ar) =Sum(2	286.72 307.64 211) _{15,1012} 0 215) _{15,1012}	460.02 493.58 = 0 =	1 93.2 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of Efficiency Efficiency Ja Space hea 434. (211)m = {[i] 460 Space hea = {[(98)m x (215)m= 0 Water heat Output from 141. Efficiency of (217)m= 87.4	f total heating of main spoof secondaring requires and the secondaring requires and the secondaring fuel (secondaring fuel (secondaring fuel (secondaring fuel (secondaring fuel fuel fuel fuel fuel fuel fuel fuel	mace heating from a mace heating ary/supple	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ x 100 ÷ (x) 0 ulated al 121.89 84.54 onth	stem 1 em 1 y heating d above 45.92 100 ÷ (2 49.27 month 208) 0	Jun) 0 206) 0 108.23	n, % Jul 0 0	(204) = (2 Aug 0 Tota 115.2	02) x [1 - Sep 0 0 0 1 (kWh/yea 116.07	Oct 118.7 127.36 ar) =Sum(2 0 ar) =Sum(2	286.72 307.64 211) _{15,1012} 0 215) _{15,1012}	460.02 493.58 = 0 =	1 93.2 0 kWh/ye	(204) (206) (208) ar (211) (211)
Fraction of Efficiency Efficiency Space head 434. (211)m = {[i definition of the color of the	f total heating of main spoof secondaring requires and the secondaring requires and the secondaring fuel (secondaring fuel (secondaring fuel (secondaring fuel (secondaring fuel fuel fuel fuel fuel fuel fuel fuel	mar sement (c 211.99 24)] + (21 227.46 227.46 23.65 ater 86.01 , kWh/mc 0 ÷ (217)	main systementar Apr alculated 107.47 0)m } x 115.31 y), kWh/ 100 ÷ (1) 0 ulated al 121.89 84.54 onth m	stem 1 em 1 y heating May d above 45.92 100 ÷ (2 49.27 month 208) 0 bove) 120.6	Jun) 0 206) 0 108.23	n, % Jul 0 0 103.94	(204) = (2 Aug 0 Tota 115.2 80.1	02) x [1 - Sep 0 0 0 0 1 (kWh/yea 116.07	Oct 118.7 127.36 ar) =Sum(2 127.24 84.68	286.72 307.64 211) _{15,1012} 0 215) _{15,1012} 130.55	460.02 493.58 = 0 = 137.47 87.66	1 93.2 0 kWh/ye	(204) (206) (208) ar (211) (211)

Annual totals		kWh/year	kWh/year_
Space heating fuel used, main system 1			2100.96
Water heating fuel used			1763.37
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			234.31 (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)	<u> </u>		
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh	kg CO2/year
	kWh/year (211) x	kg CO2/kWh 0.216 =	kg CO2/year 453.81 (261)
Space heating (secondary)	kWh/year (211) x (215) x	kg CO2/kWh 0.216 = 0.519 =	kg CO2/year 453.81 (261) 0 (263)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	kg CO2/kWh 0.216 = 0.519 =	kg CO2/year 453.81 (261) 0 (263) 380.89 (264)
Space heating (secondary) Water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	kg CO2/kWh 0.216 = 0.519 = 0.216 =	kg CO2/year 453.81 (261) 0 (263) 380.89 (264) 834.7 (265)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x (232) x	kg CO2/kWh 0.216 = 0.519 = 0.519 =	kg CO2/year 453.81 (261) 0 (263) 380.89 (264) 834.7 (265) 38.93 (267)

El rating (section 14)

				N 4 11						
			User D	Details:						
Assessor Name:	Neil Ingham			Strom	a Num	ber:		STRO	0002943	
Software Name:	Stroma FSAP	2012		Softwa	are Ve	rsion:		Versio	n: 1.0.1.9	
				Address						
Address :	Flat 5, 16, Roch	nester Mews	, LOND(ON, NW1	9JB					
1. Overall dwelling dime	ensions:		_							
One word the en				a(m²)			ight(m)	1,- ,	Volume(m ³	<u> </u>
Ground floor				70.74	(1a) x	2	2.8	(2a) =	198.07	(3a)
Total floor area TFA = (1	la)+(1b)+(1c)+(1d)	+(1e)+(1r	ገ) <u>7</u>	70.74	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	198.07	(5)
2. Ventilation rate:				- 41		4 - 4 - 1			2	
	main heating	secondar heating	ry 	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	=	0	x 2	20 =	0	(6b)
Number of intermittent fa	ans					2	x .	10 =	20	(7a)
Number of passive vents	S				F	0	x -	10 =	0	(7b)
Number of flueless gas t					<u> </u>	0	x	40 =	0	(7c)
Trambor of macrosc gas i					L					(10)
								Air ch	nanges per ho	our
Infiltration due to chimne	eys, flues and fans	= (6a)+(6b)+(7a)	7a)+(7b)+((7c) =	Γ	20		÷ (5) =	0.1	(8)
If a pressurisation test has		ntended, procee	ed to (17),	otherwise (continue fr	om (9) to	(16)			
Number of storeys in t	the dwelling (ns)								0	(9)
Additional infiltration	0.05 for all and hard		. 0. 05. (-				[(9)	-1]x0.1 =	0	(10)
Structural infiltration: (if both types of wall are p					•	uction			0	(11)
deducting areas of open			Tile great	ici wali arc	a (anoi					
If suspended wooden	floor, enter 0.2 (un	sealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, er	nter 0.05, else ente	er O							0	(13)
Percentage of window	s and doors draug	ht stripped							0	(14)
Window infiltration				0.25 - [0.2	` '	-			0	(15)
Infiltration rate				(8) + (10)					0	(16)
Air permeability value	•		•	•	•	etre of e	envelope	area	3	(17)
If based on air permeab	-					is heina u	sad		0.25	(18)
Number of sides shelter		ot nao boon doi	10 01 a ao	groo an po	modbinty	io boilig a	ocu		3	(19)
Shelter factor				(20) = 1 -	[0.075 x (19)] =			0.78	(20)
Infiltration rate incorpora	ting shelter factor			(21) = (18) x (20) =				0.19	(21)
Infiltration rate modified	for 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	4.9 4.4 4	.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	22)								-	
Wind Factor (22a)m = $(2^{2})^{m}$		08 005	0.05	0.02	1	1.00	1 12	1 10]	
(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 infiltration rate (allowing for shelter ar	nd wind s	need) –	(21a) v	(22a)m					
0.25 0.24 0.24 0.21 0.21	0.18	0.18	0.18	0.19	0.21	0.22	0.23]	
Calculate effective air change rate for the appl	1 1		00	00	V-2 ·	0.22	0.20		
If mechanical ventilation:								0	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23	a) × Fmv (e	equation (N	N5)) , othe	wise (23b) = (23a)			0	(23b)
If balanced with heat recovery: efficiency in % allowing	for in-use fa	actor (from	Table 4h) =				0	(23c)
a) If balanced mechanical ventilation with he	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		(24a)
b) If balanced mechanical ventilation without	t heat rec	overy (N	ЛV) (24b	m = (22)	2b)m + (23b)		1	
(24b)m= 0 0 0 0 0	0	0	0	0	0	0	0		(24b)
c) If whole house extract ventilation or positi if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$	•				5 × (23b	o)			
(24c)m= 0 0 0 0 0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation or whole house positi if (22b)m = 1, then (24d)m = (22b)m other	•				0.5]			•	
(24d)m= 0.53 0.53 0.53 0.52 0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.53		(24d)
Effective air change rate - enter (24a) or (24	b) or (24d	c) or (24	d) in box	(25)	•	•	•		
(25)m= 0.53 0.53 0.53 0.52 0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.53		(25)
3. Heat losses and heat loss parameter:									
ELEMENT Gross Openings area (m²) m²	Net Ard A ,n		U-valı W/m2		A X U (W/		k-value kJ/m²-l		
Windows Type 1	9.18		/[1/(1.2)+		10.51	$\stackrel{\prime}{ o}$			(27)
Windows Type 2	11.88	x ₁ ,	/[1/(1.2)+	0.04] =	13.6	=			(27)
Windows Type 3	16.2		· /[1/(1.2)+	L	18.55	╡			(27)
Walls Type1 81.48 37.26	44.22	=	0.23		10.17	=	60	2653.2	¬`´
Walls Type2 32.48 0	32.48	=	0.19	<u> </u>	6.19	룩 ;	60	1948.8	=
Roof 70.74 0	70.74	=	0.13	-	9.2	믁 ¦	9	636.66	╡゛゛
Total area of elements, m ²		=	0.13	[9.2		9	030.00	(31)
Party floor	184.7	=				Г	40		¬ `´
Internal wall **	70.74	=				L	40	2829.6	╡``
* for windows and roof windows, use effective window U-v	73.92		ı formula 1	/[/1/ L.valu	(۱۵) ۱۸۵ دامر	e aiven in	9 naragrant	665.28	(32c)
** include the areas on both sides of internal walls and par		aled using	TOTTIUIA 1	/[(1/O-vaid	0-7+0.0 4] 6	is giveri iii	paragrapi	1 3.2	
Fabric heat loss, W/K = S (A x U)			(26)(30)	+ (32) =				68.22	(33)
Heat capacity Cm = S(A x k)				((28)	.(30) + (32	2) + (32a).	(32e) =	8733.54	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) i	n kJ/m²K			= (34)	÷ (4) =			123.46	(35)
For design assessments where the details of the construction can be used instead of a detailed calculation.	tion are not	known pr	ecisely the	indicative	values of	TMP in Ta	able 1f		_
Thermal bridges : S (L x Y) calculated using A	ppendix k	(9.66	(36)
if details of thermal bridging are not known (36) = $0.15 \times (30)$	31)			(2.5)	(2.5)				_
Total fabric heat loss					(36) =	(-)		77.88	(37)
Ventilation heat loss calculated monthly			Α.			25)m x (5)		1	
Jan Feb Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(38)
(38)m= 34.7 34.61 34.54 34.18 34.11	33.8	33.8	33.74	33.92	34.11	34.24	34.39		(30)
Heat transfer coefficient, W/K	1	444 ==	444 ==		= (37) + (1,,,,,==	1	
(39)m= 112.58 112.49 112.42 112.06 111.99	111.68	111.68	111.62	111.8	111.99	112.12	112.27		_
Stroma FSAP 2012 Version: 1.0.1.9 (SAP 9.92) - http://wv					Augres -	Sum(39) ₁	/4.0	112.0m6 _{age 2}	(30)

Heat loss para	ameter (I	HLP), W	′m²K					(40)m	= (39)m ÷	- (4)			
(40)m= 1.59	1.59	1.59	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.59		
		!							Average =	Sum(40) ₁ .	12 /12=	1.58	(40)
Number of day	<u> </u>	<u> </u>							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	rement:								kWh/ye	ear:	
Assumed occurring TFA > 13.	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		26		(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		.97		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i							_	1 - 22		L			
(44)m= 96.77	93.25	89.73	86.21	82.69	79.17	79.17	82.69	86.21	89.73	93.25	96.77		
. ,									I Total = Su	m(44) ₁₁₂ =		1055.64	(44)
Energy content of	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 143.5	125.51	129.51	112.91	108.34	93.49	86.63	99.41	100.6	117.24	127.98	138.97		
			. ,						Total = Su	m(45) ₁₁₂ =		1384.11	(45)
If instantaneous v	vater heati	ng at point	of use (no	not water	storage),	enter 0 ın	boxes (46)) to (61)		1			
(46)m= 21.53	18.83	19.43	16.94	16.25	14.02	13	14.91	15.09	17.59	19.2	20.85		(46)
Water storage Storage volum) includir	na anv so	olar or W	/WHRS	storane	within sa	ame ves	ച	0			(47)
If community h	•					_		x1110 100	00.				(41)
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.	54		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		_	-				(48) x (49)) =			0		(50)
b) If manufact			-										(54)
Hot water stor If community h	-			e z (KVVI	n/iitie/ua	iy)					0		(51)
Volume factor	_		011 1.0								0		(52)
Temperature f	actor fro	m Table	2b							—	0		(53)
Energy lost fro	om watei	r storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or	(54) in (55)								0.	32		(55)
Water storage	loss cal	culated t	or each	month			((56)m = (55) × (41)	m				
(56)m= 10.04	9.07	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04		(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= 10.04	9.07	10.04	9.72	10.04	9.72	10.04	10.04	9.72	10.04	9.72	10.04		(57)
Primary circuit	t loss (ar	nnual) fro	m Table	<u></u>							0		(58)
Primary circuit	,	•			59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	/ factor f	rom Tab	le H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)

Combi lo	oss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
	38.22	33.26	35.44	32.95	32.66	30.26	31.27	32.66	32.95	35.44	35.64	38.22		(61)
Total he	at requ	uired for	water he	eating ca	alculated	l for eac	n month	(62)m	= 0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	191.76	167.84	174.99	155.58	151.04	133.47	127.95	142.1	1 143.27	162.72	173.34	187.24		(62)
Solar DHV	N input o	alculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter	'0' if no sola	r contribut	ion to wate	er heating)	1	
(add add	ditiona	l lines if	FGHRS	and/or V	vwhrs	applies	, see Ap	pendix	(G)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
FHRS	28.82	22.39	19.9	14.31	10.42	6.73	6.24	7.16	7.24	15.49	22.32	29.25	•	(63) (G2)
Output f	rom w	ater hea	ter										_	
(64)m=	161.8	144.45	153.99	140.2	139.54	125.69	120.58	133.8	3 134.91	146.08	149.92	156.83		_
								0	utput from w	ater heate	r (annual)₁	12	1707.82	(64)
Heat ga	ins fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.85	× (45)m	+ (61	m] + 0.8 x	د [(46)m	+ (57)m	+ (59)m	1	
(65)m=	65.3	57.3	59.96	53.56	52.22	46.43	44.66	49.25	49.46	55.88	59.24	63.8		(65)
includ	le (57)ı	m in cald	culation of	of (65)m	only if c	ylinder i	s in the	dwellir	g or hot w	ater is fr	om com	munity h	eating	
5. Inte	rnal ga	ains (see	Table 5	and 5a):									
Metabol	lic gain	s (Table	5), Wat	ts									_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Au	g Sep	Oct	Nov	Dec		
(66)m=	113.2	113.2	113.2	113.2	113.2	113.2	113.2	113.2	113.2	113.2	113.2	113.2		(66)
Lighting	gains	(calcula	ted in Ap	pendix	L, equat	ion L9 o	r L9a), a	lso se	e Table 5		•		•	
(67)m=	17.74	15.76	12.82	9.7	7.25	6.12	6.62	8.6	11.54	14.66	17.11	18.24	1	(67)
Appliand	ces gai	ins (calc	ulated in	Append	dix L, eq	uation L	13 or L1	3a), al	so see Ta	ble 5		1	ı	
(68)m=	199.02	201.08	195.88	184.8	170.82	157.67	148.89	146.8	3 152.03	163.11	177.09	190.24		(68)
Cooking	gains	(calcula	ted in A	pendix	L, equat	tion L15	or L15a	, also	see Table	5	•		'	
(69)m=	34.32	34.32	34.32	34.32	34.32	34.32	34.32	34.32	34.32	34.32	34.32	34.32	[(69)
Pumps a	and far	ns gains	(Table 5	 ба)		!							ı	
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
Losses	e.g. ev	aporatio	n (nega	ive valu	es) (Tab	le 5)			'				ı	
(71)m=	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-90.5	6 -90.56	-90.56	-90.56	-90.56		(71)
Water h	eating	gains (T	able 5)						•				'	
(72)m=	87.77	85.28	80.59	74.38	70.19	64.48	60.02	66.2	68.7	75.1	82.28	85.75		(72)
Total in	ternal	gains =	:			(66)	m + (67)m	ı + (88)r	n + (69)m +	(70)m + (7	1)m + (72)	m	I	
_	364.5	362.08	349.24	328.85	308.22	288.24	275.49	281.5	9 292.23	312.83	336.44	354.18		(73)
6. Sola	ır gains	S:												
Solar gai	ins are c	alculated	using sola	r flux from	Table 6a	and assoc	ated equa	tions to	convert to th	e applicat	ole orientat	ion.		
Orientat	ion: A	Access F	actor	Area		Flu			g_		FF		Gains	
	Т	able 6d		m²		Tal	ole 6a		Table 6b	T	able 6c		(W)	
Southeas	st _{0.9x}	0.77	X	16	.2	x 3	6.79	×	0.63	x	0.8	=	208.19	(77)
Southeas	st _{0.9x}	0.77	X	16	.2	x 6	2.67	x	0.63	x	0.8	=	354.62	(77)
Southeas	st _{0.9x}	0.77	X	16	.2	x 8	5.75	×	0.63	x	0.8	=	485.21	(77)
Southeas	st _{0.9x}	0.77	х	16	.2	x 1	06.25	x	0.63	x	0.8	=	601.19	(77)

Southeast 0.9x	0.77	x	16.2	1 x	119.01	1 x	0.63	ТхГ	0.8		673.39	(77)
Southeast 0.9x	0.77	x	16.2] x	118.15] x	0.63]	0.8		668.52	(77)
Southeast 0.9x	0.77	X	16.2]]	113.91]] _X	0.63	_	0.8	=	644.52	(77)
Southeast 0.9x	0.77	X	16.2]]	104.39]]	0.63	x	0.8	-	590.66	(77)
Southeast 0.9x	0.77	x	16.2]]	92.85]] _X	0.63	x	0.8	=	525.38	(77)
Southeast 0.9x	0.77	X	16.2) x	69.27) x	0.63	x	0.8	-	391.93	(77)
Southeast 0.9x	0.77	x	16.2)] x	44.07) x	0.63	x	0.8		249.36	(77)
Southeast 0.9x	0.77	x	16.2) x	31.49) x	0.63	x	0.8	-	178.16	(77)
Southwest _{0.9x}	0.77	X	11.88	X	36.79	ĺ	0.63	_ x	0.8	=	152.67	(79)
Southwest _{0.9x}	0.77	x	11.88	X	62.67	i	0.63	x	0.8	=	260.05	(79)
Southwest _{0.9x}	0.77	x	11.88	X	85.75	ĺ	0.63	x	0.8	=	355.82	(79)
Southwest _{0.9x}	0.77	x	11.88	X	106.25]	0.63	_ x [0.8	=	440.88	(79)
Southwest _{0.9x}	0.77	x	11.88	X	119.01	i	0.63	i x	0.8	=	493.82	(79)
Southwest _{0.9x}	0.77	x	11.88	x	118.15	i	0.63	x	0.8	<u> </u>	490.25	(79)
Southwest _{0.9x}	0.77	x	11.88	x	113.91	ĺ	0.63	x	0.8	-	472.65	(79)
Southwest _{0.9x}	0.77	x	11.88	x	104.39	j	0.63	×	0.8		433.15	(79)
Southwest _{0.9x}	0.77	X	11.88	x	92.85	ĺ	0.63	×	0.8	=	385.28	(79)
Southwest _{0.9x}	0.77	x	11.88	x	69.27	ĺ	0.63	x	0.8	=	287.42	(79)
Southwest _{0.9x}	0.77	x	11.88	x	44.07	ĺ	0.63	x	0.8	=	182.86	(79)
Southwest _{0.9x}	0.77	X	11.88	x	31.49]	0.63	x	0.8	=	130.65	(79)
Northwest 0.9x	0.77	X	9.18	X	11.28	x	0.63	x	0.8	=	36.18	(81)
Northwest 0.9x	0.77	X	9.18	x	22.97	х	0.63	x	0.8	=	73.64	(81)
Northwest _{0.9x}	0.77	X	9.18	X	41.38	x	0.63	x	0.8	=	132.67	(81)
Northwest _{0.9x}	0.77	X	9.18	X	67.96	x	0.63	x [0.8	=	217.89	(81)
Northwest _{0.9x}	0.77	X	9.18	X	91.35	x	0.63	x [0.8	=	292.88	(81)
Northwest 0.9x	0.77	X	9.18	X	97.38	x	0.63	x	0.8	=	312.25	(81)
Northwest 0.9x	0.77	X	9.18	X	91.1	x	0.63	x	0.8	=	292.1	(81)
Northwest 0.9x	0.77	X	9.18	X	72.63	x	0.63	x	0.8	=	232.86	(81)
Northwest 0.9x	0.77	X	9.18	X	50.42	X	0.63	x	8.0	=	161.66	(81)
Northwest 0.9x	0.77	X	9.18	X	28.07	x	0.63	x	0.8	=	89.99	(81)
Northwest 0.9x	0.77	X	9.18	X	14.2	x	0.63	x	0.8	=	45.52	(81)
Northwest 0.9x	0.77	X	9.18	X	9.21	X	0.63	x	0.8	=	29.54	(81)
Solar gains in v		-		$\overline{}$			s = Sum(74)m.		T		1	(00)
(83)m= 397.03			1259.96 1460.0		71.01 1409.27	1256	5.68 1072.32	769.34	477.74	338.36		(83)
Total gains – in			` 	<u> </u>		1500	27 1264 55	1000 17	014 10	600 FF		(84)
` '			1588.81 1768.3		759.24 1684.76	1538	3.27 1364.55	1082.17	814.18	692.55		(04)
7. Mean interr		•										_
Temperature	_	• .		_		ole 9	Th1 (°C)				21	(85)
Utilisation fact				Ť		_					1	
Jan	Feb	Mar	Apr Ma	_	Jun Jul	 	ug Sep	Oct	Nov	Dec		(96)
(86)m= 0.93	0.87	0.78	0.65 0.51		0.38 0.28	0.3	0.49	0.74	0.89	0.94		(86)

Moon	intorno	l tompor	oturo in	living or	oo T1 (fa	allow etc	no 2 to 7	7 in Tabl	o ()o)					
I				_ <u> </u>	<u> </u>	i	ps 3 to 7	1	20.75	20.25	40.07	40.00		(87)
(87)m= Temn	19.18 erature	19.57	20.01	20.42 periods in	20.68	dwelling	20.87 from Ta	20.86 hle 9 Ti		20.35	19.67	19.08		(07)
(88)m=	19.62	19.62	19.62	19.62	19.63	19.63	19.63	19.63	19.63	19.63	19.62	19.62		(88)
` ′				<u> </u>		<u>!</u>	ee Table		10.00	10.00	10.02	.0.02		,
(89)m=	0.92	0.85	0.75	0.61	0.45	0.31	0.2	0.23	0.41	0.69	0.87	0.93		(89)
` ′		ļ		ļ		I	l		l	<u> </u>	0.0.	0.00		()
ı						- ` `	ollow ste		i				l	(00)
(90)m=	17.26	17.82	18.42	18.95	19.27	19.42	19.46	19.45	19.36	18.89	17.97	17.13		(90)
									I	rLA = LIVIN	g area ÷ (4	+) =	0.47	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	A) × T2					
(92)m=	18.15	18.64	19.16	19.64	19.93	20.07	20.11	20.11	20.01	19.57	18.76	18.04		(92)
Apply	adjustn	nent to tl	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	18	18.49	19.01	19.49	19.78	19.92	19.96	19.96	19.86	19.42	18.61	17.89		(93)
8. Spa	ace hea	ting requ	uirement											
						ed at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a	,							l	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ition fac	tor for g	ains, hm	1:									ı	
(94)m=	0.9	0.83	0.73	0.6	0.46	0.32	0.22	0.25	0.43	0.68	0.85	0.92		(94)
Usefu	I gains,	hmGm ,	W = (94)	4)m x (8	4)m								ı	
(95)m=	685.83	868.67	966.41	954.24	809.53	565.95	368.29	386.26	584.98	732.19	691.48	634.44		(95)
Month	ly aver	age exte	rnal tem	perature	from Ta	able 8							ı	
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
						i e	=[(39)m :	x [(93)m	`				ı	
` ′		1528.42		1186.2	904.97	594.27	375.7	397.04	643.44	987.64	1290.65	1537.26		(97)
Space	heatin			r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95		1)m		ı	
(98)m=	637.6	443.35	327.34	167.01	71.01	0	0	0	0	190.05	431.4	671.7		_
								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2939.46	(98)
Space	e heatin	g require	ement in	kWh/m²	?/year								41.55	(99)
9a. Ene	erav red	uiremer	nts – Indi	ividual h	eating s	vstems i	ncluding	micro-C	CHP)					
	e heatir	•			Jam. 9 J	, 0.00			, ,					
-		_	at from s	econdar	y/supple	mentary	system						0	(201)
Fracti	on of sp	ace hea	at from m	nain syst	em(s)		•	(202) = 1 -	- (201) =				1	(202)
Fracti	on of to	tal heatii	ng from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficie	ency of i	main spa	ace heat	ing syste	em 1								93.2	(206)
Efficie	ency of	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	 ear
Space	heatin	g require	ement (c	alculate	d above))	•		•	•			l	
	637.6	443.35	327.34	167.01	71.01	0	0	0	0	190.05	431.4	671.7		
(211)m	= {[(98)m x (20	4)] + (21	10)m } x	100 ÷ (2	206)				=				(211)
	684.12	475.69	351.22	179.2	76.19	0	0	0	0	203.92	462.88	720.71		• •
l		<u> </u>	<u> </u>	<u> </u>	<u> </u>	I	I	Tota	l I (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3153.92	(211)

Space heating fuel (accordany) k/M/h/month									
Space heating fuel (secondary), kWh/month = {[(98)m x (201)] + (214) m } x 100 ÷ (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) 161.8 144.45 153.99 140.2 139.54 1	25.69 12	20.58	133.83	134.91	146.08	149.92	156.83		
Efficiency of water heater	23.09	20.30	133.03	134.31	140.00	149.92	130.03	80.1	(216)
	80.1	80.1	80.1	80.1	85.51	87.36	88.1		」` ´ ´ (217)
Fuel for water heating, kWh/month									
$(219)m = (64)m \times 100 \div (217)m$	50.04	<u> </u>	407.00	100.10	470.00	474.04	470.04		
(219)m= 183.95 165.11 177.61 164.38 167.62 1	56.91 1	50.54	167.08	168.43 I = Sum(2	170.83	171.61	178.01	2022.09	(219)
Annual totals				. • • • • • • • • • • • • • • • • • • •		Wh/year		kWh/year	
Space heating fuel used, main system 1						,		3153.92	7
Water heating fuel used								2022.09	Ī
Electricity for pumps, fans and electric keep-hot							!		_
central heating pump:							30		(230c)
boiler with a fan-assisted flue							45		(230e)
Total electricity for the above, kWh/year			sum	of (230a).	(230g) =			75	(231)
Electricity for lighting				, ,	ν ο,			313.34	(232)
, , ,	نام يام ماريط	na mi	oro CHD					313.34	
12a. CO2 emissions – Individual heating system	is includii	ng mid	CIO-CHP						
	Energy kWh/				Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	
Space heating (main system 1)	(211)	x			0.2	16	=	681.25	(261)
Space heating (secondary)	(215)	X			0.5	19	=	0	(263)
Water heating	(219)	X			0.2	16	=	436.77	(264)
Space and water heating	(261) +	- (262) -	+ (263) + (264) =				1118.02	(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	=	162.62	(268)
Total CO2, kg/year				sum o	f (265)(2	271) =		1319.57	(272)
Dwelling CO2 Emission Rate				(272)	÷ (4) =			18.65	(273)

El rating (section 14)

85

(274)

BRUKL Output Document



Compliance with England Building Regulations Part L 2013

Project name

16 Rochester Mews

As designed

Date: Tue Oct 07 10:57:10 2014

Administrative information

Building Details

Address: Workshop Premises, 16 Rochester Mews,

LONDON, NW1 9JB

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.d.2

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v4.2.0

BRUKL compliance check version: v5.2.d.2

Owner Details

Name: Palmhurst Group Telephone number:

Address: , ,

Certifier details

Name: Neil Ingham

Telephone number: 07736 771584

Address: 7 Rosemary Way, Cleethorpes, DN35 0SR

Criterion 1: The calculated CO₂ emission rate for the building should not exceed the target

	4.4
CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	14
Target CO₂ emission rate (TER), kgCO₂/m².annum	14
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	8.2
Are emissions from the building less than or equal to the target?	BER =< TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and the building services should achieve reasonable overall standards of energy efficiency

Values not achieving standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building	Jabiic
Element	

Element	U _{a-Limit}	Ua-Calc	Ui-Calc	Surface where the maximum value occurs*
Wall**	0.35	0.23	0.23	Workshop - Zone 1_W_6
Floor	0.25	0.2	0.2	Workshop - Zone 1_S_3
Roof	0.25	0.13	0.13	Workshop - Zone 1_R_5
Windows***, roof windows, and rooflights	2.2	1.25	1.25	Workshop - Zone 1_G_7
Personnel doors	2.2	1	1	Workshop - Zone 1_D_11
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

U_{a-Limit} = Limiting area-weighted average U-values [W/(m²K)]

U_{a-Calc} = Calculated area-weighted average U-values [W/(m²K)]

U_{i-Calc} = Calculated maximum individual element U-values [W/(m²K)]

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building		
m³/(h.m²) at 50 Pa	10	3		

^{*} There might be more than one surface where the maximum U-value occurs.

^{**} Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

^{***} Display windows and similar glazing are excluded from the U-value check.

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	< 0.9

1- Gas heating

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(I/s)]	HR efficiency			
This system	0.86	-	0.65	-	-			
Standard value	N/A	N/A						
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system NO								

1- PoU

	Water heating efficiency	Storage loss factor [kWh/litre per day]			
This building	1	-			
Standard value	1	N/A			

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide		
Α	Local supply or extract ventilation units serving a single area		
В	Zonal supply system where the fan is remote from the zone		
C Zonal extract system where the fan is remote from the zone			
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery		
Е	Local supply and extract ventilation system serving a single area with heating and heat recovery		
F	Other local ventilation units		
G	Fan-assisted terminal VAV unit		
Н	Fan coil units		
1	Zonal extract system where the fan is remote from the zone with grease filter		

Zone name		SFP [W/(I/s)]						шр "	fficionay		
ID of system type	Α	В	С	D	E	F	G	Н	1	HR efficiency	
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Workshop - Zone 1	0.6	-	-	-	-	-	-	-	-	-	N/A

General lighting and display lighting	Lumino	us effic		
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Workshop - Zone 1	76	-	-	1295

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?	
Workshop - Zone 1	YES (+53.6%)	NO	

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	213.9	213.9
External area [m²]	447.4	447.4
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	7
Average conductance [W/K]	170.35	150.88
Average U-value [W/m²K]	0.38	0.34
Alpha value* [%]	16.66	55.42

^{*} Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

A1/A2 Retail/Financial and Professional services

A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways

0 B1 Offices and Workshop businesses

B2 to B7 General Industrial and Special Industrial Groups

B8 Storage or Distribution

C1 Hotels

C2 Residential Inst.: Hospitals and Care Homes

C2 Residential Inst.: Residential schools

C2 Residential Inst.: Universities and colleges

C2A Secure Residential Inst.

Residential spaces

D1 Non-residential Inst.: Community/Day Centre

D1 Non-residential Inst.: Libraries, Museums, and Galleries

D1 Non-residential Inst.: Education

D1 Non-residential Inst.: Primary Health Care Building D1 Non-residential Inst.: Crown and County Courts

D2 General Assembly and Leisure, Night Clubs and Theatres

Others: Passenger terminals Others: Emergency services

Others: Miscellaneous 24hr activities

Others: Car Parks 24 hrs Others - Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional		
Heating	15.95	21.14		
Cooling	0	0		
Auxiliary	3.19	2.13		
Lighting	4.36	15.31		
Hot water	1.65	1.91		
Equipment*	17.75	17.75		
TOTAL**	25.15	40.49		

^{*} Energy used by equipment does not count towards the total for calculating emissions.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	161.33	84.34
Primary energy* [kWh/m²]	47.7	80.1
Total emissions [kg/m²]	8.2	14

^{*} Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

^{**} Total is net of any electrical energy displaced by CHP generators, if applicable.

ŀ	HVAC Systems Performance									
Sys	stem Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2		Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST	[ST] Flued radiant heater, [HS] Unitary radiant heater, [HFT] Natural Gas, [CFT] Natural Gas									
	Actual	39.5	121.8	15.9	0	3.2	0.69	0	0.86	0
	Notional	65.4	18.9	21.1	0	2.1	0.82	0		Andrews

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption

Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)

Cool SSEER = Cooling system seasonal energy efficiency ratio

Heat gen SSEFF = Heating generator seasonal efficiency

Cool gen SSEER = Cooling generator seasonal energy efficiency ratio

ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Key Features

The BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	U _{i-Тур}	U _{i-Min}	Surface where the minimum value occurs*	
Wall	0.23	0.23	Workshop - Zone 1_W_6	
Floor	0.2	0.2	Workshop - Zone 1_S_3	
Roof	0.15	0.13	Workshop - Zone 1_R_5	
Windows, roof windows, and rooflights	1.5	1.25	Workshop - Zone 1_G_7	
Personnel doors	1.5	1	Workshop - Zone 1_D_11	
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"	
High usage entrance doors	1.5	-	"No external high usage entrance doors"	
U _{I-Typ} = Typical individual element U-values [W/(m²K)] U _{I-Min} = Minimum individual element U-values [W/(m²K)]				
* There might be more than one surface where the minimum U-value occurs.				

Air PermeabilityTypical valueThis buildingm³/(h.m²) at 50 Pa53