Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.8 Printed on 07 October 2020 at 14:38:25

Project Information:

Assessed By: John Ashe (STRO031268) **Building Type:**

Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 75.27m²

Site Reference : COPPETTS WOOD, London Plot Reference: Unit 27 - COPPETTS WOOD, Lo

Address:

Client Details:

Name:

Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas (c), Mains gas (c)

Fuel factor: 1.00 (mains gas (c), mains gas (c))

Target Carbon Dioxide Emission Rate (TER) 17.48 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 10.65 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 48.1 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 44.3 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.13 (max. 0.25)	0.13 (max. 0.70)	OK
Roof	(no roof)		
Openings	0.90 (max. 2.00)	0.90 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals 5.00 (design value)

OK Maximum 10.0

4 Heating efficiency

Main Heating system: Community heating schemes - mains gas

Community boilers

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

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

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

Regulations Compliance Report

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.9	
Maximum	1.5	OK
MVHR efficiency:	91%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	OK
Based on:		
Overshading:	Average or unknown	
Windows facing: East	6.82m²	
Windows facing: West	7.13m²	
Ventilation rate:	4.00	
10 Key features		
Windows U-value	0.9 W/m ² K	
Community heating, heat from boilers – mains gas		
Photovoltaic array		

Thermal Bridge Report

Property Details: Unit 27 - COPPETTS WOOD, London

Address:

Located in: England Region: Thames valley

Thermal bridges:

Thermal bridges: No information on thermal bridging (y=0.15) (y=0.15)

Predicted Energy Assessment



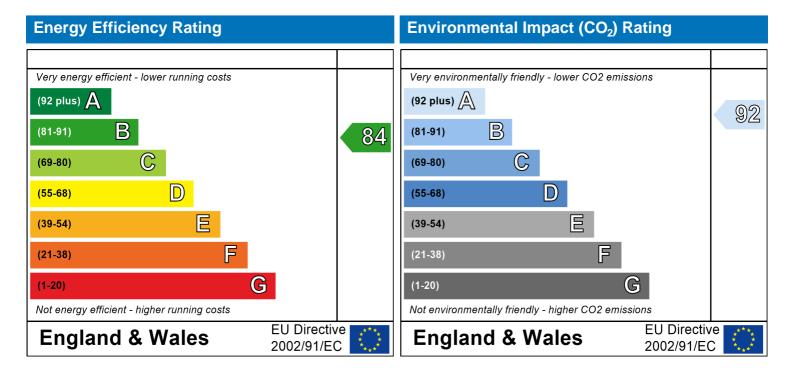
Dwelling type:
Date of assessment:
Produced by:

Ground floor Flat 30 September 2020 John Ashe

Produced by: John Ash Total floor area: 75.27 m²

This is a Predicted Energy Assessment for a property which is not yet complete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, an Energy Performance Certificate is required providing information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2012 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

Developer Confirmation Report

Property Details: Unit 27 - COPPETTS WOOD, London

Address:

Located in: England Region: Thames valley

UPRN:

Date of assessment: 30 September 2020 Date of certificate: 07 October 2020

Assessment type: New dwelling design stage

Transaction type: New dwelling

Thermal Mass Parameter: Indicative Value Low

Comments:

Property description:

Dwelling type: Flat

Detachment:

Year Completed: 2020 Front of dwelling faces: North

Comments:

Opening types:

Name: Type: Frame Factor: U-Value: Area: g-value: Rear Windows Windows 0.7 0.63 0.9 6.82 Left Windows Windows 0.7 0.63 7.13 0.9

Overshading: Average or unknown

Comments:

Opaque Elements:

Type: U-Value: Kappa:

External Elements

Walls

0.15 Please provide the U-Value calculation to justify the U-Value entered into the assessment.

N/A

GF

0.13 Please provide the U-Value calculation to justify the U-Value entered into the assessment.

N/A

Internal Elements (Area, Kappa)
Party Elements (Area, Kappa)

Thermal bridges:

Developer Confirmation Report

Thermal bridges: Comments:	No information on thermal bridging ($y=0.15$) ($y=0.15$)
If specific construction details have	been adopted then please provide the associated checklists; signed and dated.
Ventilation:	
Pressure test: Ventilation:	Yes (As designed) Balanced with heat recovery Number of wet rooms: Kitchen + 2 Ductwork: Insulation, rigid Approved Installation Scheme: True
Pressure test: Comments:	5
Please provide the pressure test ce	rtificate, or certificates if the result is based on an average; signed and dated.
Main heating system:	
Main heating system:	Community heating schemes Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 89 Heat source: Community boilers heat from boilers – mains gas, heat fraction 0.4, efficiency 89 Piping>=1991, pre-insulated, low temp, variable flow
Comments:	
Main heating Control:	
Main heating Control:	Charging system linked to use of community heating, programmer and at least two room thermostats
Comments:	
Considerable and a state of the	
Secondary heating system: Secondary heating system: Comments:	None

Developer Confirmation Report

Water heating:	
Water heating: Comments:	No hot water cylinder
	Solar panel: False
Others:	
Electricity tariff: Low energy lights: Terrain type: Wind turbine: Photovoltaics: Comments:	Standard Tariff 100% Low rise urban / suburban No Photovoltaic 1 Installed Peak power: 0.8504757 Tilt of collector: 30° Overshading: None or very little Collector Orientation: South
Please provide the MCS cer include any calculations to	tificate or data sheet equivalent confirming the size of the array on the roof. This should support a proportioned amount included in the assessment.
Declaration :	
I confirm that the property has Signed:	as been built to the above specification.
Date:	

User Details: **Assessor Name:** John Ashe Stroma Number: STRO031268 Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.8 Property Address: Unit 27 - COPPETTS WOOD, London Address: 1. Overall dwelling dimensions Area(m²) Av. Height(m) Volume(m³) Ground floor 75.27 (1a) x (2a) = 200.22 (3a) 2.66 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)(4)75.27 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =200.22 (5) total m³ per hour main secondary other heating heating x 40 =Number of chimneys (6a) 0 0 x 20 =Number of open flues 0 O O 0 0 (6b) Number of intermittent fans x 10 =(7a) 0 0 x 10 =Number of passive vents (7b) 0 0 x 40 =Number of flueless gas fires (7c)Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = \div (5) = (8) 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) (9) O Additional infiltration (10)[(9)-1]x0.1 =0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)0 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 0 (12) If no draught lobby, enter 0.05, else enter 0 (13)O Percentage of windows and doors draught stripped (14)0 Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0 (15)Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) =O (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise (18) = (16)0.25 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)0 $(20) = 1 - [0.075 \times (19)] =$ Shelter factor (20)1 $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor 0.25 (21)Infiltration rate modified for monthly wind speed Jan Feb Jul Sep Mar Apr Mav Jun Aug Oct Nov Dec Monthly average wind speed from Table 7 (22)m =5.1 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor $(22a)m = (22)m \div 4$ (22a)m 1.27 1.25 1.23 1.08 0.95 0.95 0.92 1 1.08 1.12 1.1 1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a)	x (22a)m					
0.32	0.25	0.27).28	0.29]	
Calculate effective air change rate for the applicable case		•			•	— ,,,,
If mechanical ventilation: If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), other	horwico (22h) -	- (22a)			0.5	(23a)
		= (23a)			0.5	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table		.) (001		(00)	77.35	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (2	- 		-	<u>`</u>) ÷ 100]]	(24a)
(24a)m= 0.43 0.43 0.42 0.39 0.38 0.35 0.35 0.34		ļ ļ).39	0.41]	(24a)
b) If balanced mechanical ventilation without heat recovery (MV) (2-4b)m= 0 0 0 0 0 0 0 0	$\frac{46}{100}$ m = (220)	$\frac{(230)}{0}$	0		1	(24b)
		0	0	0		(240)
c) If whole house extract ventilation or positive input ventilation from if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (23b)$		(23h)				
(24c)m =	0.5	0	0	0	1	(24c)
d) If natural ventilation or whole house positive input ventilation from					J	(= : -)
if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [$.5]				
(24d)m= 0 0 0 0 0 0 0 0	0	0	0	0]	(24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in b	ox (25)	<u> </u>				
(25)m= 0.43 0.43 0.42 0.39 0.38 0.35 0.35 0.34		0.38	0.39	0.41]	(25)
		·			1	
3. Heat losses and heat loss parameter:	-l	A V I I		l l	- A	V I.
ELEMENTGrossOpeningsNet AreaU-valuearea (m²)m²A ,m²W/n	alue n2K	A X U (W/K)		k-value kJ/m²-l		X k I/K
· · ·)+ 0.04] =	5.92				(27)
Windows Type 2 7.13 x1/[1/(0.9)+ 0.04] =	6.19				(27)
Floor 75.27 x 0.1		9.785099	Г			(28)
Walls 50.06 13.95 36.11 x 0.1	==	5.42			╡	(29)
Total area of elements, m ²	<u> </u>	5.42	L			(31)
* for windows and roof windows, use effective window U-value calculated using formula	a 1/[/1/ -value	0+0 041 as di	iven in	naragranl	132	(31)
** include the areas on both sides of internal walls and partitions	i in (in o value)) 10.0-1 _] 40 g/	von m	paragrapi	7 0.2	
Fabric heat loss, $W/K = S (A \times U)$ (26)(3	30) + (32) =				27.32	(33)
Heat capacity $Cm = S(A \times k)$	((28)((30) + (32) +	(32a)	(32e) =	10446.3	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	Indicativ	ve Value: Lo	w		100	(35)
For design assessments where the details of the construction are not known precisely	the indicative v	alues of TM	P in Ta	able 1f		
can be used instead of a detailed calculation.						— (22)
Thermal bridges: S (L x Y) calculated using Appendix K					18.8	(36)
if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss	(33) + (3	36) =			46.12	(37)
Ventilation heat loss calculated monthly		= 0.33 × (25)r	m x (5)		40.12	(0.)
Jan Feb Mar Apr May Jun Jul Aug			Nov	Dec]	
(38)m= 28.54 28.13 27.72 25.65 25.24 23.17 23.17 22.76	- 	_	6.07	26.89	1	(38)
					J	• • •
Heat transfer coefficient, W/K		= (37) + (38)n		72.04	1	
(39)m= 74.66 74.25 73.84 71.77 71.36 69.29 69.29 68.88			2.19	73.01	71.67	(39)
Heat loss parameter (HLP), W/m²K		verage = Sur = (39)m ÷ (4)	11(38)1	12 / 1 🚄	11.01	(33)
					٦	
(40)m= 0.99 0.99 0.98 0.95 0.95 0.92 0.92 0.92	0.93	0.95	0.96	0.97		

Number of days in month (Table 1a)

Numbe	 		Man		N4=	1	11	Δ	0.5.5	0-4	NI	Data	1	
(44)	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. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
	ed occu		N + 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	ΓFA -13.		37		(42)
	A £ 13.9				`	,		, ,.	`					
Reduce	the annua	l average	ater usag hot water	usage by	5% if the c	lwelling is	designed	` ,		se target o		.42		(43)
not more			person per		aler use, i	lot and co	·				ı		1	
11-1	Jan .	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot Wate		i litres per	day for ea	acn montn	va,m = 1a	ctor from 1	1 able 1 c x	(43) 1		-			l	
(44)m=	99.46	95.84	92.22	88.61	84.99	81.37	81.37	84.99	88.61	92.22	95.84	99.46		_
Energy	contant of	hot water	used - cal	culated m	onthly – 1	100 v Vd r	n v nm v [Tm / 360(m(44) ₁₁₂ = ables 1b, 1		1084.99	(44)
-					· ·	·	i			· -	·	,		
(45)m=	147.49	129	133.11	116.05	111.36	96.09	89.04	102.18	103.4	120.5	131.54	142.84		7(45)
If instant	taneous w	ater heatii	ng at point	of use (no	hot water	r storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1422.6	(45)
										40.00	40.70	04.40		(46)
(46)m= Water	22.12 storage	19.35	19.97	17.41	16.7	14.41	13.36	15.33	15.51	18.08	19.73	21.43		(46)
	-		includin	a anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
_		, ,	nd no ta				•							()
		-	hot wate		_			, ,	ers) ente	er '0' in (47)			
	storage			•					,	`	,			
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature fa	actor fro	m Table	2b								0		(49)
Energy	lost fro	m water	storage	, kWh/ye	ear			(48) x (49)) =		1	10		(50)
• • • • • • • • • • • • • • • • • • • •			eclared o	-		or is not	known:							
		•	factor fr		e 2 (kW	h/litre/da	ıy)				0.	02		(51)
	-	_	ee section	on 4.3									İ	
	e factor			O.L.								03		(52)
•			m Table								0	.6		(53)
•			storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	-	03		(54)
	(50) or (, ,	,								1.	03		(55)
Water	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m 			•	
(56)m=		28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er contains	dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primar	y circuit	loss (an	nual) fro	m Table	3							0		(58)
	•	•	culated f			59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor fi	om Tabl	le H5 if t	here is s	solar wat	er heati	ng and a	cylinde	r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi	loss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)

Total hea	at required for	water he	eating ca	alculated	d for	each month	(62)	m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 2	202.77 178.93	188.39	169.55	166.63	14	9.58 144.32	157	'.45	156.89	175.78	185.03	198.12		(62)
Solar DHW	/ input calculated	using App	endix G o	Appendix	(H (ı	negative quantit	y) (en	ter '0'	if no solar	contribu	ition to wate	er heating)	1	
(add add	ditional lines if	FGHRS	and/or \	WWHRS	ар	plies, see Ap	pend	dix G	3)				_	
(63)m=	0 0	0	0	0		0 0	()	0	0	0	0		(63)
Output fr	rom water hea	iter												
(64)m= 2	202.77 178.93	188.39	169.55	166.63	14	9.58 144.32	157	'.45	156.89	175.78	185.03	198.12		
	-							Outp	ut from wa	ater heate	er (annual) ₁	12	2073.44	(64)
Heat gai	ns from water	heating,	kWh/m	onth 0.2	5 ´[[0.85 × (45)m	ı + (6	31)m	ı] + 0.8 x	[(46)m	ı + (57)m	+ (59)m]	
(65)m=	93.26 82.83	88.48	81.38	81.25	74	4.75 73.83	78	.2	77.17	84.29	86.53	91.72		(65)
include	e (57)m in cal	culation of	of (65)m	only if c	ylin	der is in the	dwel	ling	or hot wa	ater is f	from com	munity h	eating	
5. Inter	rnal gains (see	e Table 5	and 5a):										
	c gains (Table			,										
	Jan Feb	Mar	Apr	May	Τ,	Jun Jul	A	ug	Sep	Oct	Nov	Dec		
(66)m= 1	142.02 142.02	142.02	142.02	142.02	┼	2.02 142.02	142	Ť	142.02	142.02	142.02	142.02		(66)
Liahtina :	gains (calcula	ted in Ar	pendix	L. eguat	ion	L L9 or L9a). a	ılso s	ee T	 Гable 5		ļ		ļ	
Ť	47.43 42.12	34.26	25.93	19.39	_	6.37 17.68	22.	_	30.85	39.18	45.72	48.74		(67)
_	es gains (calc	ulated in	Annend	<u> </u>	uati	on I 13 or I 1	3a)	also	see Tah	ole 5	Į		ł	
(68)m= 3		307.42	290.03	268.08		7.45 233.67	230	_	238.6	255.99	277.94	298.57		(68)
	gains (calcula			<u> </u>	<u> </u>								ł	, ,
Ť	51.57 51.57	51.57	51.57	51.57	_	1.57 51.57	51.		51.57	51.57	51.57	51.57	l	(69)
_	and fans gains			0.101	Ļ				001		0	0	İ	• ,
(70)m=		0	0	0		0 0		,	0	0	0	0	1	(70)
<u> </u>				<u> </u>	\	<u> </u>	`	<u> </u>	· I			Ů		(. 0)
_	e.g. evaporation -94.68 -94.68	-94.68	-94.68	-94.68	_	4.68 -94.68	-94	68	-94.68	-94.68	-94.68	-94.68	l	(71)
` ′			-34.00	-34.00	-9	4.00 -94.00	-34	.00	-94.00	-94.00	-94.00	-34.00	İ	(, ,)
_	eating gains (7		113.03	109.2	10	3.81 99.23	10	<u> </u>	107.19	113.29	120.18	123.27]	(72)
			113.03	109.2	10	(66)m + (67)n	<u> </u>				ļ		İ	(12)
	ternal gains = 584.03 579.88	559.51	527.91	495.58	16	6.54 449.5	<u> </u>	.43	475.55	507.36	1 , , ,	569.49	1	(73)
6. Solar		559.51	527.91	490.06	40	0.54 449.5	437	.43	475.55	507.50	542.75	309.49		(73)
	ns are calculated	using sola	r flux from	Table 6a	and	associated equa	ations	to co	nvert to the	e applica	ble orientat	ion		
_	on: Access F	_	Area		ana	Flux	1110110	10 00	9_	c applica	FF	1011.	Gains	
Onoman	Table 6d		m ²			Table 6a		T	9_ able 6b	٦	Table 6c		(W)	
East	0.9x 0.77	x	6.8	32	_x [19.64] x		0.63	7 x [0.7		40.94	(76)
East	0.9x 0.77	X	6.8		x [38.42]]		0.63	_	0.7	= =	80.08	(76)
East	0.9x 0.77	x	6.8		x [63.27]]		0.63	x	0.7	= =	131.88] (76)
East	0.9x 0.77	X	6.8		x [92.28]]		0.63	x	0.7	= =	192.34] (76)
East	0.9x 0.77	Х	6.8		x	113.09) x		0.63	x	0.7		235.72	(76)
East	0.9x 0.77	X	6.8		x [115.77) x		0.63	x	0.7		241.3	(76)
East	0.9x 0.77	X	6.8		x	110.22) x		0.63	x	0.7		229.73] (76)
East	0.9x 0.77	X	6.8		x [94.68) x		0.63	x	0.7		197.33	(76)
					L		_							

East	0.9x	0.77	x	6.8	32	X	7	73.59	X	0.63	X	0.7	=	153.38	(76)
East	0.9x	0.77	x	6.8	32	x	4	15.59	X	0.63	X	0.7	=	95.02	(76)
East	0.9x	0.77	X	6.8	32	X	2	24.49	X	0.63	X	0.7	=	51.04	(76)
East	0.9x	0.77	Х	6.8	32	x	1	16.15	X	0.63	X	0.7	=	33.66	(76)
West	0.9x	0.77	Х	7.1	13	X	1	19.64	X	0.63	x	0.7	=	42.8	(80)
West	0.9x	0.77	X	7.1	13	X	3	38.42	X	0.63	x	0.7	=	83.72	(80)
West	0.9x	0.77	X	7.1	13	x	6	3.27	X	0.63	x	0.7	=	137.87	(80)
West	0.9x	0.77	X	7.1	13	x	9	92.28	X	0.63	x	0.7	=	201.08	(80)
West	0.9x	0.77	X	7.1	13	x	1	13.09	X	0.63	x	0.7	=	246.43	(80)
West	0.9x	0.77	X	7.1	13	x	1	15.77	X	0.63	x	0.7	=	252.27	(80)
West	0.9x	0.77	X	7.1	13	x	1	10.22	X	0.63	x	0.7	=	240.17	(80)
West	0.9x	0.77	X	7.1	13	x	9	94.68	X	0.63	x	0.7	=	206.3	(80)
West	0.9x	0.77	х	7.1	13	x	7	73.59	X	0.63	x	0.7	=	160.35	(80)
West	0.9x	0.77	X	7.1	13	x	4	15.59	X	0.63	x	0.7	=	99.34	(80)
West	0.9x	0.77	X	7.1	13	x	2	24.49	X	0.63	x	0.7	=	53.36	(80)
West	0.9x	0.77	х	7.1	13	x	1	16.15	x	0.63	x	0.7		35.19	(80)
									_						
Solar o	ains in	watts, ca	alculated	l for eac	h mont	h			(83)m	n = Sum(74)m	(82)m	ı			
(83)m=	83.73	163.8	269.75	393.42	482.15	\neg	93.56	469.89	403	- 	194.3		68.86		(83)
Total g	ains – i	nternal a	nd solar	(84)m =	- (73)m	+ (83)m	, watts		!	ļ			_	
(84)m=	667.77	743.68	829.27	921.32	977.73	9	60.11	919.39	861	.06 789.28	701.7	2 647.15	638.35		(84)
L								<u> </u>					1		
7 Me:	an inter	nal temr	erature	(heating	SEASO	n)									
		nal temp					area i	from Tal	0 <u>م</u> ام	Th1 (°C)				24	(85)
Temp	erature	during h	eating p	eriods ir	n the liv	ing			ole 9	, Th1 (°C)				21	(85)
Temp	erature ition fac	during h	neating pains for l	eriods ir	n the liv	ring m (s	ее Та	able 9a)			T 00	t Nov	Doc	21	(85)
Tempe Utilisa	erature ition fac Jan	during heter for g	neating p ains for l Mar	eriods ir iving are Apr	n the liv ea, h1,r May	ring m (s	ee Ta Jun	ble 9a) Jul	Α	ug Sep	Oc		Dec	21	
Tempo Utilisa (86)m=	erature tion fac Jan 0.91	during heter for g Feb 0.89	neating p ains for l Mar 0.83	eriods in iving are Apr 0.72	n the livea, h1,r May	ring m (s	ee Ta Jun ^{0.44}	Jul 0.32	0.3	ug Sep 36 0.55	Oc 0.77		Dec 0.92	21	(85)
Tempo Utilisa (86)m=	erature Ition fac Jan 0.91 interna	during heter for g Feb 0.89	neating p ains for Mar 0.83 ature in	eriods ir iving are Apr 0.72 living are	n the livea, h1,r May 0.59	ring m (s	ee Ta Jun ^{0.44} ow ste	ble 9a) Jul 0.32 ps 3 to 7	0.0	ug Sep 36 0.55 able 9c)	0.77	0.88	0.92	21	(86)
Tempo Utilisa (86)m=	erature tion fac Jan 0.91	during heter for g Feb 0.89	neating p ains for l Mar 0.83	eriods in iving are Apr 0.72	n the livea, h1,r May	ring m (s	ee Ta Jun ^{0.44}	Jul 0.32	0.3	ug Sep 36 0.55 able 9c)		0.88	 	21	
Tempo Utilisa (86)m= Mean (87)m=	erature Ition fac Jan 0.91 Interna	during heter for g Feb 0.89 I temper	meating pains for Mar 0.83 ature in 20.03	eriods in iving are Apr 0.72 living are 20.49	n the livea, h1,r May 0.59 ea T1 (ring m (s follo	Jun 0.44 ow ste	Jul 0.32 ps 3 to 7 20.98	A 0.37 in 1 20.	ug Sep 36 0.55 able 9c)	0.77	0.88	0.92	21	(86)
Tempo Utilisa (86)m= Mean (87)m=	erature Ition fac Jan 0.91 Interna	during heter for g Feb 0.89 I temper	meating pains for Mar 0.83 ature in 20.03	eriods in iving are Apr 0.72 living are 20.49	n the livea, h1,r May 0.59 ea T1 (ring m (s follo	Jun 0.44 ow ste	Jul 0.32 ps 3 to 7 20.98	A 0.37 in 1 20.	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C)	0.77	0.88	0.92	21	(86)
Tempor (88)m= [erature tion fac Jan 0.91 interna 19.4 erature 20.09	during heter for g Feb 0.89 I temper 19.65 during h	meating properties of the control of	eriods ir iving are Apr 0.72 living are 20.49 eriods ir 20.12	n the livea, h1,r May 0.59 ea T1 (20.78 n rest 0 20.13	ring m (s	Jun 0.44 ow ste 20.94 velling 20.15	Jul 0.32 ps 3 to 7 20.98 from Ta 20.15	A 0.37 in 1 20.	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C)	0.77	0.88	0.92	21	(86)
Tempor (88)m= [erature tion fac Jan 0.91 interna 19.4 erature 20.09	during heter for g Feb 0.89 I temper 19.65 during h	meating properties of the control of	eriods ir iving are Apr 0.72 living are 20.49 eriods ir 20.12	n the livea, h1,r May 0.59 ea T1 (20.78 n rest 0 20.13	ring m (s	Jun 0.44 ow ste 20.94 velling 20.15	Jul 0.32 ps 3 to 7 20.98 from Ta 20.15	A 0.37 in 1 20.	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C) 15 20.14	0.77	0.88 3 19.9 3 20.12	0.92	21	(86)
Tempor Utilisa (86)m= [Mean (87)m= [Tempor (88)m= [Utilisa (89)m= [erature Ition fac Jan 0.91 Interna 19.4 erature 20.09 Ition fac 0.9	during heter for g Feb 0.89 I temper 19.65 during heter for g 0.87	meating properties of the second properties of	eriods in iving are Apr 0.72 living are 20.49 eriods in 20.12 rest of d 0.69	n the livea, h1,r May 0.59 ea T1 (20.78 n rest o 20.13 welling 0.55	ring m (s	Jun 0.44 ow ste 20.94 velling 20.15 ,m (se 0.38	Jul 0.32 pps 3 to 7 20.98 g from Ta 20.15 pee Table 0.26	A 0.37 in 1 20.42 able 9 20.42 9 20.42 0.22	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C) 15 20.14	20.48 20.13	0.88 3 19.9 3 20.12	0.92 19.39 20.11	21	(86) (87) (88)
Tempor (86)m= [Mean (87)m= [Tempor (88)m= [Utilisa (89)m= [Mean (87)m= [erature tion fact Jan 0.91 interna 19.4 erature 20.09 tion fact 0.9 interna	during heter for g Feb 0.89 Il temper 19.65 during heter for g 0.87 Il temper	meating properties of the control of	eriods in iving are 0.72 living are 20.49 eriods in 20.12 rest of d 0.69 the rest	n the livea, h1,r May 0.59 ea T1 (20.78 n rest o 20.13 welling 0.55 of dwel	ring (sm (s	ee Ta Jun 0.44 ow ste 20.94 velling 20.15 ,m (se 0.38	Jul 0.32 pps 3 to 7 20.98 g from Ta 20.15 pee Table 0.26	A 0.37 in 1 20. 20. 9a) 0.2	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C) 15 20.14 29 0.49 4 to 7 in Tab	20.48 20.13	0.88 3 19.9 3 20.12 0.86	0.92 19.39 20.11		(86) (87) (88)
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Tempor Utilisa (86)m= [Mean (87)m= [Tempor (88)m= [Utilisa (89)m= [Mean (90)m= [erature Ition fact Jan 0.91 Interna 19.4 erature 20.09 Ition fact 0.9 Interna 17.98	during heter for g Feb 0.89 I temper 19.65 during heter for g 0.87 I temper 18.33	meating properties of the second properties of	eriods in iving are 0.72 living are 20.49 eriods in 20.12 rest of d 0.69 the rest 19.5	n the livea, h1,r May 0.59 ea T1 (20.78 n rest o 20.13 welling 0.55 of dwel 19.89	ring (sm (sfollo	ee Ta Jun 0.44 ow ste 20.94 velling 20.15 ,m (se 0.38 T2 (fe	Jul 0.32 pps 3 to 7 20.98 from Ta 20.15 ee Table 0.26 ollow ste	9a) 0.2	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C) 15 20.14 29 0.49 5 to 7 in Tab 14 20.02	0.77 20.48 20.13 0.74 le 9c) 19.5	0.88 3 19.9 3 20.12 0.86	0.92 19.39 20.11 0.91	21	(86) (87) (88) (89)
Tempor Utilisa (86)m= [Mean (87)m= [Tempor (88)m= [Utilisa (89)m= [Mean (90)m= [erature tion fact Jan 0.91 interna 19.4 erature 20.09 tion fact 0.9 interna 17.98	during heter for g Feb 0.89 l temper 19.65 during h 20.09 eter for g 0.87 l temper 18.33	meating properties of the second properties of	eriods in iving are 0.72 living are 20.49 eriods in 20.12 rest of d 0.69 the rest 19.5	the lives, h1,r May 0.59 ea T1 (20.78 rest o 20.13 welling 0.55 of dwel 19.89	ring m (s follows) follows for the second se	ee Ta Jun 0.44 ow ste 20.94 velling 20.15 ,m (se 0.38 T2 (fe 20.09	Jul 0.32 ps 3 to 7 20.98 from Ta 20.15 ee Table 0.26 ollow ste 20.14 LA × T1	A 0.37 in 1 20. able 9 20. 9a) 0.2 eps 3 20.	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C) 15 20.14 29 0.49 3 to 7 in Tab 14 20.02 — fLA) × T2	0.77 20.48 20.13 0.74 le 9c) 19.5	0.88 3 19.9 3 20.12 0.86 1 18.7 ving area ÷ (0.92 19.39 20.11 0.91 17.96 4) =		(86) (87) (88) (89) (90) (91)
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Tempor Utilisar (86)m= [Mean (87)m= [Tempor (88)m= [Utilisar (89)m= [Mean (90)m= [Mean (90)m= [Apply (93)m= [erature tion fact Jan 0.91 interna 19.4 erature 20.09 tion fact 0.9 interna 17.98 interna 18.51 adjustr 18.51	during heter for g Feb 0.89 I temper 19.65 during heter for g 0.87 I temper 18.33 I temper 18.82 ment to the second of the second o	meating properties of the mean	eriods in iving are Apr 0.72 living are 20.49 eriods in 20.12 rest of d 0.69 the rest 19.5 r the who interna 19.87	n the livea, h1,r May 0.59 ea T1 (20.78 n rest o 20.13 welling 0.55 of dwel 19.89	ring m (s follows) follows fol	ee Ta Jun 0.44 ow ste 20.94 velling 20.15 ,m (se 0.38 T2 (fo 20.09 g) = fl 20.41	Jul 0.32 pps 3 to 7 20.98 g from Ta 20.15 pee Table 0.26 ollow ste 20.14 LA × T1 20.45	A A 0.37 in 1 20.37 in 1 20.39 a) 0.20	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C) 15 20.14 29 0.49 3 to 7 in Tab 14 20.02 - fLA) × T2 45 20.34 where appr	0.77 20.48 20.13 0.74 0.74 le 9c) 19.55 fLA = Li	0.88 3 19.9 3 20.12 0.86 1 18.7 ving area ÷ (0.92 19.39 20.11 0.91 17.96 4) =		(86) (87) (88) (89) (90) (91)
Tempor Utilisa (86)m= [Mean (87)m= [Tempor (88)m= [Utilisa (89)m= [Mean (90)m= [Mean (92)m= [Apply (93)m= [8. Spa	erature Ition fact Jan 0.91 interna 19.4 erature 20.09 Ition fact 0.9 interna 17.98 interna 18.51 adjustr 18.51 acc hea	during heter for g Feb 0.89 1 temper 19.65 during h 20.09 eter for g 0.87 1 temper 18.33 Il temper 18.82 ment to th 18.82 uting required	meating properties of the mean	eriods in iving are Apr 0.72 living are 20.49 eriods in 20.12 rest of d 0.69 the rest 19.5 r the what 19.87 internal 19.87	the live ea, h1,r May 0.59 ea T1 (20.78 m rest o 20.13 welling 0.55 of dwelling 19.89 cole dw 20.22 tempe 20.22	ring m (s follows) follows fol	ee Ta Jun 0.44 ow ste 20.94 velling 20.15 ,m (se 0.38 T2 (fe 20.09 g) = fl 20.41 ure fro 20.41	Jul 0.32 ps 3 to 7 20.98 from Ta 20.15 ee Table 0.26 ollow ste 20.14 LA × T1 20.45 om Table 20.45	A 0.37 in 1 20. 20. 20. 20. 20. 20. 20. 20. 20. 20.	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C) 15 20.14 29 0.49 3 to 7 in Tab 14 20.02 - fLA) × T2 45 20.34 where appr 45 20.34	0.77 20.48 20.13 0.74 le 9c) 19.56 fLA = Li 19.88 opriate 19.88	0.88 3 19.9 3 20.12 0.86 1 18.7 ving area ÷ (3 19.15	0.92 19.39 20.11 0.91 17.96 4) =	0.38	(86) (87) (88) (89) (90) (91) (92)
Tempor Utilisa (86)m= [Mean (87)m= [Tempor (88)m= [Utilisa (89)m= [Mean (90)m= [Mean (92)m= [Apply (93)m= [8. Span Set Ti	erature Ition factorial Jan 0.91 interna 19.4 erature 20.09 Ition factorial 17.98 interna 18.51 adjustr 18.51 ace head to the internal	during heter for g Feb 0.89 1 temper 19.65 during h 20.09 eter for g 0.87 1 temper 18.33 Il temper 18.82 ment to th 18.82 uting required	meating properties of the mean	eriods in iving are Apr 0.72 living are 20.49 eriods in 20.12 rest of d 0.69 the rest 19.5 r the who 19.87 interna 19.87	the lives, h1,r May 0.59 ea T1 (20.78 rest o 20.13 welling 0.55 of dwelling 19.89 cole dwelling 20.22 tempe 20.22	ring m (s follows) follows fol	ee Ta Jun 0.44 ow ste 20.94 velling 20.15 ,m (se 0.38 T2 (fe 20.09 g) = fl 20.41 ure fro 20.41	Jul 0.32 ps 3 to 7 20.98 from Ta 20.15 ee Table 0.26 ollow ste 20.14 LA × T1 20.45 om Table 20.45	A 0.37 in 1 20. 20. 20. 20. 20. 20. 20. 20. 20. 20.	ug Sep 36 0.55 Table 9c) 97 20.87 9, Th2 (°C) 15 20.14 29 0.49 3 to 7 in Tab 14 20.02 - fLA) × T2 45 20.34 where appr	0.77 20.48 20.13 0.74 le 9c) 19.56 fLA = Li 19.88 opriate 19.88	0.88 3 19.9 3 20.12 0.86 1 18.7 ving area ÷ (3 19.15	0.92 19.39 20.11 0.91 17.96 4) =	0.38	(86) (87) (88) (89) (90) (91) (92)

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Litilioot	tion foo	tor for a	aina hm											
(94)m=	0.88	tor for g	0.79	0.69	0.55	0.4	0.29	0.32	0.51	0.72	0.84	0.89	1	(94)
_		ļ		4)m x (8									J	, ,
	589.01	631.5	654.56	631.28	541.31	385	262.44	272.72	400.38	508.66	545.85	568.88]	(95)
Month	ly aver	age exte	rnal tem	perature	from Ta	able 8							•	
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
						i	=[(39)m :		<u> </u>	ī	000.0	1040.70	1	(07)
` '		1033.77	<u> </u>	787.54	608.05	402.6	267.05 th = 0.02	279.04	437.29	661.99	869.9	1043.79	J	(97)
· -	351.21	270.32	216.5	112.51	49.66	0	0.02	0	0	114.07	233.32	353.34]	
` ′ L			ļ					ITota	l Il per year	L (kWh/year		18) _{15,912} =	1700.92	(98)
Space	heatin	g require	ement in	kWh/m²	² /year								22.6	(99)
•		•		mmunity		scheme	j							
							ater heat	ting prov	rided by	a comm	unity scł	neme.		
							heating (,		0	(301)
Fraction	n of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
							procedure			up to four	other heat	sources; t	he latter	
			_	<i>mal and wa</i> nity boile		rom powe	r stations.	See Appei	ndıx C.				0.4	(303a)
Fraction	n of cor	nmunity	heat fro	m heat s	source 2								0.4	(303b)
Fraction	n of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	sa) =	0.4	(304a)
Fraction	n of tota	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	8b) =	0.4	(304b)
Factor f	or cont	rol and	charging	method	(Table	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distribu	ition los	ss factor	(Table 1	12c) for (commun	ity heatii	ng syste	m					1.05	(306)
Space I	heating	g											kWh/yea	ar
Annual	space	heating	requiren	nent									1700.92	
Space h	neat fro	m Com	munity b	oilers					(98) x (30	04a) x (30	5) x (306)	=	714.39	(307a)
Space h	neat fro	m heat	source 2	2					(98) x (30	04b) x (30	5) x (306)	=	714.39	(307b)
Efficien	cy of se	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308)
Space h	neating	require	ment fro	m secon	dary/sup	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water h				1										_
		neating r ommuni	•										2073.44	
		m Comn							(64) x (30	03a) x (30	5) x (306)	=	870.84	(310a)
Water h	neat fro	m heat s	source 2						(64) x (30	03b) x (30	5) x (306)	=	870.84	(310b)
Electrici	ity used	d for hea	at distrib	ution				0.01	× [(307a)	(307e) +	· (310a)	(310e)] =	31.7	(313)
Cooling	Syster	m Energ	y Efficie	ncy Rati	0								0	(314)
Space o	cooling	(if there	is a fixe	ed coolin	g systen	n, if not e	enter 0)		= (107) ÷	(314) =			0	(315)
				within du): put from	outside					274.8	(330a)
modial	noai ve	madon	Jaiail	Jou, GAII	act of po	JIIIVG III	Pat 110111	Juliaue					214.0	(0000)

				_
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year		=(330a) + (330b) + (330g) =	274.8	(331)
Energy for lighting (calculated in Append	dix L)		335.02	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)		-734.49	(333)
Electricity generated by wind turbine (Ap	opendix M) (negative quantity)		0	(334)
10b. Fuel costs – Community heating s	scheme			
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x	4.24 x 0.01 =	30.29	(340a)
Space heating from heat source 2	(307b) x	4.24 × 0.01 =	30.29	(340b)
Water heating from CHP	(310a) x	4.24 x 0.01 =	36.92	(342a)
Water heating from heat source 2	(310b) x	4.24 x 0.01 =	36.92	(342b)
		Fuel Price		
Pumps and fans	(331)	13.19 x 0.01 =	36.25	(349)
Energy for lighting	(332)	13.19 x 0.01 =	44.19	(350)
Additional standing charges (Table 12)			120	(351)
Energy saving/generation technologies				
Total energy cost	= (340a)(342e) + (345)(354) =		334.86	(355)
11b. SAP rating - Community heating s	scheme			
Energy cost deflator (Table 12)			0.42	(356)
Energy cost factor (ECF)	$[(355) \times (356)] \div [(4) + 45.0] =$		1.17	(357)
SAP rating (section12)			83.69	(358)
12b. CO2 Emissions – Community heat		ergy Emission factor	Emissions	
		h/year kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and w				
Efficiency of heat source 1 (%)	· ·	s repeat (363) to (366) for the second fu	09	(367a)
Efficiency of heat source 2 (%)	If there is CHP using two fuels	s repeat (363) to (366) for the second fu	el 89	(367b)
CO2 associated with heat source 1	[(307b)+(310b)] x	100 ÷ (367b) x 0.22	384.73	(367)
CO2 associated with heat source 2	[(307b)+(310b)] x	100 ÷ (367b) x 0.22	384.73	(368)
Electrical energy for heat distribution	[(313) x	0.52	16.45	(372)
Total CO2 associated with community s	ystems (363)(36	66) + (368)(372)	785.91	(373)
CO2 associated with space heating (see	condary) (309) x	0	= 0	(374)
CO2 associated with water from immers	sion heater or instantaneous hea	ater (312) x 0.22	0	(375)
Total CO2 associated with space and w	ater heating (373) + (3	74) + (375) =	785.91	(376)
CO2 associated with electricity for pump	os and fans within dwelling (331)) x 0.52	142.62	(378)

CO2 associated with electricity for lighti	ng	(332))) x	0.52	= 173.87	(379)
Energy saving/generation technologies		, ,,,,	0.02		_ '` ′
Item 1	(000) to (001) do app.		0.52 × 0.01	-381.2	(380)
Total CO2, kg/year	sum of (376)(382) =			721.21	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			9.58	(384)
El rating (section 14)				91.96	(385)
13b. Primary Energy – Community heat	ing scheme				
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Energy from other sources of space and Efficiency of heat source 1 (%)	3 \	HP) sing two fuels repeat (363) to	o (366) for the second f	fuel 89	(367a)
Efficiency of heat source 2 (%)	If there is CHP us	sing two fuels repeat (363) t	o (366) for the second f	fuel 89	(367b)
Energy associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	1.22	= 2173.01	(367)
Energy associated with heat source 2	[(307b	y)+(310b)] x 100 ÷ (367b) x	1.22	= 2173.01	(368)
Electrical energy for heat distribution		[(313) x		97.33	(372)
Total Energy associated with communit	y systems	(363)(366) + (368)(3	72)	= 4443.36	(373)
if it is negative set (373) to zero (unle	ss specified otherwise	, see C7 in Appendix	C)	4443.36	(373)
Energy associated with space heating (secondary)	(309) x	0	= 0	(374)
Energy associated with water from imm	ersion heater or instar	ntaneous heater(312) x	1.22	= 0	(375)
Total Energy associated with space and	d water heating	(373) + (374) + (375) =		4443.36	(376)
Energy associated with space cooling		(315) x	3.07	= 0	(377)
Energy associated with electricity for pu	ımps and fans within d	welling (331)) x	3.07	= 843.63	(378)
Energy associated with electricity for lig	hting	(332))) x	3.07	= 1028.51	(379)
Energy saving/generation technologies Item 1			3.07 × 0.01	-2254.88	(380)

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

Total Primary Energy, kWh/year

(383)

4060.62

			l Iser F	Details:						
Assessor Name:	John Ashe		O S C I L	Strom	o Num	hori		STDO	031268	
Software Name:	Stroma FSAP 2	2012		Softwa					on: 1.0.5.8	
			roperty Address: Unit 27 - COPPETTS WOOD, London							
Address :										
1. Overall dwelling dime	ensions:									
0 10				a(m²)			ight(m)	1	Volume(m³)	_
Ground floor			7	75.27	(1a) x	2	.66	(2a) =	200.22	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+	·(1e)+(1r	ገ) <u>7</u>	75.27	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	200.22	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	٢
Number of chimneys	0 +		+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	<u> </u>	0	Ī - [0	x	20 =	0	(6b)
Number of intermittent fa	ans				, 	3	x .	10 =	30	(7a)
Number of passive vents	3				F	0	x -	10 =	0	(7b)
Number of flueless gas f	ires				<u> </u>	0	x 4	40 =	0	(7c)
gae i					L					
								Air ch	nanges per ho	ur
Infiltration due to chimne	ys, flues and fans =	= (6a)+(6b)+(7	7a)+(7b)+((7c) =	Γ	30		÷ (5) =	0.15	(8)
If a pressurisation test has b		ended, procee	d to (17),	otherwise o	continue fr	om (9) to ((16)			_ _
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration Structural infiltration: 0	OF for atool or timb	or frama ar	. 0 25 fo	r maaan		uction	[(9)	-1]x0.1 =	0	(10)
if both types of wall are p					•	uction			0	(11)
deducting areas of openi	ngs); if equal user 0.35	,	J		,					
If suspended wooden	•	,	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	•								0	(13)
Percentage of window	s and doors draugh	it stripped		0.25 - [0.2	v (14) · 1	001 -			0	(14)
Window infiltration Infiltration rate				(8) + (10)	. ,	- 1	+ (15) =		0	(15)
Air permeability value,	a50 expressed in	cubic metre	s ner ho	. , , , ,	, , ,	, , ,	, ,	area	5	(16)
If based on air permeabi	•		•	•	•	0110 01 0	птоюро	aroa	0.4	(18)
Air permeability value applie	-					is being u	sed		<u> </u>	
Number of sides sheltered	ed								0	(19)
Shelter factor				(20) = 1 -		9)] =			1	(20)
Infiltration rate incorpora	•			(21) = (18) x (20) =				0.4	(21)
Infiltration rate modified t	 	1	1	Δ	0	0-4	l Na	D.,	1	
Jan Feb		ay Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	
Monthly average wind sp	1 1	2 2 2 2	2.0	2.7	4	4.0	A F	4.7	1	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
(22a)m= 1.27 1.25	1.23 1.1 1.0	8 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m	
	.47
Calculate effective air change rate for the applicable case	
If mechanical ventilation:	0 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a)	0 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	0 (23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (`
(2-10)	0 (24a)
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b)	
(24b)m= 0 0 0 0 0 0 0 0 0 0	0 (24b)
c) If whole house extract ventilation or positive input ventilation from outside if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b)m + 0.5 \times (23b)$	
(24c)m= 0 0 0 0 0 0 0 0 0 0 0	0 (24c)
d) If natural ventilation or whole house positive input ventilation from loft if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m² x 0.5]	
(24d)m= 0.63 0.62 0.62 0.6 0.59 0.57 0.57 0.57 0.58 0.59 0.6 0.	.61 (24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25)	
(25)m= 0.63 0.62 0.62 0.6 0.59 0.57 0.57 0.57 0.58 0.59 0.6 0.	.61 (25)
3. Heat losses and heat loss parameter:	
·	value A X k
	/m²-K kJ/K
Windows Type 1 $6.82 x^{1/[1/(1.4) + 0.04]} = 9.04$	(27)
Windows Type 2 7.13 $x^{1/[1/(1.4) + 0.04]} = 9.45$	(27)
Floor 75.27 x 0.13 = 9.785099	(28)
Walls 50.06 13.95 36.11 x 0.18 = 6.5	(29)
Total area of elements, m ²	(31)
* for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in para ** include the areas on both sides of internal walls and partitions	, ,
Fabric heat loss, $W/K = S (A \times U)$ (26)(30) + (32) =	34.78 (33)
Heat capacity $Cm = S(A \times k)$ ((28)(30) + (32) + (32a)(32a)	(34) (24)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium	250 (35)
For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table can be used instead of a detailed calculation.	1f
Thermal bridges : S (L x Y) calculated using Appendix K	6.27 (36)
if details of thermal bridging are not known (36) = 0.05 x (31)	
Total fabric heat loss (33) + (36) =	41.05 (37)
Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$	 1
	Dec
(38)m= 41.62 41.29 40.96 39.43 39.14 37.8 37.8 37.55 38.32 39.14 39.72 40	0.33 (38)
Heat transfer coefficient, W/K $(39)m = (37) + (38)m$	
(39)m= 82.67 82.33 82.01 80.47 80.19 78.85 78.85 78.6 79.36 80.19 80.77 81	1.37
Heat loss parameter (HLP), W/m ² K	2= 80.47 (39)
(40)m= 1.1 1.09 1.09 1.07 1.07 1.05 1.05 1.04 1.05 1.07 1.07 1.	.08
Average = Sum(40) ₁₁₂ /1:	2= 1.07 (40)

Numbe	er of day	s in moi	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
										•	•			
4. Wa	ater heat	ing ene	rgy requi	irement:								kWh/ye	ear:	
Accum	ned occu	nanov l	NI									07	1	(40)
	A > 13.9			[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		37		(42)
	A £ 13.9	•											•	
	I average the annua									se target o		.42		(43)
	e that 125	-				_	-							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	er usage ir	litres per	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m=	99.46	95.84	92.22	88.61	84.99	81.37	81.37	84.99	88.61	92.22	95.84	99.46		
Eneray (content of	hot water	used - cal	culated m	onthly – 4	190 v Vd r	m v nm v [Tm / 360(m(44) ₁₁₂ = ables 1b, 1		1084.99	(44)
-				i		·	ı		ı	· ·		,	1	
(45)m=	147.49	129	133.11	116.05	111.36	96.09	89.04	102.18	103.4	120.5	131.54 m(45) ₁₁₂ =	142.84	1422.6	(45)
If instant	taneous w	ater heatii	ng at point	of use (no	o hot water	storage),	enter 0 in	boxes (46		Total = Su	III(43) ₁₁₂ =		1422.0	
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage													
•	e volum	, ,		•			_		ame ves	sel		150		(47)
	munity h	_			_				are) ant	ar '∩' in <i>(</i>	47 \			
	storage		not wate	:i (tili5 ii	iciuues i	HStaritai	ieous cc	ווטט וטווות	cis) cill	51 0 111 (41)			
	nanufacti		eclared l	oss fact	or is kno	wn (kWł	n/day):					0		(48)
Tempe	erature fa	actor fro	m Table	2b								0		(49)
Energy	lost fro	m water	storage	, kWh/y	ear			(48) x (49) =			0		(50)
•	nanufacti			-									· !	(-4)
	ater stora munity h	-			ie Z (KVV	n/iitre/da	ay)					0		(51)
	e factor	_										0		(52)
Tempe	erature fa	actor fro	m Table	2b								0		(53)
Energy	y lost fro	m water	storage	, kWh/y	ear			(47) x (51) x (52) x (53) =		0		(54)
	(50) or (, ,	,									0		(55)
Water	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m 				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contains	dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – ([H11)] ÷ (5	0), else (5	7)m = (56) •	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primar	y circuit	loss (ar	nual) fro	m Table	e 3							0		(58)
	y circuit				,	•	` '	, ,		.1				
,	dified by						r			r	<u> </u>	_	1	(50)
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
	loss cal			·	ì ´	`	`	í 	_	1 -	_		I	(04)
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)

Total hea	at requi	ired for	water h	eating ca	alculated	d fo	r each	n month	(62)	m =	0.85 × (45)m	+ ((46)m +	(57)r	n +	(59)m + (61)m	
(62)m= 1	125.37	109.65	113.15	98.64	94.65	8	1.68	75.69	86.8	35	87.89	102.	43	111.81	121	.41		(62)
Solar DHW	/ input ca	alculated i	using App	endix G oı	Appendix	(H ((negativ	e quantity	v) (ent	er '0'	if no solar	contri	ibuti	on to wate	r hea	ting)	•	
(add add	ditional	lines if I	FGHRS	and/or \	VWHRS	ap	plies,	see Ap	pend	ix G	S)							
(63)m=	0	0	0	0	0		0	0	0		0	0		0	0			(63)
Output fr	rom wa	ter heat	ter															
(64)m= 1	125.37	109.65	113.15	98.64	94.65	8	1.68	75.69	86.8	35	87.89	102.	43	111.81	121	.41		-
										Outp	ut from wa	ater he	ater	(annual) _{1.}	12		1209.21	(64)
Heat gai	ns from	water	heating,	kWh/m	onth 0.2	5 ′	[0.85	× (45)m	+ (6	1)m] + 0.8 x	[(46)m ·	+ (57)m	+ (59	9)m]	
(65)m=	31.34	27.41	28.29	24.66	23.66	2	0.42	18.92	21.7	71	21.97	25.6	31	27.95	30.3	35		(65)
includ	e (57)m	n in calc	culation	of (65)m	only if c	ylir	nder is	s in the o	dwell	ing	or hot wa	ater i	s fro	om comi	muni	ity h	eating	
5. Inter	rnal gai	ns (see	Table 5	and 5a):													
Metaboli	c gains	(Table	5), Wat	ts														
	Jan	Feb	Mar	Apr	May		Jun	Jul	Αι	Jg	Sep	Od	ct	Nov	D	ес		
(66)m=	118.35	118.35	118.35	118.35	118.35	1	18.35	118.35	118.	.35	118.35	118.	35	118.35	118	.35		(66)
Lighting	gains (calculat	ted in Ap	pendix	L, equat	ion	L9 or	L9a), a	lso s	ee 7	Table 5							
(67)m=	18.97	16.85	13.7	10.37	7.75	(6.55	7.07	9.1	9	12.34	15.6	67	18.29	19.	.5		(67)
Appliand	es gair	ns (calc	ulated ir	Append	dix L, eq	uat	tion L1	13 or L1	3a), a	also	see Tal	ole 5					•	
(68)m= 2	209.27	211.44	205.97	194.32	179.62	10	65.79	156.56	154.	.39	159.86	171.	51	186.22	200	.04		(68)
Cooking	gains (calcula	ted in A	ppendix	L, equa	tior	ո L15 ։	or L15a)	, als	o se	e Table	5					•	
(69)m=	34.83	34.83	34.83	34.83	34.83	3	4.83	34.83	34.8	33	34.83	34.8	3	34.83	34.8	83		(69)
Pumps a	and fans	s gains	(Table 5	Ба)		_	•			•	•		•				'	
(70)m=	0	0	0	0	0		0	0	0		0	0		0	0			(70)
Losses e	e.g. eva	poratio	n (nega	tive valu	es) (Tab	le :	 5)			'	•		•					
(71)m=	-94.68	-94.68	-94.68	-94.68	-94.68	-6	94.68	-94.68	-94.	68	-94.68	-94.6	68	-94.68	-94.	.68		(71)
Water he	eating g	gains (T	able 5)				•			•	•		•				•	
(72)m=	42.13	40.79	38.02	34.25	31.81	2	8.36	25.43	29.	18	30.52	34.4	2	38.82	40.	.8		(72)
Total int	ternal g	gains =				_	(66)	m + (67)m	+ (68)m +	· (69)m + (70)m -	+ (71	1)m + (72)	m		ı	
(73)m= 3	328.87	327.59	316.2	297.45	277.68	2	59.21	247.57	251.	.27	261.22	280.	.1	301.83	318	.84		(73)
6. Solai	r gains:						1											
Solar gai	ns are ca	lculated u	using sola	r flux from	Table 6a	and	associ	ated equa	tions t	о со	nvert to the	e appl	icab	le orientati	ion.			
Orientati			actor	Area			Flu			_	g		_	FF			Gains	
	Ta	able 6d		m²			Tab	ole 6a		Ta	able 6b		la	able 6c			(W)	
East	0.9x	0.77	Х	6.8	32	x	1	9.64	X		0.63	X		0.7		=	40.94	(76)
East	0.9x	0.77	X	6.8	32	x	3	8.42	X		0.63	X		0.7		=	80.08	(76)
East	0.9x	0.77	X	6.8	32	x	6	3.27	x		0.63	X		0.7		=	131.88	(76)
East	0.9x	0.77	х	6.8	32	x	9:	2.28	x		0.63	X		0.7		=	192.34	(76)
East	0.9x	0.77	х	6.8	32	X	11	13.09	x		0.63	X		0.7		=	235.72	(76)
East	0.9x	0.77	X	6.8	32	x	11	15.77	x		0.63	X		0.7		=	241.3	(76)
East	0.9x	0.77	x	6.8	32	x	11	10.22	x		0.63	X		0.7		=	229.73	(76)
East	0.9x	0.77	X	6.8	32	x	9	4.68	x		0.63	x		0.7		=	197.33	(76)
			_						_									

	_								_						
East	0.9x	0.77	X	6.8	32	X	7	73.59	X	0.63	X	0.7	=	153.38	(76)
East	0.9x	0.77	X	6.8	32	X	4	15.59	X	0.63	X	0.7	=	95.02	(76)
East	0.9x	0.77	X	6.8	32	X	2	24.49	X	0.63	X	0.7	=	51.04	(76)
East	0.9x	0.77	X	6.8	32	X	1	16.15	X	0.63	X	0.7	=	33.66	(76)
West	0.9x	0.77	X	7.′	13	x	1	19.64	x	0.63	X	0.7	=	42.8	(80)
West	0.9x	0.77	X	7.′	13	x	3	38.42	x	0.63	X	0.7	=	83.72	(80)
West	0.9x	0.77	Х	7.′	13	x	6	63.27	x	0.63	X	0.7	=	137.87	(80)
West	0.9x	0.77	Х	7.′	13	x	9	92.28	x	0.63	x	0.7	=	201.08	(80)
West	0.9x	0.77	X	7.′	13	x	1	13.09	x	0.63	x	0.7	=	246.43	(80)
West	0.9x	0.77	Х	7.′	13	x	1	15.77	x	0.63	X	0.7	=	252.27	(80)
West	0.9x	0.77	X	7.′	13	x	1	10.22	X	0.63	x	0.7	=	240.17	(80)
West	0.9x	0.77	X	7.′	13	x	9	94.68	x	0.63	x	0.7	=	206.3	(80)
West	0.9x	0.77	X	7.′	13	x	7	73.59	x	0.63	x	0.7	=	160.35	(80)
West	0.9x	0.77	Х	7.′	13	x	4	15.59	x	0.63	x	0.7	=	99.34	(80)
West	0.9x	0.77	X	7.′	13	x	2	24.49	x	0.63	x	0.7	=	53.36	(80)
West	0.9x	0.77	X	7.′	13	x	1	16.15	x	0.63	x	0.7	=	35.19	(80)
Solar q	ains in	watts, ca	alculated	I for eac	h mont	h			(83)m	n = Sum(74)m .	(82)m				
(83)m=	83.73	163.8	269.75	393.42	482.15	\neg	93.56	469.89	403	.63 313.73	194.3	6 104.4	68.86]	(83)
Total g	ains – i	nternal a	nd solar	(84)m =	= (73)m	1 + (83)m	, watts			!			J	
(84)m=	412.61	491.39	585.95	690.87	759.83	7	52.77	717.47	654	1.9 574.96	474.4	6 406.24	387.7]	(84)
														4	
7. Me	an inter	nal temr	erature	(heating	seaso	n)									
			erature neating p	•			area t	from Tal	ole 9	. Th1 (°C)				21	(85)
Temp	erature	during h	eating p	eriods i	n the liv	/ing			ole 9	, Th1 (°C)				21	(85)
Temp	erature ition fac	during h	neating pains for l	eriods in	n the liv ea, h1,r	ving m (s	ее Та	able 9a)			Oct	Nov	Dec	21	(85)
Temp	erature	during h	eating p	eriods i	n the liv	ring m (s				ug Sep	Oct	Nov 1	Dec 1	21	(85)
Temp Utilisa (86)m=	erature ition fac Jan 1	during hetor for g Feb	neating pains for Mar	eriods in iving are Apr 0.95	n the livea, h1,r May	ving m (s	ee Ta Jun ^{0.64}	Jul 0.48	A 0.5	ug Sep 54 0.82	<u> </u>			21	
Temp Utilisa (86)m=	erature Ition fac Jan 1 interna	during heter for g Feb 1 I temper	neating p ains for l Mar 0.99 ature in	eriods in living are Apr 0.95 living ar	n the livea, h1,r May 0.83	ring m (s	ee Ta Jun ^{0.64} ow ste	Jul 0.48	0.5 7 in T	ug Sep 54 0.82 able 9c)	0.98	1	1	21	(86)
Temp Utilisa (86)m= Mean (87)m=	erature Ition fac Jan 1 interna	during heter for g Feb 1 I temper	meating pains for Mar 0.99 ature in 20.23	eriods in living are Apr 0.95 living ar 20.6	n the livea, h1,r May 0.83 ea T1 (ring m (s r follo	ee Ta Jun 0.64 ow ste	Jul 0.48 ps 3 to 7	0.5 7 in T 20.	ug Sep 54 0.82 Table 9c) 99 20.9	<u> </u>	1		21	
Temp Utilisa (86)m= Mean (87)m= Temp	erature Ition fac Jan 1 interna 19.78 erature	during heter for g Feb 1 I temper 19.95 during h	neating pains for Mar 0.99 ature in 20.23	eriods in iving are 0.95 living are 20.6 eriods in	n the lives a, h1,r May 0.83 ea T1 (20.86	ring (s	ee Ta Jun 0.64 ow ste 20.97 velling	Jul 0.48 ps 3 to 7 21	A 0.57 in T 20.	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C)	0.98	1 20.09	19.76	21	(86)
Temp Utilisa (86)m= Mean (87)m=	erature Ition fac Jan 1 interna	during heter for g Feb 1 I temper	meating pains for Mar 0.99 ature in 20.23	eriods in living are Apr 0.95 living ar 20.6	n the livea, h1,r May 0.83 ea T1 (ring (s	ee Ta Jun 0.64 ow ste	Jul 0.48 ps 3 to 7	0.5 7 in T 20.	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C)	0.98	1 20.09	1	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m=	erature ation fac Jan 1 interna 19.78 erature 20	during heter for g Feb 1 I temper 19.95 during h	meating properties of the control of	Apr 0.95 living are 20.6 eriods in	n the livea, h1,r May 0.83 ea T1 (20.86 n rest o 20.03	ring m (s	Jun 0.64 ow ste 20.97 velling	Jul 0.48 ps 3 to 7 21 from Ta	A 0.57 in T 20.	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C)	0.98	1 20.09	19.76	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m=	erature ation fac Jan 1 interna 19.78 erature 20	during heter for g Feb 1 I temper 19.95 during h	meating properties of the control of	Apr 0.95 living are 20.6 eriods in	n the livea, h1,r May 0.83 ea T1 (20.86 n rest o 20.03	ving m (s	Jun 0.64 ow ste 20.97 velling	Jul 0.48 ps 3 to 7 21 from Ta 20.04	A 0.57 in T 20.	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04	0.98	1 20.09	19.76	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	erature ation fac Jan 1 interna 19.78 erature 20 ation fac	during heter for g Feb 1 I temper 19.95 during heter for g 1	meating properties of the second properties of	Apr 0.95 living are 20.6 eriods ii 20.03 rest of d 0.93	n the livea, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78	ring m (s	ee Ta Jun 0.64 ww ste 20.97 velling 20.04 m (se 0.56	Jul 0.48 eps 3 to 7 21 g from Ta 20.04 ee Table 0.38	A 0.57 in T 20. able 9 20. 9a) 0.4	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04	0.98 20.53 20.03	1 3 20.09 3 20.02	19.76	21	(86) (87) (88)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	erature ation fac Jan 1 interna 19.78 erature 20 ation fac	during heter for g Feb 1 I temper 19.95 during heter for g 1	meating properties of the second properties of	Apr 0.95 living are 20.6 eriods ii 20.03 rest of d 0.93	n the livea, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78	ring m (s follows) follows for the second se	ee Ta Jun 0.64 ww ste 20.97 velling 20.04 m (se 0.56	Jul 0.48 eps 3 to 7 21 g from Ta 20.04 ee Table 0.38	A 0.57 in T 20. able 9 20. 9a) 0.4	ug Sep 64 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 13 0.75 1 to 7 in Table	0.98 20.53 20.03	1 3 20.09 3 20.02	19.76	21	(86) (87) (88)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean	erature Ition fac Jan 1 interna 19.78 erature 20 Ition fac 1 interna	during heter for g Feb 1 I temper 19.95 during heter for g 1 I temper	neating properties of the seating properties	Apr 0.95 living are 20.6 eriods in 20.03 rest of d 0.93 the rest	n the livea, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78 of dwel	ring m (s follows) follows for the second se	ee Ta Jun 0.64 ow ste 20.97 velling 20.04 m (se 0.56 T2 (fe	Jul 0.48 ps 3 to 7 21 from Ta 20.04 ee Table 0.38 ollow ste	A 0.5.7 in T 20. 20. 20. 9a) 0.4	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 43 0.75 6 to 7 in Table 04 19.99	0.98 20.53 20.03 0.97 e 9c) 19.65	1 3 20.09 3 20.02	1 19.76 20.02	21	(86) (87) (88) (89)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	erature ation fact Jan 1 interna 19.78 erature 20 ation fact 1 interna 18.89	during heter for g Feb 1 I temper 19.95 during heter for g 1 I temper 19.05	meating properties of the second properties of	Apr 0.95 living are 20.6 eriods in 20.03 rest of d 0.93 the rest 19.7	n the livea, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78 of dwel 19.94	ring (sm (s follow), he follow	ee Ta Jun 0.64 ow ste 20.97 velling 20.04 m (se 0.56 T2 (fo	Jul 0.48 pps 3 to 7 21 from Ta 20.04 ee Table 0.38 ollow ste 20.04	A 0.5 7 in T 20. 20. 9a) 0.4 eps 3	ug Sep 64 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 43 0.75 6 to 7 in Table 04 19.99	0.98 20.53 20.03 0.97 e 9c)	1 3 20.09 3 20.02 1 1 5 19.21	1 19.76 20.02		(86) (87) (88) (89)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	erature ation fact Jan 1 interna 19.78 erature 20 ation fact 1 interna 18.89 interna	during heter for g Feb 1 I temper 19.95 during h 20.01 eter for g 1 I temper 19.05	meating properties of the second properties of	Apr 0.95 living are 20.6 eriods in 20.03 rest of d 0.93 the rest 19.7	the lives, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78 of dwelling	ring m (s / l / l / l / l / l / l / l / l / l /	ee Ta Jun 0.64 ow ste 20.97 velling 20.04 m (se 0.56 T2 (fe 20.03	Jul 0.48 ps 3 to 7 21 from Ta 20.04 pe Table 0.38 ollow ste 20.04 LA × T1	A 0.5 7 in 1 20. able 9 20. 9a) 0.4 eps 3 20.	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 43 0.75 4 to 7 in Table 04 19.99 - fLA) × T2	0.98 20.53 20.03 0.97 e 9c) 19.65 fLA = Li	1 3 20.09 3 20.02 1 1 5 19.21 ving area ÷ (-	1 19.76 20.02 1 18.88 4) =		(86) (87) (88) (89) (90) (91)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m=	erature ation fact Jan 1 interna 19.78 erature 20 ation fact 1 interna 18.89 interna 19.22	during heter for g Feb 1 I temper 19.95 during h 20.01 eter for g 1 I temper 19.05 I temper 19.39	meating properties of the second properties of	Apr 0.95 living are 20.6 eriods in 20.03 rest of d 0.93 the rest 19.7	n the livea, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78 of dwel 19.94	ring (s (s / l) (s / l	ee Ta Jun 0.64 ow ste 20.97 velling 20.04 m (se 0.56 T2 (fe 20.03	able 9a) Jul 0.48 ps 3 to 7 21 from Ta 20.04 ee Table 0.38 ollow ste 20.04 LA × T1 20.4	A A 0.5 of the control of the contro	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 43 0.75 4 to 7 in Table 04 19.99 - fLA) × T2 .4 20.33	0.98 20.53 20.03 0.97 e 9c) 19.65 LA = Li	1 3 20.09 3 20.02 1 1 5 19.21 ving area ÷ (-	1 19.76 20.02		(86) (87) (88) (89)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply	erature ation fact Jan 1 interna 19.78 erature 20 ation fact 1 interna 18.89 interna 19.22 adjustn	during heter for g Feb 1 I temper 19.95 during h 20.01 eter for g 1 I temper 19.05 I temper 19.39 ment to ti	meating properties are also properties at the control of the contr	Apr 0.95 living are 20.6 eriods in 20.03 rest of d 0.93 the rest 19.7 r the wh 20.04 n interna	the lives, h1,r May 0.83 ea T1 (20.86 h rest o 20.03 welling 0.78 of dwelling 19.94 lole dwelling 19.94	ring m (s follo 2 follo 2 fling gellin 2 ellin 2	ee Ta Jun 0.64 ow ste 20.97 velling 20.04 m (se 0.56 T2 (fe 20.03 g) = fl 20.39 ure fro	Jul 0.48 ps 3 to 7 21 from Ta 20.04 pe Table 0.38 ollow ste 20.04 LA × T1 20.4 pm Table	A A 0.57 in T 20. able 9 20. 9a) 0.4 4e, 4e,	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 43 0.75 6 to 7 in Table 04 19.99 - fLA) × T2 .4 20.33 where appre	0.98 20.53 20.03 0.97 e 9c) 19.65 fLA = Livitate 19.98	1 3 20.09 3 20.02 1 1 19.21 ving area ÷ (-	1 19.76 20.02 1 18.88 4) =		(86) (87) (88) (89) (90) (91) (92)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m=	erature ation fact Jan 1 interna 19.78 erature 20 ation fact 1 interna 18.89 interna 19.22 adjustn 19.22	during heter for grade Feb 1 I temper 19.95 during heter for grade 19.05 I temper 19.05 I temper 19.39 nent to the 19.39	neating properties of the mean of the mean of the second o	Apr 0.95 living are 20.6 eriods in 20.03 rest of d 0.93 the rest 19.7 r the wh 20.04 interna	n the livea, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78 of dwel 19.94	ring m (s follo 2 follo 2 fling gellin 2 ellin 2	ee Ta Jun 0.64 ow ste 20.97 velling 20.04 m (se 0.56 T2 (fe 20.03	able 9a) Jul 0.48 ps 3 to 7 21 from Ta 20.04 ee Table 0.38 ollow ste 20.04 LA × T1 20.4	A A 0.5 of the control of the contro	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 43 0.75 6 to 7 in Table 04 19.99 - fLA) × T2 .4 20.33 where appre	0.98 20.53 20.03 0.97 e 9c) 19.65 LA = Li	1 3 20.09 3 20.02 1 1 19.21 ving area ÷ (-	1 19.76 20.02 1 18.88 4) =		(86) (87) (88) (89) (90) (91)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	erature ation fact Jan 1 interna 19.78 erature 20 ation fact 1 interna 18.89 interna 19.22 adjustn 19.22 acce hea	during heter for g Feb 1 I temper 19.95 during h 20.01 eter for g 1 I temper 19.05 I temper 19.39 ment to th 19.39 ting requires	meating properties of the mean	Apr 0.95 living are 20.6 eriods ii 20.03 rest of d 0.93 the rest 19.7 or the wh 20.04 interna 20.04	the lives, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78 of dwelling 19.94 cole dwelling 20.28 I tempe 20.28	ring m (s follo 2 follo 2 fliing 2 ellin 2 eratu 2	ee Ta Jun 0.64 ow ste 20.97 velling 20.04 m (se 0.56 T2 (fe 20.03 g) = fl 20.39 ure fro 20.39	Jul 0.48 ps 3 to 7 21 from Ta 20.04 pe Table 0.38 ollow ste 20.04 LA × T1 20.4 pm Table 20.4	A A 0.57 in T 20. able 5 20. 9a) 0.4 4e, 20	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 43 0.75 6 to 7 in Table 04 19.99 - fLA) × T2 .4 20.33 where appre .4 20.33	0.98 20.53 20.03 0.97 e 9c) 19.65 fLA = Lift 19.98 ppriate 19.98	1 3 20.09 3 20.02 1 1 5 19.21 ving area ÷ (3 19.54	1 19.76 20.02 1 18.88 4) =	0.38	(86) (87) (88) (89) (90) (91) (92)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	erature ation fact Jan 1 interna 19.78 erature 20 ation fact 1 interna 18.89 interna 19.22 adjustn 19.22 acce hea to the i	during heter for great for great for great	meating properties of the mean	Apr 0.95 living are 20.6 eriods ii 20.03 rest of d 0.93 the rest 19.7 r the wh 20.04 interna 20.04 mperatu	the lives, h1,r May 0.83 ea T1 (20.86 n rest o 20.03 welling 0.78 of dwel 19.94 alole dw 20.28 I tempe 20.28 re obtain	ring m (s follo 2 follo 2 fliing 2 ellin 2 eratu 2	ee Ta Jun 0.64 ow ste 20.97 velling 20.04 m (se 0.56 T2 (fe 20.03 g) = fl 20.39 ure fro 20.39	Jul 0.48 ps 3 to 7 21 from Ta 20.04 pe Table 0.38 ollow ste 20.04 LA × T1 20.4 pm Table 20.4	A A 0.57 in T 20. able 5 20. 9a) 0.4 4e, 20	ug Sep 54 0.82 Table 9c) 99 20.9 9, Th2 (°C) 05 20.04 43 0.75 6 to 7 in Table 04 19.99 - fLA) × T2 .4 20.33 where appre	0.98 20.53 20.03 0.97 e 9c) 19.65 fLA = Lift 19.98 ppriate 19.98	1 3 20.09 3 20.02 1 1 5 19.21 ving area ÷ (3 19.54	1 19.76 20.02 1 18.88 4) =	0.38	(86) (87) (88) (89) (90) (91) (92)

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Utilisa	ation fac	tor for g	ains, hm	1:										
(94)m=	1	0.99	0.98	0.93	0.8	0.59	0.42	0.48	0.77	0.97	1	1		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8	4)m	•	•	•	•	•	•			
(95)m=	411.7	488.59	574.9	641.94	606.31	443.8	298.12	311.34	444.89	458.71	404.27	387.08		(95)
Mont	hly aver	age exte	rnal tem	perature	e from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	e for me	an intern	al temp	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]	_			
(97)m=	1233.54	1192.96	1080.29	896.41	688.24	456.2	299.66	314.4	494.56	752.35	1005.03	1221.47		(97)
Spac	e heatin	g require	ement fo	r each n	nonth, k	Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m=	611.45	473.34	376.01	183.22	60.96	0	0	0	0	218.46	432.55	620.79		
								Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	2976.78	(98)
Spac	e heatin	g require	ement in	kWh/m	²/year							ĺ	39.55	(99)
8c S	nace co	olina red	quiremer	nt								L		
		Ĭ	July and		See Tal	ble 10b								
Caro	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	loss rate	e Lm (ca	lculated	using 2	5°C inter	rnal tem	perature	and ext	ernal ter	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	741.17	583.48	597.36	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm	•	•	•		•		•	•			
(101)m=	0	0	0	0	0	0.93	0.97	0.95	0	0	0	0		(101)
Usefu	ıl loss, h	mLm (V	Vatts) = ((100)m x	(101)m									
(102)m=	0	0	0	0	0	691.33	564.77	568.66	0	0	0	0		(102)
Gains	s (solar	gains ca	lculated	for appli	icable w	eather re	egion, se	e Table	10)					
(103)m=	0	0	0	0	0	967.98	924.92	853.29	0	0	0	0		(103)
			<i>ement fo</i> (104)m <			dwelling,	continu	ous (kW	h' = 0.0	24 x [(10	03)m – (102)m]>	k (41)m	
(104)m=	0	0	0	0	0	199.19	267.96	211.77	0	0	0	0		
		•	•	•	•	•	•	•	Tota	l = Sum(104)	=	678.91	(104)
Cooled	d fractio	n							f C =	cooled	area ÷ (4	4) =	1	(105)
		actor (Ta	able 10b)	,	,		,						
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
_						()	(,,,,,)		Tota	I = Sum((104)	=	0	(106)
-			ment for				- 							
(107)m=	0	0	0	0	0	49.8	66.99	52.94	0	0	0	0		_
										l = Sum(107)	=	169.73	(107)
Space	cooling	require	ment in k	رWh/m²/	year				(107)) ÷ (4) =			2.25	(108)
8f. Fat	oric Ene	rgy Effic	iency (ca	alculated	only un	der spe	cial conc	litions, s	ee section	on 11)				
Fabri	c Energ	y Efficie	ncy						(99)	+ (108) =	=		41.8	(109)
Targe	et Fabri	c Energ	y Efficie	ency (TF	EE)								48.07	(109)

			l Iser F	Details:						
Assessor Name:	John Ashe		O S C I L	Strom	o Num	hori		STDO	031268	
Software Name:	Stroma FSAP 2	2012		Softwa					on: 1.0.5.8	
			roperty	Address			PETTS V			
Address :										
1. Overall dwelling dime	ensions:									
0 10				a(m²)			ight(m)	1	Volume(m³)	_
Ground floor			7	75.27	(1a) x	2	.66	(2a) =	200.22	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+	·(1e)+(1r	ገ) <u>፣</u>	75.27	(4)					
Dwelling volume					(3a)+(3b))+(3c)+(3d	l)+(3e)+	.(3n) =	200.22	(5)
2. Ventilation rate:										
	main heating	secondar heating	У	other		total			m³ per hou	٢
Number of chimneys	0 +		+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	<u> </u>	0	Ī - [0	x	20 =	0	(6b)
Number of intermittent fa	ans				, 	3	x .	10 =	30	(7a)
Number of passive vents	3				F	0	x -	10 =	0	(7b)
Number of flueless gas f	ires				<u> </u>	0	x 4	40 =	0	(7c)
gae i					L					
								Air ch	nanges per ho	ur
Infiltration due to chimne	ys, flues and fans =	= (6a)+(6b)+(7	7a)+(7b)+((7c) =	Γ	30		÷ (5) =	0.15	(8)
If a pressurisation test has b		ended, procee	d to (17),	otherwise o	continue fr	om (9) to ((16)			_ _
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration Structural infiltration: 0	OF for atoal or timb	or frama ar	. 0 25 fo	r maaan		uction	[(9)	-1]x0.1 =	0	(10)
if both types of wall are p					•	uction			0	(11)
deducting areas of openi	ngs); if equal user 0.35	,	J		,					
If suspended wooden	•	,	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	•								0	(13)
Percentage of window	s and doors draugh	it stripped		0.25 - [0.2	v (14) · 1	001 -			0	(14)
Window infiltration Infiltration rate				(8) + (10)	. ,	- 1	+ (15) =		0	(15)
Air permeability value,	a50 expressed in	cubic metre	s ner ho	. , , , ,	, , ,	, , ,	, ,	area	5	(16)
If based on air permeabi	•		•	•	•	0110 01 0	птоюро	aroa	0.4	(18)
Air permeability value applie	-					is being u	sed		<u> </u>	
Number of sides sheltered	ed								0	(19)
Shelter factor				(20) = 1 -		9)] =			1	(20)
Infiltration rate incorpora	•			(21) = (18) x (20) =				0.4	(21)
Infiltration rate modified t	 	1	1	Δ	0	0-4	l Na	D.,	1	
Jan Feb		ay Jun	Jul	Aug	Sep	Oct	Nov	Dec	I	
Monthly average wind sp	1 1	2 2 2 2	2.0	2.7	4	4.0	A F	4.7	1	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
(22a)m= 1.27 1.25	1.23 1.1 1.0	8 0.95	0.95	0.92	1	1.08	1.12	1.18		

0.51	2.5	`				i ´	(21a) x	,	0.40	0.45	0.47	1	
Calculate effe	0.5 ective air	0.49 change	0.44 rate for t	0.43 he appli	0.38 Cable ca	0.38 se	0.37	0.4	0.43	0.45	0.47		
If mechanic		-										0	(2
If exhaust air h	neat pump	using Appe	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (I	N5)) , othe	wise (23b) = (23a)			0	(2
If balanced wit	h heat reco	overy: effic	iency in %	allowing for	or in-use f	actor (fron	n Table 4h) =				0	(2
a) If balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a)m = (22	2b)m + (2	23b) × [1 – (23c)	÷ 100]	
24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
b) If balance	ed mech	anical ve	entilation	without	heat rec	covery (N	ЛV) (24b)m = (22	2b)m + (2	23b)		•	
(4b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(
c) If whole h	nouse ex m < 0.5 >			•	•				.5 × (23b))		•	
4c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(
<u> </u>	m = 1, th	en (24d)	m = (22l	o)m othe	rwise (2	4d)m =	0.5 + [(2	2b)m² x	-			1	,
4d)m= 0.63	0.62	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(
Effective air			<u> </u>	<u> </u>	``	ŕ `	r 					1	,
(5)m= 0.63	0.62	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(
3. Heat losse	es and he	eat loss p	paramete	er:									
LEMENT	Gros	•	Openin		Net Ar	ea	U-valı	ıe	AXU		k-value	. A	Χk
	area		m		A ,r		W/m2		(W/I	〈)	kJ/m²·l		J/K
indows Type	e 1				6.82	_x 1	/[1/(0.9)+	0.04] =	5.92				(
/indows Type	e 2				7.13	x1	/[1/(0.9)+	0.04] =	6.19				(
oor					75.07	=		:					
					75.27	7 X	0.13	=	9.78509	9			(
/alls	50.0	06	13.9	5	36.11	=	0.13	= = [9.78509 5.42	9 [=
			13.9	5		x		=		9			
otal area of e	elements d roof wind	ows, use e	effective wi	ndow U-va	36.11 125.3	x 3	0.15	=	5.42		n paragraph	13.2	
otal area of e for windows and include the are	elements d roof wind as on both	s, m² ows, use e sides of ir	ffective wi	ndow U-va	36.11 125.3	x 3	0.15	= [/[(1/U-valu	5.42		ı paragraph	7 3.2	(
otal area of e for windows and include the are abric heat los	elements d roof wind as on both ss, W/K :	ows, use e sides of ir = S (A x	ffective wi	ndow U-va	36.11 125.3	x 3	0.15	= [/[(1/U-valu + (32) =	5.42	ns given in			
otal area of e for windows and include the area abric heat los eat capacity	elements d roof wind as on both ss, W/K : Cm = S(ows, use e sides of ir = S (A x (A x k)	offective with the state of the	ndow U-va	36.11 125.3: alue calculitions	X 3 Pated using	0.15	= [(1/U-valu + (32) = ((28)	5.42 ue)+0.04] a	as given in 2) + (32a)		27.32	
otal area of e for windows and include the area abric heat los eat capacity hermal mass or design asses	elements of roof winder as on both ss, W/K: Cm = S(s parame	ows, use e sides of ir = S (A x (A x k) eter (TMF	effective winternal walk U) P = Cm : tails of the	ndow U-va Is and part	36.11 125.3: alue calculations	x 3 lated using	0.15 g formula 1 (26)(30)	= [(1/U-valu + (32) = ((28)	5.42 ue)+0.04] a (30) + (32 tive Value:	2) + (32a)	(32e) =	27.32 10446.3	
otal area of e for windows and include the area abric heat lost eat capacity hermal mass or design assess an be used inste	elements d roof wind as on both ss, W/K: Cm = S(s parame sments wh	ows, use e sides of ir = S (A x (A x k) eter (TMF) erer the de tailed calculation	offective winternal wall U) P = Cm : tails of the culation.	ndow U-va ls and part - TFA) in constructi	36.11 125.3 alue calculations kJ/m²K	x 3 lated using	0.15 g formula 1 (26)(30)	= [(1/U-valu + (32) = ((28)	5.42 ue)+0.04] a (30) + (32 tive Value:	2) + (32a)	(32e) =	27.32 10446.3	
Valls otal area of e for windows and include the are abric heat los leat capacity hermal mass or design asses an be used inste hermal bridg details of therma	elements d roof windles on both ss, W/K: Cm = S(s parame esments whe ead of a de tes: S (L al bridging	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calcu x Y) cal	effective winternal wall U) P = Cm - tails of the culation. culated to	ndow U-ve ls and part - TFA) in constructi	36.11 125.3 alue calculations kJ/m²K ion are not	x 3 lated using	0.15 g formula 1 (26)(30)	= ((28) Indicative	5.42 (a) +0.04] a (30) + (32) (30) + (32) (4) tive Values of	2) + (32a)	(32e) =	27.32 10446.3 100	
otal area of e for windows and include the area abric heat los eat capacity hermal mass or design assess an be used inste hermal bridg details of thermotal fabric he	elements d roof winder as on both ss, W/K: Cm = S(s parame esments whe ead of a de es : S (L eal bridging eat loss	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calculation x Y) call are not kn	effective winternal wall U) P = Cm ÷ tails of the culation. culated to cown (36) =	ndow U-vels and part - TFA) in construction using Ap	36.11 125.3 alue calculations kJ/m²K ion are not	x 3 lated using	0.15 g formula 1 (26)(30)	= (1/U-valu + (32) = ((28) Indica indicative	5.42 (30) + (32) tive Value: e values of	as given in 2) + (32a) : Low TMP in T	(32e) =	27.32 10446.3 100	
otal area of e for windows and include the area abric heat los eat capacity hermal mass or design assess an be used inste hermal bridg details of thermatotal fabric hereal	elements d roof windles on both ss, W/K: Cm = S(s parame esments wheeld of a de les : S (L al bridging eat loss at loss ca	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calco x Y) cal are not kn	effective winternal walk U) P = Cm ÷ tails of the culation. culated to cown (36) =	ndow U-ve ls and part - TFA) in constructi using Ap = 0.05 x (3	36.11 125.3: alue calculations kJ/m²K fon are not spendix k	x 3 lated using	0.15 If formula 1. (26)(30)	= ((1/U-value) + (32) = ((28) Indica + indicative (33) + (38)m	5.42 (30) + (32) tive Value: e values of (36) = = 0.33 × (2) + (32a) : Low TMP in T	(32e) =	27.32 10446.3 100	
otal area of eact of windows and include the area abric heat lose eat capacity mermal mass or design assess on be used instead fabric heat labric heat labric heat lation heat labric heat lation heat labric heat	elements d roof winder as on both ss, W/K: Cm = S(s parame es parame es of a de les : S (L al bridging eat loss at loss ca	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calculated x Y) calculated are not known	effective winternal wall U) P = Cm : tails of the culation. culated to cown (36) = I monthly	ndow U-vels and part - TFA) in constructionsing Ap = 0.05 x (3)	36.11 125.3 alue calculations a kJ/m²K fon are not spendix h 1) Jun	x 3 lated using	0.15 formula 1 (26)(30) recisely the	= (1/U-value) + (32) = ((28) Indica indicative (33) + (38)m Sep	5.42 (30) + (32 (30) + (32 (30) = 0.33 × (Oct	25)m x (5 Nov	(32e) = Fable 1f	27.32 10446.3 100	
otal area of eact of windows and include the area abric heat lose eat capacity nermal mass or design assess on be used instermal bridg details of thermotal fabric heartilation head	elements d roof windles on both ss, W/K: Cm = S(s parame esments wheeld of a de les : S (L al bridging eat loss at loss ca	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calco x Y) cal are not kn	effective winternal walk U) P = Cm ÷ tails of the culation. culated to cown (36) =	ndow U-ve ls and part - TFA) in constructi using Ap = 0.05 x (3	36.11 125.3: alue calculations kJ/m²K fon are not spendix k	x 3 lated using	0.15 If formula 1. (26)(30)	= ((1/U-value) + (32) = ((28) Indica + indicative (33) + (38)m	5.42 (30) + (32) tive Value: e values of (36) = = 0.33 × (2) + (32a) : Low TMP in T	(32e) =	27.32 10446.3 100	
otal area of each include the area abric heat lose eat capacity hermal mass or design assess in be used instendental bridge details of thermal brial fabric hermal tabric hermal solution hermal bridge details of thermal brial fabric hermal bridge details of thermal brial fabric hermal bridge details of thermal brial fabric hermal bridge details of thermal bridge details of the bridge details	elements d roof winder as on both ss, W/K: Cm = S(s parame esments whe ead of a de les : S (L al bridging eat loss at loss ca Feb 41.29	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calculated x Y) cal are not known alculated	effective winternal wall U) P = Cm : tails of the culation. culated to cown (36) = I monthly	ndow U-vels and part - TFA) in constructionsing Ap = 0.05 x (3)	36.11 125.3 alue calculations a kJ/m²K fon are not spendix h 1) Jun	x 3 lated using	0.15 formula 1 (26)(30) recisely the	= (1/U-value) + (32) = ((28) Indicative) (33) + (38)m Sep 38.32	5.42 (30) + (32 (30) + (32 (30) = 0.33 × (Oct	25)m x (5 Nov 39.72	(32e) = Fable 1f	27.32 10446.3 100	
otal area of endingly of the area of eat capacity the area of eat capacity the area of eat capacity the area of eat capacity the area of eating assess on the used instead of the area of the area of the entilation here. Jan	elements d roof winder as on both ss, W/K: Cm = S(s parame esments whe ead of a de les : S (L al bridging eat loss at loss ca Feb 41.29	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calculated x Y) cal are not known alculated	effective winternal wall U) P = Cm : tails of the culation. culated to cown (36) = I monthly	ndow U-vels and part - TFA) in constructionsing Ap = 0.05 x (3)	36.11 125.3 alue calculations a kJ/m²K fon are not spendix h 1) Jun	x 3 lated using	0.15 formula 1 (26)(30) recisely the	= (1/U-value) + (32) = ((28) Indicative) (33) + (38)m Sep 38.32	5.42 (30) + (32 tive Value: e values of (36) = = 0.33 × (Oct 39.14	25)m x (5 Nov 39.72	(32e) = Fable 1f	27.32 10446.3 100	
otal area of entermal mass or design assess on be used instermal bridg details of thermotal fabric heentilation heentilati	elements d roof winder as on both ss, W/K: Cm = S(s parame es parame es : S (L al bridging eat loss at loss ca Feb 41.29 coefficiel 87.41	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calculated are not known alculated Mar 40.96 nt, W/K	effective winternal wall U) P = Cm - tails of the ulation. culated united win (36) = 1 monthly Apr 39.43	ndow U-vels and part - TFA) in constructi using Ap = 0.05 x (3	36.11 125.3 alue calculations a kJ/m²K fon are not spendix k 1) Jun 37.8	x 3 ated using t known pr	0.15 formula 1 (26)(30) recisely the	= (1/U-value) + (32) = ((28) Indicative) (33) + (38)m Sep 38.32 (39)m 84.44	5.42 (a) +0.04] a (30) + (32) (30) + (32) (ive Values of a values of a values of a values of a values of a values of a value a values of a value a	25)m x (5 Nov 39.72 38)m 85.84 Sum(39).	(32e) = Fable 1f Dec 40.33	27.32 10446.3 100	
otal area of entermal mass or design assess on be used instermal bridg details of thermotal fabric heentilation heads) B)m= discontinuous area of entermal bridg details of thermotal fabric heentilation heads) and the details of the entermal bridg details of the entermal bridg details of the entermal bridg details of the entermal bridg details of the entermal bridg details of the entermal bridg details of the entermal bridg details of the entermal bridg details of the entermal bridge detai	elements d roof winder as on both ss, W/K: Cm = S(s parame es parame es : S (L al bridging eat loss at loss ca Feb 41.29 coefficiel 87.41	ows, use e sides of ir = S (A x (A x k) eter (TMF ere the de tailed calculated are not known alculated Mar 40.96 nt, W/K	effective winternal wall U) P = Cm - tails of the ulation. culated united win (36) = 1 monthly Apr 39.43	ndow U-vels and part - TFA) in constructi using Ap = 0.05 x (3	36.11 125.3 alue calculations a kJ/m²K fon are not spendix k 1) Jun 37.8	x 3 ated using t known pr	0.15 formula 1 (26)(30) recisely the	= (1/U-value) + (32) = ((28) Indicative) (33) + (38)m Sep 38.32 (39)m 84.44	5.42 (30) + (32) (30) + (32) (30) + (32) (30) + (32) (30) + (32) (30) + (32) (30) + (32) (31) + (32) (32) + (32) (33) + (32) (34) + (32) (35) + (32) (36) + (32) (37) + (32) (37) + (32) (38) + (32)	25)m x (5 Nov 39.72 38)m 85.84 Sum(39).	(32e) = Fable 1f Dec 40.33	27.32 10446.3 100 18.8 46.12	

Numbe	er of day	s in moi	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
													•	
4. Wa	iter heat	ing enei	rgy requi	irement:								kWh/ye	ear:	
Accum	ed occu	nancy	NI									0.7	1	(40)
			+ 1.76 x	[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		37		(42)
	A £ 13.9	•						(05 11)	00				1	
			ater usag hot water							se target o		.42		(43)
not more	e that 125	litres per _l	person per	r day (all w	vater use, i	hot and co	ld)							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water	er usage in	i litres per	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)			-		•	
(44)m=	99.46	95.84	92.22	88.61	84.99	81.37	81.37	84.99	88.61	92.22	95.84	99.46		
Eneray (content of	hot water	used - cal	culated m	onthly = 4.	190 x Vd.r	m x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1084.99	(44)
(45)m=	147.49	129	133.11	116.05	111.36	96.09	89.04	102.18	103.4	120.5	131.54	142.84	1	
(10)111=	111110		100.11	110.00	111.00	00.00	00.01	102.10	<u> </u>		m(45) ₁₁₂ =	<u> </u>	1422.6	(45)
If instant	taneous w	ater heatii	ng at point	of use (no	o hot water	r storage),	enter 0 in	boxes (46			,			
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage		inaludin	va opvio	olor or M	WHDC	otorogo	within o	ama voa	ool			1	(47)
•		, ,	includin Ind no ta	•			_		aille ves	SEI		0		(47)
	-	_	hot wate		_				ers) ente	er '0' in ((47)			
Water	storage	loss:											_	
a) If m	anufacti	urer's de	eclared l	oss fact	or is kno	wn (kWł	n/day):					0		(48)
•			m Table									0		(49)
• • • • • • • • • • • • • • • • • • • •			storage eclared o	-		or is not	known:	(48) x (49) =			0		(50)
•			factor fr	-								0]	(51)
	-	_	ee secti	on 4.3										
	e factor f			2h								0		(52)
•			m Table		005			(47) v (F4) v (EQ) v (E2\		0] 1	(53)
• • • • • • • • • • • • • • • • • • • •	(50) or (storage	, KVVII/y	eai			(47) x (51) X (52) X (os) =	-	0 0		(54) (55)
	. , .	, ,	culated f	for each	month			((56)m = (55) × (41)	m		0	J	(00)
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(56)
	er contains	dedicate	d solar sto	rage, (57)		x [(50) – (<u>I</u> H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	J lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0]	(57)
Primar	v circuit	loss (ar	nnual) fro	ım Tahlı	- 3 	Į	<u>!</u>		<u>!</u>	<u>!</u>		0	<u>.</u>]	(58)
			culated f			59)m = ((58) ÷ 36	65 × (41)	m			<u>- </u>	ı	
	•		rom Tab		,	•	` '	, ,		r thermo	stat)		_	
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss cal	culated	for each	month	(61)m =	(60) ÷ 30	65 × (41)m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)

Total heat require	red for w	ater he	eating ca	alculated	for e	ach month	(62)	m =	0.85 × (45)m +	· (46)m +	(57)m +	(59)m + (61)m	
(62)m= 125.37	109.65	113.15	98.64	94.65	81.6	8 75.69	86.	85	87.89	102.43	111.81	121.41		(62)
Solar DHW input ca	lculated us	sing Appe	endix G or	Appendix	H (ne	gative quantity	y) (ent	ter '0'	if no solar	contribu	ition to wate	er heating)	•	
(add additional I	ines if F	GHRS	and/or V	VWHRS	appl	ies, see Ap	pend	dix G	3)				_	
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0														
(63)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0														
(64)m= 125.37	109.65	113.15	98.64	94.65	81.6	8 75.69	86.	85	87.89	102.43	111.81	121.41		
	-							Outp	ut from wa	ater heat	er (annual) ₁	12	1209.21	(64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)m + (61)m] + 0.8 x [(46)m + (57)m + (59)m] (65)m= 31.34 27.41 28.29 24.66 23.66 20.42 18.92 21.71 21.97 25.61 27.95 30.35 include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a):														
(65)m= 31.34	27.41	28.29	24.66	23.66	20.4	2 18.92	21.	71	21.97	25.61	27.95	30.35		(65)
include (57)m	in calcu	lation o	of (65)m	only if c	ylinde	er is in the	dwell	ling	or hot wa	ater is	from com	munity h	leating	
5. Internal gair	ns (see 1	Гable 5	and 5a)):										
Metabolic gains (Table 5), Watts														
(64)m= 125.37 109.65 113.15 98.64 94.65 81.68 75.69 86.85 87.89 102.43 111.81 121.41 Output from water heater (annual)112 1209.21 (64) Heat gains from water heating, kWh/month 0.25 [0.85 × (45)m + (61)m] + 0.8 × [(46)m + (57)m + (59)m] (65)m= 31.34 27.41 28.29 24.66 23.66 20.42 18.92 21.71 21.97 25.61 27.95 30.35 (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (66)m= 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 118.35 (66)														
														(66)
Lighting gains (d	calculate	d in Ap	pendix I	_, equat	ion L	9 or L9a), a	lso s	ee 7	Table 5		•		•	
(67)m= 18.97	16.85	13.7	10.37	7.75	6.5	5 7.07	9.1	19	12.34	15.67	18.29	19.5		(67)
Appliances gain	s (calcul	ated in	Append	lix L, eq	uatio	n L13 or L1	3a),	also	see Tal	ole 5				
(68)m= 209.27	211.44	205.97	194.32	179.62	165.	79 156.56	154	.39	159.86	171.51	186.22	200.04		(68)
Cooking gains (calculate	ed in Ap	pendix	L, equat	ion L	15 or L15a), als	o se	e Table	5	•		•	
(69)m= 34.83	34.83	34.83	34.83	34.83	34.8	3 34.83	34.	83	34.83	34.83	34.83	34.83		(69)
Pumps and fans	gains (Table 5	a)			•		•			•		•	
(70)m= 0	0	0	0	0	0	0)	0	0	0	0		(70)
Losses e.g. eva	poration	(negati	ive valu	es) (Tab	le 5)			-						
(71)m= -94.68	-94.68	-94.68	-94.68	-94.68	-94.6	68 -94.68	-94	.68	-94.68	-94.68	-94.68	-94.68		(71)
Water heating g	ains (Tal	ble 5)												
(72)m= 42.13	40.79	38.02	34.25	31.81	28.3	6 25.43	29.	18	30.52	34.42	38.82	40.8		(72)
Total internal g	ains =					(66)m + (67)n	n + (68	3)m +	· (69)m + (70)m + (71)m + (72)	m		
(73)m= 328.87	327.59	316.2	297.45	277.68	259.	21 247.57	251	.27	261.22	280.1	301.83	318.84		(73)
6. Solar gains:														
Solar gains are cal		ŭ		Table 6a		•	tions	to co	nvert to the	e applica		ion.		
Orientation: Ac	cess Fa	ctor	Area m²			Flux Table 6a		Т:	g_ able 6b	_	FF Fable 6c		Gains (W)	
		_			_		1			- r			` ,	٦,,
East 0.9x	0.77	×	6.8		×	19.64	X		0.63		0.7	= =	40.94	(76)
East 0.9x	0.77	X	6.8		×	38.42	X		0.63	× [0.7	=	80.08	<u> </u> (76)
East 0.9x	0.77	×	6.8		×	63.27	X		0.63		0.7	=	131.88	<u> </u> (76)
East 0.9x	0.77	X	6.8		X L	92.28	X		0.63		0.7	=	192.34	<u> </u> (76)
East 0.9x	0.77	X	6.8		x L	113.09	X		0.63	x [0.7	=	235.72	<u> </u> (76)
East 0.9x	0.77	X	6.8	2	× L	115.77	X	<u> </u>	0.63	x [0.7	_ =	241.3	(76)
East 0.9x	0.77	X	6.8	2	x L	110.22	X		0.63	x [0.7	=	229.73	(76)
East 0.9x	0.77	X	6.8	2	x	94.68	X		0.63	X	0.7	=	197.33	(76)

	_								_						
East	0.9x	0.77	X	6.8	82	X	7	73.59	x	0.63	X	0.7	=	153.38	(76)
East	0.9x	0.77	X	6.8	82	X	4	15.59	x	0.63	X	0.7	=	95.02	(76)
East	0.9x	0.77	X	6.8	32	X	2	24.49	X	0.63	X	0.7	=	51.04	(76)
East	0.9x	0.77	X	6.8	32	X	1	16.15	X	0.63	X	0.7	=	33.66	(76)
West	0.9x	0.77	X	7.	13	x	1	19.64	x	0.63	x	0.7	=	42.8	(80)
West	0.9x	0.77	X	7.	13	x	3	38.42	X	0.63	x	0.7	=	83.72	(80)
West	0.9x	0.77	X	7.	13	X	6	3.27	x	0.63	x	0.7	=	137.87	(80)
West	0.9x	0.77	X	7.	13	X	9	92.28	x	0.63	X	0.7	=	201.08	(80)
West	0.9x	0.77	X	7.	13	X	1	13.09	x	0.63	X	0.7	=	246.43	(80)
West	0.9x	0.77	X	7.	13	x	1	15.77	x	0.63	x	0.7	=	252.27	(80)
West	0.9x	0.77	X	7.	13	X	1	10.22	x	0.63	X	0.7	=	240.17	(80)
West	0.9x	0.77	X	7.	13	X	9	94.68	x	0.63	X	0.7	=	206.3	(80)
West	0.9x	0.77	x	7.	13	x	7	73.59	x	0.63	x	0.7	=	160.35	(80)
West	0.9x	0.77	X	7.	13	X	4	15.59	x	0.63	X	0.7	=	99.34	(80)
West	0.9x	0.77	X	7.	13	X	2	24.49	x	0.63	x	0.7	=	53.36	(80)
West	0.9x	0.77	x	7.	13	x	1	16.15	x	0.63	x	0.7		35.19	(80)
									_						
Solar g	ains in	watts, ca	alculated	for eac	h montl	h			(83)m	n = Sum(74)m	(82)m				
(83)m=	83.73	163.8	269.75	393.42	482.15	4	93.56	469.89	403	.63 313.73	194.3	6 104.4	68.86		(83)
Total g	ains – i	nternal a	and sola	(84)m :	= (73)m	+ (83)m	, watts						_	
(84)m=	412.61	491.39	585.95	690.87	759.83	7	52.77	717.47	654	1.9 574.96	474.4	6 406.24	387.7		(84)
7. Mea	an inter	nal temp	perature	(heating	g seaso	n)									
				`			area t	from Tal	ole 9	, Th1 (°C)				21	(85)
Tempe	erature		neating p	eriods i	n the liv	ring			ole 9	, Th1 (°C)				21	(85)
Tempe	erature	during h	neating p	eriods i	n the liv	ring n (s				, Th1 (°C)	Oct	Nov	Dec	21	(85)
Tempe	erature tion fac	during h	neating pains for	eriods i	n the liv	ring m (s	ee Ta	able 9a)		ug Sep	Oct 0.9	. Nov 0.96	Dec 0.98	21	(85)
Tempe Utilisa (86)m=	erature tion fac Jan 0.97	during heter for g	neating pains for Mar 0.92	eriods i living ar Apr 0.85	n the livea, h1,rMay	ring m (s	ee Ta Jun ^{0.6}	Jul 0.47	A 0.5	ug Sep 52 0.73	-	+		21	
Tempe Utilisa (86)m=	erature tion fac Jan 0.97	during heter for g	neating pains for Mar 0.92	eriods i living ar Apr 0.85	n the livea, h1,rMay	ring n (s	ee Ta Jun ^{0.6}	Jul 0.47	A 0.5	ug Sep 52 0.73 able 9c)	-	+		21	
Tempe Utilisa (86)m= Mean (87)m=	erature tion fac Jan 0.97 interna 18.49	during heter for g Feb 0.96 I temper	neating pains for Mar 0.92 ature in 19.29	eriods in living are Apr 0.85 living ar	n the livea, h1,r May 0.74 ea T1 (1) 20.45	ring m (s follo	ee Ta Jun 0.6 ow ste	Jul 0.47 ps 3 to 7 20.92	0.5 7 in T 20.	ug Sep 52 0.73 able 9c) 89 20.61	0.9	0.96	0.98	21	(86)
Tempe Utilisa (86)m= Mean (87)m= Tempe	erature tion fac Jan 0.97 interna 18.49 erature	during heter for g Feb 0.96 I temper 18.78 during h	neating pains for Mar 0.92 ature in 19.29	living are 0.85 living are 19.93 eeriods i	n the livea, h1,r May 0.74 ea T1 (i) 20.45	ring m (s follo	ee Ta Jun 0.6 ow ste 20.79 /elling	Jul 0.47 ps 3 to 7 20.92 from Ta	0.5 7 in T 20.	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C)	19.9	0.96	0.98 18.45	21	(86)
Tempe Utilisa (86)m= Mean (87)m= Tempe (88)m=	Jan 0.97 interna 18.49 erature 19.95	during heter for g Feb 0.96 I temper 18.78 during h	meating pains for Mar 0.92 ature in 19.29 meating pains 19.95	living are 0.85 living are 19.93 periods if 19.97	n the livea, h1,r May 0.74 ea T1 (1) 20.45 n rest or	follo	ee Ta Jun 0.6 ow ste 20.79 velling	Jul 0.47 ps 3 to 7 20.92 from Ta	A 0.57 in T 20.	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C)	0.9	0.96	0.98	21	(86)
Tempe Utilisa (86)m= Mean (87)m= Tempe (88)m= Utilisa	Jan 0.97 interna 18.49 erature 19.95 tion fac	during heter for g Feb 0.96 I temper 18.78 during heter for g	neating pains for Mar 0.92 ature in 19.29 neating pains for	eriods in iving are 0.85 living are 19.93 eriods in 19.97	n the livea, h1,r May 0.74 ea T1 (iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	ring (s	ee Ta Jun 0.6 ow ste 20.79 velling 19.99 ,m (se	Jul 0.47 ps 3 to 7 20.92 from Ta 19.99 ee Table	A 0.57 in T 20.00 able 9 19.00 9a)	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98	0.9 19.9	0.96	0.98 18.45 19.96	21	(86) (87) (88)
Temper Utilisa (86)m= [Mean (87)m= [Temper (88)m= [Utilisa (89)m= [Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97	during heter for g Feb 0.96 I temper 18.78 during h 19.95 eter for g 0.95	neating pains for Mar 0.92 ature in 19.29 neating pains for 0.91	Apr 0.85 living ar 19.93 eriods ii 19.97 rest of d 0.83	n the livea, h1,r May 0.74 ea T1 (1 20.45 n rest or 19.97 welling, 0.7	ring m (s follo	ee Ta Jun 0.6 ow ste 20.79 velling 19.99 ,m (se 0.53	Jul 0.47 pps 3 to 7 20.92 from Ta 19.99 pee Table 0.38	A 0.57 in T 20.42 able 9 19.42 9a)	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98	0.9 19.9 19.97	0.96	0.98 18.45	21	(86)
Temper (86)m= [Mean (87)m= [Temper (88)m= [Utilisa (89)m= [Mean (87)m= [Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97 interna	during heter for g Feb 0.96 I temper 18.78 during heter for g 0.95 I temper	neating pains for Mar 0.92 rature in 19.29 neating pains for 0.91 rature in	Apr 0.85 living are 19.93 periods in 19.97 rest of d 0.83 the rest	n the livea, h1,r May 0.74 ea T1 (iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	ring (sm (s follow) follow fol	ee Ta Jun 0.6 w ste 20.79 velling 19.99 m (se 0.53	Jul 0.47 ps 3 to 7 20.92 from Ta 19.99 ee Table 0.38 ollow ste	A 0.5.7 in T 20. 20. 19. 19. 9a) 0.4	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 13 0.67 1 to 7 in Tab	0.9 19.9 19.97 0.88 le 9c)	0.96 19.09 19.97	0.98 18.45 19.96		(86) (87) (88) (89)
Temper Utilisa (86)m= [Mean (87)m= [Temper (88)m= [Utilisa (89)m= [Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97	during heter for g Feb 0.96 I temper 18.78 during h 19.95 eter for g 0.95	neating pains for Mar 0.92 ature in 19.29 neating pains for 0.91	Apr 0.85 living ar 19.93 eriods ii 19.97 rest of d 0.83	n the livea, h1,r May 0.74 ea T1 (1 20.45 n rest or 19.97 welling, 0.7	ring (sm (s follow) follow fol	ee Ta Jun 0.6 ow ste 20.79 velling 19.99 ,m (se 0.53	Jul 0.47 pps 3 to 7 20.92 from Ta 19.99 pee Table 0.38	A 0.57 in T 20.42 able 9 19.42 9a)	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 43 0.67 6 to 7 in Tab 94 19.72	0.9 19.9 19.97 0.88 le 9c) 19.06	0.96 19.09 7 19.97 0.95	0.98 18.45 19.96 0.97		(86) (87) (88) (89)
Tempe Utilisa (86)m= Mean (87)m= Tempe (88)m= Utilisa (89)m= Mean	Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97 interna	during heter for g Feb 0.96 I temper 18.78 during heter for g 0.95 I temper	neating pains for Mar 0.92 rature in 19.29 neating pains for 0.91 rature in	Apr 0.85 living are 19.93 periods in 19.97 rest of d 0.83 the rest	n the livea, h1,r May 0.74 ea T1 (iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	ring (sm (s follow)) follow f dw h2, h2, h1, h2, h2, f dw	ee Ta Jun 0.6 w ste 20.79 velling 19.99 m (se 0.53	Jul 0.47 ps 3 to 7 20.92 from Ta 19.99 ee Table 0.38 ollow ste	A 0.5.7 in T 20. 20. 19. 19. 9a) 0.4	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 43 0.67 6 to 7 in Tab 94 19.72	0.9 19.9 19.97 0.88 le 9c) 19.06	0.96 19.09 19.97	0.98 18.45 19.96 0.97	21	(86) (87) (88) (89)
Temper (86)m= [Mean (87)m= [Temper (88)m= [Utilisar (89)m= [Mean (90)m= [erature tion fac Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97 interna 17.65	during heter for g Feb 0.96 I temper 18.78 during h 19.95 eter for g 0.95 I temper 17.94	neating pains for Mar 0.92 ature in 19.29 neating pains for 0.91 ature in 18.44	living are 19.93 eriods in 19.97 rest of do 0.83 the rest 19.07	n the livea, h1,r May 0.74 ea T1 (to 20.45 n rest or 19.97 welling, 0.7 of dwel 19.56	ring (s follo	ee Ta Jun 0.6 ow ste 20.79 velling 19.99 ,m (se 0.53 T2 (fo	Jul 0.47 pps 3 to 7 20.92 from Ta 19.99 ee Table 0.38 ollow ste 19.95	A 0.5 of 10	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 43 0.67 6 to 7 in Tab 94 19.72	0.9 19.9 19.97 0.88 le 9c) 19.06	0.96 19.09 7 19.97 0.95	0.98 18.45 19.96 0.97		(86) (87) (88) (89)
Temper Utilisa (86)m= Mean (87)m= Temper (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m=	erature tion fac Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97 interna 17.65	during heter for g Feb 0.96 I temper 18.78 during h 19.95 eter for g 0.95 I temper 17.94 I temper	neating pains for Mar 0.92 ature in 19.29 neating pains for 0.91 ature in 18.44 ature (for 18.76	Apr 0.85 living ar 19.93 eriods ii 19.97 rest of d 0.83 the rest 19.07	m the livea, h1,r May 0.74 ea T1 (to 20.45 n rest or 19.97 welling, 0.7 of dweld 19.56 nole dweld 19.89	ring m (s follo	ee Ta Jun 0.6 ow ste 20.79 velling 19.99 ,m (se 0.53 T2 (fo 19.86 g) = fl 20.21	Jul 0.47 pps 3 to 7 20.92 from Ta 19.99 pee Table 0.38 ollow ste 19.95 LA × T1 20.32	A 0.5. 7 in T 20. able 9 19. 9a) 0.4 + (1 20	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 43 0.67 6 to 7 in Tab 94 19.72 — fLA) × T2 3 20.05	0.9 19.97 0.88 e 9c) 19.06 fLA = Li	0.96 19.09 19.97 0.95 18.26 ving area ÷ (4	0.98 18.45 19.96 0.97		(86) (87) (88) (89)
Temper Utilisa (86)m= Mean (87)m= Temper (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply	erature tion fac Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97 interna 17.65 interna 17.96 adjustr	during heter for g Feb 0.96 I temper 18.78 during h 19.95 ctor for g 0.95 I temper 17.94 I temper 18.26 ment to the	neating pains for Mar 0.92 rature in 19.29 reating pains for 0.91 rature in 18.44 rature (for 18.76 reating pains for 18.76 re	Apr 0.85 living ar 19.93 eriods ii 19.97 rest of d 0.83 the rest 19.07	n the livea, h1,r May 0.74 ea T1 (iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	follo fo	ee Ta Jun 0.6 ow ste 20.79 /elling 19.99 ,m (se 0.53 T2 (fo 19.86 g) = fl 20.21 ure fro	Jul 0.47 ps 3 to 7 20.92 from Ta 19.99 ee Table 0.38 ollow ste 19.95 LA × T1 20.32 om Table	A 0.5 7 in T 20. able 9 9a) 0.4 eps 3 19. + (1 20 4 4e,	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 43 0.67 6 to 7 in Tab 94 19.72 — fLA) × T2 3 20.05 where appre	0.9 19.97 19.97 0.88 19.06 19.06 19.38 ppriate	0.96 19.09 19.97 0.95 18.26 ving area ÷ (4	0.98 18.45 19.96 0.97 17.62 4) =		(86) (87) (88) (89) (90) (91)
Temper Utilisa (86)m= Mean (87)m= Temper (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m=	erature tion fac Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97 interna 17.65 interna 17.96 adjustr 17.96	during heter for g Feb 0.96 I temper 18.78 during h 19.95 eter for g 0.95 I temper 17.94 I temper 18.26 ment to ti 18.26	neating pains for Mar 0.92 ature in 19.29 neating pains for 0.91 ature in 18.44 ature (for 18.76 he mear 18.76	living are 19.93 eriods in 19.97 rest of do 0.83 the rest 19.07 or the what 19.4 in internal 19.4	m the livea, h1,r May 0.74 ea T1 (to 20.45 n rest or 19.97 welling, 0.7 of dweld 19.56 nole dweld 19.89	follo fo	ee Ta Jun 0.6 ow ste 20.79 velling 19.99 ,m (se 0.53 T2 (fo 19.86 g) = fl 20.21	Jul 0.47 pps 3 to 7 20.92 from Ta 19.99 pee Table 0.38 ollow ste 19.95 LA × T1 20.32	A 0.5. 7 in T 20. able 9 19. 9a) 0.4 + (1 20	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 43 0.67 6 to 7 in Tab 94 19.72 — fLA) × T2 .3 20.05 where appre	0.9 19.97 0.88 e 9c) 19.06 fLA = Li	0.96 19.09 19.97 0.95 18.26 ving area ÷ (4	0.98 18.45 19.96 0.97 17.62 4) =		(86) (87) (88) (89) (90) (91)
Temper Utilisa (86)m= Mean (87)m= Temper (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	erature tion fac Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97 interna 17.65 interna 17.96 adjustr 17.96 ace hea	during heter for g Feb 0.96 I temper 18.78 during h 19.95 ctor for g 0.95 I temper 17.94 I temper 18.26 ment to th 18.26 tting requ	neating pains for Mar 0.92 rature in 19.29 reating pains for 0.91 rature in 18.44 rature (for 18.76 reating pains for 18.76 re	Apr 0.85 living ar 19.93 eriods ii 19.97 rest of d 0.83 the rest 19.07 or the wh 19.4 internal 19.4	n the livea, h1,r May 0.74 ea T1 (i 20.45 n rest or 19.97 welling, 0.7 of dwel 19.56 nole dwel 19.89 I tempe	follo follo follo follo follo follo follo follo follo z faw follo z faw follo z faw follo z faw follo z faw follo z faw follo z faw follo z faw follo z faw follo z follo z z follo z z z	ee Ta Jun 0.6 ow ste 20.79 /elling 19.99 ,m (se 0.53 T2 (fo 19.86 g) = fl 20.21 ure fro 20.21	Jul 0.47 ps 3 to 7 20.92 from Ta 19.99 ee Table 0.38 ollow ste 19.95 LA × T1 20.32 om Table 20.32	A 0.5 7 in T 20. able 9 9a) 0.4 eps 3 19. + (1 20 4 4e, 20	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 43 0.67 6 to 7 in Tab 94 19.72 — fLA) × T2 .3 20.05 where approximates a constant of the con	0.9 19.97 19.97 0.88 9 c) 19.06 fLA = Li 19.38 ppriate 19.38	0.96 19.09 19.97 0.95 18.26 ving area ÷ (4) 18.57	0.98 18.45 19.96 0.97 17.62 4) = 17.93	0.38	(86) (87) (88) (89) (90) (91)
Temper Utilisa (86)m= Mean (87)m= Temper (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Span Set Ti	erature tion fac Jan 0.97 interna 18.49 erature 19.95 tion fac 0.97 interna 17.65 interna 17.96 adjustr 17.96 ace head to the	during heter for g Feb 0.96 I temper 18.78 during h 19.95 ctor for g 0.95 I temper 17.94 I temper 18.26 ment to th 18.26 tting requ	neating pains for Mar 0.92 ature in 19.29 neating pains for 0.91 ature in 18.44 ature (for 18.76 the mean 18.76 cuirement ternal terman	living are 19.93 living are 19.93 leriods in 19.97 rest of do 0.83 the rest 19.07 or the what 19.4 internal 19.4 mperatu	n the livea, h1,r May 0.74 ea T1 (i 20.45 n rest or 19.97 welling, 0.7 of dwel 19.56 nole dwel 19.89 I tempe 19.89 re obtai	follo follo follo follo follo follo follo follo follo z faw follo z faw follo z faw follo z faw follo z faw follo z faw follo z faw follo z faw follo z faw follo z follo z z follo z z z	ee Ta Jun 0.6 ow ste 20.79 /elling 19.99 ,m (se 0.53 T2 (fo 19.86 g) = fl 20.21 ure fro 20.21	Jul 0.47 ps 3 to 7 20.92 from Ta 19.99 ee Table 0.38 ollow ste 19.95 LA × T1 20.32 om Table 20.32	A 0.5 7 in T 20. able 9 9a) 0.4 eps 3 19. + (1 20 4 4e, 20	ug Sep 52 0.73 Table 9c) 89 20.61 9, Th2 (°C) 99 19.98 43 0.67 6 to 7 in Tab 94 19.72 — fLA) × T2 3 20.05 where appre	0.9 19.97 19.97 0.88 9 c) 19.06 fLA = Li 19.38 ppriate 19.38	0.96 19.09 19.97 0.95 18.26 ving area ÷ (4) 18.57	0.98 18.45 19.96 0.97 17.62 4) = 17.93	0.38	(86) (87) (88) (89) (90) (91)

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Utilisation factor for gains, hm:		
(94)m= 0.96 0.94 0.89 0.81 0.69 0.54 0.41 0.46	0.68 0.86 0.94 0.9	6 (94)
Useful gains, hmGm , W = (94)m x (84)m		_
(95)m= 395.12 459.86 523.19 560.6 527.06 408.95 291.65 298.42	388.49 409.87 381.87 373.	41 (95)
Monthly average external temperature from Table 8		_
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4	14.1 10.6 7.1 4.2	(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)n	n— (96)m]	_
(97)m= 1198.95 1167.73 1067.7 897.99 698.35 470.47 311.8 326.08	502.63 748.35 984.61 1187	.15 (97)
Space heating requirement for each month, kWh/month = 0.024 x [(97	r)m – (95)m] x (41)m	_
(98)m= 598.05 475.69 405.12 242.92 127.44 0 0 0	0 251.83 433.97 605.	42
Tot	al per year (kWh/year) = $Sum(98)_{15,91}$	3140.43 (98)
Space heating requirement in kWh/m²/year		41.72 (99)
8c. Space cooling requirement		
Calculated for June, July and August. See Table 10b		
Jan Feb Mar Apr May Jun Jul Aug	Sep Oct Nov De	ec
Heat loss rate Lm (calculated using 25°C internal temperature and ex	 	
(100)m= 0 0 0 0 0 788.87 621.03 635.93	0 0 0 0	(100)
Utilisation factor for loss hm		
(101)m= 0 0 0 0 0 0.8 0.85 0.82	0 0 0 0	(101)
Useful loss, hmLm (Watts) = (100)m x (101)m		
(102)m= 0 0 0 0 0 628.24 528.9 523.78	0 0 0 0	(102)
Gains (solar gains calculated for applicable weather region, see Table	10)	_
(103)m= 0 0 0 0 0 967.98 924.92 853.29	0 0 0 0	(103)
Space cooling requirement for month, whole dwelling, continuous (kV	$Vh) = 0.024 \times [(103)m - (102)n]$	า] x (41)m
set (104)m to zero if (104)m < 3 × (98)m		_
(104)m= 0 0 0 0 244.62 294.65 245.15	0 0 0 0	
	Total = Sum(104) =	784.41 (104)
Cooled fraction	$f C = cooled area \div (4) =$	1 (105)
Intermittency factor (Table 10b) (106)m= 0 0 0 0 0.25 0.25 0.25		\neg
(106)m= 0 0 0 0 0.25 0.25 0.25		(400)
Space cooling requirement for month = (104) m × (105) × (106) m	Total = Sum(1,0,4) =	0 (106)
(107)m= 0 0 0 0 0 61.15 73.66 61.29	0 0 0 0	\neg
(101)	Total = Sum(1,0.7) =	196.1 (107)
Change and lines are guite and the LAND /m2// cons		
Space cooling requirement in kWh/m²/year	(107) ÷ (4) =	2.61 (108)
8f. Fabric Energy Efficiency (calculated only under special conditions, s	·	
Fabric Energy Efficiency	(99) + (108) =	44.33 (109)

User Details: **Assessor Name:** John Ashe Stroma Number: STRO031268 Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.8 Property Address: Unit 27 - COPPETTS WOOD, London Address: 1. Overall dwelling dimensions Area(m²) Av. Height(m) Volume(m³) Ground floor 75.27 (1a) x (2a) = 200.22 (3a) 2.66 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)(4)75.27 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =200.22 (5) total m³ per hour main secondary other heating heating x 40 =Number of chimneys (6a) 0 0 x 20 =Number of open flues 0 O O 0 0 (6b) Number of intermittent fans x 10 =(7a) 0 0 x 10 =Number of passive vents (7b) 0 0 x 40 =Number of flueless gas fires (7c)Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = \div (5) = (8) 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) (9) O Additional infiltration (10)[(9)-1]x0.1 =0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)0 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 0 (12) If no draught lobby, enter 0.05, else enter 0 (13)O Percentage of windows and doors draught stripped (14)0 Window infiltration $0.25 - [0.2 \times (14) \div 100] =$ 0 (15)Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) =O (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise (18) = (16)0.25 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)0 $(20) = 1 - [0.075 \times (19)] =$ Shelter factor (20)1 $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor 0.25 (21)Infiltration rate modified for monthly wind speed Jan Feb Jul Sep Mar Apr Mav Jun Aug Oct Nov Dec Monthly average wind speed from Table 7 (22)m =5.1 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor $(22a)m = (22)m \div 4$ (22a)m 1.27 1.25 1.23 1.08 0.95 0.95 0.92 1 1.08 1.12 1.1 1.18

Adjusted infiltration rate (allowing for shelter and wind speed) = (21a)	x (22a)m					
0.32	0.25	0.27).28	0.29]	
Calculate effective air change rate for the applicable case		•			•	— ,,,,
If mechanical ventilation: If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), other	horwico (22h) -	- (22a)			0.5	(23a)
		= (23a)			0.5	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table		.) (001		(00)	77.35	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR) (2	- 		-	<u>`</u>) ÷ 100]]	(24a)
(24a)m= 0.43 0.43 0.42 0.39 0.38 0.35 0.35 0.34		ļ ļ).39	0.41]	(24a)
b) If balanced mechanical ventilation without heat recovery (MV) (2-4b)m= 0 0 0 0 0 0 0 0	$\frac{46}{100}$ m = (220)	$\frac{(230)}{0}$	0		1	(24b)
		0	0	0		(240)
c) If whole house extract ventilation or positive input ventilation from if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (23b)$		(23h)				
(24c)m =	0.5	0	0	0	1	(24c)
d) If natural ventilation or whole house positive input ventilation from					J	(= : -)
if $(22b)m = 1$, then $(24d)m = (22b)m$ otherwise $(24d)m = 0.5 + [$.5]				
(24d)m= 0 0 0 0 0 0 0 0	0	0	0	0]	(24d)
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in b	ox (25)	<u> </u>				
(25)m= 0.43 0.43 0.42 0.39 0.38 0.35 0.35 0.34		0.38	0.39	0.41]	(25)
		·			1	
3. Heat losses and heat loss parameter:	-l	A V I I		l l	- A	V I.
ELEMENTGrossOpeningsNet AreaU-valuearea (m²)m²A ,m²W/n	alue n2K	A X U (W/K)		k-value kJ/m²-l		X k I/K
· · ·)+ 0.04] =	5.92				(27)
Windows Type 2 7.13 x1/[1/(0.9)+ 0.04] =	6.19				(27)
Floor 75.27 x 0.1		9.785099	Г			(28)
Walls 50.06 13.95 36.11 x 0.1	==	5.42			╡	(29)
Total area of elements, m ²	<u> </u>	5.42	L			(31)
* for windows and roof windows, use effective window U-value calculated using formula	a 1/[/1/ -value	0+0 041 as di	iven in	naragranl	132	(31)
** include the areas on both sides of internal walls and partitions	i in (in o value)) 10.0-1 _] 40 g/	von m	paragrapi	7 0.2	
Fabric heat loss, $W/K = S (A \times U)$ (26)(3	30) + (32) =				27.32	(33)
Heat capacity $Cm = S(A \times k)$	((28)((30) + (32) +	(32a)	(32e) =	10446.3	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	Indicativ	ve Value: Lo	w		100	(35)
For design assessments where the details of the construction are not known precisely	the indicative v	alues of TM	P in Ta	able 1f		
can be used instead of a detailed calculation.						— (22)
Thermal bridges: S (L x Y) calculated using Appendix K					18.8	(36)
if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss	(33) + (3	36) =			46.12	(37)
Ventilation heat loss calculated monthly		= 0.33 × (25)r	m x (5)		40.12	(0.)
Jan Feb Mar Apr May Jun Jul Aug			Nov	Dec]	
(38)m= 28.54 28.13 27.72 25.65 25.24 23.17 23.17 22.76	- 	_	6.07	26.89	1	(38)
					J	• • •
Heat transfer coefficient, W/K		= (37) + (38)n		72.04	1	
(39)m= 74.66 74.25 73.84 71.77 71.36 69.29 69.29 68.88			2.19	73.01	71.67	(39)
Heat loss parameter (HLP), W/m²K		verage = Sur = (39)m ÷ (4)	11(38)1	12 / 1 🚄	11.01	(33)
					٦	
(40)m= 0.99 0.99 0.98 0.95 0.95 0.92 0.92 0.92	0.93	0.95	0.96	0.97		

Number of days in month (Table 1a)

ا	· .		1					1 ,		<u> </u>			1	
	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. Wa	iter heat	ting ene	rgy requi	rement:								kWh/ye	ear:	
Assum	ed occu	ıpancy, l	N								2.	.37		(42)
if TF	A > 13.9	9, N = 1	+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.				` '
	A £ 13.9	•	ator uoo	va in litra	o por de	\/d o	0.000	(05 v NI)	. 26				1	(40)
			ater usaç hot water							se target o).42		(43)
not more	e that 125	litres per	person pei	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 ii	n litres pei	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)				•		
(44)m=	99.46	95.84	92.22	88.61	84.99	81.37	81.37	84.99	88.61	92.22	95.84	99.46		
_											m(44) ₁₁₂ =		1084.99	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x E	OTm / 3600) kWh/mor	ith (see Ta	ables 1b, 1	c, 1d)	•	
(45)m=	147.49	129	133.11	116.05	111.36	96.09	89.04	102.18	103.4	120.5	131.54	142.84		_
If instant	taneous w	ator hoati	ng at point	of use (no	hot water	r storaga)	enter () in	hoves (46		Γotal = Su	m(45) ₁₁₂ =	=	1422.6	(45)
ı												I	İ	(40)
(46)m= Water	22.12 storage	19.35	19.97	17.41	16.7	14.41	13.36	15.33	15.51	18.08	19.73	21.43		(46)
	•) includir	ig any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
_		, ,	and no ta				_							` ,
	-	_	hot wate		-			. ,	ers) ente	er '0' in (47)			
Water	storage	loss:												
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0		(48)
Tempe	rature f	actor fro	m Table	2b								0		(49)
•			storage	-				(48) x (49)) =		1	10		(50)
•			eclared of factor fr	-								20	I	(54)
		•	see secti		6 Z (KVV	ii/iiii c /uc	iy <i>)</i>				0.	.02		(51)
	•	from Ta									1.	.03		(52)
Tempe	rature f	actor fro	m Table	2b							0	.6		(53)
Energy	lost fro	m water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =	1.	.03		(54)
Enter	(50) or ((54) in (5	55)								1.	.03		(55)
Water	storage	loss cal	culated t	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er 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=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Priman	v circuit	lose (ar	nnual) fro	m Table	3 3	1				I		0		(58)
	•	•	culated			59)m = ((58) ÷ 36	65 × (41)	m			-	I	(= -)
	-		rom Tab		,	•	. ,	, ,		r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi	loss cal	lculated	for each	month /	(61)m –	(60) ÷ 30	35 × (41))m					•	
(61)m=	0	0	0	0	0	00) + 30	0	0	0	0	0	0		(61)
(3.7/11–	ı	ı	ı ĭ	l	ı ĭ	I	ı ĭ	ı ĭ	ı ĭ	ı	ı	ı		(0.)

Total heat req	uired for	water he	eating ca	alculated	for e	ach month	(62)	m =	0.85 × ((45)m +	· (46)m +	(57)m +	(59)m + (61)m	
(62)m= 202.77	178.93	188.39	169.55	166.63	149.5	8 144.32	157	'.45	156.89	175.78	185.03	198.12		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (neg	ative quantit	y) (ent	ter '0'	if no sola	r contribu	ition to wate	er heating)		
(add additiona	al lines if	FGHRS	and/or V	WWHRS	appli	es, see Ap	pend	O xib	3)				_	
(63)m= 0	0	0	0	0	0	0	C)	0	0	0	0		(63)
Output from w	ater hea	ter												
(64)m= 202.77	178.93	188.39	169.55	166.63	149.5	8 144.32	157	.45	156.89	175.78	185.03	198.12		
	-	-				-	-	Outp	out from wa	ater heat	er (annual)₁	12	2073.44	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 ´ [0.	35 × (45)m	ı + (6	31)m	n] + 0.8 x	(46)m	n + (57)m	+ (59)m]	
(65)m= 93.26	82.83	88.48	81.38	81.25	74.7	73.83	78	.2	77.17	84.29	86.53	91.72		(65)
include (57)	m in cal	culation of	of (65)m	only if c	ylinde	r is in the	dwell	ling	or hot w	ater is	from com	munity h	neating	
5. Internal g	ains (see	e Table 5	and 5a):										
Metabolic gair	ns (Table	e 5). Wat	ts											
Jan	Feb	Mar	Apr	May	Jui	n Jul	А	ug	Sep	Oct	Nov	Dec		
(66)m= 118.35	118.35	118.35	118.35	118.35	118.3	5 118.35	118	.35	118.35	118.35	118.35	118.35		(66)
Lighting gains	(calcula	ted in Ap	pendix	L, equat	ion L9	or L9a), a	ılso s	ee 7	Table 5		•			
(67)m= 18.97	16.85	13.7	10.37	7.75	6.55	7.07	9.1	19	12.34	15.67	18.29	19.5		(67)
Appliances ga	ins (calc	ulated in	Append	dix L, eq	uation	L13 or L1	3a),	also	see Tal	ble 5	•		•	
(68)m= 209.27	211.44	205.97	194.32	179.62	165.7	9 156.56	154	.39	159.86	171.51	186.22	200.04		(68)
Cooking gains	s (calcula	ted in A	opendix	L, equat	tion L	5 or L15a), als	o se	e Table	5	•	•	•	
(69)m= 34.83	34.83	34.83	34.83	34.83	34.8	34.83	34.	83	34.83	34.83	34.83	34.83		(69)
Pumps and fa	ns gains	(Table 5	<u></u> ба)			•					•		•	
(70)m= 0	0	0	0	0	0	0	()	0	0	0	0		(70)
Losses e.g. ev	vaporatio	n (nega	ive valu	es) (Tab	le 5)									
(71)m= -94.68	-94.68	-94.68	-94.68	-94.68	-94.6	8 -94.68	-94	.68	-94.68	-94.68	-94.68	-94.68		(71)
Water heating	gains (T	Table 5)											_	
(72)m= 125.35	123.26	118.93	113.03	109.2	103.8	1 99.23	105	5.1	107.19	113.29	120.18	123.27		(72)
Total internal	gains =				(66)m + (67)n	n + (68	3)m +	- (69)m + ((70)m + (71)m + (72)	m		
(73)m= 412.1	410.06	397.11	376.23	355.08	334.6	6 321.37	327	'.19	337.89	358.98	383.19	401.31		(73)
6. Solar gain														
Solar gains are		•				•	ations	to co	nvert to th	e applica		ion.		
Orientation:	Access F Table 6d		Area m²			Tux Table 6a		T	g_ able 6b	-	FF Fable 6c		Gains (W)	
East 0.9x	0.77	x	6.8	32	x	19.64] x		0.63	x [0.7		40.94	(76)
East 0.9x	0.77	X	6.8		x	38.42]] x		0.63	╡ <u>,</u>	0.7	= =	80.08	(76)
East 0.9x	0.77	X	6.8		x	63.27) x		0.63	╡ <u> </u>	0.7	-	131.88	(76)
East 0.9x	0.77	X	6.8		x	92.28)] x		0.63	= x	0.7		192.34	(76)
East 0.9x	0.77	X	6.8		х	113.09	X		0.63	x [0.7	-	235.72	(76)
East 0.9x	0.77	X	6.8	32	х	115.77	X		0.63	x	0.7	=	241.3	(76)
East 0.9x	0.77	X	6.8	32	x	110.22	X		0.63	_ x [0.7	=	229.73	(76)
East 0.9x	0.77	X	6.8	32	х	94.68	x		0.63	x [0.7		197.33	(76)
•							_					_		_•

	_								_						
East	0.9x	0.77	X	6.8	32	X	7	73.59	X	0.63	X	0.7	=	153.38	(76)
East	0.9x	0.77	X	6.8	32	X	4	15.59	X	0.63	X	0.7	=	95.02	(76)
East	0.9x	0.77	X	6.8	32	X	2	24.49	X	0.63	X	0.7	=	51.04	(76)
East	0.9x	0.77	X	6.8	32	X	1	16.15	X	0.63	X	0.7	=	33.66	(76)
West	0.9x	0.77	X	7.1	13	X	1	19.64	X	0.63	X	0.7	=	42.8	(80)
West	0.9x	0.77	X	7.1	13	X	3	38.42	X	0.63	X	0.7	=	83.72	(80)
West	0.9x	0.77	X	7.1	13	X	6	63.27	X	0.63	X	0.7	=	137.87	(80)
West	0.9x	0.77	X	7.1	13	X	9	92.28	X	0.63	X	0.7	=	201.08	(80)
West	0.9x	0.77	X	7.1	13	X	1	13.09	X	0.63	X	0.7	=	246.43	(80)
West	0.9x	0.77	X	7.1	13	X	1	15.77	X	0.63	X	0.7	=	252.27	(80)
West	0.9x	0.77	X	7.1	13	X	1	10.22	X	0.63	X	0.7	=	240.17	(80)
West	0.9x	0.77	X	7.1	13	X	9	94.68	X	0.63	X	0.7	=	206.3	(80)
West	0.9x	0.77	X	7.1	13	X	7	73.59	X	0.63	X	0.7	=	160.35	(80)
West	0.9x	0.77	X	7.1	13	X	4	15.59	X	0.63	X	0.7	=	99.34	(80)
West	0.9x	0.77	X	7.1	13	X	2	24.49	X	0.63	X	0.7	=	53.36	(80)
West	0.9x	0.77	X	7.1	13	X	1	16.15	X	0.63	X	0.7	=	35.19	(80)
Solar o	ains in	watts, ca	alculated	I for eac	h mont	h			(83)m	n = Sum(74)m	(82)m				
(83)m=	83.73	163.8	269.75	393.42	482.15	\neg	93.56	469.89	403	.63 313.73	194.3	6 104.4	68.86]	(83)
Total g	ains – i	nternal a	and sola	· (84)m =	= (73)m	+ (83)m	, watts						J	
(84)m=	495.83	573.86	666.86	769.65	837.23	8	28.22	791.26	730	.82 651.63	553.3	4 487.6	470.17]	(84)
l.			•	•							•		•	4	
7. Me	an inter	nal temr	perature	(heating	seaso	n)									
		nal temp		`			area t	from Tal	ole 9	. Th1 (°C)				21	(85)
Temp	erature	during h	neating p	eriods ir	n the liv	ing			ole 9	, Th1 (°C)				21	(85)
Temp	erature ation fac	during h	neating pains for	eriods in	n the liv	ring m (s	ее Та	able 9a)			Oc	Nov	Dec	21	(85)
Temp Utilisa	erature	during h	neating p	eriods ir	n the liv	ring m (s				ug Sep	Oc:	t Nov	Dec 0.96	21	(85)
Temp Utilisa (86)m=	erature ation fac Jan 0.96	during heter for g	neating pains for Mar	eriods in living are Apr 0.79	n the livea, h1,r May	ring m (s	ee Ta Jun _{0.49}	Jul 0.37	0.4	ug Sep 11 0.63	-		1	21	
Temp Utilisa (86)m= Mean	erature ation fac Jan 0.96 interna	during heter for g Feb 0.93	neating pains for Mar 0.89	eriods in living are Apr 0.79 living are	n the livea, h1,r May 0.65	ring m (s	ee Ta Jun 0.49 ow ste	ble 9a) Jul 0.37 ps 3 to 7	0.4 7 in 1	ug Sep 11 0.63 able 9c)	0.84	0.93	0.96	21	(86)
Temp Utilisa (86)m=	erature ation fac Jan 0.96	during heter for g	neating pains for Mar	eriods in living are Apr 0.79	n the livea, h1,r May	ring m (s	ee Ta Jun _{0.49}	Jul 0.37	0.4	ug Sep 11 0.63	-		1	21	
Temp Utilisa (86)m= Mean (87)m= Temp	erature Jan 0.96 interna 19.06 erature	during heter for g Feb 0.93 I temper 19.34 during h	neating pains for Mar 0.89 rature in 19.79	eriods in living are 0.79 living are 20.34 eriods in	n the livea, h1,r May 0.65 ea T1 (ring m (s follo	ee Ta Jun 0.49 ow ste 20.91 velling	Jul 0.37 ps 3 to 7 20.97	A 0.47 in 1 20.	ug Sep 11 0.63 able 9c)	0.84	0.93	0.96	21	(86)
Temp Utilisa (86)m= Mean (87)m=	erature Ition fac Jan 0.96 interna	during heter for g Feb 0.93 I temper 19.34	neating pains for Mar 0.89 rature in 19.79	eriods in living are Apr 0.79 living are 20.34	n the livea, h1,r May 0.65 ea T1 (ring m (s follo	ee Ta Jun 0.49 ow ste	Jul 0.37 ps 3 to 7 20.97	A 0.47 in 1 20.	ug Sep 11 0.63 Table 9c) 96 20.81 9, Th2 (°C)	0.84	0.93	0.96	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m=	erature ation fac Jan 0.96 interna 19.06 erature 20.09	during heter for g Feb 0.93 I temper 19.34 during h	meating pains for Mar 0.89 rature in 19.79 neating part 20.1	Apr 0.79 living are 20.34 periods in	n the livea, h1,r May 0.65 ea T1 (20.71 n rest o 20.13	ring m (s	Jun 0.49 ow ste 20.91 velling	Jul 0.37 ps 3 to 7 20.97 from Ta 20.15	A 0.47 in 1 20.	ug Sep 11 0.63 Table 9c) 96 20.81 9, Th2 (°C)	20.3	0.93	0.96	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m=	erature ation fac Jan 0.96 interna 19.06 erature 20.09	during heter for g Feb 0.93 Il temper 19.34 during h	meating pains for Mar 0.89 rature in 19.79 neating part 20.1	Apr 0.79 living are 20.34 periods in	n the livea, h1,r May 0.65 ea T1 (20.71 n rest 0 20.13	ring m (s	Jun 0.49 ow ste 20.91 velling	Jul 0.37 ps 3 to 7 20.97 from Ta 20.15	A 0.47 in 1 20.	ug Sep 11 0.63 Table 9c) 96 20.81 9, Th2 (°C) 15 20.14	20.3	0.93	0.96	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	erature ation fac Jan 0.96 interna 19.06 erature 20.09 ation fac 0.95	during heter for g Feb 0.93 I temper 19.34 during heter for g 0.92	meating pains for Mar 0.89 rature in 19.79 reating part 20.1 ains for 0.87	Apr 0.79 living are 20.34 eriods in 20.12 rest of d 0.76	n the livea, h1,r May 0.65 ea T1 (20.71 n rest o 20.13 welling 0.61	ring m (s	Jun 0.49 ow ste 20.91 velling 20.15 ,m (se 0.44	Jul 0.37 pps 3 to 7 20.97 g from Ta 20.15 pee Table 0.3	A 0.4 7 in 1 20. able 9 20. 9a)	ug Sep 11 0.63 Table 9c) 96 20.81 9, Th2 (°C) 15 20.14	20.3 20.13 0.82	0.93 19.61 3 20.12	0.96 19.04 20.11	21	(86) (87) (88)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	erature ation fac Jan 0.96 interna 19.06 erature 20.09 ation fac 0.95	during heter for g Feb 0.93 I temper 19.34 during heter for g 0.92	meating pains for Mar 0.89 rature in 19.79 reating part 20.1 ains for 0.87	Apr 0.79 living are 20.34 eriods in 20.12 rest of d 0.76	n the livea, h1,r May 0.65 ea T1 (20.71 n rest o 20.13 welling 0.61	ring (sm (s	Jun 0.49 ow ste 20.91 velling 20.15 ,m (se 0.44	Jul 0.37 pps 3 to 7 20.97 g from Ta 20.15 pee Table 0.3	A 0.4 7 in 1 20. able 9 20. 9a)	ug Sep 1 0.63 Table 9c) 96 20.81 9, Th2 (°C) 15 20.14 4 0.57 to 7 in Tab	20.3 20.13 0.82	0.93 19.61 3 20.12 0.92	0.96 19.04 20.11	21	(86) (87) (88)
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Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	erature ation fact Jan 0.96 interna 19.06 erature 20.09 ation fact 0.95 interna 17.49	during heter for g Feb 0.93 Il temper 19.34 during h 20.09 ctor for g 0.92 Il temper 17.89	neating pains for Mar 0.89 rature in 19.79 reating pains for 0.87 rature in 18.54	Apr 0.79 living are 20.34 periods in 20.12 rest of d 0.76 the rest 19.31	n the livea, h1,r May 0.65 ea T1 (20.71 n rest o 20.13 welling 0.61 19.8	ring m (s follows) follows for the second se	ee Ta Jun 0.49 ow ste 20.91 velling 20.15 ,m (se 0.44 T2 (fe 20.07	Jul 0.37 ps 3 to 7 20.97 from Ta 20.15 pe Table 0.3 ollow ste 20.13	A 0.47 in 1 20. able 9 20. 9a) 0.3 eps 3 20.	ug Sep 1 0.63 Table 9c) 96 20.81 9, Th2 (°C) 15 20.14 34 0.57 1 to 7 in Tab 13 19.95 - fLA) × T2	0.84 20.3 20.13 0.82 le 9c) 19.28	0.93 19.61 3 20.12 0.92 3 18.3 ving area ÷ (-	0.96 19.04 20.11 0.96 17.47 4) =		(86) (87) (88) (89) (90) (91)
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Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m=	erature ation fact Jan 0.96 interna 19.06 erature 20.09 ation fact 0.95 interna 17.49 interna 18.08 adjustr 18.08	during heter for g Feb 0.93 I temper 19.34 during heter for g 0.92 I temper 17.89 I temper 18.44 ment to t 18.44	meating pains for Mar 0.89 rature in 20.1 ains for 0.87 rature in 18.54 rature (for 19.01 he mear 19.01	living are Apr 0.79 living are 20.34 periods ir 20.12 rest of d 0.76 the rest 19.31 or the wh 19.69 n interna 19.69	the livea, h1,r May 0.65 ea T1 (20.71 rest of 20.13 welling 0.61 19.8	ring m (s follows) follows fol	ee Ta Jun 0.49 ow ste 20.91 velling 20.15 ,m (se 0.44 T2 (fe 20.07	Jul 0.37 pps 3 to 7 20.97 from Ta 20.15 pee Table 0.3 ollow ste 20.13 LA × T1 20.45	A A 0.44	ug Sep 11 0.63 Table 9c) 96 20.81 9, Th2 (°C) 15 20.14 34 0.57 1 to 7 in Tab 13 19.95 - fLA) × T2 44 20.28 where appre	0.84 20.3 20.13 0.82 le 9c) 19.28 fLA = Li	0.93 19.61 3 20.12 0.92 3 18.3 ving area ÷ (0.96 19.04 20.11 0.96 17.47 4) =		(86) (87) (88) (89) (90) (91)
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Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m= Mean (92)m= Apply (93)m= 8. Spa	erature ation fact Jan 0.96 interna 19.06 erature 20.09 ation fact 0.95 interna 17.49 interna 18.08 adjustr 18.08 ace head to the	during heter for g Feb 0.93 Itemper 19.34 during h 20.09 eter for g 0.92 Itemper 17.89 Itemper 18.44 ment to t 18.44 atting required	meating pains for Mar 0.89 rature in 19.79 reating pains for 0.87 rature in 18.54 rature (for 19.01 the mean 19.01 uirement ternal tern	living are 20.34 eriods in 20.34 eriods in 20.12 rest of d 0.76 the rest 19.31 er the wh 19.69 interna 19.69 mperatur	the lives, h1,r May 0.65 ea T1 (20.71 n rest o 20.13 welling 0.61 of dwelling 19.8 cole dw 20.14 tempe 20.14 re obtain	ring m (s follows) follows fol	ee Ta Jun 0.49 ow ste 20.91 velling 20.15 ,m (se 0.44 T2 (fe 20.07 g) = fl 20.39 ure fro 20.39	Jul 0.37 ps 3 to 7 20.97 from Ta 20.15 pe Table 0.3 ollow ste 20.13 LA × T1 20.45 pm Table 20.45	A 0.4 7 in 1 20. able 9 20. 9a) 0.3 20. + (1 20. 24e, 20.	ug Sep 11 0.63 Table 9c) 96 20.81 9, Th2 (°C) 15 20.14 34 0.57 1 to 7 in Tab 13 19.95 - fLA) × T2 44 20.28 where appre	0.84 20.3 20.13 0.82 le 9c) 19.28 fLA = Li 19.66 opriate 19.66	0.93 19.61 3 20.12 0.92 3 18.3 ving area ÷ (0.96 19.04 20.11 0.96 17.47 4) = 18.06	0.38	(86) (87) (88) (89) (90) (91) (92)

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

	. ,													
Utilisati (94)m=	on fac 0.93	tor for g	ains, hm 0.85	0.75	0.61	0.45	0.33	0.37	0.58	0.8	0.9	0.94		(94)
_		hmGm		ļ		0.43	0.55	0.57	0.30	0.0	0.9	0.34		(0.)
	462.13	1	566.05	576.29	514.52	376.3	259.8	268.8	379.73	443.75	440.94	441.67		(95)
Monthly	y aver	age exte	rnal tem	perature	from Ta	able 8								
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
		e for me	1		1	i	-``		<u> </u>	r –		1	1	(0-1)
` ′		1004.99		774.72	602.29	400.9	266.55	278.3	433.01	646.58	843.75	1011.79		(97)
	<u>neatin</u> 421.47	g require 326.95	265.89	or each n	65.3	/Vn/mon ⁻	th = 0.02	24 x [(97)m - (95 0)m] x (4 ⁻¹	1)m 290.02	424.17		
(00)=		020.00	200.00	1 12.01	00.0			<u> </u>	l per year	<u> </u>		L	2087.57	(98)
Space	heatin	g require	ement in	ı kWh/m²	²/year						, ,		27.73	(99)
9b. Ener		•			•	scheme	į							
This par								tina prov	rided by	a comm	unitv sch	neme.		
Fraction											. ,		0	(301)
Fraction	of spa	ace heat	from co	mmunity	system	1 – (30	1) =						1	(302)
	-									up to four	other heat	sources; ti	he latter	
includes b Fraction			_			rom powe	r stations.	See Appe	naix C.				0.4	(303a)
Fraction	of co	mmunity	heat fro	m heat s	source 2								0.4	(303b)
Fraction	of tota	al space	heat fro	m Comn	nunity bo	oilers				(3	02) x (303	a) =	0.4	(304a)
Fraction	of tota	al space	heat fro	m comm	nunity he	at sourc	e 2			(3	02) x (303	b) =	0.4	(304b)
Factor fo	or con	trol and	charging	method	l (Table	4c(3)) fo	r commu	unity hea	ating sys	tem			1	(305)
Distribut	ion los	ss factor	(Table 1	12c) for (commun	ity heati	ng syste	m					1.05	(306)
Space h	neatin	g											kWh/yea	<u>ur</u>
Annual	space	heating	requiren	nent									2087.57	
Space h	eat fro	om Comi	munity b	oilers					(98) x (30	04a) x (30	5) x (306)	=	876.78	(307a)
Space h	eat fro	om heat	source 2	2					(98) x (30	04b) x (30	5) x (306)	=	876.78	(307b)
Efficienc	cy of s	econdar	y/supple	mentary	heating	system	in % (fro	m Table	4a or A	ppendix	E)		0	(308
Space h	eating	g require	ment fro	m secon	dary/sup	oplemen	tary syst	tem	(98) x (30	01) x 100 -	÷ (308) =		0	(309)
Water h	eating	g												_
Annual v		•	•										2073.44	
If DHW t Water h									(64) x (30	03a) x (30	5) x (306) :	=	870.84	(310a)
Water h	eat fro	m heat s	source 2						(64) x (30	03b) x (30	5) x (306) :	=	870.84	(310b)
Electricit	ty use	d for hea	at distrib	ution				0.01	× [(307a)	(307e) +	(310a)((310e)] =	34.95	(313)
Cooling	Syste	m Energ	y Efficie	ncy Rati	0								0	(314)
Space c	ooling	(if there	is a fixe	ed cooling	g system	n, if not e	enter 0)		= (107) ÷	- (314) =			0	(315)
		oumps a												<u> </u>
mechan	ical ve	entilation	- baland	ced, extra	act or po	sitive in	put from	outside					274.8	(330a)

warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	b) + (330g) =	274.8	(331)
Energy for lighting (calculated in Appendix L)			335.02	(332)
Electricity generated by PVs (Appendix M) (negative quantity)			-734.49	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity	')		0	(334)
12b. CO2 Emissions – Community heating scheme				
	Energy «Wh/year	Emission factor kg CO2/kWh	r Emissions kg CO2/year	
	(Willyeal	kg CO2/kWii	kg CO2/year	
CO2 from other sources of space and water heating (not CHP) Efficiency of heat source 1 (%) If there is CHP using two forms the source of th	uels repeat (363) to	(366) for the second fu	ıel 89	(367a)
Efficiency of heat source 2 (%) If there is CHP using two files	uels repeat (363) to	(366) for the second fu	uel 89	(367b)
CO2 associated with heat source 1 [(307b)+(310b)] x 100 ÷ (367b) x	0.22	= 424.14	(367)
CO2 associated with heat source 2 [(307b)+(310b)] x 100 ÷ (367b) x	0.22	= 424.14	(368)
Electrical energy for heat distribution [(313)	x	0.52	= 18.14	(372)
Total CO2 associated with community systems (363)	.(366) + (368)(372	2)	= 866.43	(373)
CO2 associated with space heating (secondary) (309)	(0	= 0	(374)
CO2 associated with water from immersion heater or instantaneous h	neater (312) x	0.22	= 0	(375)
Total CO2 associated with space and water heating (373) -	+ (374) + (375) =		866.43	(376)
CO2 associated with electricity for pumps and fans within dwelling	331)) x	0.52	= 142.62	(378)
CO2 associated with electricity for lighting (332)))	x	0.52	= 173.87	(379)
Energy saving/generation technologies (333) to (334) as applicable Item 1		0.52 x 0.01 =	-381.2	(380)
Total CO2, kg/year sum of (376)(382) =			801.72	(383)
Dwelling CO2 Emission Rate (383) ÷ (4) =			10.65	(384)

El rating (section 14)

(385)

91.07

		User D	Details:						
Assessor Name:	John Ashe		Strom	a Num	her:		STRO	031268	
Software Name:	Stroma FSAP 2012		Softwa					n: 1.0.5.8	
		Property	Address	: Unit 27	- COPF	PETTS V	VOOD, L	ondon.	
Address :									
1. Overall dwelling dime	nsions:	_							
Ground floor			a(m²)	l(10) v		ight(m)	(2a) =	Volume(m³	_
	\			(1a) x	2	2.66	(2d) =	200.22	(3a)
•	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	75.27	(4)					_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	200.22	(5)
2. Ventilation rate:	main accorde		04h 0#		40401				-
	main seconda heating heating	iry 	other		total			m³ per hou	r —
Number of chimneys	0 + 0	+	0	=	0	X	40 =	0	(6a)
Number of open flues	0 + 0	+	0	=	0	X	20 =	0	(6b)
Number of intermittent fa	ns				3	Х	10 =	30	(7a)
Number of passive vents				Ī	0	X	10 =	0	(7b)
Number of flueless gas fi	res			Ī	0	X	40 =	0	(7c)
				<u>L</u>					
							Air ch	nanges per ho	ur
•	ys, flues and fans = $(6a)+(6b)+(6b)$				30		÷ (5) =	0.15	(8)
If a pressurisation test has b Number of storeys in the	een carried out or is intended, proce	ed to (17), (otherwise (continue fr	om (9) to	(16)			¬ ₍₀₎
Additional infiltration	ie dweiling (115)					[(9)	-1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame o	r 0.35 fo	r masonı	ry consti	uction	[(0)	. j	0	(11)
•••	resent, use the value corresponding	to the great	ter wall are	a (after					
deducting areas of openir	ngs); if equal user 0.35 loor, enter 0.2 (unsealed) or () 1 (seale	ad) else	enter 0				0	(12)
If no draught lobby, en		7. i (Scale	ou), else	CITICI O				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration	3 [1]		0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metr	es per ho	our per s	quare m	etre of e	envelope	area	5	(17)
If based on air permeabil	ity value, then $(18) = [(17) \div 20] +$	(8), otherw	ise (18) = ((16)				0.4	(18)
	s if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			_
Number of sides sheltere Shelter factor	d		(20) = 1 -	[0 075 v (*	10)1 –			0	(19)
Infiltration rate incorporat	ing shalter factor		(20) = 1 (21) = (18)					1	(20)
Infiltration rate modified for			(21) = (10) X (20) =				0.4	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind sp		1	1 3	1	1			J	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
		1	1			1	1	1	
Wind Factor (22a)m = (22	` 	0.05	0.00	Ι 4	1 4 00	1 4 4 0	1.40	1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
0.51	0.5	0.49	0.44	0.43	0.38	0.38	0.37	0.4	0.43	0.45	0.47]	
Calculate effe		_	rate for t	he appli	cable ca	se		-	-				(23
If exhaust air h			endix N. (2	3b) = (23a	ı) × Fmv (e	eguation (N5)) . othe	rwise (23b) = (23a)			0	(23)
If balanced wit									, (,			0	(230
a) If balance		•	-	_					2h)m + (23h) x [1 – (23c)		(230
(24a)m = 0	0	0	0	0	0	0	0	0	0	0	0]	(24a
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (f	MV) (24t)m = (22	2b)m + (23b)		J	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
c) If whole h	nouse ex n < 0.5 >			•					.5 × (23k))	•	•	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
d) If natural if (22b)r	ventilation			•	•				0.5]	,		_	
(24d)m= 0.63	0.62	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(240
Effective air	change	rate - er	iter (24a) or (24k	o) or (24	c) or (24	d) in bo	(25)					
(25)m= 0.63	0.62	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(25
3. Heat losse	es and he	eat loss r	paramet	er:									
ELEMENT	Gros	_	Openin		Net Ar	ea	U-val	re	ΑXU		k-value	9	AXk
	area	(m^2)	m		A ,r		W/m2		(W/		kJ/m²•		kJ/K
Windows Type	e 1				6.82	_X 1	/[1/(1.4)+	0.04] =	9.04				(27
Windows Type	e 2				7.13	_X 1	/[1/(1.4)+	0.04] =	9.45				(27
Floor					75.27	7 X	0.13	=	9.78509	9			(28
Walls	50.0)6	13.9	5	36.11	ı x	0.18		6.5				(29
Total area of e	elements	, m²			125.3	3							(31
* for windows and ** include the are						ated using	g formula 1	/[(1/U-valu	ie)+0.04] a	as given in	paragrapl	n 3.2	
Fabric heat lo	ss, W/K	= S (A x	U)				(26)(30)	+ (32) =				34.78	(33
Heat capacity								((28).	(30) + (3	2) + (32a).	(32e) =	10446.3	(34
Thermal mass	parame	eter (TMF	P = Cm -	- TFA) ir	kJ/m²K	•		Indica	tive Value	: Medium		250	(35
For design asses can be used inste				construct	ion are no	t known pi	recisely the	indicative	values of	TMP in T	able 1f		
Thermal bridg				usina An	pendix I	<						6.27	(36
if details of therm	•	,		• .	•	•						0.21	(00
Total fabric he			, ,	·	•			(33) +	(36) =			41.05	(37
Ventilation he	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= 41.62	41.29	40.96	39.43	39.14	37.8	37.8	37.55	38.32	39.14	39.72	40.33		(38
Heat transfer	coefficie	nt, W/K						(39)m	= (37) + (38)m		-	
(39)m= 82.67	82.33	82.01	80.47	80.19	78.85	78.85	78.6	79.36	80.19	80.77	81.37]	
	•	!				!	•		Average =		12 /12=	80.47	(39
Heat loss para			m²K						= (39)m ÷	· · · · · ·		— — —	
(40)m= 1.1	1.09	1.09	1.07	1.07	1.05	1.05	1.04	1.05	1.07	1.07	1.08		
									Average =	Sum(40) ₁	12 /12=	1.07	(40

Number of days in month (Table 1a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
if TF				[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (1	ΓFA -13.		37		(42)
Reduce	the annua	l average		usage by	5% if the a	lwelling is	designed t	(25 x N) to achieve	+ 36 a water us	se target o		.42		(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
İ		n litres per	day for ea										l	
(44)m=	99.46	95.84	92.22	88.61	84.99	81.37	81.37	84.99	88.61	92.22	95.84	99.46		7
Energy o	content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x D	OTm / 3600) kWh/mon		m(44) ₁₁₂ = ables 1b, 1		1084.99	(44)
(45)m=	147.49	129	133.11	116.05	111.36	96.09	89.04	102.18	103.4	120.5	131.54	142.84		_
If instant	aneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46		Γotal = Su	m(45) ₁₁₂ =		1422.6	(45)
(46)m=	22.12 storage	19.35	19.97	17.41	16.7	14.41	13.36	15.33	15.51	18.08	19.73	21.43		(46)
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150		(47)
Otherw Water	ise if no storage	stored loss:	nd no ta hot wate	er (this in	icludes i	nstantar	neous co	, ,	ers) ente	er '0' in (· I	(40)
,			m Table		טווא פו וכ	wii (Kvvi	i/uay).					39		(48)
•			storage		ar			(48) x (49)	١ –			54		(49) (50)
b) If m Hot wa If comr	anufact ter stora nunity h	urer's de age loss	eclared of factor fr ee section	cylinder I om Tabl	oss fact		known:	(40) X (40)	_			75	 	(51)
			m Table	2b								0		(52) (53)
•			storage		ear			(47) x (51)) x (52) x (53) =		0		(54)
• • • • • • • • • • • • • • • • • • • •		54) in (5	_	,						,	-	75		(55)
Water	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)r	m			•	
(56)m=	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(56)
If cylinde	er contains	dedicate	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	23.33	21.07	23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(57)
	•	•	inual) fro				/ \					0		(58)
	•				,		. ,	65 × (41) ng and a	m ı cylindeı	r thermo	stat)			
(59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi	loss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)

Total heat required for water h	eating calculated	d for each mont	th (62)m = 0.85 ×	(45)m + (46)m +	(57)m +	(59)m + (61)m	1
(62)m= 194.09 171.08 179.71	161.14 157.95	141.18 135.64	1 148.77 148.49	167.1 176.63	189.43		(62)
Solar DHW input calculated using App	endix G or Appendi	x H (negative quan	tity) (enter '0' if no sola	ar contribution to water	er heating)		
(add additional lines if FGHRS	and/or WWHRS	S applies, see A	ppendix G)				
(63)m= 0 0 0	0 0	0 0	0 0	0 0	0		(63)
Output from water heater							
(64)m= 194.09 171.08 179.71	161.14 157.95	141.18 135.64	1 148.77 148.49	167.1 176.63	189.43		_
			Output from v	vater heater (annual)	112	1971.22	(64)
Heat gains from water heating	, kWh/month 0.2	25 ´ [0.85 × (45)	m + (61)m] + 0.8	x [(46)m + (57)m	+ (59)m]	
(65)m= 86.32 76.56 81.54	74.66 74.3	68.02 66.88	71.25 70.45	77.34 79.81	84.77		(65)
include (57)m in calculation	of (65)m only if	cylinder is in the	e dwelling or hot v	vater is from com	munity h	eating	
5. Internal gains (see Table 5	5 and 5a):						
Metabolic gains (Table 5), Wa	· ·						
Jan Feb Mar	Apr May	Jun Jul	Aug Sep	Oct Nov	Dec		
(66)m= 118.35 118.35 118.35	118.35 118.35	118.35 118.35	 	118.35 118.35	118.35		(66)
Lighting gains (calculated in A	opendix L. equa	tion L9 or L9a).	also see Table 5				
(67)m= 18.97 16.85 13.7	10.37 7.75	6.55 7.07	9.19 12.34	15.67 18.29	19.5		(67)
Appliances gains (calculated in	Annendix Lec	uuation I 13 or I	13a) also see Ta	uble 5			
(68)m= 209.27 211.44 205.97	194.32 179.62	165.79 156.56		171.51 186.22	200.04		(68)
Cooking gains (calculated in A	<u> </u>	<u> </u>					, ,
(69)m= 34.83 34.83 34.83	34.83 34.83	34.83 34.83		34.83 34.83	34.83		(69)
` '	<u> </u>	04.00	04.00	04.00	04.00		()
Pumps and fans gains (Table 5) (70)m= 3 3 3	3 3	3 3	3 3	3 3	3		(70)
	<u> </u>	1 1					(10)
Losses e.g. evaporation (nega (71)m= -94.68 -94.68 -94.68	11ve values) (1 at	94.68 -94.68	3 -94.68 -94.68	-94.68 -94.68	-94.68		(71)
` '	-94.66	-94.66	94.66 -94.66	-94.06	-94.00		(71)
Water heating gains (Table 5)	1 400 7 1 00 07		1 05 77 1 07 05	1400 05 1440 05	1 440 04		(70)
(72)m= 116.02 113.93 109.59	103.7 99.87	94.48 89.9	95.77 97.85	103.95 110.85	113.94		(72)
Total internal gains =		·)m + (68)m + (69)m +	1 1			<i></i>
(73)m= 405.77 403.73 390.77	369.9 348.74	328.32 315.04	320.85 331.56	352.64 376.86	394.98		(73)
6. Solar gains:	o flore from Table Oa			ha ang lingh la ani antai	·		
Solar gains are calculated using solar		•		• •	tion.	Onima	
Orientation: Access Factor Table 6d	Area m²	Flux Table 6a	g_ Table 6b	FF Table 6c		Gains (W)	
_					_		7(76)
5.77		X 19.64	X 0.63	x 0.7	=	40.94	(76)
		X 38.42	× 0.63	× 0.7	=	80.08	(76)
East 0.9x 0.77 x		X 63.27	X 0.63	× 0.7	=	131.88	(76)
East 0.9x 0.77 x		x 92.28	X 0.63	X 0.7	=	192.34	(76)
East 0.9x 0.77 x		X 113.09	x 0.63	× 0.7	=	235.72	(76)
East 0.9x 0.77 x	6.82	x 115.77	× 0.63	× 0.7	=	241.3	(76)
East 0.9x 0.77 x	6.82	X 110.22	× 0.63	× 0.7	=	229.73	(76)
East 0.9x 0.77 x		× 94.68	x 0.63	X 0.7			(76)

East	0.9x	0.77	X	6	.82	X	7:	3.59	x	0.63	х	· [0.7		=	153.38	(76)
East	0.9x	0.77	x	6	.82	x	4	5.59	x	0.63	x	·Γ	0.7		=	95.02	(76)
East	0.9x	0.77	X	6	.82	x	2	4.49	x	0.63	×	⟨┌	0.7		=	51.04	(76)
East	0.9x	0.77	X	6	.82	x	1	6.15	x	0.63	x	ζĒ	0.7		=	33.66	(76)
West	0.9x	0.77	X	7	.13	x	1	9.64	x	0.63	×	ζĒ	0.7		=	42.8	(80)
West	0.9x	0.77	X	7	.13	x	3	8.42	х	0.63	×	ͺͺͺ	0.7	司	=	83.72	(80)
West	0.9x	0.77	X	7	.13	x	6:	3.27	х	0.63	×	ζŢ	0.7	司	=	137.87	(80)
West	0.9x	0.77	X	7	.13	x	9:	2.28	х	0.63	×	ͺͺϝ	0.7	\equiv	=	201.08	(80)
West	0.9x	0.77	х	7	.13	x	11	13.09	x	0.63	×	ζĒ	0.7	司	=	246.43	(80)
West	0.9x	0.77	X	7	.13	x	11	15.77	x	0.63	×	ζĒ	0.7		=	252.27	(80)
West	0.9x	0.77	X	7	.13	x	11	10.22	x	0.63	×	ͺͺͺ	0.7	\equiv	=	240.17	(80)
West	0.9x	0.77	Х	7	.13	x	9.	4.68	x	0.63	×	ζĒ	0.7		=	206.3	(80)
West	0.9x	0.77	X	7	.13	x	7:	3.59	x	0.63	×	ͺͺϝ	0.7		=	160.35	(80)
West	0.9x	0.77	X	7	.13	x	4:	5.59	x	0.63	×	ζĒ	0.7		=	99.34	(80)
West	0.9x	0.77	X	7	.13	x	2	4.49	x	0.63	×	ζĒ	0.7		=	53.36	(80)
West	0.9x	0.77	X	7	.13	x	1	6.15	x	0.63	x	ζĒ	0.7		=	35.19	(80)
	-						-		•			_					
Solar	ains in	watts, ca	alculate	d for ea	ch mont	:h			(83)m	n = Sum(74)m	ı(82)	m					
(83)m=	83.73	163.8	269.75	393.42	_	\neg	93.56	469.89	403	.63 313.73	194	.36	104.4	68.8	36		(83)
Total g	jains – i	nternal a	nd sola	r (84)m	= (73)m	1 + (83)m ,	watts								•	
(84)m=	489.5	567.53	660.52	763.31	830.89	8	21.89	784.93	724	.49 645.29	54	7	481.26	463.	84		(84)
7. Me	an inter	nal temp	erature	(heatin	g seaso	n)											
		nal temp		•	Ĭ		area f	rom Tal	ole 9	. Th1 (°C)						21	(85)
Temp	erature	during h	eating p	periods	in the liv	/ing			ole 9	, Th1 (°C)						21	(85)
Temp	erature ation fac	during h	neating pains for	periods living a	in the liv	/ing m (s	ee Ta	ble 9a)				oct	Nov	De	2 C	21	(85)
Temp Utilisa	erature ation fac Jan	during heter for g	neating pains for	periods living a Apr	in the live in the liver in the	/ing m (s	ee Ta Jun	ble 9a) Jul	Α	ug Sep	+	oct	Nov 0.99	De		21	
Temp Utilisa (86)m=	erature ation fac Jan 1	during heter for garage	eating pains for Mar	living a Apr 0.92	in the live in the	/ing m (s	ee Ta Jun ^{0.6}	Jul 0.44	A 0.4	ug Sep 19 0.77	O 0.9		Nov 0.99	De		21	(85)
Temp Utilisa (86)m= Mean	perature ation fact Jan 1 interna	during heter for government for gove	neating pains for Mar 0.98	living a Apr 0.92 living a	in the livrea, h1, May 0.79 rea T1 (/ing m (s /	ee Ta Jun ^{0.6} w ste	ble 9a) Jul 0.44 os 3 to 7	A 0.4 7 in T	ug Sep 9 0.77 able 9c)	0.9	96	0.99	1		21	(86)
Temp Utilisa (86)m=	erature ation fac Jan 1	during heter for garage	eating pains for Mar	living a Apr 0.92	in the live in the	/ing m (s /	ee Ta Jun ^{0.6}	Jul 0.44	A 0.4	ug Sep 9 0.77 able 9c)	+	96	+			21	
Temp Utilisa (86)m= Mean (87)m=	Jan 1 interna	during heter for games feb 0.99 I temper 20.04	ains for Mar 0.98 ature in	living a Apr 0.92 living a 20.66	in the livrea, h1, May 0.79 rea T1 (/ing m (s /	ee Ta Jun 0.6 ow step 20.98	Jul 0.44 os 3 to 7	A 0.47 in T 20.	ug Sep 9 0.77 able 9c)	20.	96	0.99	1		21	(86)
Temp Utilisa (86)m= Mean (87)m=	Jan 1 interna	during heter for games feb 0.99 I temper 20.04	ains for Mar 0.98 ature in	living a Apr 0.92 living a 20.66	in the livrea, h1, May 0.79 rea T1 (ving m (s / (follo	ee Ta Jun 0.6 ow step 20.98	Jul 0.44 os 3 to 7	A 0.47 in T 20.	ug Sep 19 0.77 Table 9c) 199 20.93 20.93	20.	61	0.99	1	36	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m=	Jan 1 interna 19.88 perature	during heter for games Feb 0.99 I temper 20.04 during h	meating pains for Mar 0.98 ature in 20.32 meating pains 20.01	living a Apr 0.92 living a 20.66 periods 20.03	in the liverea, h1, May 0.79 rea T1 (20.89) in rest c 20.03	ring m (s	Jun 0.6 w step 20.98 velling	Jul 0.44 os 3 to 7 21 from Ta 20.04	A 0.47 in T 20.	ug Sep 19 0.77 Table 9c) 199 20.93 20.93	20.	61	0.99	19.8	36	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m=	Jan 1 interna 19.88 perature	during heter for games Feb 0.99 I temper 20.04 during h	meating pains for Mar 0.98 ature in 20.32 meating pains 20.01	living a Apr 0.92 living a 20.66 periods 20.03	in the liverea, h1, May 0.79 rea T1 (20.89) in rest c 20.03	ving m (s	Jun 0.6 w step 20.98 velling	Jul 0.44 os 3 to 7 21 from Ta 20.04	A 0.47 in T 20.	ug Sep 19 0.77 Table 9c) 19 20.93 19 7h2 (°C) 10 20.04	20.	96 61 03	0.99	19.8	36	21	(86)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	Jan 1 interna 19.88 perature 20 ation fac	during heter for gase sector f	meating pains for Mar 0.98 ature in 20.32 meating pains for 0.97	living a Apr 0.92 living a 20.66 periods 20.03 rest of 0.9	in the liverea, h1, may 0.79 rea T1 (20.89 in rest c 20.03 dwelling 0.74	ving m (s	Jun 0.6 www.step 20.98 velling 20.04 mm (se 0.51	Jul 0.44 0s 3 to 7 21 from Ta 20.04 e Table 0.35	A 0.47 in T 20.48 able 9 20.49 0.3	ug Sep 19 0.77 Table 9c) 19 20.93 19 70, Th2 (°C) 10 20.04	20.	03	20.18	19.8	36	21	(86) (87) (88)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m=	Jan 1 interna 19.88 perature 20 ation fac	during heter for gase sector f	meating pains for Mar 0.98 ature in 20.32 meating pains for 0.97	living a Apr 0.92 living a 20.66 periods 20.03 rest of 0.9	in the liverea, h1, may 0.79 rea T1 (20.89 in rest c 20.03 dwelling 0.74	ving m (s / / / / / / / / / / / / / / / / / /	Jun 0.6 www.step 20.98 velling 20.04 mm (se 0.51	Jul 0.44 0s 3 to 7 21 from Ta 20.04 e Table 0.35	A 0.47 in T 20.48 able 9 20.49 0.3	ug Sep 19 0.77 Table 9c) 99 20.93 9, Th2 (°C) 05 20.04 10 0.69 10 7 in Tal	20.	03	20.18	19.8	02	21	(86) (87) (88)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean	Jan 1 interna 19.88 perature 20 ation fac	during heter for gase of the second during heter for gase of temper of tempe	meating pains for Mar 0.98 ature in 20.32 meating pains for 0.97 ature in	living a Apr 0.92 living a 20.66 periods 20.03 rest of 0.9 the res	in the liverea, h1, May 0.79 rea T1 (20.89) in rest conduction 20.03 dwelling 0.74 t of dwe	ving m (s / / / / / / / / / / / / / / / / / /	Jun 0.6 www.step 20.98 velling 20.04 mm (see 0.51	Jul 0.44 os 3 to 7 21 from Ta 20.04 e Table 0.35 ollow ste	A 0.27 in T 20. able 9 20. 9a) 0.3	ug Sep 19 0.77 Table 9c) 99 20.93 9, Th2 (°C) 05 20.04 10 0.69 10 7 in Tal	20.4 20.4 20.5 0.9 0.9	03 03 58	0.99 20.18 20.02 0.99	19.8	02	21	(86) (87) (88) (89)
Temp Utilisa (86)m= Mean (87)m= Temp (88)m= Utilisa (89)m= Mean (90)m=	Jan 1 interna 19.88 erature 20 ation fact ation fact 1 interna 18.51	during heter for games of the second	ains for Mar 0.98 ature in 20.32 eating p 20.01 ains for 0.97 ature in 19.15	living a Apr 0.92 living a 20.66 ceriods 20.03 rest of 6 0.9 the res 19.64	in the liverea, h1, May 0.79 rea T1 (20.89 in rest c 20.03 dwelling 0.74 t of dwe 19.93	ving m (s / / / / / / / / / / / / / / / / / / /	ee Ta Jun 0.6 ow step 20.98 velling 20.04 ,m (se 0.51 T2 (fd 20.03	Jul 0.44 0s 3 to 7 21 from Ta 20.04 e Table 0.35 bllow ste	A 0.4 7 in T 20. able 9 20. 9a) 0.3 eps 3	ug Sep 19 0.77 Table 9c) 99 20.93 9, Th2 (°C) 05 20.04 19 0.69 10 7 in Tal 19.99	0.9 20. 20. 0.9 0.9 19. fLA =	03 03 58	0.99 20.18 20.02 0.99	19.8	02		(86) (87) (88) (89)
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Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Utilisation fact	or for a	ains. hm	ı:										
(94)m= 0.99	0.99	0.97	0.9	0.75	0.54	0.38	0.43	0.72	0.94	0.99	1		(94)
Useful gains, l	hmGm ,	W = (94	4)m x (84	4)m									
(95)m= 486.96	561.07	639.64	687.62	626.66	447.86	298.7	312.58	461.5	515.53	475.99	461.99		(95)
Monthly avera	ge exte	rnal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate							-``	- 					
` '	1180.08	1073.22		688.76	456.44	299.71	314.5	495.46	751.26	995.65	1204.62		(97)
Space heating	<u> </u>		r				 	ì	<u> </u>		l l		
(98)m= 543.11	415.98	322.58	149.43	46.2	0	0	0	0	175.39	374.15	552.52		7,000
							Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	2579.36	(98)
Space heating	g require	ement in	kWh/m²	/year								34.27	(99)
9a. Energy requ	uiremer	ıts – Indi	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space heating	_												,
Fraction of spa	ace hea	t from s	econdar	y/supple	mentary	system						0	(201)
Fraction of spa	ace hea	t from m	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of total	al heatiı	ng from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficiency of m	nain spa	ce heat	ing syste	em 1								93.5	(206)
Efficiency of s	econda	ry/suppl	ementar	y heating	g system	ո, %						0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ır
Space heating	require	ement (c	alculate	d above))		•	•		•			
543.11	415.98	322.58	149.43	46.2	0	0	0	0	175.39	374.15	552.52		
$(211)m = \{[(98)]$	m x (20	4)] } x 1	00 ÷ (20)6)									(211)
580.87	444.9	345.01	159.82	49.41	0	0	0	0	187.58	400.16	590.93		_
							Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	<u></u>	2758.67	(211)
Space heating	•		• •	month									
= {[(98)m x (20													
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		7,
							Tota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water heating		4a# /aala	ام امدادان	(میره									
Output from wa	171.08	179.71	161.14	157.95	141.18	135.64	148.77	148.49	167.1	176.63	189.43		
Efficiency of wa	ater hea	ter	ļ				<u> </u>	<u> </u>		<u> </u>	l .	79.8	(216)
(217)m= 87.41	87.1	86.36	84.61	81.99	79.8	79.8	79.8	79.8	84.94	86.77	87.5		(217)
Fuel for water h	neating.	kWh/mo	onth				ļ			ļ.	<u> </u>		
(219)m = (64)n													
(219)m= 222.03	196.43	208.1	190.45	192.64	176.92	169.97	186.43	186.08	196.71	203.56	216.49		,
							Tota	I = Sum(2				2345.81	(219)
Annual totals	fuol ··- ·	∞!∽مسام	o) (ctc:	4					k'	Wh/year	I	kWh/year	1
Space heating			system	I								2758.67]
Water heating f	uel use	d										2345.81	
Electricity for pu	umps, fa	ans and	electric	keep-ho	t								

central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (230a)(230g) =		75	(231)
Electricity for lighting				335.02	(232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	Energy kWh/year	Emission fac kg CO2/kWh	ctor	Emissions kg CO2/yea	
Space heating (main system 1)	(211) x	0.216	=	595.87	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	506.69	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1102.57	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	173.87	(268)
Total CO2, kg/year	sum	of (265)(271) =		1315.37	(272)

TER =

(273)

17.48

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 07 October 2020

Property Details: Unit 27 - COPPETTS WOOD, London

Dwelling type:FlatLocated in:EnglandRegion:Thames valley

Cross ventilation possible:YesNumber of storeys:1Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Low

Night ventilation: False **Blinds, curtains, shutters:**

Ventilation rate during hot weather (ach): 4 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient: 264.29 (P1)

Transmission heat loss coefficient: 46.1

Summer heat loss coefficient: 310.41 (P2)

Overhangs:

Orientation: Ratio: Z_overhangs:

East (Rear Windows) 0 1 West (Left Windows) 0 1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
East (Rear Windows)	1	0.9	1	0.9	(P8)
West (Left Windows)	1	0.9	1	0.9	(P8)

Solar gains

Orientation		Area	Flux	g_{-}	FF	Shading	Gains
East (Rear Windows)	0.9 x	6.82	117.51	0.63	0.7	0.9	286.27
West (Left Windows)	0.9 x	7.13	117.51	0.63	0.7	0.9	299.28
						Total	585.55 (P3/P4)

Internal dains:

	June	July	August	
Internal gains	466.54	449.5	457.43	
Total summer gains	1088.12	1035.04	972.57 (P5)	
Summer gain/loss ratio	3.51	3.33	3.13 (P6)	
Mean summer external temperature (Thames valley)	16	17.9	17.8	
Thermal mass temperature increment	1.3	1.3	1.3	
Threshold temperature	20.81	22.53	22.23 (P7)	
Likelihood of high internal temperature	Slight	Medium	Medium	

Assessment of likelihood of high internal temperature: Medium