Regulations Compliance Report

Project Information	on:			
ssessed By:	John Ashe (STRO	D031268)	Building Type:	Flat
Owelling Details:				
EW DWELLING	DESIGN STAGE		Total Floor Area: 5	2.23m ²
te Reference :	COPPETTS WOO	OD, London	Plot Reference:	Unit 38 - COPPETTS WOOD
ddress :				
Client Details:				
ame:				
ddress :				
•	rs items included v ete report of regula	within the SAP calculations. tions compliance.		
a TER and DEF	R			
		gas (c), Mains gas (c)		
,	mains gas (c), mains	• • • • •	10 50 kg/m2	
•	oxide Emission Rate Dioxide Emission Ra	· · · ·	18.52 kg/m² 11.48 kg/m²	ОК
b TFEE and DF				
	rgy Efficiency (TFE	E)	43.4 kWh/m²	
-	nergy Efficiency (DF		40.5 kWh/m ²	
-		,		ОК
2 Fabric U-value				
Element		Average	Highest	
External	wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Floor Roof		(no floor) 0.13 (max. 0.20)	0.13 (max. 0.35)	ОК
Opening	s	0.13 (max. 0.20) 0.90 (max. 2.00)	0.90 (max. 0.33)	OK
a Thermal brid				
		using user-specified y-value of	0.15	
Thermal	bridging calculated			
Air permeabili			5.00 (design valu	ue)
Air permeabili	ty		5.00 (design val 10.0	ue) OK
3 Air permeabili Air permea Maximum	ty bility at 50 pascals			,
3 Air permeabili Air permea	ity bility at 50 pascals ency	Community heating scheme Community boilers	10.0	,
 Air permeabili Air permea Maximum Heating efficie Main Heatin 	ity bility at 50 pascals ency	Community heating scheme	10.0	,
Air permeabili Air permea Maximum Heating efficie Main Heatin	ity bility at 50 pascals ency ng system: heating system:	Community heating scheme Community boilers	10.0	,
Air permeabili Air permea Maximum Heating efficie Main Heatin Secondary	ity bility at 50 pascals ency ng system: heating system: ation	Community heating scheme Community boilers	10.0	,
Air permeabili Air permea Maximum Heating efficie Main Heatin Secondary	ity bility at 50 pascals ency ng system: heating system: ation	Community heating scheme Community boilers None	10.0	,
Air permeabili Air permea Maximum Heating efficie Main Heatin Secondary Cylinder insul Hot water S Controls	ity bility at 50 pascals ency ng system: heating system: ation Storage:	Community heating scheme Community boilers None No cylinder	10.0	,
 Air permeabili Air permea Maximum Heating efficie Main Heatin Secondary Cylinder insul Hot water S Controls 	ity bility at 50 pascals ency ng system: heating system: ation	Community heating scheme Community boilers None	10.0 es - mains gas use of community heating,	,

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	ОК
MVHR efficiency:	91%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Medium	ОК
Based on:		
Overshading:	Average or unknown	
Windows facing: West	9.33m ²	
Ventilation rate:	4.00	
10 Key features		
Windows U-value	0.9 W/m²K	

Windows U-value Community heating, heat from boilers – mains gas Photovoltaic array 0.9 W/m²K

Thermal Bridge Report

Property Details: Unit 38 - COPPETTS WOOD, London							
Address:							
Located in:	England						
Region:	Thames valley						
Thermal bridges:							
Thermal bridges:	No information on thermal bridging ($y=0.15$) ($y=0.15$)						



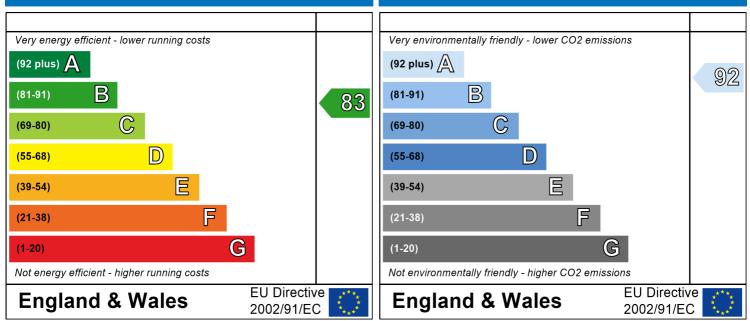
Dwelling type: Date of assessment: Produced by: Total floor area: Top floor Flat 30 September 2020 John Ashe 52.23 m²

Environmental Impact (CO₂) Rating

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.

Energy Efficiency Rating



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 38 - 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: Detachment:	Flat		
Year Completed:	2020		
Front of dwelling faces:	North		
Comments:			

Opening types:					
Name: Left Windows	Type: Windows	Frame Factor: 0.7	g-value: 0.63	U-Value: 0.9	Area: 9.33
Overshading: Comments:	Ą	verage or unknown			

Opaque Elements:

Type: External Elements	U-Va	lue:	Карра:
Walls Flat <u>Internal Elements (Area, Kappa)</u> Party Elements (Area, Kappa)	0.15 0.13	Please provide the U-Value calculation to justify the U-Value entered into the assessment. Please provide the U-Value calculation to justify the U-Value entered into the assessment.	N/A N/A

Thermal bridges:

Developer Confirmation Report

Thermal bridges:

No information on thermal bridging (y=0.15) (y =0.15)

Comments:

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 5

Pressure test: Comments:

Please provide the pressure test certificate, 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:

Secondary heating system:

Secondary heating system: None
Comments:

Developer Confirmation Report

Water heating: Comments:	No hot water cylinder
	Solar panel: False
Others:	
Electricity tariff:	Standard Tariff
Low energy lights:	100%
Terrain type:	Low rise urban / suburban
Wind turbine:	No
Photovoltaics:	Photovoltaic 1
	Installed Peak power: 0.5901468 Tilt of collector: 30°
	Overshading: None or very little
	Collector Orientation: South
Comments:	collector orientation. South

Declaration :

I confirm that the property has been built to the above specification.	
Signed:	

.....

Date:

.....

		ι	Jser Det	ails:						
Assessor Name: Software Name:	John Ashe Stroma FSAP 20 ⁷	12			Num re Ver				031268 n: 1.0.5.8	
		Pro	perty Ad				PETTS W	/OOD, L	ondon	
Address :										
1. Overall dwelling dime	nsions:									
Ground floor			Area(n 52.2	-	(1a) x	Av. He	ight(m) .66	(2a) =	Volume(m ³) 138.93	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1	e)+(1n)	52.2	23	(4)			-		-
Dwelling volume					(3a)+(3b)	+(3c)+(3d	l)+(3e)+	.(3n) =	138.93	(5)
2. Ventilation rate:										
		econdary heating	ot	her		total			m ³ per hour	/
Number of chimneys		0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0	+	0		0	×	20 =	0	(6b)
Number of intermittent fai	าร				Г	0	x ′	10 =	0	(7a)
Number of passive vents					Г	0	x ′	10 =	0	(7b)
Number of flueless gas fi	res				Γ	0	x 4	40 =	0	(7c)
								Air ch	anges per ho	ur
Infiltration due to chimney	$r_{\rm s}$ flues and fans = (6)	6a)+(6b)+(7a)	+(7b)+(7c)) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has be					ontinue fro	-		. (0) –	0	
Number of storeys in th	e dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.	25 for steel or timber	frame or 0	.35 for m	nasonry	/ constr	uction			0	(11)
if both types of wall are pr deducting areas of openin		sponding to th	ne greater i	wall area	(after					
If suspended wooden f	- · · ·	led) or 0.1	(sealed)), else e	enter 0				0	(12)
If no draught lobby, ent			、 ,						0	(13)
Percentage of windows	and doors draught s	tripped						·	0	(14)
Window infiltration			0.2	25 - [0.2	x (14) ÷ 1	= [00			0	(15)
Infiltration rate			(8)) + (10) +	· (11) + (1	2) + (13) +	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cu	bic metres	per hour	r per sq	uare me	etre of e	nvelope	area	5	(17)
If based on air permeabili									0.25	(18)
Air permeability value applies		is been done (or a degree	e air peri	meability i	s being us	sed	Í		٦
Number of sides sheltere Shelter factor	a		(20	0) = 1 - [().075 x (1	9)] =			0	(19) (20)
Shelter factor $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$								(20)		
Infiltration rate modified for	-	d	(., (,					0.25	
	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		1 1	I		<u> </u>		1			
r	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
	· · ·	1 1	I				1		I	
Wind Factor $(22a)m = (22a)m $	· · · · ·	0.05	0.05	0.02		1.00	1.40	1 4 0		
(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		

Adjuste	ed infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
	0.32	0.31	0.31	0.28	0.27	0.24	0.24	0.23	0.25	0.27	0.28	0.29		
			-	rate for t	he appli	cable ca	se	-		•		-		
		al ventila											0.5	(23a
lf exh	aust air h	eat pump	using App	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23b
If bala	anced with	n heat reco	overy: effic	iency in %	allowing f	or in-use fa	actor (fron	n Table 4h) =				77.3	5 (23c)
a) If	balance	ed mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m=	0.43	0.43	0.42	0.39	0.38	0.35	0.35	0.34	0.36	0.38	0.39	0.41		(24a
b) If	balance	ed mecha	anical ve	entilation	without	heat rec	overy (N	MV) (24b)m = (22	2b)m + (2	23b)			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b
c) If	whole h	ouse ex	tract ver	ntilation of	or positiv	e input v	/entilatio	on from o	outside		•	-		
i	f (22b)n	n < 0.5 ×	(23b), t	then (240	c) = (23b); otherv	vise (24	c) = (22b	o) m + 0.	5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	on or wh	ole hous	se positiv	/e input	ventilatio	on from l	oft	•		-		
,				m = (22		•				0.5]				
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d
Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in boy	(25)		-	-		
(25)m=	0.43	0.43	0.42	0.39	0.38	0.35	0.35	0.34	0.36	0.38	0.39	0.41		(25)
A 11								•	1	•		•	1	
				paramete										• • •
ELEN	IENT	Gros area		Openin m		Net Ar A ,n		U-valı W/m2		A X U (W/I	()	k-value kJ/m²·l		A X k kJ/K
Window	NS	aiou	()		•	9.33		/[1/(0.9)+		8.11			· ·	(27)
									I		,			
Walls		24.7		9.33	3	15.4	×	0.15		2.31			\dashv	(29)
Roof		52.3	8	0		52.38	s x	0.13	=	6.81				(30)
Total a	rea of e	elements	, m²			77.11								(31)
							ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	ns given in	paragraph	1 3.2	
				nternal wal	ls and part	titions		(26) (20)	(22) -					
		ss, W/K :	``	0)				(26)(30)					17.22	
		Cm = S((30) + (32		(32e) =	924	(34)
		•	``	⁻ = Cm ÷	,					tive Value			100	(35)
	-	sments wh ad of a de		tails of the	construct	ion are not	t known pr	recisely the	e indicative	e values of	TMP in T	able 1f		
				culated u	using An	nondiv k	(44.5	7 (36)
	-		,	own (36) =	• •	•	`						11.57	/(30)
	abric he		are not wi	ionn (00) -	- 0.00 x (0	')			(33) +	(36) =			28.79	9 (37)
			alculated	d monthly	v					= 0.33 × (25)m x (5)		
vontila	Jan	Feb	Mar	Apr	, May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
(38)m=	19.81	19.52	19.23	17.8	17.51	16.08	16.08	15.79	16.65	17.51	18.09	18.66		(38)
				11.0	11.01	10.00	10.00	10.79				10.00	1	(00)
1		coefficier	· · · · · · · · · · · · · · · · · · ·						· · ·	= (37) + (3	·	1	1	
(39)m=	48.6	48.31	48.02	46.59	46.3	44.87	44.87	44.59	45.45	46.3	46.88	47.45].
Heatla	ee noro	ameter (H		/m2k						Average = = (39)m ÷		12 /12=	46.52	2 (39)
(40)m=	0.93	0.92	0.92	0.89	0.89	0.86	0.86	0.85	0.87	= (39)III ÷	0.9	0.91	1	
(+0)11=	0.93	0.92	0.92	0.09	0.09	0.00	0.00	0.00					0.89	(40)
										Average =	Jun(40)1	12 / 14=	0.69	(-0)

Numbe	r of day	s in mor	nth (Tab	le 1a)								_		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wa	ter heat	ing ener	gy requi	irement:								kWh/ye	ear:	
if TF.				[1 - exp	(-0.0003	49 x (TF	-A -13.9)2)] + 0.(0013 x (1	ΓFA -13.		76		(42)
								(25 x N) to achieve		o torgat a		5.9		(43)
		-			ater use, h	-	-	lo achieve	a waler us	e largel u	1			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate					Vd,m = fac				000	•••		200		
(44)m=	83.49	80.46	77.42	74.38	71.35	68.31	68.31	71.35	74.38	77.42	80.46	83.49		
I										Total = Su	· · ·		910.82	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly $= 4.$	190 x Vd,n	n x nm x E	0Tm / 3600	kWh/mon	oth (see Ta	bles 1b, 1	c, 1d)		
(45)m=	123.82	108.29	111.75	97.42	93.48	80.67	74.75	85.77	86.8	101.16	110.42	119.91		_
lf instant	aneous w	ater heatii	na at noint	of use (no	hot water	storage)	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	-	1194.23	(45)
		16.24				• /		. ,	. ,	45 47	10.50	17.00	l	(46)
(46)m= Water s	18.57 storage		16.76	14.61	14.02	12.1	11.21	12.87	13.02	15.17	16.56	17.99		(40)
Storage	e volum	e (litres)	includin	ng any so	olar or W	WHRS	storage	within sa	ame ves	sel		0		(47)
	•	-			velling, e			(47) mbi boil	ora) onto	or (0' in (47)			
	storage		not wate			ISlania					47)			
	-		eclared l	oss facto	or is know	wn (kWł	n/day):					0		(48)
Tempe	rature fa	actor fro	m Table	2b								0		(49)
Energy	lost fro	m water	storage	, kWh/ye	ear			(48) x (49)	=		1	10		(50)
				•	oss facto								I	
		-	ee secti		e 2 (kWł	i/iitie/ua	iy)				0.	02		(51)
		from Tal									1.	03		(52)
Tempe	rature fa	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 f	for each	month			((56)m = (55) × (41)r	m		-		
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	r contains	dedicated	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	lix 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	inual) fro	om Table	e 3							0		(58)
Primar	y circuit	loss cal	culated f	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
È I								ng and a	-		,		I	
(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					L	
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)

Total h	neat req	uired for	water h	neatir	ng ca	alculate	d fo	r eacl	h month	(62)	m =	0.85 × (45)m	+ (46)m	+ (57))m +	(59)m + (61)m	
(62)m=	179.09	158.22	167.02	15	0.92	148.76	1	34.16	130.03	141	.05	140.29	156.4	3 163.91	17	5.19		(62)
Solar DI	HW input	calculated	using Ap	pendix	x G or	Appendi	хH	(negativ	ve quantity	/) (en	ter '0	' if no solai	r contri	oution to wa	ater he	ating)		
(add a	dditiona	l lines if	FGHRS	Sanc	d/or V	VWHR:	S ap	oplies,	, see Ap	penc	dix C	3)						
(63)m=	0	0	0		0	0		0	0	C)	0	0	0		0		(63)
Output	t from w	ater hea	ter															
(64)m=	179.09	158.22	167.02	15	0.92	148.76	1	34.16	130.03	141	.05	140.29	156.4	3 163.91	17	5.19		_
											Outp	out from wa	ater he	ater (annua)112		1845.07	(64)
Heat g	ains fro	m water	heating	, kW	/h/mo	onth 0.2	25 ´	[0.85	× (45)m	+ (6	61)m	n] + 0.8 x	(46) (m + (57)r	n + (59)m]	
(65)m=	85.39	75.95	81.38	75	5.19	75.3	6	69.62	69.08	72.	.74	71.66	77.8	6 79.51	84	.09		(65)
inclu	ude (57)	m in calo	culation	of (6	65)m	only if	cyli	nder is	s in the c	dwel	ling	or hot w	ater is	from co	mmur	nity h	leating	
5. In	ternal ga	ains (see	Table	5 an	d 5a)):												
Metab	olic gair	s (Table	5) Wa	itts	,													
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec																		
(66)m=	105.35	105.35	105.35	10	5.35	105.35	1	05.35	105.35	105	5.35	105.35	105.3	105.35	5 10	5.35		(66)
Lightin	g gains	(calcula	ted in A	pper	ndix l	L, equa	tion	L9 oi	r L9a), a	lso s	see -	Table 5			_			
(67)m=	34.88	30.98	25.19	<u></u>	0.07	14.26		2.04	13.01	16		22.69	28.8	1 33.63	35	5.85		(67)
Applia	nces da	ins (calc	ulated i	n Ap	penc	dix L. eo	jua	tion L'	13 or L1	3a).	also	see Tal	ble 5					
(68)m=	228.39	230.76	224.79	<u> </u>	2.08	196.03	·	80.94	170.86	168		174.47	187.1	8 203.23	3 21	8.31		(68)
	L	(calcula			ndix	l equa	 atior	า I 15	or I 15a)) als	50 SE	e Table	5					
(69)m=	47.29	47.29	47.29	<u> </u>	.29	47.29	-	7.29	47.29	47.		47.29	47.2	9 47.29	47	.29		(69)
		ns gains		1 5a)														
(70)m=				<u> </u>	0	0	Т	0	0)	0	0	0		0		(70)
		l vaporatio							-			-	_	-				
(71)m=	-70.23	-70.23	-70.23	1	0.23	-70.23	-	70.23	-70.23	-70	23	-70.23	-70.2	3 -70.23	-70	0.23	l	(71)
		gains (T				. 0.20		0.20	. 0.20		0	. 0.20						
		113.02	· ·	-	4.43	101.21		6.69	92.84	97.	77	99.52	104.6	5 110.43	11	3.03	l	(72)
		gains =		10	1.10	101.21	<u> </u>							· (71)m + (7		0.00		()
(73)m=	460.45	457.17	441.77	41	7.98	393.9	3	72.07	359.12	365	<i>.</i>	379.09	403.0		<u></u>	9.59	l	(73)
. ,	lar gains			1 - 1	1.50	000.0		12.01	000.12	000		010.00	400.0	4 420.00	<u> </u>	0.00		()
	Ŭ		using sol	ar flux	from	Table 6a	and	associ	ated equa	tions	to co	nvert to th	e appli	cable orient	ation.			
-		Access F	-		Area			Flu				g_		FF			Gains	
		Table 6d			m²				ole 6a		Т	able 6b		Table 60	;		(W)	
West	0.9x	0.77)		9.3	33	x	1	9.64	x		0.63	x	0.7		=	56	(80)
West	0.9x	0.77)	,	9.3	33	x	3	8.42	x		0.63	×	0.7		=	109.55	(80)
West	0.9x	0.77	,		9.3		x		3.27	 x	F	0.63	۲ × ۲	0.7		=	180.42](80)
West	0.9x	0.77	,		9.3		x		2.28	x		0.63	۲ × ۲	0.7		=	263.12	(80)
West	0.9x	0.77	,		9.3		x		13.09	 x	⊢	0.63	۲ × ۲	0.7		=	322.47	(80)
West	0.9x	0.77			9.3		x		15.77	 x	<u> </u>	0.63	۲ × ۲	0.7		=	330.1	(80)
West	0.9x	0.77			9.3		x		10.22	x l		0.63		0.7		=	314.27	(80)
West	0.9x	0.77			9.3		x		4.68	^ x	⊢	0.63	- ×	0.7		=	269.96	(80)
-	0.07	0.11	′		5.5			⁹	1.00	1	L	0.00	^				200.00	1 (22)

	West 0.9x 0.77 x 9.33 x 73.59 x 0.63 x 0.7 = 209.83 (80)														
West	0.9x	0.77	x	9.3	3	×	73.59	×		0.63	x	0.7	=	209.83	(80)
West	0.9x	0.77	x	9.3	33	x	45.59	×		0.63	×	0.7	=	129.99	(80)
West	0.9x	0.77	x	9.3	33	x	24.49	×		0.63	x	0.7	=	69.83	(80)
West	0.9x	0.77	x	9.3	33	x	16.15) × [0.63	x	0.7	=	46.05	(80)
Solar g	ains in	watts, ca	alculated	for eac	h month			(83)m	= Su	um(74)m .	(82)m	1	r		
(83)m=	56	109.55	180.42	263.12	322.47	330		269.	96	209.83	129.99	69.83	46.05		(83)
Total g	ains – ir	nternal a	nd solar	(84)m =	= (73)m ·	+ (83)	m, watts					·			
(84)m=	516.45	566.72	622.18	681.11	716.37	702.	18 673.39	635.	53	588.92	533.03	499.52	495.65		(84)
7. Me	an inter	nal temp	erature	(heating	season)									
Temp	erature	during h	eating p	eriods ir	n the livii	ng are	ea from Ta	ble 9,	Th1	1 (°C)				21	(85)
Utilisa	ation fac	tor for ga	ains for I	iving are	ea, h1,m	(see	Table 9a)								_
	Jan	Feb	Mar	Apr	May	Ju	n Jul	Au	ıg	Sep	Oct	Nov	Dec		
(86)m=	0.89	0.85	0.79	0.68	0.54	0.3	9 0.29	0.3	2	0.5	0.72	0.84	0.9		(86)
Mean	internal	tomnor	atura in	livina ar			steps 3 to	7 in T	able	9 (C)				1	
(87)m=	19.69	19.91	20.24	20.62	20.85	20.9		20.9	-	20.92	20.62	20.14	19.68]	(87)
								I			20.02	20.11	10.00	I	(-)
•					-		ing from Ta	1	-	. ,				1	(00)
(88)m=	20.14	20.15	20.15	20.17	20.18	20.	2 20.2	20.2	21	20.19	20.18	20.17	20.16		(88)
Utilisa	ation fac	tor for g	ains for I	rest of d	welling,	h2,m	(see Table	9a)							
(89)m=	0.87	0.84	0.77	0.65	0.51	0.3	5 0.24	0.20	6	0.45	0.68	0.82	0.88		(89)
Mean	internal	temper	ature in	the rest	of dwelli	ng T2	2 (follow st	eps 3	to 7	' in Tabl	e 9c)				
(90)m=	18.42	18.73	19.19	19.72	20.01	20.1	<u> </u>	20.2		20.11	, 19.74	19.07	18.41		(90)
										f	LA = Livin	g area ÷ (4	4) =	0.45	(91)
Moon	internal	tompor	atura (fo	r tho wh	olo dwo	llina)	= fLA × T1	<u>т (1</u>	fl	∧) v T2					_
(92)m=	18.99	19.26	19.66	20.12	20.39	20.5	1	20.5	- 1	20.47	20.14	19.55	18.98]	(92)
				-			from Table						10.00	I	~ /
(93)m=	18.99	19.26	19.66	20.12	20.39	20.5	- I	20.5	- T	20.47	20.14	19.55	18.98		(93)
			uirement]	
				nperatu	re obtair	ed at	step 11 of	Table	e 9b	, so tha	t Ti,m=(76)m an	d re-calo	culate	
			or gains	•			•			,	, (,	-		
	Jan	Feb	Mar	Apr	May	Ju	n Jul	Au	ıg	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	:											
(94)m=	0.86	0.82	0.76	0.65	0.52	0.3	7 0.26	0.29	9	0.46	0.68	0.81	0.86		(94)
Usefu	Il gains,	hmGm ,	W = (94	4)m x (8-	4)m										
(95)m=	441.64	464.78	470.85	441.23	369.47	257.	93 175.35	182.	.4	272.75	362.65	404.12	428.5		(95)
	nly avera	-	rnal tem	·	e from Ta	able 8	3							1	
(96)m=	4.3	4.9	6.5	8.9	11.7	14.		16.4		14.1	10.6	7.1	4.2		(96)
Heat		1		· · ·		1	W =[(39)m	1	ŕ	. ,				1	
(97)m=	713.84	693.6	632.1	522.91	402.22	265.		185.		289.63	441.54	583.5	701.45		(97)
•							onth = 0.02	1	Ť			ŕ		1	
(98)m=	202.52	153.77	119.97	58.81	24.37	0	0	0		0	58.7	129.16	203.07		٦.
								٦	Fotal	per year	(kWh/yea	⁻) = Sum(9	8)15,912 =	950.35	(98)
Space	e heating	g require	ement in	kWh/m²	/year									18.2	(99)

9b. Energy requirements – Community heating scheme			
This part is used for space heating, space cooling or water heating prov Fraction of space heat from secondary/supplementary heating (Table 1		0	(301)
Fraction of space heat from community system $1 - (301) =$		1	(302)
The community scheme may obtain heat from several sources. The procedure allows for		he latter	
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appe Fraction of heat from Community boilers	ndix C.	0.4	(303a)
Fraction of community heat from heat source 2		0.4	(303b)
Fraction of total space heat from Community boilers	(302) x (303a) =	0.4	(304a)
Fraction of total space heat from community heat source 2	(302) x (303b) =	0.4	(304b)
Factor for control and charging method (Table 4c(3)) for community hea	ating system	1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		kWh/yea	· _
Annual space heating requirement		950.35	
Space heat from Community boilers	(98) x (304a) x (305) x (306) =	399.15	(307a)
Space heat from heat source 2	(98) x (304b) x (305) x (306) =	399.15	(307b)
Efficiency of secondary/supplementary heating system in % (from Table	e 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating			_
Annual water heating requirement		1845.07	
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x (305) x (306) =	774.93	(310a)
Water heat from heat source 2	(64) x (303b) x (305) x (306) =	774.93	(310b)
Electricity used for heat distribution 0.01	I × [(307a)(307e) + (310a)(310e)] =	23.48	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside		190.68	(330a)
warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	190.68	(331)
Energy for lighting (calculated in Appendix L)		246.37	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-509.66	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity)		0	(334)
10b. Fuel costs – Community heating scheme			-

	Fuel	Fuel Price	Fuel Cost
	kWh/year	(Table 12)	£/year
Space heating from CHP	(307a) x	4.24 × 0.01 =	16.92 (340a)

Energy from other sources of space and Efficiency of heat source 1 (%)	d water heating (not CHP) If there is CHP using two fuels rep	oeat (363) to	(366) for the second fue	89	(367a)
	Energ kWh/y	-	Primary factor	P.Energy kWh/year	
13b. Primary Energy – Community heat	ing scheme				
El rating (section 14)				92.5	(385)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			10.42	(384)
Total CO2, kg/year	sum of (376)(382) =			544.39	(383)
Energy saving/generation technologies Item 1	(333) to (334) as applicable		0.52 × 0.01 =	-264.51	(380)
CO2 associated with electricity for lighti	ng (332))) x		0.52	127.87	(379)
CO2 associated with electricity for pump	os and fans within dwelling (331)) x		0.52	98.96	(378)
Total CO2 associated with space and w	ater heating (373) + (374)	+ (375) =		582.08	(376)
CO2 associated with water from immers	sion heater or instantaneous heater	(312) x	0.22	= 0	(375)
CO2 associated with space heating (see	condary) (309) x		0	- 0	(374)
Total CO2 associated with community s	ystems (363)(366)	+ (368)(37)	2) =	= 582.08	(373)
Electrical energy for heat distribution	[(313) x		0.52	= 12.19	(372)
CO2 associated with heat source 2	[(307b)+(310b)] x 100	÷ (367b) x	0.22	= 284.94	(368)
CO2 associated with heat source 1	[(307b)+(310b)] x 100	÷ (367b) x	0.22	= 284.94	(367)
Efficiency of heat source 2 (%)	If there is CHP using two fuels re	oeat (363) to	(366) for the second fue	89	(367b)
CO2 from other sources of space and w Efficiency of heat source 1 (%)	If there is CHP using two fuels rep				(367a)
CO2 from other courses of cross and	Energ kWh/y	-	Emission factor kg CO2/kWh	Emissions kg CO2/year	
12b. CO2 Emissions – Community heat					
SAP rating (section12)				83.3	(358)
Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0] =			0.42	(356)
Energy cost deflator (Table 12)				0.42	(356)
Total energy cost 11b. SAP rating - Community heating s	= (340a)(342e) + (345)(354) =			277.21	(355)
Energy saving/generation technologies	-(2400) -(2400) + (245) -(254)				
Additional standing charges (Table 12)				120	(351)
Energy for lighting	(332)		13.19 × 0.01 =	32.5	(350)
Pumps and fans	(331)		13.19 × 0.01 =	25.15	(349)
		Fue	el Price	52.00	
Water heating from heat source 2	(310b) x		4.24 × 0.01 =	32.86	(342b)
Water heating from CHP	(310a) x		4.24 x 0.01 =	32.86	(3400) (342a)
Space heating from heat source 2	(307b) x		4.24 x 0.01 =	16.92	(340b)

Efficiency of heat source 2 (%)	If there is CHP using two fuels repeat (363) to	o (366) for the second f	uel	89	(367b)
Energy associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	1.22	=	1609.41	(367)
Energy associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x	1.22	=	1609.41	(368)
Electrical energy for heat distribution	[(313) x		=	72.09	(372)
Total Energy associated with community syster	ms (363)(366) + (368)(37	2)	=	3290.9	(373)
if it is negative set (373) to zero (unless spec	ified otherwise, see C7 in Appendix (C)		3290.9	(373)
Energy associated with space heating (seconda	ary) (309) x	0	=	0	(374)
Energy associated with water from immersion h	neater or instantaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water I	heating (373) + (374) + (375) =			3290.9	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps an	d fans within dwelling (331)) x	3.07	=	585.4	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	756.36	(379)
Energy saving/generation technologies Item 1		3.07 × 0.01	=	-1564.66	(380)
Total Primary Energy, kWh/year	sum of (376)(382) =			3068	(383)

		Us	ser Details:						
Assessor Name: Software Name:	John Ashe Stroma FSAP 20	012	Stroma Softwa					031268 n: 1.0.5.8	
		Prop	erty Address:	Unit 38 ·	- COPP	ETTS W	/00D, L	ondon	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor		[Area(m ²) 52.23	(1a) x	Av. Hei 2.	ght(m) 66	(2a) =	Volume(m ³) 138.93) (3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	52.23	(4)					
Dwelling volume		L]	(3a)+(3b)+	+(3c)+(3d)+(3e)+	.(3n) =	138.93	(5)
2. Ventilation rate:									
	main heating	secondary heating	other		total			m ³ per hour	,
Number of chimneys	0 +		+ 0] = [0	x 4	40 =	0	(6a)
Number of open flues	0 +	0	+ 0	;] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ans				2	x 1	10 =	20	(7a)
Number of passive vents	3				0	x 1	10 =	0	(7b)
Number of flueless gas f	ires				0	x 4	40 =	0	(7c)
							Air ch	anges per ho	⊐ ur
Infiltration due to chimps	wa fluos and fana -	(62)+(6b)+(72)+($(7b)_{\pm}(7c) =$	_					-
Infiltration due to chimne If a pressurisation test has I	•			ontinue fro	20 m (9) to (÷ (5) =	0.14	(8)
Number of storeys in t			(17), outor moo o		<i>m</i> (0) to (10)		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
Structural infiltration: (0.25 for steel or timbe	er frame or 0.3	35 for masonr	y constru	iction			0	(11)
	present, use the value corr	responding to the	greater wall area	a (after					
deducting areas of open If suspended wooden		aled) or 0.1 (s	sealed), else (enter 0				0	(12)
If no draught lobby, er			,,					0	(13)
Percentage of window	s and doors draught	stripped					·	0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 10	= [00			0	(15)
Infiltration rate			(8) + (10) +	- (11) + (12	2) + (13) +	- (15) =		0	(16)
Air permeability value,	• • •	•	•	•	etre of e	nvelope	area	5	(17)
If based on air permeabi								0.39	(18)
Air permeability value applie Number of sides shelter		nas been done or	r a degree air per	meability is	s being us	sed		-	
Shelter factor	eu		(20) = 1 - [0.075 x (19	9)] =			0	(19) (20)
Infiltration rate incorpora	ting shelter factor		(21) = (18)					0.39	(21)
Infiltration rate modified	0	ed						0.00	
Jan Feb	Mar Apr May	-i - i -	Jul Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	beed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3	3.8 3.7	4	4.3	4.5	4.7		
Wind Factor $(22a)m = (2)$	2)m ÷ 4								
(22a)m= 1.27 1.25	1.23 1.1 1.08	0.95 0	.95 0.92	1	1.08	1.12	1.18		
	•	•							

Adjuste	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
	0.5	0.49	0.48	0.43	0.42	0.37	0.37	0.36	0.39	0.42	0.44	0.46		
			-	rate for t	he appli	cable ca	se		•	•	-	-		
		al ventila											0	(23a)
lf exh	aust air h	eat pump	using App	endix N, (2	:3b) = (23a	ı) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0	(23b)
lf bala	anced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				0	(23c)
a) If	balance	ed mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If	balance	ed mecha	anical ve	entilation	without	heat rec	covery (N	MV) (24b	o)m = (22	2b)m + (2	23b)			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If	whole h	ouse ex	tract ver	tilation of	or positiv	e input v	ventilatio	on from o	outside	-		-		
i	f (22b)n	n < 0.5 ×	(23b), t	hen (240	c) = (23b); otherv	wise (24	c) = (22b	o) m + 0.	.5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	on or wh	ole hous	se positiv	/e input	ventilatio	on from l	oft	•	•			
í	f (22b)n	n = 1, th	en (24d)	m = (22	o)m othe	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]				
(24d)m=	0.63	0.62	0.62	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)	-		-		
(25)m=	0.63	0.62	0.62	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61		(25)
0.11	- (]								•	•		•		
				paramete										A X/1
ELEN	IENI	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-value kJ/m²·l		A X k kJ/K
Window	ws		()			9.33		/[1/(1.4)+		12.37				(27)
Walls			20	0.00							╡╷			(29)
		24.7		9.33	»	15.4		0.18	=	2.77			\dashv	
Roof		52.3		0		52.38	3 ×	0.13	=	6.81				(30)
Total a	rea of e	elements	, m²			77.11								(31)
				effective wi nternal wal			ated using	g formula 1	/[(1/U-valı	ie)+0.04] a	as given in	paragraph	1 3.2	
		s, W/K :			is and part	1110115		(26)(30)) + (32) =				01.0	5 (33)
		Cm = S(``	0)				(_0)(00)		(30) + (32	2) + (225)	(220) -	21.9	
			. ,									(328) =	924	
		•		⊃ = Cm ÷						tive Value			250	(35)
	-	ad of a de			constructi	on are not	t known pi	recisely the	e indicative	e values of	IMP IN T	adle 11		
				culated u	usina Ap	pendix ł	<						3.86	; (36)
	-		,	own (36) =	• •	•							0.00	, , , , , , , , , , , , , , , , , , ,
Total fa	abric he	at loss							(33) +	(36) =			25.8	1 (37)
Ventila	tion hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5))		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	28.71	28.48	28.26	27.23	27.04	26.13	26.13	25.97	26.48	27.04	27.43	27.84		(38)
	anofor (L coefficier						1	(20)~	= (37) + (3	38)m	I	I	
1			· · · · · · · · · · · · · · · · · · ·	52.02	50.04	51.04	51.04	E4 77	<u> </u>		·	52.64	l	
(39)m=	54.51	54.29	54.07	53.03	52.84	51.94	51.94	51.77	52.29	52.84	53.23	53.64	EDO	3 (39)
Heat Ic	oss para	meter (H	HLP). W	/m²K						Average = = (39)m ÷	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	12 / 1 ∠ =	53.0	3 (38)
(40)m=	1.04	1.04	1.04	1.02	1.01	0.99	0.99	0.99	1	1.01	1.02	1.03		
	L	!	!		I		!	1	I	I Average =	I Sum(40)₁	₁₂ /12=	1.02	2 (40)

Numbe	er of day	/s in mo	nth (Tab	le 1a)										
	Jan	Feb	Mar	Apr	Мау	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	ting ene	rgy requ	irement:								kWh/ye	ear:	
if TF				(1 - exp	(-0.0003	849 x (TF	⁻ A -13.9)2)] + 0.(0013 x (⁻	ΓFA -13.		76		(42)
				ge in litre								5.9		(43)
		-		usage by r day (all w		-	-	to achieve	a water us	se target o	t			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate				יץ ach month					Seb	001	INOV	Dec		
(44)m=	83.49	80.46	77.42	74.38	71.35	68.31	68.31	71.35	74.38	77.42	80.46	83.49		
()	00.10	00.10		1 1.00	11.00	00.01	00.01	11.00			m(44) ₁₁₂ =		910.82	(44)
Energy o	content of	hot water	used - ca	lculated m	onthly $= 4$.	190 x Vd,r	m x nm x D) 7 Tm / 3600						`
(45)m=	123.82	108.29	111.75	97.42	93.48	80.67	74.75	85.77	86.8	101.16	110.42	119.91		
										Total = Su	m(45) ₁₁₂ =	-	1194.23	(45)
lf instan	taneous w	ater heati	ng at poin	t of use (no	o hot water	r storage),	enter 0 in	boxes (46) to (61)					
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage) includir	ng any se	alar or M		etorado	within or	mayas	sol		450	l	(47)
-				ank in dw			-			501		150		(47)
		-		er (this in	-			• •	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 f	actor fro	m Table	2b								0		(49)
Energy	/ lost fro	m water	r storage	e, kWh/ye	ear			(48) x (49)) =			0		(50)
				cylinder										
		age loss leating s		rom Tabl	ie z (kvvi	n/litre/da	iy)					0	_	(51)
	•	from Ta		011 4.5								0		(52)
		actor fro		2b								0		(53)
Energy	/ lost fro	m water	storage	e, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter	(50) or ((54) in (5	55)	-								0		(55)
Water	storage	loss cal	culated	for each	month			((56)m = (55) × (41)ı	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contains	s dedicate	d solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	l lix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Drimar	L	loss (ar	nual) fr	om Table		I	I	I				0		(58)
	-			for each		59)m = ((58) ÷ 36	65 x (41)	m			•		()
	•			le H5 if t		,	• •	• • •		r thermo	stat)			
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi	loss ca	lculated	for each	n month ((61)m =	(60) ÷ 36	65 x (41							
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)
	L	I	I	L	1	I	I	I			I		l	

Total h	otal heat required for water heating calculated for each month $(62)m = 0.85 \times (45)m + (46)m + (57)m + (59)m + (61)m$ (2)m = 105.24 92.05 94.98 82.81 79.46 68.57 63.54 72.91 73.78 85.98 93.86 101.92 (62)															
(62)m=	105.24	92.05	94.98	82.81	79.46	6	8.57	63.54	72.	91	73.78	85.98	93.86	101.92		(62)
Solar DI	-IW input	calculated	using App	pendix G or	r Appendi	хH	negativ	ve quantity	/) (ent	er '0'	if no solar	contrib	oution to wate	er heating	1)	
(add a	dditiona	l lines if	FGHRS	S and/or \	NWHR	S ap	plies,	, see Ap	penc	lix G	i)					
(63)m=	0	0	0	0	0		0	0	0)	0	0	0	0		(63)
Output	t from w	ater hea	ter	·		-					-				_	
(64)m=	105.24	92.05	94.98	82.81	79.46	6	8.57	63.54	72.	91	73.78	85.98	93.86	101.92	7	
				•					<u> </u>	Outp	ut from wa	ter hea	ter (annual)	12	1015.09	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	25 ´	[0.85	× (45)m	+ (6	1)m] + 0.8 x	[(46)	m + (57)m	+ (59)r	n]	
(65)m=	26.31	23.01	23.75	20.7	19.86	1	7.14	15.88	18.	23	18.44	21.5	23.46	25.48	7	(65)
inclu	ude (57)	m in calc	ulation	of (65)m	only if	cylir	nder is	s in the c	dwell	ing c	or hot wa	ater is	from com	munity	_ heating	
	. ,			. ,	-					U					U U	
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=	87.79	87.79	87.79	87.79	87.79	-	7.79	87.79	87.	<u> </u>	87.79	87.79		87.79	-	(66)
	a gains	(calculat	L ted in A	ppendix	l equa	tion	190	19a) a	lso s	ee T	able 5					
(67)m=	13.95	12.39	10.08	7.63	5.7	-	4.81	5.2	6.7		9.08	11.52	13.45	14.34	7	(67)
				n Appeno												
(68)m=	153.02	154.61	150.61	142.09	131.34		21.23	114.48	112		116.89	125.4	1 136.16	146.27	7	(68)
				1									1 100.10	110.27		()
(69)m=	31.78	31.78	31.78	Appendix 31.78	L, equa	T	1.78	31.78	, ais 31.		31.78	31.78	31.78	31.78	7	(69)
					51.70		1.70	51.70	51.	/0	51.70	51.70	5 51.70	51.70		(00)
-		ns gains		$\frac{5a}{0}$	0	1	0	0	0		0	0	0	0	7	(70)
(70)m=		-	-			Ļ	-	0	0		0	0	0	0		(70)
	<u> </u>	· ·	<u> </u>	ative valu	, `	-	,	70.00	70	00	70.00	70.00	70.00	70.00	7	(71)
(71)m=	-70.23	-70.23	-70.23	-70.23	-70.23	- /	70.23	-70.23	-70	.23	-70.23	-70.23	3 -70.23	-70.23		(71)
		gains (T	· · · · ·	1		T .									-	(70)
(72)m=		34.24	31.92	28.75	26.7	2	3.81	21.35	24		25.62	28.89		34.25		(72)
	r	gains =				-	. ,	· ,	<u>`</u>	<u></u>		<u> </u>	(71)m + (72)		-	
(73)m=	251.67	250.58	241.94	227.81	213.08	1	99.19	190.37	193	.49	200.92	215.1	6 231.54	244.19		(73)
	lar gains				T 11 0		-									
-			-			and	Flu		tions			e applic	able orientat FF	lion.	Coine	
Unenta		Access F Fable 6d		Area m²				x ble 6a			g_ able 6b		Table 6c		Gains (W)	
West	0.9x	0.77	x	9.3	33	x	1	9.64	x		0.63	x	0.7	=	56	(80)
West	0.9x	0.77	x	9.3	33	x	3	8.42	x		0.63	x	0.7	=	109.55	(80)
West	0.9x	0.77	x	9.3	33	x	6	3.27	x		0.63	×	0.7	=	180.42	(80)
West	0.9x	0.77	x	9.3	33	x	9	2.28	x		0.63	×	0.7	=	263.12	(80)
West	0.9x	0.77	×	9.3	33	x	1'	13.09	x		0.63	x	0.7	=	322.47	(80)
West	0.9x	0.77	×	9.3	33	x	1	15.77	x		0.63	× ٦	0.7	=	330.1	(80)
	I			0.0	.0			10.11	^		0.00	~	-			
West	0.9x	0.77	×			x		10.22	x		0.63	x	0.7	=	314.27	(80)

	West 0.9x 0.77 x 9.33 x 73.59 x 0.63 x 0.7 = 209.83 (80)														
West	st 0.9x 0.77 x 9.33 x 73								x	0.63	x	0.7	=	209.83	(80)
West	0.9x						5.59	x	0.63	x	0.7	=	129.99	(80)	
West	0.9x	0.77	x	9.3	3	x	2	24.49	x	0.63	x	0.7	=	69.83	(80)
West	0.9x 0.77 X 9.33 X 16.1								x	0.63	x	0.7	=	46.05	(80)
Solar g	ains in	watts, ca	alculated	for eac	n month				(83)m = \$	Sum(74)m .	(82)m				
(83)m=	56	109.55	180.42	263.12	322.47		30.1	314.27	269.96	209.83	129.99	69.83	46.05		(83)
Total g	ains – i	nternal a	nd solar	⁻ (84)m =	= (73)m ·	+ (8	83)m	, watts					-		
(84)m=	307.68	360.13	422.36	490.93	535.55	52	29.29	504.64	463.45	410.75	345.16	301.37	290.25		(84)
7. Me	an inter	nal temp	perature	(heating	season)									
Temp	erature	during h	neating p	eriods ir	the livi	ng	area f	from Tab	ole 9, Tl	11 (°C) 1ר				21	(85)
Utilisa	ation fac	tor for g	ains for I	living are	ea, h1,m	ı (s	ee Ta	ble 9a)							
	Jan	Feb	Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(86)m=	1	1	0.98	0.94	0.81	(0.61	0.45	0.51	0.79	0.97	1	1		(86)
Mean	interna	l temper	ature in	living ar	ea T1 (fo	ollo	w ste	ns 3 to 7	r in Tab	le 9c)				I	
(87)m=	19.89	20.05	20.32	20.66	20.89	1	20.98	21	21	20.93	20.6	20.19	19.88		(87)
						Ļ								ł	
			eating p	-		<u> </u>		r	r		00.07	00.07	00.00	l	(88)
(88)m=	20.05	20.05	20.05	20.07	20.07	2	20.09	20.09	20.09	20.08	20.07	20.07	20.06		(00)
Utilisa	ation fac	tor for g	ains for i	rest of d	welling,	h2,	,m (se	e Table	9a)			-		1	
(89)m=	1	0.99	0.98	0.91	0.76	(0.53	0.36	0.41	0.71	0.96	0.99	1		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ing	T2 (fe	ollow ste	eps 3 to	7 in Tabl	le 9c)				
(90)m=	19.04	19.2	19.47	19.81	20.01	2	20.08	20.09	20.09	20.05	19.76	19.35	19.03		(90)
										1	fLA = Livir	g area ÷ (4) =	0.45	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llin	a) = fl	A 🗙 T1	+ (1 – f	LA) × T2					
(92)m=	19.42	19.58	19.85	20.19	20.4	-	20.49	20.5	20.5	20.44	20.14	19.73	19.41		(92)
	adiustr	nent to t	he mean	interna	temper	i atu	ire fro		4e. wh	ere appro	i opriate			ł	
(93)m=	19.42	19.58	19.85	20.19	20.4	—	20.49	20.5	20.5	20.44	20.14	19.73	19.41		(93)
8. Sp	ace hea	ting requ	uirement			1				•					
Set T	i to the ı	mean int	ernal ter	nperatu	e obtair	ned	at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	culate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a	_		-				-			
	Jan	Feb	Mar	Apr	May		Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	ation fac		ains, hm	:		-		1	-				•	1	
(94)m=	1	0.99	0.98	0.92	0.78	(0.57	0.4	0.45	0.75	0.96	0.99	1		(94)
			, W = (94	<u>, , , , , , , , , , , , , , , , , , , </u>	<u>,</u>	-		1				1	1	I	
(95)m=	306.77	357.53	412.73	450.69	415.97		99.74	201.65	210.67	306.38	330.79	299.41	289.62		(95)
	<u> </u>	-	rnal tem	·		-		1					1	I	
(96)m=	4.3	4.9	6.5	8.9	11.7		14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
			i	· · ·		1				n– (96)m	ŕ – – –	070.00	045.00	I	(07)
(97)m=	824.29	797.07	721.89	598.83	459.9		05.68	202.34	212.04	331.71	504.03	672.09	815.82		(97)
•		· ·				vvh T				′)m – (95	ŕ	ŕ	204 5	l	
(98)m=	385.03	295.37	230.02	106.66	32.68		0	0	0	0	128.89	268.33	391.5	1000 10	
	Total per year (kWh/year) = Sum(98) _{15,912} = 1838.49 (98)														
Space	e heatin	g require	ement in	kWh/m²	/year									35.2	(99)

8c. Space cooling requirement Calculated for June, July and August. See Table 10b														
Calcu	lated fo	r June, J	luly and	August.	See Tal	ple 10b						-		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat I	oss rate	e Lm (ca	lculated	using 2	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	488.24	384.36	393.48	0	0	0	0		(100)
Utilisa	tion fac	tor for lo	ss hm											
(101)m=	0	0	0	0	0	0.95	0.98	0.97	0	0	0	0		(101)
Usefu	l loss, h	mLm (V	/atts) = (100)m x	: (101)m									
(102)m=	0	0	0	0	0	465.16	376.34	381.01	0	0	0	0		(102)
Gains	(solar g	gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)			-		
(103)m=	0	0	0	0	0	685.03	654.96	607.84	0	0	0	0		(103)
	Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 x (98)m													
set (1	set (104)m to zero if (104)m < 3 × (98)m													
(104)m=	0	0	0	0	0	158.31	207.29	168.76	0	0	0	0		_
										= Sum(,	=	534.36	(104)
	fraction								f C =	cooled	area ÷ (4	4) =	1	(105)
r		actor (Ta											I	
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
-					(((()		Total	= Sum(104)	=	0	(106)
· .		requirer			, ,		· ,					1	I	
(107)m=	0	0	0	0	0	39.58	51.82	42.19	0	0	0	0		_
									Total	= Sum(107)	=	133.59	(107)
Space	cooling	requirer	nent in k	:Wh/m²/y	/ear				(107)	÷ (4) =			2.56	(108)
8f. Fab	ric Enei	rgy Effici	ency (ca	lculated	only un	der spec	cial cond	litions, se	ee sectio	on 11)				
Fabric	Energy	y Efficier	псу						(99) -	+ (108) =	=		37.76	(109)
Targe	t Fabri	c Energ	y Efficie	ency (TF	EE)								43.42	(109)

		U	ser Details:										
Assessor Name:	John Ashe		Stroma	a Numl	ber:		STRO	031268					
Software Name:	Stroma FSAP 201	12	Softwa	re Ver	sion:		Versio	n: 1.0.5.8					
		Prop	perty Address:	Unit 38	- COPP	PETTS W	/OOD, L	ondon					
Address :													
1. Overall dwelling dimer	nsions:												
Ground floor]	Area(m²)	(1a) x	Av. He	ight(m) .66	(2a) =	138.93) (3a)				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e	L e)+(1n) [(4)]`´						
Dwelling volume	, , , , , , , , ,	, , , , , , , , , , , , , , , , , , ,			+(3c)+(3d	l)+(3e)+	.(3n) =	138.93	(5)				
2. Ventilation rate:							l		_] · ·				
		econdary	other		total			m ³ per hou					
Number of chimneys	heating I	neating 0	+ 0] = [0	x 4	40 =	0	(6a)				
Number of open flues	0 +	0	+ 0	,] = [0	x 2	20 =	0	(6b)				
Number of intermittent far	IS			Ĺ	2	x	0 =	20	(7a)				
Number of passive vents					0	x ^	0 =	0	(7b)				
Number of flueless gas fir	es			Ē	0	X 4	40 =	0	(7c)				
Air changes per hour													
Infiltration due to chimney	s flues and fans – (6	3a)+(6b)+(7a)+	-(7b)+(7c) =	Г	20		÷ (5) =	0.14	(8)				
If a pressurisation test has be				ontinue fro	-		- (0) -	0.14					
Number of storeys in th	e dwelling (ns)							0	(9)				
Additional infiltration						[(9)	1]x0.1 =	0	(10)				
Structural infiltration: 0.2				•	uction			0	(11)				
if both types of wall are pre deducting areas of opening		sponding to the	e greater wall area	a (after									
If suspended wooden fl		led) or 0.1 ((sealed), else	enter 0				0	(12)				
If no draught lobby, ente	er 0.05, else enter 0							0	(13)				
Percentage of windows	and doors draught s	tripped						0	(14)				
Window infiltration			0.25 - [0.2	x (14) ÷ 10	= [00			0	(15)				
Infiltration rate			(8) + (10) -	+ (11) + (1	2) + (13) -	+ (15) =		0	(16)				
Air permeability value, o	50, expressed in cub	pic metres p	per hour per so	luare me	etre of e	nvelope	area	5	(17)				
If based on air permeabilit								0.39	(18)				
Air permeability value applies		s been done o	r a degree air per	meability i	s being us	sed			_				
Number of sides sheltered Shelter factor	3		(20) = 1 - [0 075 x (1	9)1 -			0	(19)				
	na abaltar factor		(20) = 1 - [(21) = (18)		5)] –		l	1	(20)				
Infiltration rate incorporati	0	-1	(21) = (10)	x (20) =			l	0.39	(21)				
Infiltration rate modified fo		1 1	Jul Aug	Son	Oct	Nov	Dee						
	Mar Apr May	Jun	Jul Aug	Sep	Oct	Nov	Dec						
Monthly average wind spe	- I I	20	20 27	4	1.2	4.5	47						
(22)m= 5.1 5 4	4.9 4.4 4.3	3.8	3.8 3.7	4	4.3	4.5	4.7						
Wind Factor (22a)m = (22)m ÷ 4												
(22a)m= 1.27 1.25 1	.23 1.1 1.08	0.95 0	0.95 0.92	1	1.08	1.12	1.18						

b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) (24b)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Adjuste	ed infiltr	ation rat	e (allowi	ing for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m										
If nechanical ventilation. If exhaust all heat pump using Appendix N, (23b) = (23a) x Fm (equation (N5i), otherwise (23b) = (23a) If exhaust all heat pump using Appendix N, (23b) = (23a) x Fm (equation (N5i), otherwise (23b) = (23a) a) If balanced mechanical ventilation with heat recovery (MV/HR) (24a)m = (22b)m + (23b) x [1 - (23c) + 100] (24a)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						-			0.36	0.39	0.42	0.44	0.46							
If exhaust air heat pump using Appendix N. (23b) = (23a) × Fmv (equation (N5)), otherwise (23b) = (23a) If balanced mechanical ventilation with leat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 - (23c) + 100] (24a)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				•	rate for t	he appli	cable ca	se	•		•		•			-				
It balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 0 (22b) a) It balanced mechanical ventilation with heat recovery (MV-HR) (24a)m = (22b)m + (23b) × [1 - (23c) ÷ 100] (24a)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0															0	(23a)				
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 - (23c) + 100] (24a)m 0 0 0 0 0 0 0 0 0 0	lf exh	aust air h	eat pump	using App	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)				0	(23b)				
$ \begin{array}{c c} (24a)m & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & $	If bala	anced with	n heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =					0	(23c)				
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) (24b)m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	a) If	balance	d mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24a)				
c) If whole house extract ventilation or positive input ventilation from outside if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b) (24c)m $= 0$ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	b) If	balance	ed mecha	anical ve	entilation	without	heat rec	covery (N	MV) (24b)m = (22	2b)m + (2	23b)		-						
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)	(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24b)				
if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b)	c) If	whole h	ouse ex	tract ver	ntilation o	or positiv	e input v	ventilatio	on from o	outside	•		•	•						
a) 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)m ² x 0.5] (24d)m 0.63 0.62 0.59 0.57 0.57 0.57 0.58 0.59 0.6 0.61 (24d)m (25)m 0.63 0.62 0.59 0.59 0.57 0.57 0.58 0.59 0.6 0.61 (24d) (25)m 0.63 0.62 0.59 0.59 0.57 0.57 0.58 0.59 0.6 0.61 (25) State losses and heat loss parameter: ELEMENT area (m ²) Openings A, m ² U-value A X U k-value A X k kJ/k Windows 9.33 115.4 × 0.15 = 2.31 (29) (29) Roof 52.38 0 52.38 × 0.13 = 6.81 (30) (31) * (31) * * (31) * * (31) * * (32) (32) (32) (32) (32) (32) (32) (32) (32) (32) <td>,</td> <td></td> <td></td> <td></td> <td></td> <td>•</td> <td>•</td> <td></td> <td></td> <td></td> <td>5 × (23b</td> <td>))</td> <td></td> <td></td> <td></td> <td></td>	,					•	•				5 × (23b))								
$ \begin{array}{c c} f(22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m^2 x 0.5] \\ \hline (24d)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline Eflective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.57 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (26)m & 0.63 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (27)m & 0.00 & 0.53 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (27)m & 0.00 & 0.53 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (27)m & 0.00 & 0.50 & 0.51 \\ \hline (26)m & 0.33 & (25)m x (5) & 0.57 & 0.57 & 0.58 & 0.59 & 0.51 & 0.$	(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24c)				
$ \begin{array}{c c} f(22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m^2 x 0.5] \\ \hline (24d)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline Eflective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.62 & 0.59 & 0.57 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (25)m & 0.63 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (26)m & 0.63 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (27)m & 0.00 & 0.53 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (27)m & 0.00 & 0.53 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline (27)m & 0.00 & 0.50 & 0.51 \\ \hline (26)m & 0.33 & (25)m x (5) & 0.57 & 0.57 & 0.58 & 0.59 & 0.51 & 0.$	d) If	natural	ventilatio	on or wh	ole hous	e positiv	/e input	ventilatio	on from l	oft										
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) (25) (25) O.63 0.62 0.59 0.59 0.57 0.57 0.58 0.59 0.6 0.61 (25) (25) 0.52 0.59 0.59 0.59 0.5 0.51 0.58 0.59 0.6 0.61 (25) Status colspan="2">(25) (25) (25) (26) 0.52 0.59 0.57 0.57 0.57 0.58 0.59 0.6 0.61 (25) (26) 0.52 0.59 0.57 0.57 0.57 0.57 0.57 0.58 0.59 0.6 0.61 (25) (26) (27) (28) (27) (28) (28) (29) (24) (26) (27) (28) (29) (27) (28) (29) <td< td=""><td>,</td><td></td><td></td><td></td><td></td><td>•</td><td>•</td><td></td><td></td><td></td><td>0.5]</td><td></td><td></td><td></td><td></td><td></td></td<>	,					•	•				0.5]									
$ \begin{array}{c c25 m} \hline \hline 0.63 & 0.62 & 0.62 & 0.59 & 0.59 & 0.57 & 0.57 & 0.58 & 0.59 & 0.6 & 0.61 \\ \hline $	(24d)m=	0.63	0.62	0.62	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61			(24d)				
3. Heat loss parameter: ELEMENT Gross area (m ²) Openings Net Area M-m ² W/m2K (W/K) k-value A X k kJ/K KJ/m ² -K kJ/K Walks 24.73 9.33 x1/1/(0.9)+0.04] = 8.11 (27) Walks 24.73 9.33 15.4 x 0.15 = 2.31 (29) Roof 52.38 0 52.38 x 0.15 = 2.31 (29) Roof 52.38 x 0.15 = 2.31 (29) Roof 52.38 x 0.15 = 2.31 (29) roof for windows, use effective window U-value calculated using formula 1/(1/U-value)+0.04] as given in paragraph 3.2 * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A × U) (26)(30) + (32) + (32a)(32e) = 924 (34) Tr.11 (17.22 (33) Heat capacity Cm = S(A × K) (17.22 (33) (36) Colspan="2">Colsp	Effe	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in box	(25)				•						
ELEMENT Gross area (m²) Openings m² Net Area A,m² U-value W/m2K A X U (W/K) k-value kJ/m²-K A X k kJ/K Windows 9.33 x1/[1/(0.9)+0.04] 8.11 (27) Walls 24.73 9.33 15.4 x 0.15 = 2.31 (29) Roof 52.38 0 52.38 0.13 = 6.81 (30) Total area of elements, m² 77.11 (31) (31) * or windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 * * include the areas on both sides of internal walls and partitions (26)(30) + (32) = 17.22 (33) Heat capacity Cm = S(A × K) (28)(30) + (32) = 17.22 (33) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 11 can be used instead of a detailed calculation. 1100 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 11 (36) if detailed calculation. (33) + (36) = 28.79 (37) Ventilation heat loss calculated monthly (33) + (36) = (28.79	(25)m=	0.63	0.62	0.62	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61			(25)				
ELEMENT Gross area (m²) Openings m² Net Area A,m² U-value W/m2K A X U (W/K) k-value kJ/m²-K A X k kJ/K Windows 9.33 x1/[1/(0.9)+0.04] 8.11 (27) Walls 24.73 9.33 15.4 x 0.15 = 2.31 (29) Roof 52.38 0 52.38 0.13 = 6.81 (30) Total area of elements, m² 77.11 (31) (31) * or windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 * * include the areas on both sides of internal walls and partitions (26)(30) + (32) = 17.22 (33) Heat capacity Cm = S(A × K) (28)(30) + (32) = 17.22 (33) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 11 can be used instead of a detailed calculation. 1100 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 11 (36) if detailed calculation. (33) + (36) = 28.79 (37) Ventilation heat loss calculated monthly (33) + (36) = (28.79	A 11							1			1			1						
area (m²) m^2 A, m² W/m2K (W/K) kJ/K kJ/K Windows 9.33 x11[1/(0.9) + 0.04] 8.11 (27) Walls 24.73 9.33 15.4 x 0.15 = 2.31 (29) Roof 52.38 0 52.38 x 0.13 = 6.81 (30) Total area of elements, m² 77.11 (31) (31) * (31) * include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A × U) (26)(30) + (32) = 17.22 (33) Heat capacity Cm = S(A × k) (28)(30) + (32) + (32)(32e) = 924 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Low 100 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 11 can be used instead of a detailed calculation. Thermal bridges : S (L x Y) calculated using Appendix K 11.57 (36) if details of thermal bridging are not known (36) = 0.05 x (31) (33) + (36) = 28.79 (37) Youtilation heat loss calculated monthly (38) = 0.33 x (25) m x (5) (39)m																				
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* for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 17.22 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 924 (34) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m ² K Indicative Value: Low 100 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 11 can be used instead of a detailed calculation. Thermal bridges : S (L x Y) calculated using Appendix K 11.57 (36) if details of thermal bridging are not known (36) = 0.05 x (31) Total fabric heat loss calculated monthly (38)m = 0.33 x (25)m x (5) Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5) (38)m= $28.71 \ 28.48 \ 28.26 \ 27.23 \ 27.04 \ 26.13 \ 26.13 \ 25.97 \ 26.48 \ 27.04 \ 27.43 \ 27.84 \ (38)$ Heat transfer coefficient, W/K (39)m = (37) + (38)m (39)m = $57.5 \ 57.27 \ 57.05 \ 56.02 \ 55.83 \ 54.93 \ 54.93 \ 54.76 \ 55.27 \ 55.83 \ 56.22 \ 56.63 \ Average = Sum(39)_{12}/12= \ 56.02 \ (39)$ Heat loss parameter (HLP), W/m ² K (40)m = (39)m + (4) (40)m = $1.1 \ 1.1 \ 1.09 \ 1.07 \ 1.05 \ 1.05 \ 1.06 \ 1.07 \ 1.08$					0		52.38	3 ×	0.13	=	6.81					(30)				
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Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 17.22 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 924 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Low 100 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f 11.57 (36) ran be used instead of a detailed calculation. 11.57 (36) Thermal bridges : S (L x Y) calculated using Appendix K 11.57 (36) if details of thermal bridging are not known (36) = 0.05 x (31) 11.57 (36) Total fabric heat loss (33) + (36) = 28.79 (37) Ventilation heat loss calculated monthly (38)m = 0.33 × (25)m × (5) (38) (39)m = (37) + (38)m (38) Heat transfer coefficient, W/K (39)m = (37) + (38)m (38) (38) (39)m = (37) + (38)m (38) (40)m = (1.1) 1.0 1.07 1.05 1.05 1.06 1.07 1.08 (39)								ated using	g formula 1	/[(1/U-valu	ie)+0.04] á	as given in	n paragraph	1 3.2						
Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 924 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Low 100 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f 11.57 (36) ran be used instead of a detailed calculation. 11.57 (36) (33) + (36) = 28.79 (37) Total fabric heat loss (33) + (36) = (28.79 (37) (38)m = 0.33 × (25)m × (5) (38)m = 0.37 × (27.43) (38) Heat transfer coefficient, W/K (39)m = (37) + (38)m (39)m = (37) + (38)m (38) (39)m = (37) + (38)m (39)m = (37) + (3						is and part	mons		(26) (30)	+ (32) -										
Thermal mass parameter (TMP = Cm \div TFA) in kJ/m ² K Indicative Value: Low 100 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges : S (L x Y) calculated using Appendix K 11.57 (36) if details of thermal bridging are not known (36) = 0.05 x (31) Total fabric heat loss (33) + (36) = 28.79 (37) Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5) Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5) (38)m = 28.71 28.48 28.26 27.23 27.04 26.13 26.13 25.97 26.48 27.04 27.43 27.84 (38) Heat transfer coefficient, W/K (39)m = (37) + (38)m (39)m = $57.5 57.27 57.05 56.02 55.83 54.93 54.93 54.76 55.27 55.83 56.22 56.63$ Average = Sum(39) ₁₁₂ /12= 56.02 (39) Heat loss parameter (HLP), W/m ² K (40)m = (39)m ÷ (4) (40)m = 1.1 1.1 1.09 1.07 1.07 1.05 1.05 1.05 1.06 1.07 1.08 1.08					0)				(20)(00)			D) (00-)	(00-)							
For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges : S (L x Y) calculated using Appendix K (33) + (36) = (33) + (36) = Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan="4">Colspan="4">Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4">Colspan="4">Colspan= Colspan="4">Colspan= Colspan="4"Colspan="4"Colspan="4"Colspan="4"Colspan="4"Colspan="4"Colspan="4"Colspan="4"				. ,									(32e) =	9	24	4				
can be used instead of a detailed calculation. Thermal bridges : S (L x Y) calculated using Appendix K 11.57 (36) if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss (33) + (36) = (28.79 (37) Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)m \times (5)$ (38)m = $28.71 \times 28.48 \times 28.26 \times 27.23 \times 27.04 \times 26.13 \times 25.97 \times 26.48 \times 27.04 \times 27.43 \times 27.84$ (38) Heat transfer coefficient, W/K (39)m = (37) + (38)m (39)m = (37) + (38)m (39)m = (37) + (38)m (40)m = (39)m = (37) + (38)m (39) (40)m = (39)m = (37) + (38)m (40)m = (39)m + (4) (40)m = (39)m + (4) (40)m = (39)m + (4) (40)m = (39)m + (4)			•											1	00	(35)				
Thermal bridges : S (L x Y) calculated using Appendix K 11.57 (36) Thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss (33) + (36) = (37) Total fabric heat loss (33) + (36) = (37) Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)m \times (5)$ Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (38)m = 28.71 28.48 28.26 27.23 27.04 26.13 25.97 26.48 27.04 27.43 27.84 (38) Heat transfer coefficient, W/K (39)m = $(37) + (38)m$ (39)m = $(37) + (38)m$ Average = Sum(39) ₁₁₂ /12= 56.02 (39) Heat transfer coefficient, W/K (40)m = $(39)m \div (4)$ (40)m = $(39)m \div (4)$ (40)m = $(39)m \div (4)$ <td <="" colspan="4" td=""><td></td><td>•</td><td></td><td></td><td></td><td>construct</td><td>on are not</td><td>t known pr</td><td>recisely the</td><td>e indicative</td><td>e values of</td><td>TMP in T</td><td>able 1f</td><td></td><td></td><td></td></td>	<td></td> <td>•</td> <td></td> <td></td> <td></td> <td>construct</td> <td>on are not</td> <td>t known pr</td> <td>recisely the</td> <td>e indicative</td> <td>e values of</td> <td>TMP in T</td> <td>able 1f</td> <td></td> <td></td> <td></td>					•				construct	on are not	t known pr	recisely the	e indicative	e values of	TMP in T	able 1f			
if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss Ventilation heat loss calculated monthly (38) = $0.33 \times (25) \times (5)$ <u>Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec</u> (38) m= 28.71 28.48 28.26 27.23 27.04 26.13 26.13 25.97 26.48 27.04 27.43 27.84 (38) Heat transfer coefficient, W/K (39) m = (37) + (38) m (39) m = $57.5 57.27 57.05 56.02 55.83 54.93 54.93 54.76 55.27 55.83 56.22 56.63$ <u>Average = Sum(39) 112 / 12 = 56.02</u> (39) Heat loss parameter (HLP), W/m ² K (40) m = (39) m ÷ (4) (40) m = <u>1.1 1.1 1.09 1.07 1.07 1.05 1.05 1.05 1.06 1.07 1.08 1.08</u>						using Ap	pendix k	<						1.	1 57	1 (36)				
Total fabric heat loss $(33) + (36) =$ (28.79) (37)Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$ Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec $(38)m = 28.71$ 28.48 28.26 27.23 27.04 26.13 26.13 25.97 26.48 27.04 27.43 27.84 (38)Heat transfer coefficient, W/K(39)m = (37) + (38)m $(39)m = 57.5$ 57.27 57.05 56.02 55.83 54.93 54.76 55.27 55.83 56.22 56.63 Average = Sum(39)_{112} / 12=(39)Heat loss parameter (HLP), W/m²K(40)m = (39)m ÷ (4)(40)m = (1.1) 1.07 1.07 1.05 1.05 1.06 1.07 1.08 1.08		-		,		• •	•							'						
(38)m = $0.33 \times (25)m \times (5)$ Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (38)m= 28.71 28.48 28.26 27.23 27.04 26.13 26.13 25.97 26.48 27.04 27.43 27.84 (38) Heat transfer coefficient, W/K (39)m = (37) + (38)m (39)m = (37, 5 57.5 57.27 57.05 56.02 55.83 54.93 54.76 55.27 55.83 56.02 (39) Heat loss parameter (HLP), W/m ² K (40)m = (39)m ÷ (4) (40)m = (39)m ÷ (4) (40)m = (1.1 1.1 1.09 1.07 1.05 1.05 1.06 1.07 1.08 1.08 (1.1					- ()	(-	,			(33) +	(36) =			28	3.79	(37)				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Ventila	tion hea	at loss ca	alculated	d monthly	v				(38)m	= 0.33 × (25)m x (5)							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			i	i			Jun	Jul	Aua	Sep	Oct	Nov	Dec]						
Heat transfer coefficient, W/K (39)m = (37) + (38)m (39)m = 57.5 57.27 57.05 56.02 55.83 54.93 54.76 55.27 55.83 56.22 56.63 Average = Sum(39) ₁₁₂ /12= 56.02 (39) Heat loss parameter (HLP), W/m ² K (40)m = (39)m ÷ (4) (40)m = (39)m ÷ (4)	(38)m=					-										(38)				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$													1	J						
Average = Sum(39) ₁₁₂ /12= 56.02 (39) Heat loss parameter (HLP), W/m ² K (40)m = $(39)m \div (4)$ (40)m = 1.1 1.09 1.07 1.05 1.05 1.06 1.07 1.08 1.08				· · · · · · · · · · · · · · · · · · ·										1						
Heat loss parameter (HLP), W/m²K (40)m = (39)m ÷ (4) (40)m= 1.1 1.09 1.07 1.05 1.05 1.06 1.07 1.08 1.08	(39)m=	57.5	57.27	57.05	56.02	55.83	54.93	54.93	54.76											
(40)m= 1.1 1.1 1.09 1.07 1.07 1.05 1.05 1.05 1.06 1.07 1.08 1.08	Heat In	nec nera	imeter (L	41 P) \//	/m²k⁄						-		12 /12=	56	j.02	(39)				
			· · · ·	, 		1 07	1.05	1.05	1.05		1	1	1 08	1						
	()		L	L		,		L						1	.07	(40)				

Numbe	er of day	rs 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 enei	rgy requ	irement:								kWh/ye	ear:		
if TF	ned occu A > 13.9 A £ 13.9	9, N = 1		: [1 - exp	(-0.0003	849 x (TF	⁻ A -13.9)2)] + 0.(0013 x (⁻	TFA -13.		76		(42)	
Annua <i>Reduce</i>	l averag	e hot wa al average	hot water		5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		5.9		(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Hot wate				ach month				, v	Seh		NOV	Dec			
(44)m=	83.49	80.46	77.42	74.38	71.35	68.31	68.31	71.35	74.38	77.42	80.46	83.49			
Enerav	content of	hot water	used - cal	Iculated mo	onthly = 4	190 x Vd.r	т х пт х Г)) Tm / 3600			m(44) ₁₁₂ =		910.82	(44)	
(45)m=	123.82	108.29	111.75	97.42	93.48	80.67	74.75	85.77	86.8	101.16	110.42	119.91			
(- /										Total = Su	m(45) ₁₁₂ =		1194.23	(45)	
lf instan	taneous w	ater heatii	ng at point	t of use (no	o hot water	r storage),	enter 0 in	boxes (46) to (61)						
(46)m= Water	0 storage	0	0	0	0	0	0	0	0	0	0	0		(46)	
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel														(47)	
Otherv Water	Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss:														
	erature fa						"day).					0		(48) (49)	
-				, kWh/ye	ear			(48) x (49)) =			0		(50)	
b) If m Hot wa If com	nanufact	urer's de age loss eating s	eclared o factor fr ee secti	cylinder l rom Tabl	oss fact							0		(51)	
Tempe	erature fa	actor fro	m Table	2b								0		(53)	
	y lost fro (50) or (-	e, kWh/ye	ear			(47) x (51)	x (52) x (53) =		0		(54)	
		. , .		for each	month			((56)m = (55) × (41)	m		0		(55)	
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)	
If cylinde	er contains	s dedicate	d solar sto	rage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H		
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)	
Primar	y circuit	loss cal	culated		month (,	. ,	65 × (41)				0		(58)	
•			r	r	r	r	r	ng and a	· ·	· · · · · ·	, 	-	l		
(59)m=	0	0	0	0	0	0	0	0	0	0	0	0		(59)	
(61)m=	loss cal	culated	for each	month (61)m = 0	(60) ÷ 36	05 × (41)m 0	0	0	0	0		(61)	
			1	1	I	1	l	1				1	l		

Total h	neat req	uired for	water	he	ating ca	alculate	ed fo	or eacl	h month	(62)	m =	0.85 × ((45)m	ı +	(46)m +	(57)r	m +	(59)m + (61)m	
(62)m=	105.24	92.05	94.98		82.81	79.46	(68.57	63.54	72.	91	73.78	85.9	8	93.86	101	.92		(62)
Solar DI	-IW input	calculated	using Ap	pe	ndix G or	Append	ix H	(negati	ve quantity	/) (ent	ter '0	if no sola	r contr	ibut	tion to wate	r hea	ting)		
(add a	dditiona	l lines if	FGHR	Sa	and/or V	VWHR	S a	oplies	, see Ap	penc	dix G	3)			-				
(63)m=	0	0	0		0	0		0	0	C)	0	0		0	0			(63)
Output	t from w	ater hea	ter																
(64)m=	105.24	92.05	94.98		82.81	79.46	(68.57	63.54	72.	91	73.78	85.9	8	93.86	101	.92		_
										-	Outp	out from wa	ater he	ate	r (annual) _{1.}	12		1015.09	(64)
Heat g	ains fro	m water	heating	g, I	kWh/mo	onth 0.2	25 ´	[0.85	× (45)m	+ (6	61)m	ı] + 0.8 x	(46)m	+ (57)m	+ (5	9)m]	
(65)m=	26.31	23.01	23.75		20.7	19.86		17.14	15.88	18.	23	18.44	21.	5	23.46	25.4	48		(65)
inclu	de (57)	m in calo	culatior	0	f (65)m	only if	cyli	nder i	s in the o	dwel	ling	or hot w	ater i	s fi	rom com	muni	ity h	leating	
5. Int	ternal ga	ains (see	Table	5	and 5a)):													
Metab	olic gair	is (Table	5). Wa	atte	s														
	Jan	Feb	Mar		Apr	May	,	Jun	Jul	A	ug	Sep	00	ct	Nov	D	ес		
(66)m=	87.79	87.79	87.79	T	87.79	87.79	1	37.79	87.79	87.	79	87.79	87.7	'9	87.79	87.	79		(66)
Lightin	g gains	(calcula	ted in A	ı ۱۹	pendix l	L, equa	atior	n L9 oi	r L9a), a	lso s	see -	Table 5						1	
(67)m=	13.95	12.39	10.08	Ť	7.63	5.7	_	4.81	5.2	6.7		9.08	11.5	52	13.45	14.:	34]	(67)
Applia	nces ga	ins (calc	ulated	in	Append	dix L, e	qua	tion L	13 or L1	3a),	also	see Tal	ble 5		11			1	
(68)m=	153.02	154.61	150.61	-	142.09	131.34	<u> </u>	21.23	114.48	112		116.89	125.	41	136.16	146	.27		(68)
Cookir	na aains	(calcula	ted in <i>i</i>	L Ap	pendix	L. equa	atio	n L15	u or L15a), als	io se	e Table	5		11			1	
(69)m=	31.78	31.78	31.78	Ť	31.78	31.78	-	31.78	31.78	31.		31.78	31.7	'8	31.78	31.	78		(69)
	and fa	ns gains	(Table	5	a)		_			I					1			1	
(70)m=	0	0	0	Ť	0	0	Τ	0	0)	0	0		0	0		1	(70)
		ı vaporatio	n (nea	_L ati	ve valu	es) (Ta	 hle	5)										1	
(71)m=	-70.23	-70.23	-70.23	-	-70.23	-70.23	_	70.23	-70.23	-70	.23	-70.23	-70.2	23	-70.23	-70.	23]	(71)
		gains (T		_														I	
(72)m=		34.24	31.92	, Т	28.75	26.7		23.81	21.35	24	5	25.62	28.8	9	32.59	34.	25]	(72)
		gains =		_	20110										(1)m + (72)			I	
(73)m=	251.67	250.58	241.94	Т	227.81	213.08	1	99.19	190.37	193	<u> </u>	200.92	215.	<u>`</u>	231.54	244	.19]	(73)
. ,	lar gains					210100	<u> </u>	00110	100101	100		200102	2.0.						
	Ŭ		using so	lar	flux from	Table 6a	a and	l associ	iated equa	tions	to co	nvert to th	e appl	ical	ole orientati	ion.			
Orienta	ation: /	Access F	actor		Area			Flu	х			g_			FF			Gains	
	-	Table 6d			m²			Tal	ole 6a		Т	able 6b		Т	able 6c			(W)	
West	0.9x	0.77		x	9.3	3	x	1	9.64	x		0.63	x	Γ	0.7		=	56	(80)
West	0.9x	0.77		x	9.3	3	x	3	8.42	x		0.63	x	Ē	0.7		=	109.55	(80)
West	0.9x	0.77		x	9.3	3	x	6	3.27	×		0.63	×	Ē	0.7		=	180.42	(80)
West	0.9x	0.77		x	9.3	3	x	9	2.28	×		0.63	x	Ē	0.7		=	263.12	(80)
West	0.9x	0.77		x	9.3		x	1	13.09	×	F	0.63	×	F	0.7	╡	=	322.47	(80)
West	0.9x	0.77		x	9.3		x		15.77	×	F	0.63	×	F	0.7	\exists	=	330.1	(80)
West	0.9x	0.77		x	9.3		x		10.22	×	F	0.63	×	F	0.7	\exists	=	314.27	(80)
West	0.9x	0.77		x	9.3		x		4.68	x	F	0.63	×	F	0.7		=	269.96	(80)
	L									1								-	1 ·

	_					_										_
West	0.9x	0.77	x	9.3	33	x	7	3.59	x		0.63	x	0.7	=	209.83	(80)
West	0.9x	0.77	x	9.3	33	x	4	5.59	x		0.63	x	0.7	=	129.99	(80)
West	0.9x	0.77	x	9.3	33	x	2	4.49	x		0.63	x	0.7	=	69.83	(80)
West	0.9x	0.77	x	9.3	33	x	1	6.15	x		0.63	_ x [0.7	=	46.05	(80)
Solar g	ains in	watts, ca	alculated	for eac	h month				(83)m	= SI	um(74)m .	(82)m		-		
(83)m=	56	109.55	180.42	263.12	322.47	33	30.1	314.27	269.	.96	209.83	129.99	69.83	46.05		(83)
Total g	ains – ir	nternal a	nd solar	⁻ (84)m =	= (73)m ·	+ (8	33)m	, watts							-	
(84)m=	307.68	360.13	422.36	490.93	535.55	52	29.29	504.64	463.	.45	410.75	345.16	301.37	290.25		(84)
7. Me	an inter	nal temp	erature	(heating	season)										
Temp	erature	during h	eating p	eriods ir	n the livi	ng a	area f	from Tab	ole 9,	Th	1 (°C)				21	(85)
•		tor for ga	• •			-										
	Jan	Feb	Mar	Apr	May	<u> </u>	Jun	Jul	A	ua	Sep	Oct	Nov	Dec		
(86)m=	0.97	0.95	0.91	0.84	0.72).57	0.44	0.4	-	0.71	0.89	0.95	0.97		(86)
Maan	interned								L 7 : "т		. () a)				1	
	18.69	18.98	19.46	20.06	20.53	<u> </u>	w ste 0.83	20.94	20.9		20.68	20.03	19.26	18.66	1	(87)
(87)m=	10.09	10.90	19.40	20.00	20.55		0.83	20.94	20.3	92	20.00	20.03	19.20	10.00		(07)
	erature	during h	eating p	eriods ir	r	r		from Ta	ble S), Tł	n2 (°C)				1	
(88)m=	20	20	20.01	20.02	20.03	20	0.04	20.04	20.0	04	20.04	20.03	20.02	20.01		(88)
Utilisa	Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)															
(89)m=	0.96	0.94	0.9	0.81	0.68	0).51	0.36	0.4	1	0.65	0.86	0.94	0.97		(89)
Mean	interna	l temper	ature in i	the rest	of dwelli	na '	T2 (f	ollow ste	ens 3	to 7	7 in Tabl	e 9c)	•	•		
(90)m=	17.89	18.17	18.64	19.23	19.67	<u> </u>	9.93	20.01	20		19.81	19.22	18.47	17.86		(90)
						I					f	LA = Livir	I ng area ÷ (4	4) =	0.45	(91)
	• • • • • • • •		- 1				.) (I	л т 4	. / 4		A) T O					
	18.25	18.53	ature (fo 19.01	r the wh 19.6	20.06	<u> </u>		_A × 11 20.43		_	A) × 12 20.2	19.59	18.83	18.22	1	(92)
(92)m=							0.33		20.4				18.83	18.22		(92)
Appiy (93)m=	18.25	nent to th 18.53	19.01	19.6	20.06	r –	0.33	20.43	20.4		20.2	19.59	18.83	18.22	1	(93)
		ting requ			20.00		0.55	20.43	20.4	+1	20.2	19.59	10.03	10.22		(00)
		<u> </u>			ro obtair	hod	at et	on 11 of	Tabl	0 Ok	o co tha	t Ti m_(76)m an	d ro colo	sulato	
		factor fo				ieu	al Sie		Tabl	e ar), 50 ina	t 11,111=(r ojin an	u le-cai	Julate	
	Jan	Feb	Mar	Apr	May		Jun	Jul	A	Jg	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm						I				1	1	1	
(94)m=	0.95	0.93	0.88	0.8	0.68	0).53	0.39	0.4	.4	0.66	0.85	0.93	0.96		(94)
Usefu	I gains,	hmGm ,	W = (94	4)m x (8-	4)m	!							Į		1	
(95)m=	292.72	334.43	373.38	392.77	364.04	27	'9.51	198.86	204.	.11	270.09	293.64	280.8	277.88		(95)
Month	nly avera	age exte	rnal tem	perature	e from Ta	able	e 8								1	
(96)m=	4.3	4.9	6.5	8.9	11.7	1	4.6	16.6	16.	4	14.1	10.6	7.1	4.2		(96)
Heat	loss rate	for mea	an intern	al tempe	erature,	Lm	, W =	=[(39)m :	x [(93	3)m-	– (96)m]			1	
(97)m=	802.13	780.85	713.69	599.69	466.47	31	4.97	210.22	219.	.71	337.22	501.65	659.23	793.84		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k	Nh/	/mont	h = 0.02	24 x [(97))m – (95)m] x (4	1)m	•	•	
(98)m=	379	299.99	253.19	148.98	76.21		0	0	0		0	154.76	272.47	383.88		
										Tota	l per year	(kWh/yea	r) = Sum(9	8)15,912 =	1968.48	(98)
Space	e heatin	g require	ement in	kWh/m²	?/vear										37.69	(99)
					.,										L 000	(***/

8c. Sp	bace co	oling rec	quiremen	t										
Calcu	lated fo	r June, J	July and	August.	See Tal	ole 10b							1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat I	oss rate	e Lm (ca	lculated	using 2	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	516.3	406.45	416.17	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	oss hm											
(101)m=	0	0	0	0	0	0.83	0.88	0.85	0	0	0	0		(101)
Usefu	l loss, h	mLm (V	Vatts) = (100)m x	(101)m									
(102)m=	0	0	0	0	0	427.33	356.91	355.61	0	0	0	0		(102)
Gains	(solar (gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)					
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $														(103)
	Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m – (102)m] x (41)m set (104)m to zero if (104)m < 3 × (98)m													
(104)m=	0	0	0	0	0	185.54	221.75	187.66	0	0	0	0		
-									Total	= Sum(104)	=	594.95	(104)
	I fraction								f C =	cooled a	area ÷ (4	4) =	1	(105)
1	ttency f	actor (Ta	able 10b)										
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		_
_									Total	I = Sum(104)	=	0	(106)
· .		· ·	ment for		, ,		· ,						1	
(107)m=	0	0	0	0	0	46.39	55.44	46.91	0	0	0	0		_
									Total	= Sum(107)	=	148.74	(107)
Space	cooling	requirer	ment in k	Wh/m²/y	/ear				(107)) ÷ (4) =			2.85	(108)
8f. Fab	ric Enei	rgy Effici	iency (ca	lculated	l only un	der spec	cial cond	litions, se	ee sectio	on 11)				
Fabric	Energ	y Efficier	псу						(99) -	+ (108) =	=		40.54	(109)

			User D	etails:									
Assessor Name:	John Ashe			Strom	a Num	ber:		STRO	031268				
Software Name:	Stroma FSAP 20)12		Softwa				Versic	on: 1.0.5.8				
		Pi	operty /	Address:	: Unit 38	- COPF	PETTS V	VOOD, L	ondon				
Address :													
1. Overall dwelling dime	nsions:												
			Area	a(m²)		Av. He	ight(m)	-	Volume(m ³)				
Ground floor			5	2.23	(1a) x	2	.66	(2a) =	138.93	(3a)			
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1	1e)+(1n) 5	2.23	(4)								
Dwelling volume					(3a)+(3b))+(3c)+(3c	l)+(3e)+	.(3n) =	138.93	(5)			
2. Ventilation rate:													
	main heating	secondary heating	У	other		total			m ³ per hou	٢			
Number of chimneys	0 +	0	+ [0	=	0	X	40 =	0	(6a)			
Number of open flues	0 +	0	ī + [0	- = [0	x	20 =	0	(6b)			
Number of intermittent fai	ns					0	x .	10 =	0	(7a)			
Number of passive vents						0	x	10 =	0	(7b)			
Number of flueless gas fi	200						×.	40 =	-	4			
Number of fideless gas in	63					0	^		0	(7c)			
Air changes per hour													
Infiltration due to chimney	/s, flues and fans =	(6a)+(6b)+(7	a)+(7b)+(7	7c) =		0		÷ (5) =	0	(8)			
If a pressurisation test has b	een carried out or is inter	ded, proceed	l to (17), c	otherwise o	continue fro	om (9) to ((16)						
Number of storeys in th	e dwelling (ns)								0	(9)			
Additional infiltration			0.05 6				[(9)	-1]x0.1 =	0	(10)			
Structural infiltration: 0. if both types of wall are pr					•	uction			0	(11)			
deducting areas of openin		coponality to	ino grout		a faitoi								
If suspended wooden f		,	1 (seale	ed), else	enter 0				0	(12)			
If no draught lobby, ent									0	(13)			
Percentage of windows	and doors draught	stripped		0.05 10.0		001			0	(14)			
Window infiltration				0.25 - [0.2 (8) + (10)		-	u (15) —		0	(15)			
Infiltration rate Air permeability value,	a50 expressed in a	ubic motro						aroa	0	(16)			
If based on air permeabili	• •		•	•	•		invelope	aica	5 0.25	(17) (18)			
Air permeability value applies	-					is being u	sed		0.25				
Number of sides sheltere	d								0	(19)			
Shelter factor				(20) = 1 -	[0.075 x (1	9)] =			1	(20)			
Infiltration rate incorporat	0			(21) = (18)) x (20) =				0.25	(21)			
Infiltration rate modified for		ed					i	1	1				
Jan Feb	Mar Apr May	y Jun	Jul	Aug	Sep	Oct	Nov	Dec	_				
Monthly average wind sp									1				
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7					
Wind Factor (22a)m = (22	2)m ÷ 4												
	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18					
	I	_!!							I				

Adjuste	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
	0.32	0.31	0.31	0.28	0.27	0.24	0.24	0.23	0.25	0.27	0.28	0.29		
			change i	rate for t	he appli	cable ca	se	-	•	•		•	[
		al ventila											0.5	(23a)
lf exha	aust air h	eat pump	using Appe	endix N, (2	3b) = (23a	ı) × Fmv (e	equation (I	N5)) , othei	rwise (23b) = (23a)			0.5	(23b)
lf bala	anced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h)) =				77.35	(23c)
a) If	balance	d mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m=	0.43	0.43	0.42	0.39	0.38	0.35	0.35	0.34	0.36	0.38	0.39	0.41		(24a)
b) If	balance	d mecha	anical ve	entilation	without	heat rec	covery (N	MV) (24b)m = (22	2b)m + (2	23b)			
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If v	whole h	ouse ex	tract ver	tilation o	or positiv	e input v	ventilatio	on from c	outside			-		
i	f (22b)n	n < 0.5 ×	< (23b), t	hen (240	c) = (23b); otherv	wise (24	c) = (22b	o) m + 0.	5 × (23b)			
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If	natural	ventilatio	on or wh	ole hous	e positiv	/e input	ventilatio	on from l	oft			•		
i	f (22b)n	n = 1, th	en (24d)	m = (22	o)m othe	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]	-			
(24d)m=	0	0	0	0	0	0	0	0	0	0	0	0		(24d)
Effec	ctive air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	d) in boy	x (25)					
(25)m=	0.43	0.43	0.42	0.39	0.38	0.35	0.35	0.34	0.36	0.38	0.39	0.41		(25)
0.110			et less a								1		1	
			eat loss p			Niet Au							_	
ELEN	IENI	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	()	k-value kJ/m²·l		A X k kJ/K
Windo	NS		(,			9.33		/[1/(0.9)+		8.11				(27)
Walls		247	72	0.22			_							(29)
		24.7		9.33		15.4	_	0.15	=	2.31	;		\dashv	
Roof		52.3		0		52.38	3 X	0.13	=	6.81				(30)
		lements				77.11								(31)
			ows, use e sides of in				ated using	g formula 1,	/[(1/U-valu	ıe)+0.04] a	ns given in	paragraph	1 3.2	
			= S (A x		is and part			(26)(30)) + (32) =				17.00	(33)
		Cm = S(0)				(_0)(00)		(30) + (32	2) + (225)	(220) -	17.22	
			. ,	2 – Cm		$1/m^{2}$				tive Value		(326) –	924	(34)
		•	eter (TMF					recisely the				able 1f	100	(35)
			tailed calc		constructi	on are not	. KNOWN PI	ecisely the	emucative	values of	TIVIP III T	adie II		
Therma	al bridge	es : S (L	x Y) cal	culated u	using Ap	pendix ł	<						11.57	(36)
	-		, are not kn		• •	•								`
Total fa	abric he	at loss							(33) +	(36) =			28.79	(37)
Ventila	tion hea	at loss ca	alculated	monthly	y				(38)m	= 0.33 × (25)m x (5))		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	19.81	19.52	19.23	17.8	17.51	16.08	16.08	15.79	16.65	17.51	18.09	18.66		(38)
I Hoot tr	ansfor (coefficier	nt \\//k				I		(30)m	= (37) + (3	28)m		1	
1	48.6	48.31	48.02	46.59	46.3	44.87	44.87	44.59	45.45	46.3	46.88	47.45	1	
(39)m=	40.0	-10.01	40.02	40.09	40.3	-++.07	-4.07	-4.09		40.3 Average =			46.52	(39)
Heat lo	oss para	meter (H	HLP), W/	′m²K						average = = (39)m ÷		12 / 1 ∠ =	40.32	(38)
(40)m=	0.93	0.92	0.92	0.89	0.89	0.86	0.86	0.85	0.87	0.89	0.9	0.91]	
		I						I		Average =	L Sum(40)₁	12 /12=	0.89	(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	ter heat	ting ener	gy requi	irement:								kWh/ye	ear:	
if TF		-		[1 - exp	(-0.0003	49 x (TF	FA -13.9)2)] + 0.()013 x (⁻	TFA -13.		76		(42)
								(25 x N) to achieve		o torgot o		5.9		(43)
		-			ater use, h	-	-	lo acilieve	a waler ut	se largel o	I			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate				-	Vd,m = fa			-						
(44)m=	83.49	80.46	77.42	74.38	71.35	68.31	68.31	71.35	74.38	77.42	80.46	83.49		
											m(44) ₁₁₂ =		910.82	(44)
Energy of	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m=	123.82	108.29	111.75	97.42	93.48	80.67	74.75	85.77	86.8	101.16	110.42	119.91		_
lf instan	taneous w	vətor hoatiu	na at noint	of use (no	hot water	storage)	ontor () in	boxes (46		Total = Su	m(45) ₁₁₂ =	-	1194.23	(45)
								r		45.47	10.50	17.00		(46)
(46)m= Water	18.57 storage	16.24 IOSS:	16.76	14.61	14.02	12.1	11.21	12.87	13.02	15.17	16.56	17.99		(46)
	•		includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If com	munity h	eating a	nd no ta	ink in dw	velling, e	nter 110) litres in	(47)						
Otherv	vise if no	o stored	hot wate	er (this in	icludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
	storage			,		<i>/</i> / <i>/</i> /	<i>.</i>							
					or is kno	wn (kvvr	n/day):					0		(48)
•		actor fro										0		(49)
			-	, kWh/ye sylinder l	ear oss facto	or is not		(48) x (49)) =		1	10		(50)
				•	e 2 (kWl						0.	02		(51)
	2	eating s		on 4.3										
		from Ta		0								03		(52)
		actor fro									0	.6		(53)
•••			-	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		03		(54)
	. ,	(54) in (5		for each	month			((56)m = (55) x (41)	~	1.	03		(55)
	-						·					00.04		(50)
(56)m=	32.01	28.92 s dedicate	32.01 d solar sto	30.98	32.01 m = (56)m	30.98 x [(50) – (32.01 H11)1 ∸ (5	32.01 0), else (5	30.98	32.01 m where (30.98 H11) is fro	32.01 m Append	ix H	(56)
-		·		- · ·				i .		I				(57)
(57)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
	•	•	,	om Table								0		(58)
	•				,	,	• •	65 × (41)		r tharma	etet)			
(moo (59)m=	23.26	21.01	23.26	22.51	23.26	22.51	23.26	ng and a 23.26	22.51	23.26	22.51	23.26		(59)
									22.01	20.20	22.01	20.20		(00)
	r	i		1	61)m =		<u> </u>	í	0			0		(64)
(61)m=	0	0	0	0	0	0	0	0	0	0	0	0		(61)

Total h	eat req	uired for	water	he	ating ca	alculate	d fo	or eacl	h month	(62)	m =	0.85 × (45)m	+	(46)m +	(57)ı	m +	(59)m + (61)m	
(62)m=	179.09	158.22	167.02		150.92	148.76	1	34.16	130.03	141	.05	140.29	156.	43	163.91	175	.19		(62)
Solar DI	-IW input	calculated	using Ap	pe	ndix G or	Append	ix H	(negati	ve quantity	/) (ent	er '0'	if no solar	r contri	but	ion to wate	r hea	ting)		
(add a	dditiona	l lines if	FGHR	Sa	and/or V	VWHR	S a	oplies	, see Ap	penc	dix G	B)							
(63)m=	0	0	0		0	0		0	0	C)	0	0		0	0)		(63)
Output	from w	ater hea	ter																
(64)m=	179.09	158.22	167.02	2	150.92	148.76	1	34.16	130.03	141	.05	140.29	156.	43	163.91	175	.19		_
									-		Outp	out from wa	ater he	ate	r (annual) _{1.}	12		1845.07	(64)
Heat g	ains fro	m water	heating	g, I	kWh/mo	onth 0.2	25 ´	[0.85	× (45)m	+ (6	i1)m] + 0.8 x	(46))m	+ (57)m	+ (5	9)m]	
(65)m=	85.39	75.95	81.38		75.19	75.3	6	69.62	69.08	72.	74	71.66	77.8	6	79.51	84.	09		(65)
inclu	ide (57)	m in calc	culatior	0	f (65)m	only if	cyli	nder i	s in the o	dwell	ing	or hot wa	ater i	s fr	rom com	mun	ity h	eating	
5. Int	ternal ga	ains (see	Table	5	and 5a)):													
Metab	olic gair	s (Table	5). Wa	atte	5														
	Jan	Feb	Mar		Apr	May		Jun	Jul	A	ug	Sep	00	t	Nov	D	ес		
(66)m=	87.79	87.79	87.79	Ť	87.79	87.79	8	37.79	87.79	87.	79	87.79	87.7	9	87.79	87.	79		(66)
Lightin	g gains	(calculat	ted in A	ı ۱۹/	pendix l	L, equa	tior	n L9 oi	r L9a), a	lso s	ee T	Fable 5							
(67)m=	13.95	12.39	10.08	Ť	7.63	5.7	_	4.81	5.2	6.7		9.08	11.5	2	13.45	14.	34		(67)
Applia	nces ga	ins (calc	ulated	in	Append	dix L, e	qua	tion L	13 or L1	3a),	also	see Tal	ble 5						
(68)m=	153.02	154.61	150.61	-	142.09	131.34	<u> </u>	21.23	114.48	112		116.89	125.	41	136.16	146	.27		(68)
Cookir	na aains	(calcula	ted in <i>i</i>	L Ap	pendix	L. equa	 atio	n L15	u or L15a`	i), als	 0 SE	e Table	5		ļ				
(69)m=	31.78	31.78	31.78	Ţ	31.78	31.78	-	31.78	31.78	31.		31.78	31.7	8	31.78	31.	78		(69)
	and fa	ns gains	(Table	5	a)		-			I									
(70)m=			0	Ť	0	0	Τ	0	0	C)	0	0		0	0)		(70)
		I aporatio	n (nea	 ati	ve valu	es) (Ta	 hle	5)											. ,
(71)m=	-70.23	-70.23	-70.23	-	-70.23	-70.23		70.23	-70.23	-70	.23	-70.23	-70.2	23	-70.23	-70	.23		(71)
		gains (T																	
		113.02		-	104.43	101.21		96.69	92.84	97.	77	99.52	104.	35	110.43	113	03	l	(72)
		gains =			104.40	101.21	<u> </u>								(1)m + (72)		.00		(/
(73)m=	331.08	329.36	319.4	Т	303.48	287.59		(00)	261.86	266	<u></u>	274.83	290.	<u>`</u>	309.38	322	97		(73)
. ,	lar gains		010.4		505.40	201.00		12.01	201.00	200	.70	214.00	200.	52	000.00	522			(10)
			usina so	lar	flux from	Table 6a	and	l associ	iated equa	tions	to co	nvert to th	e appl	icat	ole orientat	ion.			
-		Access F	•		Area			Flu				g_			FF			Gains	
		Table 6d			m²				ole 6a		Т	able 6b		Т	able 6c			(W)	
West	0.9x	0.77		x	9.3	3	x	1	9.64	×		0.63	ר ×	Г	0.7		=	56	(80)
West	0.9x	0.77		x	9.3	3	x	3	8.42	x		0.63	۲ × ۲	F	0.7		=	109.55	(80)
West	0.9x	0.77		x	9.3		x		3.27	x		0.63	۲ x آ	F	0.7		=	180.42	(80)
West	0.9x	0.77		x	9.3		x		2.28	l x		0.63	۲ x آ	F	0.7		=	263.12	(80)
West	0.9x	0.77		x	9.3		x	<u> </u>	13.09	x		0.63		F	0.7	=	=	322.47	(80)
West	0.9x	0.77		x	9.3		x	<u> </u>	15.77	x		0.63		F	0.7		=	330.1	(80)
West	0.9x	0.77		x	9.3		x		10.22	^ x		0.63	٦ ^		0.7	\dashv	_	314.27	(80)
West	0.9x	0.77		^ x	9.3		x		4.68	^ x	L	0.63	٦^ × ۲		0.7	\dashv	_	269.96	(80)
	0.07	0.77		· ·	9.3		^	L ⁹	9.00	1 ^		0.00	^	L	0.7		_	203.30	1(00)

	_					-										-
West	0.9x	0.77	x	9.3	33	×	7	3.59	x		0.63	_ × _	0.7	=	209.83	(80)
West	0.9x	0.77	x	9.3	33	×	4	5.59	x		0.63	×	0.7	=	129.99	(80)
West	0.9x	0.77	x	9.3	33	x	2	4.49	x		0.63	×	0.7	=	69.83	(80)
West	0.9x	0.77	x	9.3	33	x	1	6.15	x		0.63	x	0.7	=	46.05	(80)
	ains in		alculated		i i	1			<u> </u>	- 1	um(74)m .			1	1	
(83)m=	56	109.55	180.42	263.12	322.47		30.1	314.27	269.	.96	209.83	129.99	69.83	46.05		(83)
-			nd solar	. ,	i , ,	r Ì	,								1	()
(84)m=	387.08	438.91	499.82	566.61	610.06	60)2.18	576.13	536.	72	484.66	420.91	379.21	369.03		(84)
7. Me	an inter	nal temp	erature	(heating	season)										
Temp	erature	during h	eating p	eriods ir	n the livi	ng a	area f	from Tab	ole 9,	Th	1 (°C)				21	(85)
Utilisa	ation fac	tor for g	ains for l	iving are	ea, h1,m	(se	ee Ta	ble 9a)	_							_
	Jan	Feb	Mar	Apr	May		Jun	Jul	Au	лg	Sep	Oct	Nov	Dec		
(86)m=	0.94	0.91	0.86	0.75	0.61	0).45	0.33	0.3	7	0.58	0.8	0.91	0.95		(86)
Mean	internal	temper	ature in	living ar	ea T1 (fo	JIO	w ste	ns 3 to 7	r in T	able	9c)				1	
(87)m=	19.34	19.6	20.01	20.48	20.79	<u> </u>	0.94	20.98	20.9	- 1	20.87	20.46	19.85	19.33]	(87)
															I	
			eating p	-	r	r				_	. ,	00.40	00.47	00.40	1	(88)
(88)m=	20.14	20.15	20.15	20.17	20.18		20.2	20.2	20.2	21	20.19	20.18	20.17	20.16		(00)
Utilisa	Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a)															
(89)m=	0.93	0.9	0.84	0.73	0.57	(0.4	0.28	0.3	1	0.52	0.77	0.9	0.94		(89)
Mean	internal	temper	ature in	the rest	of dwelli	ing	T2 (fo	ollow ste	eps 3	to 7	in Tabl	e 9c)				
(90)m=	17.92	18.3	18.87	19.55	19.94	20	0.15	20.19	20.1	19	20.07	19.53	18.68	17.91		(90)
I											f	LA = Livir	ng area ÷ (4) =	0.45	(91)
Mean	internal	temner	ature (fo	r the wh	ole dwe	llinc	ר) – fl	Δ 🗸 Τ1	⊥ (1 .	_ fl	Δ) v T2					
(92)m=	18.56	18.88	19.38	19.97	20.32	<u> </u>	20.5	20.55	20.	- 1	20.43	19.95	19.2	18.55		(92)
		nent to th	ne mear			L atu	re fro				re appro				I	
(93)m=	18.56	18.88	19.38	19.97	20.32	1	20.5	20.55	20.		20.43	19.95	19.2	18.55		(93)
8. Spa	ace hea	ting regu	uirement			<u> </u>							ł			
					re obtair	ned	at ste	ep 11 of	Tabl	e 9b	o, so tha	t Ti,m=(76)m an	d re-calo	culate	
the ut	ilisation	factor fo	or gains	using Ta	ble 9a								-			
	Jan	Feb	Mar	Apr	May		Jun	Jul	Au	Jg	Sep	Oct	Nov	Dec		
Utilisa		tor for g	ains, hm	:	r									1		
(94)m=	0.91	0.88	0.82	0.72	0.58	0).42	0.3	0.3	4	0.54	0.77	0.88	0.92		(94)
			W = (94	, <u>,</u>	<u>,</u>								,		1	
(95)m=	353.89	387.64	412.06	406.82	353.97		53.46	174.08	180.	54	261.71	322.38	333.77	340.32		(95)
		-	rnal tem		ì	-									1	
(96)m=	4.3	4.9	6.5	8.9	11.7		4.6	16.6	16.		14.1	10.6	7.1	4.2		(96)
		1	an intern		1	-		- ,	<u> </u>	<u> </u>	. ,		. <u> </u>	i	1	
(97)m=	692.99	675.45	618.62	515.62	399.18		64.96	177.07	184.		287.55	432.87	567.36	680.83		(97)
			ement fo		r	Wh/				Ì			ŕ	050 5 1	1	
(98)m=	252.29	193.41	153.69	78.33	33.63		0	0	0		0	82.21	168.19	253.34		
										Total	per year	(kWh/yea	r) = Sum(9	8)15,912 =	1215.08	(98)
Space	e heating	g require	ement in	kWh/m ²	²/year										23.26	(99)

9b. Energy requirements – Community heating scheme			
This part is used for space heating, space cooling or water heating pro		[
Fraction of space heat from secondary/supplementary heating (Table 7	11) '0' if none	0	(301)
Fraction of space heat from community system $1 - (301) =$		1	(302)
The community scheme may obtain heat from several sources. The procedure allows fo includes boilers, heat pumps, geothermal and waste heat from power stations. See App		he latter	
Fraction of heat from Community boilers		0.4	(303a)
Fraction of community heat from heat source 2		0.4	(303b)
Fraction of total space heat from Community boilers	(302) x (303a) =	0.4	(304a)
Fraction of total space heat from community heat source 2	(302) x (303b) =	0.4	(304b)
Factor for control and charging method (Table 4c(3)) for community he	ating system	1	(305)
Distribution loss factor (Table 12c) for community heating system		1.05	(306)
Space heating		kWh/year	
Annual space heating requirement		1215.08	
Space heat from Community boilers	(98) x (304a) x (305) x (306) =	510.33	(307a)
Space heat from heat source 2	(98) x (304b) x (305) x (306) =	510.33	(307b)
Efficiency of secondary/supplementary heating system in % (from Table	le 4a or Appendix E)	0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x 100 ÷ (308) =	0	(309)
Water heating Annual water heating requirement		1845.07	7
If DHW from community scheme: Water heat from Community boilers	(64) x (303a) x (305) x (306) =	774.93	(310a)
Water heat from heat source 2	(64) x (303b) x (305) x (306) =	774.93	(310b)
Electricity used for heat distribution 0.0	1 × [(307a)(307e) + (310a)(310e)] =	25.71	(313)
Cooling System Energy Efficiency Ratio		0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107) ÷ (314) =	0	(315)
Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outside	9	190.68	(330a)
warm air heating system fans		0	(330b)
pump for solar water heating		0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330b) + (330g) =	190.68	(331)
Energy for lighting (calculated in Appendix L)		246.37	(332)
Electricity generated by PVs (Appendix M) (negative quantity)		-509.66	(333)
Electricity generated by wind turbine (Appendix M) (negative quantity)		0	(334)
12b. CO2 Emissions – Community heating scheme		-	_
	hergy Emission factor Vh/year kg CO2/kWh	Emissions kg CO2/year	
κν		ng UULIYEal	

CO2 from other sources of space and water heating (not CHP)

Efficiency of heat source 1 (%) If there is CHP using two fuels repeat (363) to (366) for the second fuel

(367a)

89

Efficiency of heat source 2 (%)	If there is CHP using	two fuels repeat (363) to (3	366) for the second	fuel	89	(367b)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	=	311.93	(367)
CO2 associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x	0.22	=	311.93	(368)
Electrical energy for heat distribution	[(313) x	0.52	=	13.34	(372)
Total CO2 associated with community sys	stems (363)(366) + (368)(372)		=	637.2	(373)
CO2 associated with space heating (seco	ndary) (309) x	0	=	0	(374)
CO2 associated with water from immersion	on heater or instantane	ous heater (312) x	0.22	=	0	(375)
Total CO2 associated with space and wat	er heating (373) + (374) + (375) =			637.2	(376)
CO2 associated with electricity for pumps	and fans within dwellin	ng (331)) x	0.52	=	98.96	(378)
CO2 associated with electricity for lighting] (332))) x	0.52	=	127.87	(379)
Energy saving/generation technologies (3 Item 1	33) to (334) as applica		0.52 × 0.01	1 =	-264.51	(380)
Total CO2, kg/year	sum of (376)(382) =				599.52	(383)
Dwelling CO2 Emission Rate	383) ÷ (4) =				11.48	(384)
El rating (section 14)					91.74	(385)

User Details:												
Assessor Name: Software Name:	John Ashe Stroma FSA	AP 2012		Stroma Softwa					031268 on: 1.0.5.8			
		Р	roperty <i>i</i>	Address:	: Unit 38	- COPF	PETTS V	VOOD, L	ondon			
Address :												
1. Overall dwelling dim	ensions:											
Ground floor			-	a(m²) 2.23	(1a) x		ight(m) .66	(2a) =	Volume(m ³) 138.93	(3a)		
Total floor area TFA = (1a)+(1b)+(1c)+(1	ld)+(1e)+(1n) 5	2.23	(4)							
Dwelling volume			L		(3a)+(3b))+(3c)+(3c	l)+(3e)+	.(3n) =	138.93	(5)		
2. Ventilation rate:												
	main heating	secondar heating	У	other		total			m ³ per hour	•		
Number of chimneys	0	+ 0] + [0] = [0	X 4	40 =	0	(6a)		
Number of open flues	0	+ 0	<u> </u> + [0] = [0	x	20 =	0	(6b)		
Number of intermittent f	ans	J L			, г Г	2	×	10 =	20	(7a)		
Number of passive vent	S				Г	0	x '	10 =	0	(7b)		
Number of flueless gas	fires				Г	0	x	40 =	0	(7c)		
Air changes per hour												
Infiltration due to chimn	ove fluos and fai	nc = (6a) + (6b) + (7)	a)+(7h)+(7c) -	Г					-		
If a pressurisation test has	•				continue fro	20 om (9) to (÷ (5) =	0.14	(8)		
Number of storeys in			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			(-) (-/		0	(9)		
Additional infiltration							[(9)	-1]x0.1 =	0	(10)		
Structural infiltration:	0.25 for steel or t	timber frame or	0.35 for	masonr	y constr	uction			0	(11)		
if both types of wall are deducting areas of oper	nings); if equal user 0	0.35	-							_		
If suspended wooden			1 (seale	ed), else	enter 0				0	(12)		
If no draught lobby, e									0	(13)		
Percentage of window	vs and doors dra	ught stripped		0.05 10.0		001			0	(14)		
Window infiltration				0.25 - [0.2 (8) + (10)		-	u (15) —		0	(15)		
Infiltration rate Air permeability value		t in cubic motro				· · · ·		aroa	0	(16)		
If based on air permeab			•				invelope	alea	5	(17)		
Air permeability value appl	•					is being u	sed		0.39	(18)		
Number of sides shelter						Ū			0	(19)		
Shelter factor				(20) = 1 -	[0.075 x (1	9)] =			1	(20)		
Infiltration rate incorpora	ating shelter facto	or		(21) = (18)) x (20) =				0.39	(21)		
Infiltration rate modified	for monthly winc	d speed		-			-		_	_		
Jan Feb	Mar Apr	May Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Monthly average wind s	peed from Table	7		-				-				
(22)m= 5.1 5	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7				
Wind Factor (22a)m = (2	22)m ÷ 4											
(22a)m= 1.27 1.25	1.23 1.1	1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]			

Adjuste	ed infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m						
	0.5	0.49	0.48	0.43	0.42	0.37	0.37	0.36	0.39	0.42	0.44	0.46			
			-	rate for t	he appli	cable ca	ise					•			-
		al ventila												0	(23a)
lf exh	aust air h	eat pump	using Appe	endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)				0	(23b)
If bala	anced with	heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h) =					0	(23c)
a) If	balance	d mecha	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]		
(24a)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24a)
b) If	balance	d mecha	anical ve	entilation	without	heat rec	covery (N	MV) (24b)m = (22	2b)m + (2	23b)				
(24b)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24b)
c) If	whole h	ouse ex	tract ver	tilation of	or positiv	e input v	ventilatio	n from c	outside				1		
,					•	•		c) = (22b		5 × (23b))				
(24c)m=	0	0	0	0	0	0	0	0	0	0	0	0			(24c)
d) If	natural	ventilatio	n or wh	u ole hous	e positiv	re input	ventilatio	n from l	oft		1	1	1		
,								0.5 + [(2		0.5]					
(24d)m=	0.63	0.62	0.62	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61			(24d)
Effe	ctive air	change	rate - er	nter (24a) or (24t) or (24	c) or (24	d) in boy	(25)			•	1		
(25)m=	0.63	0.62	0.62	0.59	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61			(25)
		I	I	1	I	I	1	1	I	1		1	1		
3. He	at losse			paramete											
ELEN	IENT	Gros area		Openin m	-	Net Ar A ,r		U-valı W/m2		A X U (W/I		k-value kJ/m²-l		A X kJ/ł	
Windov	NC	alea	(11-)		1-	· · ·		/[1/(1.4)+			N)	KJ/111-1	Γ.	KJ/r	
	W5					9.33	×'		0.04] =	12.37	╡,		r		(27) ¬
Walls		24.7	'3	9.33		15.4	×	0.18	= [2.77			_ L		(29)
Roof		52.3	88	0		52.38	3 X	0.13	=	6.81					(30)
Total a	rea of e	lements	, m²			77.11	1								(31)
							lated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	ns given in	n paragraph	n 3.2		
				nternal wal	ls and par	titions		(22) (22)							-
		s, W/K :	``	U)				(26)(30)) + (32) =				21	.95	(33)
Heat c	apacity	Cm = S((Axk)						((28)	(30) + (32	2) + (32a)	(32e) =	9	24	(34)
Therm	al mass	parame	ter (TMF	⁻ = Cm ÷	- TFA) ir	n kJ/m²K			Indica	tive Value	Medium		2	50	(35)
	-				construct	ion are not	t known pi	recisely the	e indicative	e values of	TMP in T	able 1f			
		ad of a de													
	-			culated (• •	•	ĸ						3	.86	(36)
	of therma abric he		are not kn	own (36) =	= 0.05 x (3	1)			(33) +	(36) =			05	. 04	(37)
				monthl	,					$= 0.33 \times ($	25)m v (5	`	20	5.81	(37)
venuia			i	monthly						-		1	1		
(0.0)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			(20)
(38)m=	28.71	28.48	28.26	27.23	27.04	26.13	26.13	25.97	26.48	27.04	27.43	27.84	J		(38)
Heat tr	ansfer o	coefficier	nt, W/K						(39)m	= (37) + (3	38)m				
(39)m=	54.51	54.29	54.07	53.03	52.84	51.94	51.94	51.77	52.29	52.84	53.23	53.64			_
										Average =		112 /12=	53	3.03	(39)
		meter (H	, I			i				= (39)m ÷	1	1	1		
(40)m=	1.04	1.04	1.04	1.02	1.01	0.99	0.99	0.99	1	1.01	1.02	1.03			-
										Average =	Sum(40)	112 /12=	1	.02	(40)

$\begin{array}{c c c c c c c c c c c c c c c c c c c $												
4. Water heating energy requirement: kWh/year: Assumed occupancy, N 1.76 if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) 1.76 if TFA £ 13.9, N = 1 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) Annual average hot water usage in litres per day Vd, average = $(25 x N) + 36$ 75.9 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) (43) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
Assumed occupancy, N [1.76] if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA \pounds 13.9, N = 1 Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
Assumed occupancy, N [1.76] if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA \pounds 13.9, N = 1 Annual average hot water usage in litres per day Vd,average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9)if TFA £ 13.9, N = 1Annual average hot water usage in litres per day Vd, average = $(25 \times N) + 36$ Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)JanFebMarAprMayJunJunAugSepOctNovDec												
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec												
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)												
(44)m= 83.49 80.46 77.42 74.38 71.35 68.31 68.31 71.35 74.38 77.42 80.46 83.49												
$Total = Sum(44)_{112} = 910.82 $ (44)												
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)												
(45)m= 123.82 108.29 111.75 97.42 93.48 80.67 74.75 85.77 86.8 101.16 110.42 119.91												
$Total = Sum(45)_{112} = 1194.23$ <i>If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)</i> (45)												
(46)m= 18.57 16.24 16.76 14.61 14.02 12.1 11.21 12.87 13.02 15.17 16.56 17.99 (46) Water storage loss: (46)												
Storage volume (litres) including any solar or WWHRS storage within same vessel 150 (4 If community heating and no tank in dwelling, enter 110 litres in (47) (4												
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)												
Water storage loss:												
a) If manufacturer's declared loss factor is known (kWh/day): 1.39 (48)												
Temperature factor from Table 2b 0.54 (49) Energy least from water storage W/b (user (49)												
Energy lost from water storage, kWh/year (48) x (49) = 0.75 (50) b) If manufacturer's declared cylinder loss factor is not known:												
Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)												
If community heating see section 4.3												
Volume factor from Table 2a0(52)Temperature factor from Table 2b0(53)												
Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$ 0(54)Enter (50) or (54) in (55)0.75(55)												
Water storage loss calculated for each month $((56)m = (55) \times (41)m$												
(56)m= 23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 22.58 23.33 (56)												
If cylinder contains dedicated solar storage, $(57)m = (56)m \times [(50) - (H11)] \div (50)$, else $(57)m = (56)m$ where (H11) is from Appendix H												
(57)m= 23.33 21.07 23.33 22.58 23.33 22.58 23.33 23.33 23.33 22.58 23.33 22.58 23.33 (57)												
Primary circuit loss (annual) from Table 3												
Primary circuit loss calculated for each month $(59)m = (58) \div 365 \times (41)m$												
(modified by factor from Table H5 if there is solar water heating and a cylinder thermostat)												
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26 23.26 23.26 22.51 23.26 22.51 23.26 (59)												
Combi loss calculated for each month $(61)m = (60) \div 365 \times (41)m$												
$(61)m = \begin{array}{ c c c c c c c c c c c c c c c c c c c$												

Total h	eat req	uired for	water h	eating ca	alculate	d fo	r eacl	n month	(62)	m =	0.85 × ((45)m	ו +	(46)m +	(57)ı	m +	(59)m + (61)m	
(62)m=	170.41	150.38	158.34	142.51	140.07	1	25.76	121.34	132	.37	131.89	147.	75	155.51	166	6.5		(62)
Solar DI	HW input	calculated	using App	endix G o	r Appendi	хH	(negativ	ve quantity	/) (ent	ter '0'	if no solar	r conti	ibut	tion to wate	er hea	ting)		
(add a	dditiona	l lines if	FGHRS	and/or \	WWHR:	S ap	plies,	, see Ap	penc	dix G	6)							
(63)m=	0	0	0	0	0		0	0	C)	0	0		0	0)		(63)
Output	t from w	ater heat	ter															
(64)m=	170.41	150.38	158.34	142.51	140.07	1	25.76	121.34	132	.37	131.89	147.	75	155.51	166	6.5		
										Outp	ut from wa	ater he	eate	r (annual) _{1.}	12		1742.84	(64)
Heat g	ains fro	m water	heating	, kWh/m	onth 0.2	25 ´	[0.85	× (45)m	+ (6	51)m] + 0.8 x	c [(46)m	+ (57)m	+ (5	9)m]	
(65)m=	78.44	69.68	74.43	68.47	68.36	6	62.89	62.13	65	.8	64.93	70.9	91	72.79	77.	15		(65)
inclu	de (57)	m in calc	culation	of (65)m	only if	cylii	nder is	s in the a	dwell	ling	or hot wa	ateri	is f	rom com	muni	ity h	eating	
5. Int	ternal ga	ains (see	Table 5	5 and 5a):	-				-						-	-	
		is (Table			/													
metab	Jan	Feb	Mar	Apr	May	Τ	Jun	Jul	A	ug	Sep	0	ct	Nov	D	ес		
(66)m=	87.79	87.79	87.79	87.79	87.79	6	37.79	87.79	87.	<u> </u>	87.79	87.		87.79	87.	79		(66)
Liahtin	a aains	(calculat	ted in A	opendix	L. equa	tion	L9 oi	r L9a), a	lso s	iee T	Table 5			11				
(67)m=	13.95	12.39	10.08	7.63	5.7	-	4.81	5.2	6.7		9.08	11.	52	13.45	14.	34		(67)
	nces da	ins (calc	ulated ir	L Append	l dixleo	1	tion L	13 or I 1	3a)	also	see Tab	ble 5		II				
(68)m=	153.02	154.61	150.61	142.09	131.34	· -	21.23	114.48	112		116.89	125.		136.16	146	.27		(68)
		(calcula																
(69)m=	31.78	31.78	31.78	31.78	2, equa	—	31.78	31.78	31.		31.78	31.7	78	31.78	31.	78		(69)
					01110			01110	011		01.10	01.1		01.10	01.	10		()
(70)m=		ns gains 3	3	3 3	3		3	3	3		3	3		3	3	2		(70)
								0		, 	3	0		5	5	,		(10)
	-70.23	aporatio	n (nega -70.23	-70.23	es) (1a	-	5) 70.23	-70.23	-70	22	-70.23	-70.	22	-70.23	-70.	22		(71)
(71)m=				-70.23	-70.23	1-	10.23	-70.23	-70	.23	-70.23	-70.	23	-70.23	-70.	.23		(71)
		gains (T	· · ·	05.00	04.00		7.05	00.54	00	44	00.40	05.0	24	404.00	100	00		(72)
(72)m=			100.04	95.09	91.88		37.35	83.51	88.		90.19	95.3		101.09	103	.69		(72)
		gains =						. ,	<u>`</u>	<u></u>	. , .	· ·		'1)m + (72)				(70)
(73)m=	324.75	323.02	313.07	297.15	281.26	2	65.74	255.53	260	.43	268.49	284.	.58	303.05	316	.64		(73)
	lar gains			r flux from	Table 6a	200	25500	inted oqua	tions	to co	nvort to th	0.000	lical	ole orientati	ion			
-		Access F	•	Area		and	Flu		110115	10 00		e app	lical	FF	1011.		Gains	
Onenta		Table 6d	actor	m²				ole 6a		Т	g_ able 6b		Т	able 6c			(W)	
West	0.9x	0.77	x	9.3	33	x	1	9.64	x		0.63	x	Γ	0.7		=	56	(80)
West	0.9x	0.77	x	9.3	33	x	3	8.42	x		0.63	×	Ē	0.7		=	109.55	(80)
West	0.9x	0.77	x	9.3	33	x	6	3.27	×		0.63	×	Ē	0.7		=	180.42	(80)
West	0.9x	0.77	x	9.3	33	x	9	2.28	×		0.63	= × ٦	Ē	0.7		=	263.12	(80)
West	0.9x	0.77	×	9.3	33	x	1	13.09	×		0.63	×	Ē	0.7		=	322.47	(80)
West	0.9x	0.77	×	9.3	33	x	1	15.77	×		0.63	_ ×	Ē	0.7		=	330.1	(80)
West	0.9x	0.77	x	9.3	33	x	1	10.22	×		0.63	_ ×	Ē	0.7		=	314.27	(80)
West	0.9x	0.77	x	9.3	33	x	9	4.68	×		0.63	×	Γ	0.7		=	269.96	(80)
	-								•									

West	о оч Г							т. г			г				
West	0.9x	0.77	×	9.3			73.59		0.63			0.7	=	209.83	(80)
West	0.9x	0.77	X	9.3			45.59	」× [」、「	0.63			0.7	=	129.99	(80)
West	0.9x	0.77	×	9.3		×	24.49		0.63			0.7	=	69.83	(80)
WESI	0.9x	0.77	x	9.3	33	×	16.15	×	0.63		×	0.7	=	46.05	(80)
Color	naina in i	wette er		for and				(02)~~	Sum (74)	(00)m				
(83)m=	56	watts, ca 109.55	180.42	263.12	322.47	330.2	314.27	269.9	= Sum(74	<u> </u>	129.99	69.83	46.05	1	(83)
							m, watts						10100	J	
(84)m=	380.75	432.57	493.48	560.27	603.73	595.8		530.3	38 478.	32	414.57	372.87	362.69]	(84)
7. Me	an inter	nal temp	erature	(heating	season)	•	1		1		1	1	1	
							a from Ta	ble 9.	Th1 (°C	;)				21	(85)
-		-	• •			-	Table 9a)		()	,					
•	Jan	Feb	Mar	Apr	May	Jur		Au	a Se	эр	Oct	Nov	Dec]	
(86)m=	0.99	0.99	0.97	0.9	0.75	0.55		0.45	<u> </u>	<u> </u>	0.94	0.99	1		(86)
Moon	intorno	tompor	atura in	living or			teps 3 to	1						1	
(87)m=	20.03	20.18	20.44	20.75	20.93	20.99		21		96	20.7	20.32	20.01	1	(87)
								I			20.7	20.02	20.01	J	(-)
•						r	ng from Ta	1	`	<u> </u>	00.07	00.07	00.00	1	(88)
(88)m=	20.05	20.05	20.05	20.07	20.07	20.09	20.09	20.0	9 20.0	8	20.07	20.07	20.06		(00)
Utilisa			1			r	see Table	9a)						1	
(89)m=	0.99	0.99	0.96	0.87	0.69	0.47	0.32	0.36	6 0.6	3	0.92	0.98	0.99		(89)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)															
(90)m=	18.76	18.99	19.36	19.79	20.01	20.08	3 20.09	20.0	9 20.0)5	19.75	19.2	18.74		(90)
										fl	LA = Livin	ig area ÷ (4) =	0.45	(91)
Mean	interna	l tempera	ature (fo	r the wh	ole dwe	lling) =	₌ fLA × T1	+ (1 -	- fLA) ×	T2					
(92)m=	19.33	19.52	19.84	20.22	20.42	20.49		20.5		- 1	20.18	19.7	19.31		(92)
Apply	adjustn	nent to th	ne mean	internal	temper	ature	rom Table	e 4e, v	vhere a	opro	priate	1	1	1	
(93)m=	19.33	19.52	19.84	20.22	20.42	20.49	20.5	20.5	5 20.4	46	20.18	19.7	19.31		(93)
8. Sp	ace hea	ting requ	uirement												
						ned at	step 11 of	Table	9b, so	that	t Ti,m=(76)m an	d re-calo	culate	
the ut		factor fo					- <u> </u>							1	
	Jan	Feb	Mar	Apr	May	Jur	n Jul	Au	g Se	эр	Oct	Nov	Dec		
(94)m=	0.99	tor for ga	ains, nm 0.96	0.88	0.72	0.51	0.35	0.4	0.6	7	0.92	0.98	0.99	ן	(94)
		hmGm ,				0.01	0.55	0.4	0.0	<i>'</i>	0.32	0.30	0.33	J	(01)
(95)m=	377.56	425.25	472.13	490.31	431.71	302.4	1 202	211.	4 318.	15	380.82	366.34	360.29]	(95)
		age exte]	
(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 mea	an intern	al tempe	erature,	Lm,V	V =[(39)m	x [(93)m– (96)m]				1	
(97)m=	819.13	793.81	721.37	600.2	460.83	, 305.8		212.7	<u> </u>	<u> </u>	506.03	670.64	810.46		(97)
Space	e heatin	g require	ement fo	r each n	honth, k	Wh/mo	h = 0.02	24 x [(97)m –	(95))m] x (4	1)m		1	
(98)m=	328.53	247.68	185.44	79.12	21.67	0	0	0	0	Í	93.16	219.1	334.93		
								Т	otal per y	ear (kWh/year	r) = Sum(9	8)15,912 =	1509.6	(98)
Space	e heatin	g require	ement in	kWh/m ²	/year									28.9	(99)
•					-										

9a. En	ergy rec	quiremer	nts – Ind	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space	e heatir	ng:												
Fracti	on of sp	ace hea	at from s	econdar	y/supple	mentary	system						0	(201)
Fracti	on of sp	ace hea	at from n	nain syst	em(s)			(202) = 1 -	- (201) =				1	(202)
Fracti	on of to	tal heati	ng from	main sys	stem 1			(204) = (20	02) × [1 –	(203)] =			1	(204)
Efficie	ency of I	main spa	ace heat	ing syste	em 1								93.5	(206)
Efficie	ency of s	seconda	ry/suppl	ementar	y heating	g system	ז, %						0	(208)
	Jan	Feb	Mar	Apr	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ır
Space		ř	·`	alculate	d above)								1	
	328.53	247.68	185.44	79.12	21.67	0	0	0	0	93.16	219.1	334.93		
(211)m		i	<u> </u>	00 ÷ (20										(211)
	351.37	264.89	198.33	84.62	23.17	0	0	0 Toto	0	99.63	234.33	358.21		
Total (kWh/year) =Sum(211) _{15,1012} =										1614.55	(211)			
•		g fuel (s)1)] } x 1		• ·	month									
(215)m=		0	0	0	0	0	0	0	0	0	0	0		
		I	1					Tota	l (kWh/yea	ar) =Sum(2	2 15) _{15,1012}	=	0	(215)
Water	heating	J												J
Output			l I	ulated al			-							
	170.41	150.38	158.34	142.51	140.07	125.76	121.34	132.37	131.89	147.75	155.51	166.5		
Efficiency of water heater (217)m= 86.54 86.14 85.24 83.32 81.08 79.8 79.8 79.8 79.8 83.62 85.73 86.64										79.8	(216)			
Fuel for water heating, kWh/month											(217)			
		m x 100												
(219)m=	196.92	174.58	185.77	171.05	172.75	157.59	152.06	165.88	165.28	176.69	181.4	192.17		_
								Tota	I = Sum(21	19a) ₁₁₂ =			2092.14	(219)
	l totals		d main	avetam	1					k\	Nh/year		kWh/year	1
•	•			system	1								1614.55]
		fuel use											2092.14]
Electric	city for p	oumps, f	ans and	electric	keep-ho	t								
centra	al heatir	ng pump	:									30		(230c)
boiler	with a f	an-assis	sted flue									45		(230e)
Total e	lectricity	y for the	above, l	kWh/yea	r			sum	of (230a).	(230g) =			75	(231)
Electric	city for li	ighting											246.37	(232)
12a. (CO2 em	issions -	– Individ	ual heati	ing syste	ems inclu	uding mi	cro-CHP)					1
						En	ergy			Emiss	ion fac	tor	Emissions	
							/h/year			kg CO			kg CO2/yea	r
Space	heating	(main s	ystem 1)		(211	1) x			0.2	16	=	348.74	(261)
Space	heating	(second	dary)			(215) x 0.519 =			=	0	(263)			
Water	heating					(219	9) x			0.2	16	=	451.9	(264)
Space and water heating (261) + (262) + (263) + (264) =										800.64	(265)			

Electricity for pumps, fans and electric keep-hot	(231)	x	0.519	=	38.93	(267)
Electricity for lighting	(232)	x	0.519	=	127.87	(268)
Total CO2, kg/year			sum of (265)(271) =		967.44	(272)
TER =					18.52	(273)

SAP 2012 Overheating Assessment

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

Property Details: Unit 38 - COPPETTS WOOD, London

Dwelling type: Located in: Region: Cross ventilation poss Number of storeys: Front of dwelling face Overshading: Overhangs: Thermal mass parame Night ventilation: Blinds, curtains, shut Ventilation rate during Overheating Details:	es: eter: ters:	ther (a	ch):	Flat England Thames valley Yes 1 North Average or unknown None Indicative Value Low False 4 (Windows open half the time)								
Summer ventilation h Transmission heat los Summer heat loss co	ss coeffici		ent:	183.39 28.8 212.18				(P1) (P2)				
Overhangs:												
Orientation:	Ratio:		Z_overhangs:									
West (Left Windows) 0 1												
Solar shading:												
Orientation: West (Left Windows) Solar gains:	Z blinds 1	:	Solar access: 0.9	Overh 1	nangs:	Z summer: 0.9		(P8)				
Orientation West (Left Windows)	0.9 x	Area 9.33	Flux 117.51	g_ 0.63	FF 0.7	Shading 0.9 Total	Gains 391.62 391.62	(P3/P4)				
Internal gains:												
Internal gains Total summer gains Summer gain/loss ratio Mean summer external Thermal mass tempera Threshold temperature Likelihood of high int	temperatu ture incren	nent	-	Jun 372 787 3.71 16 1.3 21.0 Slig	.07 .79 I	July 359.12 750.74 3.54 17.9 1.3 22.74 Medium	August 365.58 710.11 3.35 17.8 1.3 22.45 Medium	(P5) (P6) (P7)				
Assessment of likelih	ood of hig	gh inte	rnal temperatur	e: <u>Mec</u>	<u>dium</u>							