Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.17 *Printed on 16 June 2023 at 14:55:32*

Project Information:

Assessed By: Ben Talbutt (STRO036639) Building Type: Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 76.59m²

Site Reference: Fosters Estate Block D

Plot Reference: D2-07

Address:

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)

Fuel factor: 1.55 (electricity (c))

Target Carbon Dioxide Emission Rate (TER) 29.45 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 12.77 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 61.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 56.3 kWh/m²

OK

2 Fabric U-values

ElementAverageHighestExternal wall0.15 (max. 0.30)0.20 (max. 0.70)OKFloor(no floor)

Roof 0.10 (max. 0.20) 0.10 (max. 0.35) **OK**Openings 1.34 (max. 2.00) 1.40 (max. 3.30) **OK**

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 3.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Community heating schemes - Heat pump

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: No cylinder

6 Controls

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

programmer and at least two room thermostats

Hot water controls: No cylinder thermostat

No cylinder

OK

Regulations Compliance Report

7 Low energy lights		
Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK
8 Mechanical ventilation		
Continuous supply and extract system		
Specific fan power:	0.61	
Maximum	1.5	OK
MVHR efficiency:	88%	
Minimum	70%	OK
9 Summertime temperature		
Overheating risk (Thames valley):	Not assessed	?
10 Key features		
Air permeablility	3.0 m³/m²h	
Doors U-value	0.91 W/m²K	
Roofs U-value	0.1 W/m ² K	
Community heating, heat from electric heat pump		

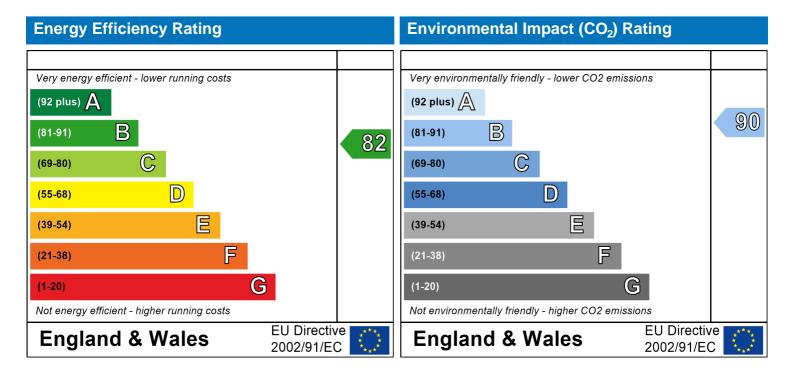
Predicted Energy Assessment



Dwelling type: Date of assessment: 13 October 2022 Ben Talbutt Produced by: Total floor area: 76.59 m²

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

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



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

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

Top floor Flat

SAP Input

Property Details: D2-07

Address:

Located in: England Region: Thames valley

UPRN:

Date of assessment: 13 October 2022 Date of certificate: 16 June 2023

Assessment type: New dwelling design stage

Transaction type:

Tenure type:

Related party disclosure:

Thermal Mass Parameter:

New dwelling

Unknown

No related party

Indicative Value Medium

Water use <= 125 litres/person/day: True

PCDF Version: 505

Property description:

Dwelling type: Flat

Detachment:

Year Completed: 2022

Floor Location: Floor area:

Storey height:

Floor 0 76.59 m² 2.82 m

Living area: 27.97 m² (fraction 0.365)

Front of dwelling faces: Unspecified

Opening types:					
	- ()	non	ına :	tvn	α e ·
	\cdot	$\cup \subset \Pi$		\cup	C.O.

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Solid			Wood
Win 1	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	No	
Win 2	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	No	
Win 3	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	No	
Win 4	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	No	
Win 5	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	No	
Win 6	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	No	
Win 7	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	No	
Win 8	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	No	

Name:	Gap:	Frame Fa	actor: g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	1	0	0.91	2.52	1
Win 1	16mm or more	0.8	0.4	1.4	2.9	1
Win 2	16mm or more	0.8	0.4	1.4	5.42	1
Win 3	16mm or more	0.8	0.4	1.4	1.99	1
Win 4	16mm or more	0.8	0.4	1.4	1.99	1
Win 5	16mm or more	0.8	0.4	1.4	0.9	1
Win 6	16mm or more	0.8	0.4	1.4	0.91	2
Win 7	16mm or more	0.8	0.4	1.4	2.01	2
Win 8	16mm or more	0.8	0.4	1.4	0.62	1

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Ext Wall	South East	1.05	2.4
Win 1		Ext Wall	North East	1.47	1.97
Win 2		Ext Wall	North East	2.26	2.4
Win 3		Ext Wall	South East	1.02	1.95
Win 4		Ext Wall	North West	1.02	1.95
Win 5		Ext Wall	North West	0.46	1.95
Win 6		Ext Wall	South West	0.46	1.97
Win 7		Ext Wall	South West	1.02	1.97

SAP Input

Win 8 Ext Wall South West 0.46 1.35 Overshading: Average or unknown Type: Gross area: Openings: Net area: U-value: Ru value: Curtain wall: Kappa: **External Elements** Ext Wall 76.47 22.18 54.29 0.14 0 False N/A Concrete Column 7.05 0 7.05 0.2 0 False N/A 0 0.9 False N/A Common Area 21.31 21.31 0.2 Roof 76.59 0 76.59 0.1 0 N/A **Internal Elements** Party Elements User-defined (individual PSI-values) Y-Value = 0.0852 Thermal bridges: Length Psi-value Other lintels (including other steel lintels) [Approved] 10.7 0.3 E2 Sill [Approved] 7.39 0.04 E3 [Approved] 43.7 0.05 E4 Jamb Corner (normal) [Approved] 14.1 0.09 E16 Flat roof 7.14 0.08 E14 Corner (inverted internal area greater than external area) [Approved] 2.82 -0.09E17 37.18 0.14 E7 Party floor between dwellings (in blocks of flats) 37.18 E14 Flat roof 0.08 Ground floor (normal) [Approved] 0 0.16 E5 Intermediate floor within a dwelling [Approved] 0 0.07 E6 Exposed floor (normal) 0 0.32 E20 [Approved] 0 0.06 E18 Party wall between dwellings Exposed floor (inverted) Р8 0 0.24 Roof (insulation at ceiling level) 0.24 P4 Yes (As designed) Pressure test: Ventilation: Balanced with heat recovery Number of wet rooms: Kitchen + 1 Ductwork: Insulation, Rigid Approved Installation Scheme: True 0 Number of chimneys: Number of open flues: 0 0 Number of fans: Number of passive stacks: 0 Number of sides sheltered: 2 3 Pressure test: Community heating schemes Main heating system: Heat source: Community heat pump heat from electric heat pump, heat fraction 1, efficiency 383 Piping>=1991, pre-insulated, low temp, variable flow

Charging system linked to use of community heating, programmer and at least two room

Secondary heating system:

Main heating Control:

Secondary heating system: None

thermostats Control code: 2312

SAP Input

Water heating

Water heating: From main heating system

Water code: 901

Fuel :heat from boilers - mains gas

No hot water cylinder Solar panel: False

Others:

Electricity tariff: Standard Tariff
In Smoke Control Area: Unknown
Conservatory: No conservatory

Low energy lights: 100%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No Photovoltaics: None Assess Zero Carbon Home: No

		l Iser I	Details:						
Assessor Name: Software Name:	Ben Talbutt Stroma FSAP 2012	<u> </u>	Strom Softwa					036639 on: 1.0.5.17	
	F	Property	Address	D2-07					
Address :									
Overall dwelling dime	ensions:	Δ	a/m²)		Asz IIa	: or lo 4 / ros \		Valuma/mi	21
Ground floor			a(m²) 76.59	(1a) x		ight(m) :.82	(2a) =	Volume(m ³	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(1		76.59	(4)](==)	210.00	(***)
	a)1(1b)1(10)1(10)1(10)1(1		76.59) + (3c)+(3c	d)+(3e)+	(3n) -		7.6
Dwelling volume				(34)1(35	71(30)1(30	a)	.(011) =	215.98	(5)
2. Ventilation rate:	main seconda	ry	other		total			m³ per hou	ır
Number of chimneys	heating heating bearing heating	□ + □	0	7 = [0	x 4	10 =	0	(6a)
Number of open flues	0 + 0	_ 	0]	0	x 2	20 =		(6b)
Number of intermittent fa		」 ` L		┙┢			10 =	0	╡`´
				Ļ	0		10 =	0	(7a)
Number of passive vents				Ļ	0			0	(7b)
Number of flueless gas f	ires				0	X 2	40 =	0	(7c)
							Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a)+(7b)+	(7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has b	peen carried out or is intended, procee	ed to (17),	otherwise o	continue fr	om (9) to				
Number of storeys in t	he dwelling (ns)					7(0)		0	(9)
Additional infiltration	.25 for steel or timber frame o	r 0 35 fo	r macani	v constr	ruction	[(9)-	-1]x0.1 =	0	(10)
	resent, use the value corresponding t			•	uction			0	(11)
deducting areas of openi	3 /· 1	4 (1	- IV - I				1		-
If suspended wooden to the sus	floor, enter 0.2 (unsealed) or 0	.1 (seal	ea), eise	enter U				0	(12)
•	s and doors draught stripped							0	(13)
Window infiltration	o and doors araugin empped		0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$							0.15	(18)
Air permeability value applie Number of sides sheltere	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7(40)
Shelter factor	eu		(20) = 1 -	[0.0 75 x (1	19)] =			0.85	(19) (20)
Infiltration rate incorpora	ting shelter factor		(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified f	for monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m <i>÷ 4</i>								
(22a)m = 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
,	1 1 1 1 1 1 1 1 1 1		1			·-		I	

Adjusted infiltr	ation rat	e (allowi	ng for sl	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effect		•	rate for t	he appli	cable ca	ise			!				
If mechanica			on the NL (C	OL) (00-		(((15)\ (b .		\ (00-\			0.5	(238
If exhaust air h		0		, ,	,	. ,	,, .	`) = (23a)			0.5	(23h
If balanced with		-	-	_								74.8	(230
a) If balance		1	i			- 	- ^ ` -	í `	– `	 	- ` ´	÷ 100] I	(0.4)
(24a)m= 0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28		(248
b) If balance	1		ı —			, , ,	r ´`	í `	 			1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24)
c) If whole h if (22b)n		tract ven k (23b), t		•	•				.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)n		on or when							0.51	•		•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change	rate - er	ı nter (24a	or (24k	o) or (24	c) or (24	d) in bo	x (25)	<u> </u>	<u> </u>	!	l	
(25)m= 0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28		(25)
							<u> </u>	L			l		
3. Heat losse ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-		A X k <j k<="" td=""></j>
Doors					2.52	x	0.91	=[2.2932				(26)
Windows Type	e 1				2.9	x1	/[1/(1.4)+	- 0.04] =	3.84				(27)
Windows Type	e 2				5.42	_x 1	/[1/(1.4)+	- 0.04] =	7.19	Ħ			(27)
Windows Type	∋ 3				1.99	x1,	/[1/(1.4)+	- 0.04] =	2.64				(27)
Windows Type	e 4				1.99	x1	/[1/(1.4)+	- 0.04] =	2.64	=			(27)
Windows Type	e 5				0.9		/[1/(1.4)+	ا ا ₌ [0.04	1.19	=			(27)
Windows Type					0.91	ऱ .	- /[1/(1.4)+	Į.	1.21	╡			(27)
Windows Type					2.01		/[1/(1.4)+	Į.	2.66	=			(27)
Windows Type					0.62	=	/[1/(1.4)+	l.	0.82	╡			(27)
Walls Type1		47	22.1			_		— ;		╡ ,			(29)
wans Type i	76.4		22.1	<u> </u>	54.29	=	0.14	=	7.6	믁 ¦		╡	=
Walla Type?					7.06	X	0.2	=	1.41				(29)
• •	7.0		0	=	7.05			─ -		= 7		= =	
Walls Type2 Walls Type3	7.09		0		21.3	1 ×	0.17	=	3.61				_
Walls Type3 Roof	21.3 76.5	31 59				=	0.17	= [3.61 7.66				(30
Walls Type3 Roof Total area of e	21.3 76.5 elements	31 59 5, m²	0		21.3° 76.59	2 x	0.1	=	7.66				(30)
Walls Type3 Roof Total area of e * for windows and	21.3 76.5 elements	31 59 s, m² lows, use e	0 0		21.3 ⁴ 76.59 181.4	2 x	0.1	=	7.66	as given in	paragraph	13.2	(30)
Walls Type3 Roof Total area of e * for windows and ** include the area	21.3 76.5 Plements I roof winder as on both	31 59 5, m² lows, use e	0 0 sternal wal		21.3 ⁴ 76.59 181.4	2 x	0.1	= [1/[(1/U-valu	7.66	as given in	paragraph		(30)
Walls Type3 Roof Total area of e * for windows and ** include the area Fabric heat los	21.3 76.5 Plements I roof winder as on both	59 5, m ² dows, use e e sides of int = S (A x	0 0 sternal wal		21.3 ⁴ 76.59 181.4	2 x	0.1	= [1/[(1/U-valu) + (32) =	7.66 (e)+0.04] a			48.64	(29) (30) (31) (33) (34)
Walls Type3 Roof Total area of e * for windows and ** include the area	21.3 76.5 elements d roof winder as on both ss, W/K = Cm = S(59 5, m ² lows, use e sides of int = S (A x (A x k)	0 0 onffective winternal wall	ls and pan	21.3° 76.59 181.4 alue calcultitions	2 2 lated using	0.1	= [1/[(1/U-valu) + (32) = ((28)	7.66	2) + (32a).			(30)

can be u	ısed instea	ad of a dea	tailed calc	ulation.										
Therma	al bridge	es : S (L	x Y) cal	culated	using Ap	pendix I	K						15.46	(36)
if details	of therma	ıl bridging	are not kn	own (36) =	= 0.05 x (3	1)								
Total fa	abric hea	at loss							(33) +	(36) =			64.1	(37)
Ventila	tion hea	t loss ca	alculated	monthl	у				(38)m	= 0.33 × (25)m x (5)		•	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	20.57	20.34	20.11	18.98	18.75	17.61	17.61	17.39	18.07	18.75	19.2	19.66		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (3	38)m			
(39)m=	84.66	84.44	84.21	83.07	82.85	81.71	81.71	81.48	82.16	82.85	83.3	83.75		
Heat Ic	oss para	meter (H	HLP), W/	m²K			-			Average = = (39)m ÷		12 /12=	83.02	(39)
(40)m=	1.11	1.1	1.1	1.08	1.08	1.07	1.07	1.06	1.07	1.08	1.09	1.09]	
Numbe	er of day	s in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.08	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
	<u> </u>				l .					l .			J	
4. Wa	iter heat	ina ener	gy requi	irement:								kWh/ye	ear:	
												,	•	
if TF	ed occu A > 13.9 A £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		.39		(42)
		•	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		91	.08	1	(43)
Reduce	the annua	ıl average	hot water	usage by	5% if the a	lwelling is	designed	to achieve		se target o			J	,
not more	e that 125	litres per p	person per	day (all w	ater use, l	not and co	ld)				1		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot wate	er usage ır	n litres per	day for ea	ach month	Vd,m = fa	ctor from	l able 1c x	(43)			1		1	
(44)m=	100.19	96.55	92.9	89.26	85.62	81.97	81.97	85.62	89.26	92.9	96.55	100.19		– , .
Energy o	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x [OTm / 3600		Total = Su oth (see Ta			1092.97	(44)
(45)m=	148.58	129.95	134.09	116.91	112.17	96.8	89.7	102.93	104.16	121.39	132.5	143.89]	
'				•	•	•	•	•		Total = Su	m(45) ₁₁₂ :	=	1433.05	(45)
If instant	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46) to (61)		•	,	1	
(46)m=	22.29	19.49	20.11	17.54	16.83	14.52	13.45	15.44	15.62	18.21	19.88	21.58		(46)
	storage		includin	na anv sa	olar or M	/WHRS	storana	within sa	me ves	امء		0	1	(47)
_		` ,		•	/elling, e		_		arric ves	301		U	J	(47)
	•	_			_			ombi boil	ers) ente	er '0' in (47)			
	storage			(1)					,		,			
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0]	(48)
Tempe	erature fa	actor fro	m Table	2b								0	j	(49)
Energy	lost fro	m water	storage	, kWh/ye	ear			(48) x (49)	=		1	10	Ī	(50)
•				-	loss fact								• 1	
		_			le 2 (kW	h/litre/da	ay)				0	.02	J	(51)
	nunity n e factor	_	ee section	UII 4.3							4	03	1	(52)
			m Table	2b								.03).6	1	(52)
													J	(30)

Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) =	= 1.0	03	((54)
Enter (50) or (54) in (55)		1.0	03	((55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$				
(56)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32	2.01 30.98	32.01	((56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57)m = (56)m wh	here (H11) is from	m Appendix	кH	
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32	2.01 30.98	32.01	((57)
Primary circuit loss (annual) from Table 3		()	((58)
Primary circuit loss calculated for each month (59)m = (58) ÷	365 × (41)m				
(modified by factor from Table H5 if there is solar water hea	ting and a cylinder the	ermostat)			
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26	23.26 22.51 23	3.26 22.51	23.26	((59)
Combi loss calculated for each month (61)m = (60) \div 365 × (4	1)m				
(61)m= 0 0 0 0 0 0	0 0	0 0	0	((61)
Total heat required for water heating calculated for each mon	$th (62)m = 0.85 \times (45)$	m + (46)m +	 (57)m + ((59)m + (61)m	
(62)m= 203.85 179.87 189.37 170.4 167.45 150.29 144.9	7 158.21 157.65 176	76.66 186	199.17	((62)
Solar DHW input calculated using Appendix G or Appendix H (negative quan	tity) (enter '0' if no solar con	ntribution to wate	r heating)		
(add additional lines if FGHRS and/or WWHRS applies, see A	Appendix G)				
(63)m= 0 0 0 0 0 0	0 0	0 0	0	((63)
Output from water heater					
(64)m= 203.85 179.87 189.37 170.4 167.45 150.29 144.9	7 158.21 157.65 170	76.66 186	199.17		
	Output from water h	heater (annual) ₁	12	2083.89	(64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)	m + (61)m] + 0.8 x [(4	16)m + (57)m	+ (59)m	1	
(65)m= 93.62 83.15 88.81 81.67 81.52 74.98 74.05	78.45 77.43 84	4.58 86.85	92.06		(65)
(65)m= 93.62 83.15 88.81 81.67 81.52 74.98 74.05 include (57)m in calculation of (65)m only if cylinder is in the				((65)
				((65)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a):				((65)
include (57)m in calculation of (65)m only if cylinder is in the	e dwelling or hot water			((65)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts	e dwelling or hot water Aug Sep C	r is from comr	munity he	eating	(65) (66)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7 143.7 143.7 143.7 143.7 143.7 143.7	Aug Sep C	r is from comm	munity he	eating	
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul	Aug Sep Control 143.7 14	r is from comm	munity he	eating	
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39	Oct Nov 43.7 143.7	Dec 143.7	eating	(66)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7 143.7 143.7 143.7 143.7 143.7 143.7 Lighting gains (calculated in Appendix L, equation L9 or L9a),	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39	Oct Nov 43.7 143.7	Dec 143.7	eating	(66)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39 13a), also see Table 9 233.62 241.9 259	Oct Nov 43.7 143.7 9.06 45.59	Dec 143.7	eating	(66) (67)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39 13a), also see Table 5 233.62 241.9 253 a), also see Table 5	Oct Nov 43.7 143.7 9.06 45.59	Dec 143.7	eating	(66) (67)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39 13a), also see Table 5 233.62 241.9 253 a), also see Table 5	r is from comr Oct Nov 43.7 143.7 9.06 45.59 5 69.53 281.78	Dec 143.7 48.6 302.69	eating	(66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39 .13a), also see Table 9 233.62 241.9 259 a), also see Table 5 5 51.76 51.76 51	r is from comr Oct Nov 43.7 143.7 9.06 45.59 5 69.53 281.78	Dec 143.7 48.6 302.69	eating	(66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is in the state of the state	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39 .13a), also see Table 9 233.62 241.9 259 a), also see Table 5 5 51.76 51.76 51	r is from common	Dec 143.7 48.6 302.69 51.76	eating	(66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep Control 143.7 14	r is from common	Dec 143.7 48.6 302.69 51.76	eating	(66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep Control 143.7 14	r is from common	Dec 143.7 48.6 302.69 51.76	eating	(66) (67) (68)
include (57)m in calculation of (65)m only if cylinder is in the state of the state	Aug Sep Control 143.7 14	r is from common	Dec 143.7 48.6 302.69 51.76 0	eating	(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep Control 143.7 14	r is from common	Dec 143.7 48.6 302.69 51.76 0 -95.8	eating	(66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39 233.62 241.9 259 a), also see Table 5 51.76 51.76 51 0 0 -95.8 -95.8 -9 105.44 107.54 113)m + (68)m + (69)m + (70)m	r is from common property of the property of t	Dec 143.7 48.6 302.69 51.76 0 -95.8 123.74 m	eating	(66) (67) (68) (70) (71)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul (66)m= 143.7	Aug Sep C 143.7 143.7 14 also see Table 5 22.92 30.76 39 233.62 241.9 259 a), also see Table 5 51.76 51.76 51 0 0 -95.8 -95.8 -9 105.44 107.54 113)m + (68)m + (69)m + (70)m	r is from common	Dec 143.7 48.6 302.69 51.76 0 -95.8	eating	(66) (67) (68) (69) (70)

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

Orientation: Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.9	x	11.28	x	0.4	x	0.8	=	7.26	(75)
Northeast _{0.9x} 0.77	X	5.42	x	11.28	x	0.4	x	0.8	=	13.56	(75)
Northeast 0.9x 0.77	X	2.9	x	22.97	x	0.4	x	0.8	=	14.77	(75)
Northeast 0.9x 0.77	X	5.42	x	22.97	x	0.4	x	0.8] =	27.6	(75)
Northeast 0.9x 0.77	X	2.9	x	41.38	x	0.4	x	0.8	=	26.61	(75)
Northeast 0.9x 0.77	X	5.42	x	41.38	x	0.4	x	0.8	=	49.73	(75)
Northeast _{0.9x} 0.77	X	2.9	x	67.96	X	0.4	X	0.8	=	43.7	(75)
Northeast _{0.9x} 0.77	X	5.42	x	67.96	x	0.4	X	0.8	=	81.68	(75)
Northeast _{0.9x} 0.77	X	2.9	x	91.35	x	0.4	x	0.8	=	58.74	(75)
Northeast _{0.9x} 0.77	X	5.42	x	91.35	X	0.4	X	0.8	=	109.79	(75)
Northeast _{0.9x} 0.77	X	2.9	x	97.38	x	0.4	X	0.8	=	62.63	(75)
Northeast _{0.9x} 0.77	X	5.42	x	97.38	x	0.4	x	0.8	=	117.05	(75)
Northeast _{0.9x} 0.77	X	2.9	X	91.1	x	0.4	x	0.8	=	58.59	(75)
Northeast _{0.9x} 0.77	X	5.42	x	91.1	x	0.4	X	0.8	=	109.5	(75)
Northeast 0.9x 0.77	X	2.9	x	72.63	x	0.4	x	0.8	=	46.71	(75)
Northeast _{0.9x} 0.77	X	5.42	x	72.63	x	0.4	x	0.8	=	87.29	(75)
Northeast _{0.9x} 0.77	X	2.9	x	50.42	x	0.4	X	0.8	=	32.43	(75)
Northeast 0.9x 0.77	X	5.42	x	50.42	x	0.4	x	0.8	=	60.6	(75)
Northeast _{0.9x} 0.77	X	2.9	x	28.07	x	0.4	x	0.8	=	18.05	(75)
Northeast 0.9x 0.77	X	5.42	x	28.07	x	0.4	x	0.8	=	33.74	(75)
Northeast 0.9x 0.77	X	2.9	x	14.2	x	0.4	x	0.8	=	9.13	(75)
Northeast _{0.9x} 0.77	X	5.42	x	14.2	x	0.4	x	0.8	=	17.06	(75)
Northeast _{0.9x} 0.77	X	2.9	x	9.21	x	0.4	x	0.8	=	5.93	(75)
Northeast _{0.9x} 0.77	X	5.42	x	9.21	x	0.4	X	0.8	=	11.07	(75)
Southeast 0.9x 0.77	X	1.99	x	36.79	x	0.4	X	0.8	=	16.24	(77)
Southeast 0.9x 0.77	X	1.99	x	62.67	x	0.4	x	0.8	=	27.66	(77)
Southeast 0.9x 0.77	X	1.99	x	85.75	x	0.4	x	0.8	=	37.84	(77)
Southeast 0.9x 0.77	x	1.99	x	106.25	x	0.4	x	0.8	=	46.89	(77)
Southeast 0.9x 0.77	X	1.99	x	119.01	x	0.4	x	0.8	=	52.52	(77)
Southeast 0.9x 0.77	X	1.99	x	118.15	x	0.4	x	0.8	=	52.14	(77)
Southeast 0.9x 0.77	X	1.99	x	113.91	x	0.4	X	0.8	=	50.27	(77)
Southeast 0.9x 0.77	X	1.99	x	104.39	x	0.4	x	0.8	=	46.07	(77)
Southeast 0.9x 0.77	X	1.99	x	92.85	X	0.4	X	0.8	=	40.98	(77)
Southeast 0.9x 0.77	X	1.99	x	69.27	x	0.4	X	0.8	=	30.57	(77)
Southeast 0.9x 0.77	X	1.99	x	44.07	x	0.4	x	0.8	=	19.45	(77)
Southeast 0.9x 0.77	x	1.99	x	31.49	x	0.4	x	0.8] =	13.9	(77)
Southwest _{0.9x} 0.77	x	0.91	x	36.79]	0.4	x	0.8] =	14.85	(79)
Southwest _{0.9x} 0.77	x	2.01	x	36.79		0.4	x	0.8] =	32.8	(79)
Southwest _{0.9x} 0.77	x	0.62	x	36.79		0.4	x	0.8] =	5.06	(79)

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Southwest _{0.9x}	0.77	X	0.91	X	62.67		0.4	X	0.8	=	25.3	(79)
Southwest _{0.9x}	0.77	X	2.01	X	62.67		0.4	X	0.8	=	55.87	(79)
Southwest _{0.9x}	0.77	X	0.62	x	62.67		0.4	X	0.8	=	8.62	(79)
Southwest _{0.9x}	0.77	X	0.91	X	85.75		0.4	X	0.8	=	34.61	(79)
Southwest _{0.9x}	0.77	X	2.01	X	85.75		0.4	X	0.8	=	76.45	(79)
Southwest _{0.9x}	0.77	X	0.62	X	85.75		0.4	X	0.8	=	11.79	(79)
Southwest _{0.9x}	0.77	X	0.91	x	106.25		0.4	X	0.8	=	42.88	(79)
Southwest _{0.9x}	0.77	X	2.01	X	106.25		0.4	X	0.8	=	94.72	(79)
Southwest _{0.9x}	0.77	X	0.62	X	106.25		0.4	x	0.8	=	14.61	(79)
Southwest _{0.9x}	0.77	X	0.91	x	119.01		0.4	x	0.8	=	48.03	(79)
Southwest _{0.9x}	0.77	X	2.01	x	119.01		0.4	x	0.8	=	106.1	(79)
Southwest _{0.9x}	0.77	X	0.62	x	119.01		0.4	x	0.8	=	16.36	(79)
Southwest _{0.9x}	0.77	x	0.91	x	118.15		0.4	x	0.8	=	47.69	(79)
Southwest _{0.9x}	0.77	x	2.01	x	118.15		0.4	x	0.8	=	105.33	(79)
Southwest _{0.9x}	0.77	X	0.62	x	118.15		0.4	x	0.8	=	16.24	(79)
Southwest _{0.9x}	0.77	X	0.91	x	113.91		0.4	x	0.8	=	45.97	(79)
Southwest _{0.9x}	0.77	X	2.01	x	113.91		0.4	x	0.8	=	101.55	(79)
Southwest _{0.9x}	0.77	X	0.62	x	113.91		0.4	x	0.8	=	15.66	(79)
Southwest _{0.9x}	0.77	X	0.91	x	104.39		0.4	x	0.8	=	42.13	(79)
Southwest _{0.9x}	0.77	X	2.01	x	104.39		0.4	x	0.8	=	93.06	(79)
Southwest _{0.9x}	0.77	X	0.62	х	104.39		0.4	x	0.8	=	14.35	(79)
Southwest _{0.9x}	0.77	x	0.91	x	92.85	ĺ	0.4	x	0.8] =	37.48	(79)
Southwest _{0.9x}	0.77	x	2.01	x	92.85		0.4	x	0.8] =	82.78	(79)
Southwest _{0.9x}	0.77	X	0.62	x	92.85		0.4	x	0.8] =	12.77	(79)
Southwest _{0.9x}	0.77	x	0.91	x	69.27		0.4	x	0.8] =	27.96	(79)
Southwest _{0.9x}	0.77	X	2.01	x	69.27		0.4	x	0.8	=	61.75	(79)
Southwest _{0.9x}	0.77	X	0.62	x	69.27		0.4	x	0.8	=	9.52	(79)
Southwest _{0.9x}	0.77	x	0.91	x	44.07		0.4	x	0.8	=	17.79	(79)
Southwest _{0.9x}	0.77	X	2.01	x	44.07		0.4	x	0.8	=	39.29	(79)
Southwest _{0.9x}	0.77	X	0.62	x	44.07		0.4	x	0.8	=	6.06	(79)
Southwest _{0.9x}	0.77	X	0.91	x	31.49		0.4	x	0.8	=	12.71	(79)
Southwest _{0.9x}	0.77	X	2.01	x	31.49		0.4	x	0.8	=	28.07	(79)
Southwest _{0.9x}	0.77	X	0.62	х	31.49		0.4	x	0.8	=	4.33	(79)
Northwest 0.9x	0.77	x	1.99	x	11.28	х	0.4	x	0.8] =	4.98	(81)
Northwest 0.9x	0.77	x	0.9	x	11.28	х	0.4	x	0.8] =	2.25	(81)
Northwest 0.9x	0.77	x	1.99	x	22.97	х	0.4	x	0.8] =	10.14	(81)
Northwest 0.9x	0.77	x	0.9	x	22.97	х	0.4	x	0.8	j =	4.58	(81)
Northwest _{0.9x}	0.77	x	1.99	х	41.38	x	0.4	x	0.8	j =	18.26	(81)
Northwest _{0.9x}	0.77	x	0.9	x	41.38	x	0.4	x	0.8] =	8.26	(81)
Northwest _{0.9x}	0.77	x	1.99	x	67.96	x	0.4	x	0.8] =	29.99	(81)
Northwest _{0.9x}	0.77	x	0.9	x	67.96	x	0.4	x	0.8	j =	13.56	(81)
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Northwest 0.9x	0.77	х	1.9	99	X	91.35	x	0.4	x	0.8	=	40.31	(81)
Northwest 0.9x	0.77	х	0.9	9	X	91.35	×	0.4	x	0.8	=	18.23	(81)
Northwest 0.9x	0.77	х	1.9	99	X	97.38	x	0.4	x	0.8	=	42.98	(81)
Northwest 0.9x	0.77	х	0.9	9	X	97.38	×	0.4	x	0.8	=	19.44	(81)
Northwest 0.9x	0.77	х	1.9	99	X	91.1	×	0.4	x	0.8	=	40.2	(81)
Northwest 0.9x	0.77	х	0.9	9	X	91.1	×	0.4	x	0.8	=	18.18	(81)
Northwest 0.9x	0.77	х	1.9	99	X	72.63	×	0.4	x	0.8	=	32.05	(81)
Northwest 0.9x	0.77	х	0.9	9	X	72.63	×	0.4	x	0.8	=	14.5	(81)
Northwest 0.9x	0.77	х	1.9	99	X	50.42	x	0.4	x	0.8	=	22.25	(81)
Northwest 0.9x	0.77	X	0.9	9	X	50.42	×	0.4	x	0.8	=	10.06	(81)
Northwest 0.9x	0.77	х	1.9	99	X	28.07	×	0.4	x	0.8	=	12.39	(81)
Northwest 0.9x	0.77	х	0.9	9	X	28.07	x	0.4	x	0.8	=	5.6	(81)
Northwest 0.9x	0.77	х	1.9	99	X	14.2	×	0.4	x	0.8	=	6.27	(81)
Northwest 0.9x	0.77	X	0.9	9	X	14.2	x	0.4	x	0.8	=	2.83	(81)
Northwest 0.9x	0.77	X	1.9	9	X	9.21	×	0.4	x	0.8	=	4.07	(81)
Northwest 0.9x	0.77	X	0.9	9	X	9.21	×	0.4	x	0.8	=	1.84	(81)
		<u></u>					_						
Solar gains in	watts, ca	lculated	for eac	h month	า		(83)n	n = Sum(74)m	(82)m				
(83)m= 97	174.54	263.55	368.04	450.09	_	63.49 439.92	- ` ` ` 		199.57	117.87	81.91]	(83)
Total gains –	internal a	nd solar	(84)m =	L = (73)m	+ (8	33)m . watts			<u> </u>]	
(84)m= 686.45		828.41	901.03	950.44	Ť	34.49 893.65	_	7.8 779.2	711.51	665.54	656.61	1	(84)
(0.)	1	0_0	0000	000		000.00	, I			1 000.0.	000.0.		(-)
7. Mean inte	rnal temp	erature ((heating	seasor	า)								
7. Mean inte	•		`			area from Ta	able 9	, Th1 (°C)				21	(85)
	e during h	eating p	eriods ir	n the liv	ing			, Th1 (°C)				21	(85)
Temperature	e during h	eating p	eriods ir	n the liv	ing n (s)	, Th1 (°C)	Oct	Nov	Dec	21	(85)
Temperature Utilisation fa	e during he	eating po	eriods ir	n the liv	ing n (s	ee Table 9a)	ug Sep	Oct 0.91	Nov 0.98	Dec 0.99	21	(85)
Temperature Utilisation fa Jan (86)m= 0.99	e during he ctor for ga Feb	eating po ains for li Mar 0.95	eriods ir iving are Apr 0.88	n the livea, h1,n May	ing n (s	ee Table 9a Jun Jul 0.55 0.4) A	ug Sep 14 0.69	-			21	
Temperature Utilisation fa Jan (86)m= 0.99 Mean interna	e during ho ctor for ga Feb 0.98	eating positions for line Mar 0.95	eriods ir iving are Apr 0.88 iving are	n the liv ea, h1,n May 0.74 ea T1 (f	ing n (s	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to) A 0.4	ug Sep 14 0.69 Table 9c)	0.91	0.98	0.99	21	(86)
Utilisation fa Jan (86)m= 0.99	e during he ctor for ga Feb	eating po ains for li Mar 0.95	eriods ir iving are Apr 0.88	n the livea, h1,n May	ing n (s	ee Table 9a Jun Jul 0.55 0.4) A	ug Sep 14 0.69 Table 9c)	-	0.98		21	
Temperature Utilisation fa Jan (86)m= 0.99 Mean interna	e during hoctor for garage Feb 0.98 all tempera 20.24	eating positions for line Mar 0.95 ature in l	eriods ir iving are Apr 0.88 iving are 20.74	n the livea, h1,n May 0.74 ea T1 (f	ing n (se	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21) A 0.4	ug Sep 14 0.69 Table 9c) 1 20.96	0.91	0.98	0.99	21	(86)
Temperature Utilisation fa Jan (86)m= 0.99 Mean internation (87)m= 20.09	e during hoctor for garage Feb 0.98 all tempera 20.24	eating positions for line Mar 0.95 ature in l	eriods ir iving are Apr 0.88 iving are 20.74	n the livea, h1,n May 0.74 ea T1 (f	ing n (second) collo	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21) A 0.4 2 7 in 1 2 Γable 9	ug Sep 14 0.69 Table 9c) 1 20.96 9, Th2 (°C)	0.91	0.98	0.99	21	(86)
Temperature Utilisation fa Jan (86)m= 0.99 Mean internative (87)m= 20.09 Temperature	reduring he ctor for gate property of the ctor for gate property o	eating ponions for line Mar 0.95 eature in lace 20.47	eriods ir Apr 0.88 iving are 20.74 eriods ir 20.01	n the livea, h1,n May 0.74 ea T1 (f 20.92 n rest of	ing (some second	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 relling from 7 0.03 20.03	A 0.4 2 7 in 1 2 20.	ug Sep 14 0.69 Table 9c) 1 20.96 9, Th2 (°C)	20.73	0.98	0.99	21	(86)
Temperature Utilisation fa Jan (86)m= 0.99 Mean internative (87)m= 20.09 Temperature (88)m= 20	reduring he ctor for gate property of the ctor for gate property o	eating ponions for line Mar 0.95 eature in lace 20.47	eriods ir Apr 0.88 iving are 20.74 eriods ir 20.01	n the livea, h1,n May 0.74 ea T1 (f 20.92 n rest of	ing (something) (s	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 relling from 7 0.03 20.03	A 0.4 2 7 in 1 2 20.	ug Sep 14 0.69 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02	20.73	0.98	0.99	21	(86)
Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98	e during he ctor for gate temperate 20.24 e during he 20 ctor for gate 0.97	eating positive in I 20.47 eating positive 20 ains for r 0.94	eriods ir iving are 0.88 iving are 20.74 eriods ir 20.01 est of do	n the livea, h1,n May 0.74 ea T1 (f 20.92 n rest of 20.02 welling, 0.68	ing (see) (see	y steps 3 to 0.99 21 relling from 7 0.03 20.03 m (see Table 0.47 0.31	A 0.4 0.7 in 1 2 Γable 9 20. le 9a) 0.5	ug Sep 14 0.69 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02	0.91 20.73 20.02	20.37	20.06	21	(86) (87) (88)
Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98 Mean intern	e during he ctor for gate temperate 20.24 e during he 20 ctor for gate 1 temperate 1 temperate 2 temperate 1 tempe	eating ponions for line Mar 0.95 eature in language 20 eating ponions for range 20 eature in the eature in the eature in the eature in the eating ponions for range 20 eature in the eature in the eature in the eating ponions for range 20 eature in the eature in the eature in the eature in the eating ponions for range 20 eature in the eature in the eating ponions for range 20 eature 20 e	eriods ir iving are Apr 0.88 iving are 20.74 eriods ir 20.01 est of do 0.85 the rest	m the live a, h1,n May 0.74 ea T1 (for 20.92 en rest of 20.02 evelling, 0.68 of dwel	ing n (see a see	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 relling from 7 0.03 20.03 m (see Table 9a 0.47 0.31 T2 (follow s	A 0.4 0.7 in 1 2 Γable 9 20. teps 3	ug Sep 14 0.69 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 35 0.6 1 to 7 in Tab	0.91 20.73 20.02 0.88 e 9c)	0.98 20.37 20.01 0.97	0.99 20.06 20.01		(86) (87) (88) (89)
Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98	e during he ctor for gate temperate 20.24 e during he 20 ctor for gate 0.97	eating positive in I 20.47 eating positive 20 ains for r 0.94	eriods ir iving are 0.88 iving are 20.74 eriods ir 20.01 est of do	n the livea, h1,n May 0.74 ea T1 (f 20.92 n rest of 20.02 welling, 0.68	ing n (see a see	y steps 3 to 0.99 21 relling from 7 0.03 20.03 m (see Table 0.47 0.31	A 0.4 0.7 in 1 2 Γable 9 20. teps 3	ug Sep 4 0.69 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 85 0.6 4 to 7 in Tab 03 19.99	0.91 20.73 20.02 0.88 le 9c) 19.73	0.98 20.37 20.01 0.97	0.99 20.06 20.01 0.99		(86) (87) (88) (89)
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Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98 Mean intern (90)m= 18.81	reduring horizontal temperature of the second secon	eating policins for line ature in land 20.47 eating policins for range of the control of the con	eriods ir iving are 0.88 iving are 20.74 eriods ir 20.01 est of do 0.85 the rest 19.73	n the lives, h1,n May 0.74 ea T1 (for 20.92 exelling, 0.68 of dwell 19.94	ing (second second seco	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 elling from 7 0.03 20.03 m (see Tabl 0.47 0.31 T2 (follow s 0.02 20.03	A 0.4 0.7 in 1 2 Γable 9 0.3 teps 3 1 + (1	ug Sep 14 0.69 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 85 0.6 1 to 7 in Tab 03 19.99 - fLA) × T2	0.91 20.73 20.02 0.88 le 9c) 19.73	0.98 20.37 20.01 0.97	0.99 20.06 20.01 0.99		(86) (87) (88) (89)
Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98 Mean intern (90)m= 18.81	e during he ctor for gas al tempera 19.03 eal tempera 19.47	eating positive in I 20.47 eating positive in I 20.47 eating positive in I 19.35 eature in table 19.35 eature (for 19.76	eriods ir iving are Apr 0.88 iving are 20.74 eriods ir 20.01 est of do 0.85 the rest 19.73 r the wh 20.1	n the livea, h1,n May 0.74 ea T1 (for 20.92 ea T1 of 20.02 ea T1 o	ing n (second collaboration) following the second collaboration of the second collab	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 elling from 7 0.03 20.03 m (see Tabl 0.47 0.31 T2 (follow s 0.02 20.03 g) = fLA × T 0.37 20.38	A 0.4 0.7 in 1 20.7 1	ug Sep 4 0.69 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 5 0.6 to 7 in Tab 03 19.99 - fLA) × T2 38 20.35	0.91 20.73 20.02 0.88 e 9c) 19.73 fLA = Liv	0.98 20.37 20.01 0.97 19.23 ing area ÷ (4	0.99 20.06 20.01 0.99 18.78 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98 Mean intern (90)m= 18.81 Mean intern (92)m= 19.28	e during he ctor for gas al tempera 19.03 eal tempera 19.47	eating positive in I 20.47 eating positive in I 20.47 eating positive in I 19.35 eature in table 19.35 eature (for 19.76	eriods ir iving are Apr 0.88 iving are 20.74 eriods ir 20.01 est of do 0.85 the rest 19.73 r the wh 20.1	n the livea, h1,n May 0.74 ea T1 (for 20.92 ea T1 of 20.02 ea T1 o	ing n (second property of the second propert	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 elling from 7 0.03 20.03 m (see Tabl 0.47 0.31 T2 (follow s 0.02 20.03 g) = fLA × T 0.37 20.38	A 0.4 0.7 in 1 2 Γable 9 0.3 teps 3 1 + (1 20. le 4e,	ug Sep 4 0.69 able 9c) 1 20.96 9, Th2 (°C) 03 20.02 55 0.6 1 to 7 in Tab 03 19.99 - fLA) × T2 38 20.35 where appre	0.91 20.73 20.02 0.88 e 9c) 19.73 fLA = Liv	0.98 20.37 20.01 0.97 19.23 ing area ÷ (4	0.99 20.06 20.01 0.99 18.78 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98 Mean intern (90)m= 18.81 Mean intern (92)m= 19.28 Apply adjust	reduring he ctor for gas al tempera 19.03 ctor for gas 19.47 ment to the ctor for gas 19.47	eating policins for line ature in to 19.76 ature in logo 20 ains for rough 20 ature in to 19.76 ature mean 19.76	eriods ir iving are Apr 0.88 iving are 20.74 eriods ir 20.01 est of dr 0.85 the rest 19.73 r the wh 20.1 internal	m the live a, h1,n May 0.74 ea T1 (for 20.92 m rest of 20.02 welling, 0.68 of dweld 19.94 edges of dweld 20.3 edges of tempe	ing n (second property of the second propert	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 elling from 7 0.03 20.03 m (see Tabl 0.47 0.31 T2 (follow s 0.02 20.03 g) = fLA × T 0.37 20.38 re from Tab	A 0.4 0.7 in 1 2 Γable 9 0.3 teps 3 1 + (1 20. le 4e,	ug Sep 14 0.69 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 15 0.6 1 to 7 in Tab 03 19.99 - fLA) × T2 38 20.35 where appre	0.91 20.73 20.02 0.88 e 9c) 19.73 fLA = Liv 20.1 copriate	0.98 20.37 20.01 0.97 19.23 ing area ÷ (4) 19.64	0.99 20.06 20.01 0.99 18.78 4) =		(86) (87) (88) (89) (90) (91) (92)
Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98 Mean intern (90)m= 18.81 Mean intern (92)m= 19.28 Apply adjust (93)m= 19.28	e during he ctor for gar length of the ctor for	eating policins for line mean 19.76 eating policins for record of the mean 19.76 eating policins for record of	eriods ir iving are Apr 0.88 iving are 20.74 eriods ir 20.01 est of dr 0.85 the rest 19.73 r the wh 20.1 internal 20.1	n the livea, h1,n May 0.74 ea T1 (for 20.92 morest of 20.02 morest of 20.68 morest of dwelling, 0.68 morest of dwelling,	ing n (second control of the contro	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 elling from 7 0.03 20.03 m (see Tabl 0.47 0.31 T2 (follow s 0.02 20.03 g) = fLA × T 0.37 20.38 re from Tab 0.37 20.38	A 0.4 0.7 in 1 2 Γable 9 0.3 1 + (1 20. 1e 4e, 20.	ug Sep 4 0.69 able 9c) 1 20.96 9, Th2 (°C) 03 20.02 55 0.6 1 to 7 in Tab 03 19.99 - fLA) × T2 38 20.35 where appress 38 20.35	0.91 20.73 20.02 0.88 e 9c) 19.73 fLA = Liv 20.1 cpriate 20.1	0.98 20.37 20.01 0.97 19.23 ing area ÷ (4) 19.64	0.99 20.06 20.01 0.99 18.78 4) = 19.25	0.37	(86) (87) (88) (89) (90) (91) (92)
Temperature Utilisation fa Jan (86)m= 0.99 Mean intern (87)m= 20.09 Temperature (88)m= 20 Utilisation fa (89)m= 0.98 Mean intern (90)m= 18.81 Mean intern (92)m= 19.28 Apply adjust (93)m= 19.28 8. Space he	e during he ctor for gar selection for gar selec	eating policins for line mean 19.76 irement enting policins for records at the content of the co	eriods in iving are Apr 0.88 iving are 20.74 eriods in 20.01 est of do 0.85 the rest 19.73 r the who 20.1 internal 20.1 internal 20.1	n the lives, h1,n May 0.74 ea T1 (for 20.92 morest of 20.02 morest of 20.02 morest of dwelling, 0.68 more obtain the property of the property	ing n (second control of the contro	ee Table 9a Jun Jul 0.55 0.4 w steps 3 to 0.99 21 elling from 7 0.03 20.03 m (see Tabl 0.47 0.31 T2 (follow s 0.02 20.03 g) = fLA × T 0.37 20.38 re from Tab 0.37 20.38	A 0.4 0.7 in 1 2 Γable 9 0.3 1 + (1 20. 1e 4e, 20.	ug Sep 4 0.69 able 9c) 1 20.96 9, Th2 (°C) 03 20.02 55 0.6 1 to 7 in Tab 03 19.99 - fLA) × T2 38 20.35 where appress 38 20.35	0.91 20.73 20.02 0.88 e 9c) 19.73 fLA = Liv 20.1 cpriate 20.1	0.98 20.37 20.01 0.97 19.23 ing area ÷ (4) 19.64	0.99 20.06 20.01 0.99 18.78 4) = 19.25	0.37	(86) (87) (88) (89) (90) (91) (92)

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Utilisation factor for gains, hm:	0.00 0.00	1 0 00	0.00	0.00		(94)
(94)m= 0.98 0.97 0.94 0.85 0.7 0.5 0.34 Useful gains, hmGm , W = (94)m x (84)m	0.39 0.63	0.88	0.96	0.98		(94)
	323.25 492.74	626.04	641.55	646.07		(95)
Monthly average external temperature from Table 8			Į.			
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6	16.4 14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [α		n]				
	324.49 513.25		1044.95	1260.34		(97)
Space heating requirement for each month, kWh/month = 0.024 (98)m= 442.76 332.8 254.13 116.02 34.64 0 0	i	5)m] x (4 119.63		457.02		
(98)m= 442.76 332.8 254.13 116.02 34.64 0 0	0 0 Total per yea	<u> </u>	290.45	L	2047.44	(98)
Space booting requirement in IANIs/m2/year	Total per yea	i (KVVII/yea) = Sum(9	0)15,912 =		=
Space heating requirement in kWh/m²/year				L	26.73	(99)
9b. Energy requirements – Community heating scheme	رم المراجع ا					
This part is used for space heating, space cooling or water heating Fraction of space heat from secondary/supplementary heating (Ta			unity scr	neme.	0	(301)
Fraction of space heat from community system 1 – (301) =	,				1	(302)
The community scheme may obtain heat from several sources. The procedure allo	lows for CHP and	Lun to four	other heat	sources: th		(000)
includes boilers, heat pumps, geothermal and waste heat from power stations. See		ap to rour	ouror mout	_	io iattor	
Fraction of heat from Community heat pump					1	(303a)
Fraction of total space heat from Community heat pump		(3	02) x (303	a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for communi	ity heating sy	stem		Γ	1	(305)
					·	(/
Distribution loss factor (Table 12c) for community heating system					1.05	(306)
Distribution loss factor (Table 12c) for community heating system Space heating				[(306)
				[]	1.05	(306)
Space heating		304a) x (30	5) x (306) :	[-	1.05 kWh/ye	(306)
Space heating Annual space heating requirement	(98) x (304a) x (30	, , ,	[= [1.05 kWh/ye 2047.44	(306) ar
Space heating Annual space heating requirement Space heat from Community heat pump	(98) × (n Table 4a or	304a) x (30	E)	[[= [1.05 kWh/ye 2047.44 2149.81	(306) ar (307a)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system)	(98) × (n Table 4a or	304a) x (30 Appendix	E)	- [[1.05 kWh/ye 2047.44 2149.81 0	(306) ar (307a) (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from	(98) × (n Table 4a or	304a) x (30 Appendix	E)	[_ []	1.05 kWh/ye 2047.44 2149.81 0	(306) ar (307a) (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme:	(98) x (n Table 4a or m (98) x (304a) x (30 Appendix 301) x 100 ·	E) ÷ (308) =]]]	1.05 kWh/ye 2047.44 2149.81 0	(306) ar (307a) (308 (309)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement	(98) x (n Table 4a or m (98) x (304a) x (30 Appendix	E) ÷ (308) =]]]	1.05 kWh/ye 2047.44 2149.81 0	(306) ar (307a) (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme:	(98) x (n Table 4a or m (98) x (304a) x (30 Appendix 301) x 100 ·	E) : (308) = :5) x (306) =	[[_	1.05 kWh/ye 2047.44 2149.81 0 0 2083.89	(306) ar (307a) (308 (309)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump	(98) x (n Table 4a or m (98) x ((64) x (304a) x (30 Appendix 301) x 100 ·	E) : (308) = :5) x (306) =	[[_	1.05 kWh/ye 2047.44 2149.81 0 0 2083.89 2188.09	(306) ar (307a) (308 (309)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution	(98) × (in Table 4a or im (98) × ((64) × (0.01 × [(307a)	304a) x (30 Appendix 301) x 100 ·	E) : (308) = :5) x (306) =	[[_	1.05 kWh/ye 2047.44 2149.81 0 0 2083.89 2188.09 43.38	(306) ar (307a) (308 (309) (310a) (313)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio	(98) x (in Table 4a or im (98) x ((64) x (0.01 x [(307a) = (107)	304a) x (30 Appendix 301) x 100 - 303a) x (30 303a) x (30	E) : (308) = :5) x (306) =	[[_	1.05 kWh/ye 2047.44 2149.81 0 0 2083.89 2188.09 43.38 0	(306) ar (307a) (308 (309) (310a) (313) (314)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f):	(98) x (in Table 4a or im (98) x ((64) x (0.01 x [(307a) = (107)	304a) x (30 Appendix 301) x 100 - 303a) x (30 303a) x (30	E) : (308) = :5) x (306) =	[[_	1.05 kWh/ye 2047.44 2149.81 0 0 2083.89 2188.09 43.38 0 0	(306) ar (307a) (308 (309) (310a) (313) (314) (315)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from outwarm air heating system fans	(98) x (in Table 4a or im (98) x ((64) x (0.01 x [(307a) = (107)	304a) x (30 Appendix 301) x 100 - 303a) x (30 303a) x (30	E) : (308) = :5) x (306) =	[[_	1.05 kWh/ye 2047.44 2149.81 0 0 2083.89 2188.09 43.38 0 0 200.92	(306) ar (307a) (308 (309) (310a) (313) (314) (315) (330a)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from our	(98) x (in Table 4a or im (98) x ((64) x (0.01 x [(307a) = (107) outside	304a) x (30 Appendix 301) x 100 - 303a) x (30 303a) x (30	E) ÷ (308) = 5) x (306) = · (310a)([[_	1.05 kWh/ye 2047.44 2149.81 0 0 2083.89 2188.09 43.38 0 0 200.92 0	(306) ar (307a) (308 (309) (310a) (313) (314) (315) (330a) (330b)

Energy for lighting (calculated in Appe	endix L)			334.04	(332)
Total delivered energy for all uses (30	7) + (309) + (310) + (312) + (315)) + (331) + (33	32)(237b) =	4872.86	(338)
10b. Fuel costs – Community heating	g scheme				
	Fuel kWh/year		el Price ble 12)	Fuel Cost £/year	
Space heating from CHP	(307a) x		4.24 × 0.01 =	91.15	(340a)
Water heating from CHP	(310a) x		4.24 × 0.01 =	92.77	(342a)
Diverse and force	(331)	Fue	el Price 13 19 x 0.01 =		7,,,,,
Pumps and fans			10.10	26.5	(349)
Energy for lighting	(332)		13.19 x 0.01 =	44.06	(350)
Additional standing charges (Table 12	·)			120	(351)
Total energy cost	= (340a)(342e) + (345)(354) =			374.49	(355)
11b. SAP rating - Community heating	g scheme				
Energy cost deflator (Table 12)				0.42	(356)
Energy cost factor (ECF)	$[(355) \times (356)] \div [(4) + 45.0] =$			1.29	(357)
SAP rating (section12)				81.95	(358)
12b. CO2 Emissions - Community he	·				
	End	ergy	Emission factor	Emissions	
	kW	/h/year	kg CO2/kWh	kg CO2/year	
CO2 from other sources of space and Efficiency of heat source 1 (%)		/h/year	kg CO2/kWh	kg CO2/year	(367a)
·	water heating (not CHP)	/h/year s repeat (363) to	kg CO2/kWh (366) for the second fue	kg CO2/year	(367a) (367)
Efficiency of heat source 1 (%)	water heating (not CHP) If there is CHP using two fuels	/h/year s repeat (363) to	kg CO2/kWh (366) for the second fue 0.52	kg CO2/year	」` <u>`</u>
Efficiency of heat source 1 (%) CO2 associated with heat source 1	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x	/h/year s repeat (363) to	(366) for the second fue 0.52 0.52	kg CO2/year 383 587.83	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x y systems (363)(3	/h/year s repeat (363) to 100 ÷ (367b) x	(366) for the second fue 0.52 0.52 = 0.52	kg CO2/year 383 587.83 22.51	(367)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x (363)(332) (309) x	/h/year s repeat (363) to 100 ÷ (367b) x 366) + (368)(37	kg CO2/kWh (366) for the second fue 0.52 0.52 2) 0 1	kg CO2/year 383 587.83 22.51 610.34	(367) (372) (373)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x (363)(3 econdary) (309) x ersion heater or instantaneous heater	/h/year s repeat (363) to 100 ÷ (367b) x 366) + (368)(37	kg CO2/kWh (366) for the second fue 0.52 0.52 = 0.52 = 0 =	kg CO2/year 383 587.83 22.51 610.34	(367) (372) (373) (374)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediate	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x [(313) x (363)(3 (3econdary) (309) x ersion heater or instantaneous heat water heating (373) + (3	/h/year s repeat (363) to 100 ÷ (367b) x 666) + (368)(37) ater (312) x 874) + (375) =	kg CO2/kWh (366) for the second fue 0.52 0.52 0.52 0 0 0 0.22	kg CO2/year 383 587.83 22.51 610.34 0 0	(367) (372) (373) (374) (375)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (second content of the co	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x [(313) x (363)(3 (3econdary) (309) x ersion heater or instantaneous heat water heating (373) + (3 mps and fans within dwelling (331)	/h/year s repeat (363) to 100 ÷ (367b) x 666) + (368)(37) ater (312) x 874) + (375) =	kg CO2/kWh (366) for the second fue 0.52 0.52 0.52 0 0 0.22	kg CO2/year 383 587.83 22.51 610.34 0 610.34	(367) (372) (373) (374) (375) (376)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediately community) Total CO2 associated with space and CO2 associated with electricity for pure	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x (363)(3 econdary) ersion heater or instantaneous heat water heating mps and fans within dwelling (331)	/h/year s repeat (363) to 100 ÷ (367b) x 666) + (368)(37) ater (312) x 874) + (375) =	kg CO2/kWh (366) for the second fue 0.52 0.52 0.52 0 0 0.22	kg CO2/year 383 587.83 22.51 610.34 0 610.34 104.28	(367) (372) (373) (374) (375) (376) (378)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediate CO2 associated with space and CO2 associated with electricity for purious co2 associated with electricity for light	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x [(313) x (363)(3 (3econdary) (309) x ersion heater or instantaneous heat water heating (373) + (3 mps and fans within dwelling (331 ating (332))) x	/h/year s repeat (363) to 100 ÷ (367b) x 666) + (368)(37) ater (312) x 874) + (375) =	kg CO2/kWh (366) for the second fue 0.52 0.52 0.52 0 0 0.22	kg CO2/year 383 587.83 22.51 610.34 0 610.34 104.28 173.37	(367) (372) (373) (374) (375) (376) (378) (379)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediate CO2 associated with space and CO2 associated with electricity for pure CO2 associated with electricity for light Total CO2, kg/year	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x [(313) x (363)(3) Execondary) Persion heater or instantaneous heat water heating (373) + (3) mps and fans within dwelling (332))) x sum of (376)(382) =	/h/year s repeat (363) to 100 ÷ (367b) x 666) + (368)(37) ater (312) x 874) + (375) =	kg CO2/kWh (366) for the second fue 0.52 0.52 0.52 0 0 0.22	kg CO2/year 383 587.83 22.51 610.34 0 610.34 104.28 173.37 887.98	(367) (372) (373) (374) (375) (376) (378) (379) (383)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (see CO2 associated with water from immediate CO2 associated with space and CO2 associated with electricity for pure CO2 associated with electricity for light Total CO2, kg/year Dwelling CO2 Emission Rate	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x [(313) x (363)(3) Recondary) Resion heater or instantaneous heat water heating (373) + (3) mps and fans within dwelling (332))) x sum of (376)(382) = (383) ÷ (4) =	/h/year s repeat (363) to 100 ÷ (367b) x 366) + (368)(37) ater (312) x 374) + (375) = 1)) x	kg CO2/kWh (366) for the second fue 0.52 0.52 0.52 0 0 0.22	kg CO2/year 383 587.83 22.51 610.34 0 610.34 104.28 173.37 887.98 11.59 90.21	(367) (372) (373) (374) (375) (376) (378) (379) (383) (384)
Efficiency of heat source 1 (%) CO2 associated with heat source 1 Electrical energy for heat distribution Total CO2 associated with community CO2 associated with space heating (secondary) CO2 associated with water from immediated CO2 associated with space and CO2 associated with electricity for pure CO2 associated with electricity for light Total CO2, kg/year Dwelling CO2 Emission Rate El rating (section 14)	water heating (not CHP) If there is CHP using two fuels [(307b)+(310b)] x [(313) x [(313) x (363)(3 (3econdary) (309) x ersion heater or instantaneous heat water heating (373) + (3 mps and fans within dwelling (331 nting (332))) x sum of (376)(382) = (383) ÷ (4) = ating scheme End	/h/year s repeat (363) to 100 ÷ (367b) x 666) + (368)(37) ater (312) x 874) + (375) =	kg CO2/kWh (366) for the second fue 0.52 0.52 0.52 0 0 0.22	kg CO2/year 383 587.83 22.51 610.34 0 610.34 104.28 173.37 887.98 11.59	(367) (372) (373) (374) (375) (376) (378) (379) (383) (384)

Energy associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	3.07	=	3477.12	(367)
Electrical energy for heat distribution	[(313) x		=	133.17	(372)
Total Energy associated with community systems	(363)(366) + (368)(372))	=	3610.29	(373)
if it is negative set (373) to zero (unless specified oth	nerwise, see C7 in Appendix C)			3610.29	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater o	r instantaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			3610.29	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps and fans v	within dwelling (331)) x	3.07	=	616.82	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1025.51	(379)
Total Primary Energy, kWh/year sur	m of (376)(382) =			5252.62	(383)

		l Iser I	Details:						
Assessor Name: Software Name:	Ben Talbutt Stroma FSAP 2012	<u> </u>	Strom Softwa					036639 on: 1.0.5.17	
	F	Property	Address	D2-07					
Address :									
Overall dwelling dime	ensions:	Δ	a/m²)		Asz IIa	: or lo 4 / ros \		Valuma/mi	21
Ground floor			a(m²) 76.59	(1a) x		ight(m) :.82	(2a) =	Volume(m ³	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(1		76.59	(4)](==)	210.00	(***)
	a)1(1b)1(10)1(10)1(10)1(1		76.59) + (3c)+(3c	d)+(3e)+	(3n) -		7.6
Dwelling volume				(34)1(35	71(30)1(30	a)	.(011) =	215.98	(5)
2. Ventilation rate:	main seconda	ry	other		total			m³ per hou	ır
Number of chimneys	heating heating bearing heating	□ + □	0	7 = [0	x 4	10 =	0	(6a)
Number of open flues	0 + 0	_ 	0]	0	x 2	20 =		(6b)
Number of intermittent fa		」 ` L		┙┢			10 =	0	╡`´
				Ļ	0		10 =	0	(7a)
Number of passive vents				Ļ	0			0	(7b)
Number of flueless gas f	ires				0	X 2	40 =	0	(7c)
							Air ch	anges per ho	our
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a)+(7b)+	(7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has b	peen carried out or is intended, procee	ed to (17),	otherwise o	continue fr	om (9) to				
Number of storeys in t	he dwelling (ns)					7(0)		0	(9)
Additional infiltration	.25 for steel or timber frame o	r 0 35 fo	r macani	v constr	ruction	[(9)-	-1]x0.1 =	0	(10)
	resent, use the value corresponding t			•	uction			0	(11)
deducting areas of openi	5 /·	4 (1	- IV - I				1		-
If suspended wooden to the sus	floor, enter 0.2 (unsealed) or 0	.1 (seal	ea), eise	enter U				0	(12)
•	s and doors draught stripped							0	(13)
Window infiltration	o and doors araugin empped		0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic metro	es per h	our per s	quare m	etre of e	envelope	area	3	(17)
•	lity value, then $(18) = [(17) \div 20] + (18)$							0.15	(18)
Air permeability value applie Number of sides sheltere	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			7(40)
Shelter factor	eu		(20) = 1 -	[0.0 75 x (1	19)] =			0.85	(19) (20)
Infiltration rate incorpora	ting shelter factor		(21) = (18) x (20) =				0.13	(21)
Infiltration rate modified f	for monthly wind speed								
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m <i>÷ 4</i>								
(22a)m = 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
,	1 1 1 1 1 1 1 1 1 1		1			·-		I	

Adjusted infiltr	ation rat	e (allowi	ng for sl	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effect		•	rate for t	he appli	cable ca	ise			!				
If mechanica			on the NL (C	OL) (00-		(((15)\ (b .		\ (00-\			0.5	(238
If exhaust air h		0		, ,	,	. ,	,, .	`) = (23a)			0.5	(23h
If balanced with		-	-	_								74.8	(230
a) If balance		1	i			- 	- ^ ` -	í `	– `	 	- ` ´	÷ 100] I	(0.4)
(24a)m= 0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28		(248
b) If balance	1		ı —			, , ,	r ´`	í `	 			1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24)
c) If whole h if (22b)n		tract ven k (23b), t		•	•				.5 × (23b	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)n		on or when							0.51	•		•	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change	rate - er	ı nter (24a	or (24k	o) or (24	c) or (24	d) in bo	x (25)	<u> </u>	<u> </u>	!	l	
(25)m= 0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28		(25)
								L			l		
3. Heat losse ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value kJ/m²-		A X k <j k<="" td=""></j>
Doors					2.52	x	0.91	=[2.2932				(26)
Windows Type	e 1				2.9	x1	/[1/(1.4)+	- 0.04] =	3.84				(27)
Windows Type	e 2				5.42	_x 1	/[1/(1.4)+	- 0.04] =	7.19	Ħ			(27)
Windows Type	∋ 3				1.99	x1,	/[1/(1.4)+	- 0.04] =	2.64				(27)
Windows Type	e 4				1.99	x1	/[1/(1.4)+	- 0.04] =	2.64	=			(27)
Windows Type	e 5				0.9		/[1/(1.4)+	ا ا ₌ [0.04	1.19	=			(27)
Windows Type					0.91	ऱ .	- /[1/(1.4)+	Į.	1.21	=			(27)
Windows Type					2.01		/[1/(1.4)+	Į.	2.66	=			(27)
Windows Type					0.62	=	/[1/(1.4)+	l.	0.82	╡			(27)
Walls Type1		47	22.1			_		— ;		╡ ,			(29)
wans Type i	76.4		22.1		54.29	=	0.14	=	7.6	믁 ¦		╡	=
Walla Type?					7.06	X	0.2	=	1.41				(29)
• •	7.0		0	=	7.05			─ -		= 7		= =	
Walls Type2 Walls Type3	7.09		0		21.3	1 ×	0.17	=	3.61				_
Walls Type3 Roof	21.3 76.5	31 59				=	0.17	= [3.61 7.66				(30
Walls Type3 Roof Total area of e	21.3 76.5 elements	31 59 5, m²	0		21.3° 76.59	2 x	0.1	=	7.66				(30)
Walls Type3 Roof Total area of e * for windows and	21.3 76.5 elements	31 59 s, m² lows, use e	0 0		21.3 ⁴ 76.59 181.4	2 x	0.1	=	7.66	as given in	paragraph	13.2	(30)
Walls Type3 Roof Total area of e * for windows and ** include the area	21.3 76.5 Plements I roof winder as on both	31 59 5, m² lows, use e	0 0 sternal wal		21.3 ⁴ 76.59 181.4	2 x	0.1	= [1/[(1/U-valu	7.66	as given in	paragraph		(30)
Walls Type3 Roof Total area of e * for windows and ** include the area Fabric heat los	21.3 76.5 Plements I roof winder as on both	59 5, m ² dows, use e e sides of int = S (A x	0 0 sternal wal		21.3 ⁴ 76.59 181.4	2 x	0.1	= [1/[(1/U-valu) + (32) =	7.66 (e)+0.04] a			48.64	(29) (30) (31) (33) (34)
Walls Type3 Roof Total area of e * for windows and ** include the area	21.3 76.5 elements d roof winder as on both ss, W/K = Cm = S(59 5, m ² lows, use e sides of int = S (A x (A x k)	0 0 onffective winternal wall	ls and pan	21.3° 76.59 181.4 alue calcultitions	2 2 lated using	0.1	= [1/[(1/U-valu) + (32) = ((28)	7.66	2) + (32a).			(30)

can be i	used instea	ad of a de	tailed calci	ulation.										
			x Y) cal		using Ap	pendix I	K						15.46	(36)
	Ū	,	are not kn		Ο.	•								(2.2)
Total fa	abric hea	at loss							(33) +	(36) =			64.1	(37)
Ventila	ition hea	t loss ca	alculated	monthl	y				(38)m	= 0.33 × ((25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	20.57	20.34	20.11	18.98	18.75	17.61	17.61	17.39	18.07	18.75	19.2	19.66		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m		_	
(39)m=	84.66	84.44	84.21	83.07	82.85	81.71	81.71	81.48	82.16	82.85	83.3	83.75		
Heat lo	ss para	meter (H	HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) ₁ - (4)	12 /12=	83.02	(39)
(40)m=	1.11	1.1	1.1	1.08	1.08	1.07	1.07	1.06	1.07	1.08	1.09	1.09		_
Numbe	er of day	s in mor	nth (Tab	le 1a)						Average =	Sum(40) ₁	12 /12=	1.08	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31]	(41)
4. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
if TF	ed occu A > 13.9 A £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		.39]	(42)
Annua Reduce	l averag the annua	e hot wa al average		usage by	5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.08]	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
Hot wate			day for ea						ОСР	001	1407	_ <u></u>]	
(44)m=	100.19	96.55	92.9	89.26	85.62	81.97	81.97	85.62	89.26	92.9	96.55	100.19	1	
	ļ ļ		ļ	Į	Į	Į	<u>!</u>	<u>l</u>		Total = Su	m(44) ₁₁₂ =	! =	1092.97	(44)
Energy (content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600) kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)	_	_
(45)m=	148.58	129.95	134.09	116.91	112.17	96.8	89.7	102.93	104.16	121.39	132.5	143.89		
If inoton	tonoouo w	ator hooti	na ot noint	of use (no	hot woto	r otorogol	ontor O in	hoves (46		Total = Su	m(45) ₁₁₂ =	=	1433.05	(45)
				· ·				boxes (46		1004	1,000	04.50	7	(40)
(46)m= Water	22.29 storage	19.49 loss:	20.11	17.54	16.83	14.52	13.45	15.44	15.62	18.21	19.88	21.58]	(46)
	•		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	1	(47)
If com	munity h	eating a	ınd no ta	ınk in dw	elling, e	nter 110) litres in	(47)					J	
Otherv	vise if no	stored	hot wate	er (this in	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in ((47)			
	storage					4.144							7	
•			eclared l		or is kno	wn (kvvr	n/day):					0]	(48)
•			m Table									0]	(49)
			storage eclared o	-		or is not	known:	(48) x (49)) =		1	10]	(50)
Hot wa	iter stora	age loss	factor free sections	om Tabl							0.	.02]	(51)
	e factor	_									1.	.03	1	(52)
Tempe	erature fa	actor fro	m Table	2b							0	0.6]	(53)

Energy lost from water storage, kWh/year	ır	(47) x	(51) x (52) x (53) =	1.	03		(54)
Enter (50) or (54) in (55)					1.	03		(55)
Water storage loss calculated for each me	onth	((56)n	$\gamma = (55) \times (41)$	m				
(56)m= 32.01 28.92 32.01 30.98 3	32.01 30.98	32.01 32.0	01 30.98	32.01	30.98	32.01		(56)
If cylinder contains dedicated solar storage, (57)m =	= (56)m x [(50) – (H	H11)] ÷ (50), els	e (57)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 32.01 28.92 32.01 30.98 3	32.01 30.98	32.01 32.0	30.98	32.01	30.98	32.01		(57)
Primary circuit loss (annual) from Table 3	3					0		(58)
Primary circuit loss calculated for each m		58) ÷ 365 × (41)m					
(modified by factor from Table H5 if the	ere is solar wate	er heating ar	d a cylinde	r thermo	stat)			
(59)m= 23.26 21.01 23.26 22.51 2	23.26 22.51	23.26 23.2	26 22.51	23.26	22.51	23.26		(59)
Combi loss calculated for each month (61	1)m = (60) ÷ 36	55 × (41)m						
(61)m= 0 0 0 0	0 0	0 0	0	0	0	0		(61)
Total heat required for water heating calc	culated for each	month (62)	$m = 0.85 \times 0$	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.85 179.87 189.37 170.4 1	167.45 150.29	144.97 158	21 157.65	176.66	186	199.17		(62)
Solar DHW input calculated using Appendix G or Ap	ppendix H (negativ	e quantity) (ent	er '0' if no sola	r contributi	on to wate	r heating)		
(add additional lines if FGHRS and/or WV	WHRS applies,	see Append	ix G)					
(63)m= 0 0 0 0	0 0	0 0	0	0	0	0		(63)
Output from water heater								
(64)m= 203.85 179.87 189.37 170.4 1	167.45 150.29	144.97 158	21 157.65	176.66	186	199.17		
	-		Output from wa	ater heater	(annual)	12	2083.89	(64)
Heat gains from water heating, kWh/mon	th 0.25 ′ [0.85	× (45)m + (6	1)ml + 0.8 y	([(46)m	+ (57)m	+ (59)m	1	
5,		× (+0)111 1 (0	1/111] 1 0.0 /	([(+0) 1	. (07)	1 (00)111	J	
	81.52 74.98	74.05 78.4		84.58	86.85	92.06	J	(65)
	81.52 74.98	74.05 78.4	15 77.43	84.58	86.85	92.06		(65)
(65)m= 93.62 83.15 88.81 81.67 8	81.52 74.98	74.05 78.4	15 77.43	84.58	86.85	92.06		(65)
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a):	81.52 74.98	74.05 78.4	15 77.43	84.58	86.85	92.06		(65)
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or	81.52 74.98	74.05 78.4	77.43 ing or hot w	84.58	86.85	92.06		(65)
include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr	81.52 74.98 nly if cylinder is	74.05 78.45 in the dwell	77.43 ring or hot w	84.58 ater is fr	86.85 om com	92.06 munity h		(65)
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 1	81.52 74.98 nly if cylinder is May Jun 119.75 119.75	74.05 78.45 in the dwell Jul At 119.75 119.	77.43 ring or hot was see 119.75 119.75	84.58 ater is fr	86.85 om com	92.06 munity h		
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L,	81.52 74.98 nly if cylinder is May Jun 119.75 119.75	74.05 78.45 in the dwell Jul At 119.75 119.	145 77.43 ring or hot w rug Sep r75 119.75 ree Table 5	84.58 ater is fr	86.85 om com	92.06 munity h		
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34	May Jun 119.75 119.75 equation L9 or 7.73 6.53	74.05 78.45 in the dwell Jul Au 119.75 119. L9a), also s 7.05 9.1	15 77.43 ring or hot was sing Sep 75 119.75 ree Table 5 7 12.31	84.58 ater is fr Oct 119.75	86.85 om com Nov 119.75	92.06 munity h		(66)
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix	May Jun 119.75 119.75 equation L9 or 7.73 6.53	74.05 78.45 in the dwell Jul Au 119.75 119. L9a), also s 7.05 9.1	145 77.43 145 77.43 149 Sep 149.75 149.75 159 119.75 169 12.31 160 See Ta	84.58 ater is fr Oct 119.75	86.85 om com Nov 119.75	92.06 munity h		(66)
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 3	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09	74.05 78.45 in the dwell Jul Au 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156	15 77.43 1 77.43 1 19.75 1 19.75 1 12.31 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88	86.85 om com Nov 119.75	92.06 munity h Dec 119.75		(66) (67)
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 7 Cooking gains (calculated in Appendix L,	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09	74.05 78.45 in the dwell Jul Au 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156	15 77.43 1 77.43 1 19 Sep 7 119.75 1 12.31 1 162.07 2 see Table 3 162.07	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88	86.85 om com Nov 119.75	92.06 munity h Dec 119.75		(66) (67)
include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 17 Cooking gains (calculated in Appendix L, (69)m= 34.97 34.97 34.97 34.97 34.97 34.97	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09 equation L15 or	74.05 78.4 s in the dwell Jul Au 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156 or L15a), also	15 77.43 1 77.43 1 19 Sep 7 119.75 1 12.31 1 162.07 2 see Table 3 162.07	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5	86.85 om com Nov 119.75 18.24	92.06 munity h Dec 119.75 19.44		(66) (67) (68)
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 1 Cooking gains (calculated in Appendix L,	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09 equation L15 or	74.05 78.4 s in the dwell Jul Au 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156 or L15a), also	A5 77.43 Ing or hot was a sep 75 119.75 ee Table 5 7 12.31 also see Table 5 162.07 o see Table 97 34.97	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5	86.85 om com Nov 119.75 18.24	92.06 munity h Dec 119.75 19.44		(66) (67) (68)
include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 7 Cooking gains (calculated in Appendix L, (69)m= 34.97 3	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09 equation L15 or 34.97 34.97	74.05 78.4 in the dwell Jul Au 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156 or L15a), also 34.97 34.5	A5 77.43 Ing or hot was a sep 75 119.75 ee Table 5 7 12.31 also see Table 5 162.07 o see Table 97 34.97	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5 34.97	86.85 om com Nov 119.75 18.24 188.79	92.06 munity h Dec 119.75 19.44 202.81		(66) (67) (68) (69)
include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 7 Cooking gains (calculated in Appendix L, (69)m= 34.97 3	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09 d, equation L15 c 34.97 34.97 0 0 c) (Table 5)	74.05 78.4 3 in the dwell Jul Ai 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156 or L15a), also 34.97 34.9	15 77.43 1 77.	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5 34.97	86.85 om com Nov 119.75 18.24 188.79	92.06 munity h Dec 119.75 19.44 202.81		(66) (67) (68) (69)
include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 7 Cooking gains (calculated in Appendix L, (69)m= 34.97 3	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09 equation L15 or 34.97 34.97	74.05 78.4 in the dwell Jul Au 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156 or L15a), also 34.97 34.5	15 77.43 1 77.	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5 34.97	86.85 om com Nov 119.75 18.24 188.79	92.06 munity h Dec 119.75 19.44 202.81 34.97		(66) (67) (68) (69)
include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 7 Cooking gains (calculated in Appendix L, (69)m= 34.97 3	May Jun 119.75 119.75 equation L9 or 7.73 6.53 (L, equation L1 182.1 168.09 , equation L15 (34.97 34.97 0 0 s) (Table 5) -95.8 -95.8	74.05 78.4 3 in the dwell Jul Au 119.75 119 L9a), also s 7.05 9.1 3 or L13a), also 158.73 156 or L15a), also 34.97 34.9 0 0 -95.8 -95	Ig Sep 75 119.75 ee Table 5 7 12.31 also see Table 52 162.07 o see Table 07 34.97 0	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5 34.97 0	86.85 om com Nov 119.75 18.24 188.79 34.97 0	92.06 munity h Dec 119.75 19.44 202.81 34.97 0		(66) (67) (68) (69) (70)
(65)m= 93.62 83.15 88.81 81.67 8 include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 3 Cooking gains (calculated in Appendix L, (69)m= 34.97	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09 equation L15 c 34.97 34.97 0 0 c) (Table 5) -95.8 -95.8	74.05 78.4 3 in the dwell Jul Ai 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156 or L15a), also 34.97 34.9 0 0 -95.8 -95	A5 77.43 A5 77.43 A6 77.43 A6 77.43 A7 77.43 A7 77.43 A7 77.43 A7 77 A7	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5 34.97 0 -95.8	86.85 Om com Nov 119.75 18.24 188.79 0 -95.8	92.06 munity h Dec 119.75 19.44 202.81 34.97 0 -95.8		(66) (67) (68) (69)
include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 70.00 Cooking gains (calculated in Appendix L, (69)m= 34.97	May Jun 119.75 119.75 equation L9 or 7.73 6.53 (L, equation L1 182.1 168.09 , equation L15 (34.97 34.97 0 0 s) (Table 5) -95.8 -95.8	74.05 78.4 3 in the dwell Jul Ai 119.75 119 L9a), also s 7.05 9.1 13 or L13a), also 158.73 156 or L15a), also 34.97 34.9 0 0 -95.8 -95 99.52 105 m + (67)m + (68	A5 77.43 Ing or hot was a sing or hot was a sin	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5 34.97 0 -95.8 113.69 (70)m + (7	86.85 om com Nov 119.75 18.24 188.79 34.97 0 -95.8 120.63 1)m + (72)	92.06 munity h Dec 119.75 19.44 202.81 34.97 0 -95.8		(66) (67) (68) (69) (70) (71)
include (57)m in calculation of (65)m or 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr (66)m= 119.75 119.75 119.75 119.75 1 Lighting gains (calculated in Appendix L, (67)m= 18.91 16.8 13.66 10.34 Appliances gains (calculated in Appendix (68)m= 212.17 214.37 208.82 197.01 70.00 Cooking gains (calculated in Appendix L, (69)m= 34.97	May Jun 119.75 119.75 equation L9 or 7.73 6.53 c L, equation L1 182.1 168.09 equation L15 c 34.97 34.97 0 0 c) (Table 5) -95.8 -95.8	74.05 78.4 3 in the dwell Jul Ai 119.75 119 L9a), also s 7.05 9.1 3 or L13a), a 158.73 156 or L15a), also 34.97 34.9 0 0 -95.8 -95	A5 77.43 Ing or hot was a sing or hot was a sin	84.58 ater is fr Oct 119.75 15.62 ble 5 173.88 5 34.97 0 -95.8	86.85 Om com Nov 119.75 18.24 188.79 0 -95.8	92.06 munity h Dec 119.75 19.44 202.81 34.97 0 -95.8		(66) (67) (68) (69) (70)

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

Orientation: Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.9	x	11.28	x	0.4	x	0.8	=	7.26	(75)
Northeast _{0.9x} 0.77	X	5.42	x	11.28	x	0.4	x	0.8	=	13.56	(75)
Northeast 0.9x 0.77	X	2.9	x	22.97	x	0.4	x	0.8	=	14.77	(75)
Northeast 0.9x 0.77	X	5.42	x	22.97	x	0.4	x	0.8] =	27.6	(75)
Northeast 0.9x 0.77	X	2.9	x	41.38	x	0.4	x	0.8	=	26.61	(75)
Northeast 0.9x 0.77	X	5.42	x	41.38	x	0.4	x	0.8	=	49.73	(75)
Northeast _{0.9x} 0.77	X	2.9	x	67.96	X	0.4	X	0.8	=	43.7	(75)
Northeast _{0.9x} 0.77	X	5.42	x	67.96	x	0.4	X	0.8	=	81.68	(75)
Northeast _{0.9x} 0.77	X	2.9	x	91.35	x	0.4	x	0.8	=	58.74	(75)
Northeast _{0.9x} 0.77	X	5.42	x	91.35	X	0.4	X	0.8	=	109.79	(75)
Northeast _{0.9x} 0.77	X	2.9	x	97.38	x	0.4	X	0.8	=	62.63	(75)
Northeast _{0.9x} 0.77	X	5.42	x	97.38	x	0.4	x	0.8	=	117.05	(75)
Northeast _{0.9x} 0.77	X	2.9	x	91.1	x	0.4	x	0.8	=	58.59	(75)
Northeast _{0.9x} 0.77	X	5.42	x	91.1	x	0.4	X	0.8	=	109.5	(75)
Northeast 0.9x 0.77	X	2.9	x	72.63	x	0.4	x	0.8	=	46.71	(75)
Northeast _{0.9x} 0.77	X	5.42	x	72.63	x	0.4	x	0.8	=	87.29	(75)
Northeast _{0.9x} 0.77	X	2.9	x	50.42	x	0.4	X	0.8	=	32.43	(75)
Northeast 0.9x 0.77	X	5.42	x	50.42	x	0.4	x	0.8	=	60.6	(75)
Northeast _{0.9x} 0.77	X	2.9	x	28.07	x	0.4	x	0.8	=	18.05	(75)
Northeast 0.9x 0.77	X	5.42	x	28.07	x	0.4	x	0.8	=	33.74	(75)
Northeast 0.9x 0.77	X	2.9	x	14.2	x	0.4	x	0.8	=	9.13	(75)
Northeast _{0.9x} 0.77	X	5.42	x	14.2	x	0.4	x	0.8	=	17.06	(75)
Northeast _{0.9x} 0.77	X	2.9	x	9.21	x	0.4	x	0.8	=	5.93	(75)
Northeast _{0.9x} 0.77	X	5.42	x	9.21	X	0.4	X	0.8	=	11.07	(75)
Southeast 0.9x 0.77	X	1.99	x	36.79	x	0.4	X	0.8	=	16.24	(77)
Southeast 0.9x 0.77	X	1.99	x	62.67	x	0.4	x	0.8	=	27.66	(77)
Southeast 0.9x 0.77	X	1.99	x	85.75	x	0.4	x	0.8	=	37.84	(77)
Southeast 0.9x 0.77	x	1.99	x	106.25	x	0.4	x	0.8	=	46.89	(77)
Southeast 0.9x 0.77	X	1.99	x	119.01	x	0.4	x	0.8	=	52.52	(77)
Southeast 0.9x 0.77	X	1.99	x	118.15	x	0.4	x	0.8	=	52.14	(77)
Southeast 0.9x 0.77	X	1.99	x	113.91	x	0.4	X	0.8	=	50.27	(77)
Southeast 0.9x 0.77	X	1.99	x	104.39	x	0.4	x	0.8	=	46.07	(77)
Southeast 0.9x 0.77	X	1.99	x	92.85	X	0.4	X	0.8	=	40.98	(77)
Southeast 0.9x 0.77	X	1.99	x	69.27	x	0.4	X	0.8	=	30.57	(77)
Southeast 0.9x 0.77	X	1.99	x	44.07	x	0.4	x	0.8	=	19.45	(77)
Southeast 0.9x 0.77	x	1.99	x	31.49	x	0.4	x	0.8] =	13.9	(77)
Southwest _{0.9x} 0.77	x	0.91	x	36.79]	0.4	x	0.8] =	14.85	(79)
Southwest _{0.9x} 0.77	x	2.01	x	36.79		0.4	x	0.8] =	32.8	(79)
Southwest _{0.9x} 0.77	x	0.62	x	36.79		0.4	x	0.8] =	5.06	(79)

Southwest _{0.9x}	0.77	1 ,	0.04	1 ,	60.67	1	0.4	1 ,	0.0	1 _	25.2	(79)
Southwest _{0.9x}	0.77] x] ,,	0.91] X] ,	62.67]]	0.4	l x	0.8] =	25.3	=
Southwest _{0.9x}	0.77] x] ,	2.01] X] v	62.67]]	0.4	X	0.8] =] _	55.87	(79)
Southwest _{0.9x}	0.77] x] x	0.62	x x	62.67]]	0.4	x x	0.8] =] =	8.62	
Southwest _{0.9x}	0.77] 1	0.91] 1	85.75]]	0.4]]	0.8]]	34.61	(79)
Southwest _{0.9x}	0.77]	2.01] X] v	85.75]]	0.4	l x	0.8] = 1 _	76.45	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77] x] x	0.62] x] x	85.75]]	0.4	x x	0.8] =] =	11.79	(79)
Southwest _{0.9x}	0.77] ^] x	2.01] ^] x	106.25]]	0.4] ^] _x	0.8] =	94.72	(79)
Southwest _{0.9x}] ^] x] ^] x]]		, ,] -] =		(79)
Southwest _{0.9x}	0.77] ^] x	0.62] ^] x	106.25]]	0.4) ^ x	0.8] =] =	14.61 48.03	(79)
Southwest _{0.9x}] ^] x]]]]		^ x]]		(79)
Southwest _{0.9x}	0.77] 1	2.01] ×] v	119.01]]	0.4) ^ x	0.8] =] =	106.1	(79)
Southwest _{0.9x}	0.77]	0.62] X] v	119.01]]	0.4]]	0.8] 1	16.36	(79)
Southwest _{0.9x}	0.77] x] ,	0.91] X] v	118.15]]	0.4	l x	0.8] =] _	47.69	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77]	2.01] X] v	118.15]]	0.4	l x	0.8] =] =	105.33	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77] x] ,	0.62] X] v	118.15]]	0.4	X I v	0.8] 1	16.24	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77]	0.91] X] v	113.91]]	0.4	l x	0.8] =] _	45.97	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77]	2.01] X] v	113.91]]	0.4	l x	0.8] = 1 _	101.55	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77]	0.62] X] v	113.91]]	0.4	X I v	0.8] = 1 _	15.66	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77] x] ,	0.91] X] v	104.39]]	0.4	x	0.8] =] =	42.13	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77] x] x	2.01	x x	104.39]]	0.4	^ x	0.8] =] =	93.06	$= \frac{(79)}{(79)}$
Southwest _{0.9x}	0.77] ^] x	0.62] ^] x	92.85]]	0.4) ^ x	0.8]	14.35 37.48	(79)
Southwest _{0.9x}	0.77] ^] x	2.01] ^] x	92.85]]	0.4) ^ x	0.8] -] =	82.78	(79)
Southwest _{0.9x}	0.77] ^] x	0.62] ^] x	92.85]]	0.4] ^ x	0.8] -] =		(79)
Southwest _{0.9x}] ^] x	0.62] ^] x	69.27]]	0.4] ^] _X]	27.96	(79)
Southwest _{0.9x}	0.77] ^] x	2.01] ^] x]]	0.4] ^ x	0.8] -] =	61.75	(79)
Southwest _{0.9x}	0.77] ^] x	0.62] ^] x	69.27 69.27]]	0.4	l ^	0.8] =	9.52	(79)
Southwest _{0.9x}	0.77] ^] x	0.02] ^] x	44.07]]	0.4] ^] x	0.8] =	17.79	(79)
Southwest _{0.9x}	0.77] ^] x	2.01] ^] x	44.07]]	0.4	^ x	0.8] =	39.29	(79)
Southwest _{0.9x}	0.77] ^] x	0.62] ^] x	44.07]]	0.4	l ^ l x	0.8] =	6.06	(79)
Southwest _{0.9x}	0.77]	0.91] ^] x	31.49]]	0.4	X	0.8] =	12.71	(79)
Southwest _{0.9x}	0.77] ^] x	2.01] ^] x	31.49	! 	0.4	l ^ l x	0.8] =	28.07	(79)
Southwest _{0.9x}	0.77] ^] x	0.62] ^] x	31.49	! 	0.4	l ^ l x	0.8]	4.33	(79)
Northwest 0.9x	0.77] ^] x	1.99] ^] x	11.28]]	0.4	l x	0.8] =	4.98	(81)
Northwest 0.9x	0.77]	0.9) ^] x	11.28	^ x	0.4	l ^	0.8]] =	2.25	(81)
Northwest 0.9x	0.77] ^] x	1.99] ^] x	22.97] ^] x	0.4	^ x	0.8] =	10.14	(81)
Northwest 0.9x	0.77] ^] x	0.9] ^] x	22.97] ^] _x	0.4) ^ x	0.8] =	4.58	(81)
Northwest 0.9x	0.77] ^] x	1.99] ^] x	41.38] ^] _x	0.4	l ^ l x	0.8] =	18.26	(81)
Northwest 0.9x	0.77] ^] x	0.9] ^] x	41.38] ^] x	0.4] ^] x	0.8] -] =	8.26	(81)
Northwest 0.9x	0.77] ^] x	1.99] ^] x	67.96	^ x	0.4	l ^	0.8] =	29.99	(81)
Northwest 0.9x	0.77] ^] x	0.9] ^] x	67.96] ^ x	0.4	l ^ l x	0.8] =	13.56	(81)
5.57	0.11	J ~		J ^	L 07.00	J ^	L <u>,,,</u>	J	L 0.0	ı	10.00	

_														_
Northwest 0.9x	0.77	X	1.9	99	X	9	1.35	X	0.4	×	0.8	=	40.31	(81)
Northwest 0.9x	0.77	Х	0.9	9	X	9	1.35	x	0.4	x	0.8	=	18.23	(81)
Northwest 0.9x	0.77	X	1.9	99	X	9	7.38	X	0.4	X	0.8	=	42.98	(81)
Northwest 0.9x	0.77	X	0.9	9	X	9	7.38	X	0.4	X	0.8	=	19.44	(81)
Northwest 0.9x	0.77	X	1.9	99	X	(91.1	x	0.4	X	0.8	=	40.2	(81)
Northwest 0.9x	0.77	X	0.9	9	X	9	91.1	X	0.4	X	0.8	=	18.18	(81)
Northwest 0.9x	0.77	x	1.9	99	x	7	2.63	x	0.4	x	0.8	=	32.05	(81)
Northwest 0.9x	0.77	x	0.9	9	X	7	2.63	x	0.4	x	0.8	=	14.5	(81)
Northwest 0.9x	0.77	x	1.9	99	X	5	0.42	x	0.4	x	0.8	=	22.25	(81)
Northwest 0.9x	0.77	x	0.9	9	X	5	0.42	x	0.4	x	0.8	=	10.06	(81)
Northwest 0.9x	0.77	x	1.9	99	X	2	8.07	x	0.4	x	0.8	=	12.39	(81)
Northwest 0.9x	0.77	x	0.9	9	X	2	8.07	x	0.4	x	0.8	=	5.6	(81)
Northwest 0.9x	0.77	x	1.9	99	X		14.2	x	0.4	x	0.8	=	6.27	(81)
Northwest 0.9x	0.77	x	0.9	9	X		14.2	X	0.4	x	0.8	=	2.83	(81)
Northwest 0.9x	0.77	x	1.9	99	X	9	9.21	x	0.4	x	0.8	=	4.07	(81)
Northwest 0.9x	0.77	x	0.9	9	X	9	9.21	x	0.4	x	0.8	=	1.84	(81)
								_						
Solar gains in	watts, calc	culated	for eacl	h month	า			(83)m	n = Sum(74)m .	(82)m	1		_	
(83)m= 97	174.54 2	263.55	368.04	450.09	4	63.49	439.92	376	.16 299.33	199.5	7 117.87	81.91		(83)
Total gains – i	nternal and	d solar	(84)m =	= (73)m	+ (8	83)m	, watts				-		_	
(84)m= 512.84	588.36	664.33	747.74	808.42	8	01.17	764.15	706	.21 640.18	561.6	504.46	486.82		(84)
7 Magainter	nal tampa	roturo (heating		- \									
7. Mean inter	nai tempei	iaiuie (meaning	Seasor	n)									
7. Mean Inter	•	`	`			area t	from Tal	ole 9	, Th1 (°C)				21	(85)
	during hea	ating pe	eriods ir	n the liv	ing			ole 9	, Th1 (°C)				21	(85)
Temperature	during hea	ating pe	eriods ir	n the liv	ing n (s				, Th1 (°C)	Oc	t Nov	Dec	21	(85)
Temperature Utilisation fac	during hea	ating pe	eriods ir	n the liv	ing n (s	ee Ta	ble 9a)		ug Sep	Oc 0.96		Dec 1	21	(85)
Temperature Utilisation fac Jan (86)m= 1	during heat tor for gain Feb	ating pens for li Mar 0.98	eriods ir ving are Apr 0.94	n the livea, h1,n May	ing n (s	ee Ta Jun ^{0.63}	Jul 0.47	A 0.5	ug Sep 52 0.79				21	
Temperature Utilisation factors Jan (86)m= 1 Mean interna	during heater for gain Feb 0.99	ating pens for li Mar 0.98	eriods ir ving are Apr 0.94	n the livea, h1,n May	ing n (s	ee Ta Jun ^{0.63}	Jul 0.47	A 0.5	ug Sep 52 0.79 able 9c)		0.99		21	
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88	during heater for gain Feb 0.99 I temperate 20.04	ns for li Mar 0.98 ure in li	eriods in ving are Apr 0.94 iving are 20.62	n the livea, h1,n May 0.82 ea T1 (f	ing n (s follo	ee Ta Jun 0.63 ow ste	Jul 0.47 ps 3 to 7	0.5 7 in T 20.	ug Sep 52 0.79 Table 9c) 99 20.92	0.96	0.99	1	21	(86)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature	during heater for gain Feb 0.99 I temperat 20.04 during heater to the du	ns for li Mar 0.98 ure in li 20.29 ating pe	eriods ir iving are Apr 0.94 iving are 20.62 eriods ir	n the livea, h1,n May 0.82 ea T1 (f	ing n (s follo	ee Ta Jun 0.63 ow ste 20.98	ble 9a) Jul 0.47 ps 3 to 7 21 from Ta	A 0.57 in T 20.	ug Sep 52 0.79 Table 9c) 99 20.92 9, Th2 (°C)	20.6	0.99	19.86	21	(86)
Temperature Utilisation fac Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20	during heater for gain Feb 0.99 I temperate 20.04 during heater 20	ns for li Mar 0.98 ure in li 20.29 ating pe	Apr 0.94 iving are 20.62 eriods ir	n the livea, h1,n May 0.82 ea T1 (for 20.87 no rest of 20.02	ing n (s follo	ee Ta Jun 0.63 ow ste 20.98 velling	ble 9a) Jul 0.47 ps 3 to 7 21 from Ta 20.03	A 0.57 in T 20.	ug Sep 52 0.79 Table 9c) 99 20.92 9, Th2 (°C)	0.96	0.99	1	21	(86)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors	tor for gair Feb 0.99 I temperate 20.04 during hea 20 ctor for gair	ns for li Mar 0.98 ure in li 20.29 ating pe	eriods in ving are Apr 0.94 iving are 20.62 eriods in 20.01 est of decrease in the control of th	n the livea, h1,n May 0.82 ea T1 (f 20.87 n rest of 20.02 welling,	ing (s)	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 ,m (se	Jul 0.47 ps 3 to 7 21 from Ta 20.03	A 0.57 in T 20. able 9 20. 9a)	ug Sep 52 0.79 Table 9c) 99 20.92 9, Th2 (°C) 03 20.02	0.96 20.6	20.19	19.86	21	(86) (87) (88)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1	tor for gair Feb 0.99 I temperate 20.04 during hea 20 ctor for gair 0.99	ns for li Mar 0.98 ure in li 20.29 ating pe 20 ns for re 0.97	eriods in ving are 0.94 iving are 20.62 eriods in 20.01 est of do 0.91	n the livea, h1,n May 0.82 ea T1 (f 20.87 n rest of 20.02 welling, 0.77	ing (s)	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 om (se 0.54	Jul 0.47 ps 3 to 7 21 from Ta 20.03 ee Table 0.37	A 0.57 in T 20.42 able 9 20.42 9a)	ug Sep 52 0.79 Table 9c) 99 20.92 9, Th2 (°C) 03 20.02	0.96 20.6 20.02	20.19	19.86	21	(86)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1 Mean interna	during heater for gair Feb 0.99 I temperate 20.04 ctor for gair 0.99 I temperate	ns for li Mar 0.98 ure in li 20.29 ating pe 20 ns for re 0.97 ure in t	eriods in ving are 0.94 viving are 20.62 eriods in 20.01 est of do 0.91 he rest	m the live a, h1,n May 0.82 ea T1 (for 20.87 ea rest of 20.02 ealling, 0.77 of dwel	follo	ee Ta Jun 0.63 ww ste 20.98 velling 20.03 m (se 0.54 T2 (fo	Jul 0.47 ps 3 to 7 21 from Ta 20.03 ee Table 0.37 ollow ste	A 0.5.7 in 1 20. 20. 9a) 0.4	ug Sep 62 0.79 Fable 9c) 99 20.92 9, Th2 (°C) 03 20.02 12 0.71 10 7 in Table	0.96 20.6 20.02 0.94 e 9c)	20.19 20.01 0.99	1 19.86 20.01	21	(86) (87) (88) (89)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1 Mean interna	during heater for gair Feb 0.99 I temperate 20.04 ctor for gair 0.99 I temperate	ns for li Mar 0.98 ure in li 20.29 ating pe 20 ns for re 0.97	eriods in ving are 0.94 iving are 20.62 eriods in 20.01 est of do 0.91	n the livea, h1,n May 0.82 ea T1 (f 20.87 n rest of 20.02 welling, 0.77	follo	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 om (se 0.54	Jul 0.47 ps 3 to 7 21 from Ta 20.03 ee Table 0.37	A 0.57 in T 20.42 able 9 20.42 9a)	ug Sep 52 0.79 Table 9c) 99 20.92 9, Th2 (°C) 03 20.02 14 0.71 15 to 7 in Table 03 19.96	0.96 20.6 20.02 0.94 e 9c) 19.56	0.99 20.19 2 20.01 0.99	1 19.86 20.01 1 18.48		(86) (87) (88) (89)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1 Mean interna	during heater for gair Feb 0.99 I temperate 20.04 ctor for gair 0.99 I temperate	ns for li Mar 0.98 ure in li 20.29 ating pe 20 ns for re 0.97 ure in t	eriods in ving are 0.94 viving are 20.62 eriods in 20.01 est of do 0.91 he rest	m the live a, h1,n May 0.82 ea T1 (for 20.87 ea rest of 20.02 ealling, 0.77 of dwel	follo	ee Ta Jun 0.63 ww ste 20.98 velling 20.03 m (se 0.54 T2 (fo	Jul 0.47 ps 3 to 7 21 from Ta 20.03 ee Table 0.37 ollow ste	A 0.5.7 in 1 20. 20. 9a) 0.4	ug Sep 52 0.79 Table 9c) 99 20.92 9, Th2 (°C) 03 20.02 14 0.71 15 to 7 in Table 03 19.96	0.96 20.6 20.02 0.94 e 9c) 19.56	20.19 20.01 0.99	1 19.86 20.01 1 18.48	0.37	(86) (87) (88) (89)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1 Mean interna	during heater for gair Feb 0.99 I temperate 20 etor for gair 0.99 I temperate 18.74	ns for li Mar 0.98 ure in li 20.29 ating pe 20 ns for re 0.97 ure in t 19.11	eriods in ving are 0.94 iving are 20.62 eriods in 20.01 est of do 0.91 he rest 19.58	n the livea, h1,n May 0.82 ea T1 (f 20.87 n rest of 20.02 welling, 0.77 of dwel 19.89	follo follo follo 2 h2,	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 ,m (se 0.54 T2 (fo	Jul 0.47 ps 3 to 7 21 from Ta 20.03 ee Table 0.37 collow ste 20.03	A 0.5 of 10	ug Sep 62 0.79 Table 9c) 99 20.92 9, Th2 (°C) 03 20.02 12 0.71 1 to 7 in Table 03 19.96	0.96 20.6 20.02 0.94 e 9c) 19.56 fLA = Li	0.99 20.19 2 20.01 0.99	1 19.86 20.01 1 18.48		(86) (87) (88) (89)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1 Mean interna (90)m= 18.51 Mean interna	during heater for gair Feb 0.99 I temperate 20.04 ctor for gair 0.99 I temperate 18.74 I temperate 18.74	ns for li Mar 0.98 ure in li 20.29 ating pe 20 ns for re 0.97 ure in t 19.11	eriods in ving are 0.94 iving are 20.62 eriods in 20.01 est of do 0.91 he rest 19.58	n the livea, h1,n May 0.82 ea T1 (f 20.87 n rest of 20.02 welling, 0.77 of dwel 19.89	follo follo follo follo g h2, h2, c elling	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 ,m (se 0.54 T2 (fo	Jul 0.47 ps 3 to 7 21 from Ta 20.03 ee Table 0.37 collow ste 20.03	A 0.5 of 10	ug Sep 62 0.79 Table 9c) 99 20.92 9, Th2 (°C) 03 20.02 42 0.71 4 to 7 in Table 03 19.96 — fLA) × T2	0.96 20.6 20.02 0.94 e 9c) 19.56 fLA = Li	0.99 20.19 2 20.01 0.99 6 18.96 ving area ÷ (-	1 19.86 20.01 1 18.48		(86) (87) (88) (89)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1 Mean interna (90)m= 18.51 Mean interna (92)m= 19.01 Apply adjustn	during heater for gair Feb 0.99 I temperate 20.04 ctor for gair 0.99 I temperate 18.74 I temperate 19.22	ns for li Mar 0.98 ure in li 20.29 ating pe 20 ns for re 0.97 ure in t 19.11 ure (for	eriods in ving are Apr 0.94 iving are 20.62 eriods in 20.01 est of do 0.91 he rest 19.58 r the whole 19.96	n the livea, h1,n May 0.82 ea T1 (f 20.87 n rest of 20.02 welling, 0.77 of dwel 19.89 ole dwe 20.25	follo follo follo follo general first discourse first disc	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 m (se 20.01 g) = fl	Jul 0.47 ps 3 to 7 21 from Ta 20.03 pe Table 0.37 collow ste 20.03	A A 0.57 in T 20. 20. 20. 20. 20. + (1 20.	ug Sep 52 0.79 Fable 9c) 99 20.92 9, Th2 (°C) 03 20.02 12 0.71 10 7 in Tabl 03 19.96 - fLA) × T2 38 20.31	0.96 20.02 0.94 e 9c) 19.56 19.94	0.99 20.19 2 20.01 0.99 6 18.96 ving area ÷ (1 19.86 20.01 1 18.48 4) =		(86) (87) (88) (89) (90) (91) (92)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1 Mean interna (90)m= 18.51 Mean interna (92)m= 19.01 Apply adjustn (93)m= 19.01	during heater for gair Feb 0.99 I temperate 20 ctor for gair 0.99 I temperate 18.74 I temperate 19.22 Inent to the 19.22	ating pens for li Mar 0.98 ure in li 20.29 ating pens for re 0.97 ure in the series of	eriods in ving are Apr 0.94 iving are 20.62 eriods in 20.01 est of do 0.91 he rest 19.58 r the whole 19.96	n the livea, h1,n May 0.82 ea T1 (f 20.87 n rest of 20.02 welling, 0.77 of dwel 19.89 ole dwe 20.25	ing (s)	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 m (se 20.01 g) = fl	Jul 0.47 ps 3 to 7 21 from Ta 20.03 pe Table 0.37 collow ste 20.03	A A 0.57 in T 20. 20. 20. 20. 20. + (1 20.	ug Sep 52 0.79 Table 9c) 99 20.92 9, Th2 (°C) 03 20.02 42 0.71 4 to 7 in Table 03 19.96 — fLA) × T2 38 20.31 where appre	0.96 20.02 0.94 e 9c) 19.56 19.94	0.99 20.19 2 20.01 0.99 6 18.96 ving area ÷ (-	1 19.86 20.01 1 18.48 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation fact (89)m= 1 Mean interna (90)m= 18.51 Mean interna (92)m= 19.01 Apply adjustm (93)m= 19.01 8. Space hear	during heater for gair Feb 0.99 I temperate 0.99 I temperate 0.99 I temperate 18.74 I temperate 19.22 Inent to the 19.22 Iting requir	ating pens for li Mar 0.98 ure in li 20.29 ating pens for re 0.97 ure in ti 19.11 ure (for 19.54 e mean 19.54	eriods in ving are Apr 0.94 iving are 20.62 eriods in 20.01 est of dr 0.91 he rest 19.58 r the what 19.96 internal 19.96	n the live a, h1,n May 0.82 ea T1 (for 20.87 ea T1) (for 20.02 ea	ing n (s follo 2 h2, h2, c lling 2 ratu 2	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 m (se 0.54 T2 (fo 20.01 g) = fl 20.36 ure fro 20.36	Jul 0.47 ps 3 to 7 21 from Ta 20.03 ee Table 0.37 ollow ste 20.03 LA × T1 20.38 m Table 20.38	A 0.5 of in T 20.	ug Sep 62 0.79 Fable 9c) 99 20.92 9, Th2 (°C) 03 20.02 42 0.71 4 to 7 in Table 03 19.96 - fLA) × T2 38 20.31 where appre	0.96 20.6 20.02 0.94 le 9c) 19.56 fLA = Li 19.94 ppriate 19.94	0.99 20.19 2 20.01 2 0.99 3 18.96 4 19.41 3 19.41	1 19.86 20.01 1 18.48 4) = 18.99	0.37	(86) (87) (88) (89) (90) (91) (92)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.88 Temperature (88)m= 20 Utilisation factors (89)m= 1 Mean interna (90)m= 18.51 Mean interna (92)m= 19.01 Apply adjustn (93)m= 19.01	during heat tor for gair Feb 0.99 I temperate 0.99 I temperate 18.74 I temperate 19.22 Inent to the 19.22 Iting requiremean inter	ating pens for li Mar 0.98 ure in li 20.29 ating pens for re 0.97 ure in ti 19.11 ure (for 19.54 emean 19.54 ement rnal term	eriods in ving are Apr 0.94 iving are 20.62 eriods in 20.01 est of do 0.91 he rest 19.58 r the whole 19.96 internal 19.96 internal 19.96	n the live ea, h1,n May 0.82 ea T1 (for 20.87 ea T1) (for 20.02 ea	ing n (s follo 2 h2, h2, c lling 2 ratu 2	ee Ta Jun 0.63 ow ste 20.98 velling 20.03 m (se 0.54 T2 (fo 20.01 g) = fl 20.36 ure fro 20.36	Jul 0.47 ps 3 to 7 21 from Ta 20.03 ee Table 0.37 ollow ste 20.03 LA × T1 20.38 m Table 20.38	A 0.5 of in T 20.	ug Sep 62 0.79 Fable 9c) 99 20.92 9, Th2 (°C) 03 20.02 42 0.71 4 to 7 in Table 03 19.96 - fLA) × T2 38 20.31 where appre	0.96 20.6 20.02 0.94 le 9c) 19.56 fLA = Li 19.94 ppriate 19.94	0.99 20.19 2 20.01 2 0.99 3 18.96 4 19.41 3 19.41	1 19.86 20.01 1 18.48 4) = 18.99	0.37	(86) (87) (88) (89) (90) (91) (92)

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Mar

Jan

Feb

Utilisation factor for gains, hm:						
	0.46 0.73	0.94	0.99	1		(94)
Useful gains, hmGm , W = (94)m x (84)m						
	321.55 469.6	5 528.95	498.23	484.59		(95)
Monthly average external temperature from Table 8						
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6	16.4 14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [- 	-ī			ı	
	324.29 510.4		1025.44	1238.39		(97)
Space heating requirement for each month, kWh/month = 0.024 (98)m= 547.57 421.89 337.87 169.81 57.48 0 0		- 	<u> </u>	F60.02		
(98)m= 547.57 421.89 337.87 169.81 57.48 0 0	0 0 Total per ye	182.18 ar (kWh/year	379.59	560.83	2657.24	(98)
Space heating requirement in kWh/m²/year	rotal pol yo	ar (KVVIII) Joan) = Ga in(G	715,912	34.69	(99)
9b. Energy requirements – Community heating scheme					0 1.00	(00)
This part is used for space heating, space cooling or water heating	na provided b	v a comm	unity sch	neme		
Fraction of space heat from secondary/supplementary heating (Ta	• .		army oor	101110.	0	(301)
Fraction of space heat from community system 1 – (301) =					1	(302)
The community scheme may obtain heat from several sources. The procedure allo		d up to four	other heat	sources; ti	he latter	
includes boilers, heat pumps, geothermal and waste heat from power stations. See Fraction of heat from Community heat pump	ee Appendix C.				1	(303a)
Fraction of total space heat from Community heat pump		(3	02) x (303	a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for communi	uity heating sy		02) X (000	ω,	1	(305)
ractor for control and charging method (rable 40(3)) for confinding	illy ricalling sy	SIGIII			I	(303)
Distribution loss factor (Table 12c) for community heating system					1.05	(306)
Distribution loss factor (Table 12c) for community heating system					1.05	(306)
Distribution loss factor (Table 12c) for community heating system Space heating Annual space heating requirement					1.05 kWh/ye 2657.24	
Space heating		(304a) x (30	5) x (306) :	=	kWh/ye	
Space heating Annual space heating requirement	(98) x	, , ,	, , ,	=	kWh/ye 2657.24	ar
Space heating Annual space heating requirement Space heat from Community heat pump	(98) x n Table 4a or	, , ,	E)	=	kWh/ye 2657.24 2790.1	(307a)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system)	(98) x n Table 4a or	Appendix	E)	=	kWh/ye 2657.24 2790.1	(307a) (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from	(98) x n Table 4a or	Appendix	E)	=	kWh/ye 2657.24 2790.1	(307a) (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme:	(98) x n Table 4a or m (98) x	Appendix (301) x 100 -	E) ÷ (308) =		kWh/ye 2657.24 2790.1 0 0 2083.89	(307a) (308 (309)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump	(98) x n Table 4a or m (98) x (64) x	Appendix (301) x 100 -	E) = (308) = 5) x (306) =	=	kWh/ye 2657.24 2790.1 0 0 2083.89 2188.09	(307a) (308 (309) (310a)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution	(98) x n Table 4a or m (98) x	Appendix (301) x 100 -	E) = (308) = 5) x (306) =	=	kWh/ye 2657.24 2790.1 0 0 2083.89	(307a) (308 (309) (310a) (313)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio	(98) x n Table 4a or m (98) x (64) x	Appendix (301) x 100 -	E) = (308) = 5) x (306) =	=	kWh/ye 2657.24 2790.1 0 0 2083.89 2188.09	(307a) (308 (309) (310a)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307	Appendix (301) x 100 -	E) = (308) = 5) x (306) =	=	kWh/ye 2657.24 2790.1 0 0 2083.89 2188.09 49.78	(307a) (308 (309) (310a) (313)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307)	Appendix (301) x 100 - (303a) x (305a)(307e) +	E) = (308) = 5) x (306) =	=	kWh/ye 2657.24 2790.1 0 0 2083.89 2188.09 49.78 0	(307a) (308 (309) (310a) (313) (314)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f):	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307)	Appendix (301) x 100 - (303a) x (305a)(307e) +	E) = (308) = 5) x (306) =	=	kWh/ye 2657.24 2790.1 0 0 2083.89 2188.09 49.78 0	(307a) (308 (308 (309) (310a) (313) (314) (315)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from our	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307)	Appendix (301) x 100 - (303a) x (305a)(307e) +	E) = (308) = 5) x (306) =	=	kWh/ye 2657.24 2790.1 0 0 2083.89 2188.09 49.78 0 0	(307a) (308 (308 (309) (310a) (313) (314) (315) (330a)
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Space heating requirement from secondary/supplementary system Water heating Annual water heating requirement If DHW from community scheme: Water heat from Community heat pump Electricity used for heat distribution Cooling System Energy Efficiency Ratio Space cooling (if there is a fixed cooling system, if not enter 0) Electricity for pumps and fans within dwelling (Table 4f): mechanical ventilation - balanced, extract or positive input from our warm air heating system fans	(98) x n Table 4a or m (98) x (64) x 0.01 x [(307) = (107)	Appendix (301) x 100 - (303a) x (305a)(307e) +	E) ÷ (308) = 5) x (306) = (310a)(=	kWh/ye 2657.24 2790.1 0 0 2083.89 2188.09 49.78 0 0 200.92 0	(307a) (308 (309) (310a) (313) (314) (315) (330a) (330b)

(332)Energy for lighting (calculated in Appendix L) 334.04 Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (332)...(237b) =5513.15 (338)12b. CO2 Emissions – Community heating scheme **Emission factor Emissions Energy** kWh/year kg CO2/kWh kg CO2/year CO2 from other sources of space and water heating (not CHP) If there is CHP using two fuels repeat (363) to (366) for the second fuel Efficiency of heat source 1 (%) (367a) 383 CO2 associated with heat source 1 $[(307b)+(310b)] \times 100 \div (367b) \times$ (367)674.59 0.52 Electrical energy for heat distribution [(313) x (372)0.52 25.84 Total CO2 associated with community systems (363)...(366) + (368)...(372)(373)700.43 CO2 associated with space heating (secondary) (309) x (374)0 CO2 associated with water from immersion heater or instantaneous heater (312) x 0.22 (375)0 Total CO2 associated with space and water heating (373) + (374) + (375) =(376)700.43 CO2 associated with electricity for pumps and fans within dwelling (331)) x (378)0.52 104.28 CO2 associated with electricity for lighting (332))) x 0.52 (379)173.37 sum of (376)...(382) =Total CO2, kg/year (383)978.07 **Dwelling CO2 Emission Rate** $(383) \div (4) =$ (384)12.77

El rating (section 14)

(385)

89.22

		Hee	er Details:						
A Nome -	Day Tallayett	USE		- M	I		CTDO	000000	
Assessor Name: Software Name:	Ben Talbutt Stroma FSAP 2012)	Stroma Softwa					036639 on: 1.0.5.17	
Contware realise.	Ottoma i O/W 2012		rty Address:		31011.		V 01010		
Address :		·	•						
1. Overall dwelling dime	ensions:								
Ground floor		<u>_</u>	rea(m²)	(10) v		ight(m)	(2a) =	Volume(m ³	(3a)
	-\.(A -\.(A-\.(A-\).	. (4.5)		(1a) x	2	.82	(2a) =	215.98	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)	+(1n)	76.59	(4)	\	I) (O)	(0.)		_
Dwelling volume				(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	215.98	(5)
2. Ventilation rate:	main se	condary	other		total			m³ per hou	ır
Number of alligners	heating he	eating		,			40 =		_
Number of chimneys			0] = [0			0	(6a)
Number of open flues	0 +	0 +	0] = [0		20 =	0	(6b)
Number of intermittent fa				Ĺ	3		10 =	30	(7a)
Number of passive vents	3			L	0	X '	10 =	0	(7b)
Number of flueless gas f	ires				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a)+(6b)+(7a)+(7l	o)+(7c) =	Г	30		÷ (5) =	0.14	(8)
	peen carried out or is intended			ontinue fr			. (0) –	0.14	(0)
Number of storeys in t	he dwelling (ns)							0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	0.25 for steel or timber frugger or steel or timber frugger from the steel or timber from the st			•	uction			0	(11)
deducting areas of openi		onaing to the g	realer wall are	a (aner					
If suspended wooden	floor, enter 0.2 (unseale	ed) or 0.1 (se	ealed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
· ·	s and doors draught str	ipped						0	(14)
Window infiltration			0.25 - [0.2					0	(15)
Infiltration rate			(8) + (10)					0	(16)
•	q50, expressed in cubic	•	•	•	etre of e	envelope	area	5	(17)
If based on air permeabil	es if a pressurisation test has				is heina u	sad		0.39	(18)
Number of sides sheltere		boon done or d	acgree an per	modelinty	io boiling a	50 u		2	(19)
Shelter factor			(20) = 1 -	0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18)	x (20) =				0.33	(21)
Infiltration rate modified f	or monthly wind speed						•		
Jan Feb	Mar Apr May	Jun Ju	ıl Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3	3.8 3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2\m ÷ 4								
(22a)m = 1.27 1.25	1.23 1.1 1.08	0.95 0.9	5 0.92	1	1.08	1.12	1.18		
` '								J	

Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.42	0.41	0.4	0.36	0.36	0.31	0.31	0.31	0.33	0.36	0.37	0.39]	
Calculate effe		•	rate for t	he appli	cable ca	se				!	!		
If mechanica												0	(23a
If exhaust air h		0 11		, ,	,	. `	,, .	,	o) = (23a)			0	(23k
If balanced with		-	-	_								0	(230
a) If balance	1	1	1	·	1			 	' ' ') ÷ 100] 1	(0.4)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a
b) If balance	1			ı —	1	, 	r ´`	í `	r ´ `	– ´ – 	· .	1	(0.4)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24)
c) If whole h if (22b)r	nouse ex n < 0.5 ×			•	•				.5 × (23b	o)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)r	ventilation								0.5]				
(24d)m= 0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58]	(240
Effective air	change	rate - er	nter (24a) or (24k	o) or (24	c) or (24	d) in bo	x (25)	•	•		•	
(25)m= 0.59	0.59	0.58	0.57	0.56	0.55	0.55	0.55	0.55	0.56	0.57	0.58]	(25)
3. Heat losse	s and he	nat lace i	aramat	or:	•	•	•	•	•	•		4	
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-valu kJ/m²-		A X k kJ/K
Doors		` '			2.52	х	1	— = 1	2.52	,			(26)
Windows Type	e 1				2.45	x1	/[1/(1.4)+	0.04] =	3.25	Ħ			(27)
Windows Type	e 2				4.58	x1	/[1/(1.4)+	0.04] =	6.07				(27)
Windows Type	e 3				1.68	x1	/[1/(1.4)+	0.04] =	2.23				(27)
Windows Type	e 4				1.68	x1	/[1/(1.4)+	0.04] =	2.23	一			(27)
Windows Type	e 5				0.76		/[1/(1.4)+	· 0.04] =	1.01	Ħ			(27)
Windows Type					0.77	= ,	/[1/(1.4)+	0.04] =	1.02	=			(27)
Windows Type					1.7		/[1/(1.4)+		2.25	\dashv			(27)
Windows Type					0.52	〓 .	- /[1/(1.4)+		0.69	\dashv			(27)
Walls Type1	76.4	17	19.1	3	57.34	_	0.18		10.32	≓ ,			(29)
Walls Type2	7.0		0		7.05	=	0.18	=	1.27	륵 ¦		= =	(29)
Walls Type3	21.3		0	=	21.3	_	0.18	=	3.84	-			(29)
Roof	76.5		0		76.59	=	0.13	=	9.96	_		-	(30)
Total area of e	L					=	0.13		9.90				(31)
* for windows and			effective wi	ndow I I-v	181.4 alue calcui		ı formula 1	1/[(1/U-valı	ue)+0.041 =	as given in	n paragrani	n 3.2	(31)
** include the area						a.ou donig	, .o.maia 1	,,, ,, o vaic	.5, 10.04] 0	g., o., III	. paragrapi	. 3.2	
Fabric heat los	ss, W/K :	= S (A x	U)				(26)(30) + (32) =				49.92	(33)
Heat capacity	Cm = S((Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	0	(34)
Thermal mass	parame	ter (TMF	c = Cm -	- TFA) ir	n kJ/m²K			Indica	itive Value	: Medium		250	(35)
		`		,									(5.5)

can be us	sed instea	ad of a de	tailed calci	ulation.										
					using Ap	pendix I	K						10.25	(36)
	•	•	•		= 0.05 x (3	•								(\
Total fa	bric hea	at loss							(33) +	(36) =			60.18	(37)
Ventilat	ion hea	t loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			_
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	41.97	41.72	41.48	40.35	40.14	39.15	39.15	38.97	39.53	40.14	40.57	41.01		(38)
Heat tra	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m		-	
(39)m=	102.14	101.9	101.66	100.53	100.31	99.33	99.33	99.15	99.71	100.31	100.74	101.19]	
Heat los	ss para	meter (H	HLP), W/	m²K				•		Average = = (39)m ÷		12 /12=	100.52	(39)
(40)m=	1.33	1.33	1.33	1.31	1.31	1.3	1.3	1.29	1.3	1.31	1.32	1.32]	
L						ı				Average =	Sum(40) ₁	12 /12=	1.31	(40)
Number	r of day	s in mor	nth (Tab	le 1a)		·					Ī		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Wat	ter heat	ing ener	gy requi	rement:								kWh/y	ear:	
Assume	ed occu	nancy I	V								2	.39	1	(42)
if TF), N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		.55	I	(42)
		•	ater usaç	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		91	.08	1	(43)
		_				_	_	to achieve	a water us	se target o	f		J	
riot more	unat 125				ater use, l		•					_	1	
Hot water	Jan	Feb	Mar	Apr	Vd,m = fa	Jun	Jul Table 10 x	Aug	Sep	Oct	Nov	Dec		
г			,								00.55	1,00,40	1	
(44)m=	100.19	96.55	92.9	89.26	85.62	81.97	81.97	85.62	89.26	92.9	96.55	100.19	4000.07	(44)
Energy co	ontent of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x L	OTm / 3600		Total = Su oth (see Ta			1092.97	(44)
(45)m=	148.58	129.95	134.09	116.91	112.17	96.8	89.7	102.93	104.16	121.39	132.5	143.89		
	-									Total = Su	m(45) ₁₁₂ =	=	1433.05	(45)
It instanta		ater heatıı	ng at point	of use (no	not water	r storage),	enter 0 ın	boxes (46) to (61)				1	
(46)m=	22.29	19.49	20.11	17.54	16.83	14.52	13.45	15.44	15.62	18.21	19.88	21.58		(46)
Water s	_		includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		150	1	(47)
_		, ,			velling, e		_					130		(,
	-	_			_			mbi boil	ers) ente	er '0' in (47)			
Water s	storage	loss:		,					•	·	·			
a) If ma	anufactı	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):				1.	.39		(48)
Temper	rature fa	actor fro	m Table	2b							0.	.54]	(49)
			storage	-				(48) x (49)) =		0.	.75]	(50)
•				-	oss fact							_	1	(54)
		_	ee secti		e 2 (kW	n/ntre/da	ay <i>)</i>					0	J	(51)
	-	from Tal										0]	(52)
Temper	rature fa	actor fro	m Table	2b								0	1	(53)
											_		-	

Energy lost from w	ater storage	e, kWh/ye	ear			(47) x (51)) x (52) x (5	53) =		0		(54)
Enter (50) or (54)	n (55)								0.	75		(55)
Water storage loss	calculated	for each	month			((56)m = (55) × (41)r	n				
(56)m= 23.33 21	07 23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(56)
If cylinder contains ded	cated solar sto	orage, (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= 23.33 21	07 23.33	22.58	23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33		(57)
Primary circuit loss	(annual) fr	om Table	e 3							0		(58)
Primary circuit loss	calculated	for each	month (59)m = ((58) ÷ 36	55 × (41)	m					
(modified by fac	or from Tab	le H5 if t	here is s	olar wat	er heatir	ng and a	cylinde	thermo	stat)			
(59)m= 23.26 21	01 23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calcula	ted for eacl	n month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required	for water h	eating ca	alculated	for eacl	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 195.17 172	.03 180.69	162	158.77	141.89	136.29	149.52	149.25	167.98	177.59	190.48		(62)
Solar DHW input calcul	ated using App	pendix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	contribut	ion to wate	er heating)	•	
(add additional line	s if FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water	heater	•	•				•				•	
(64)m= 195.17 172	.03 180.69	162	158.77	141.89	136.29	149.52	149.25	167.98	177.59	190.48		
			•		•	Outp	out from wa	ater heate	r (annual)₁	12	1981.67	(64)
Heat gains from wa	tor hoating	k\N/h/m	onth 0 21	= ′ [O OE	(45)	(04)	1 00		(·		_	
ricat gains nom w	itei neating	, K VVII/III	011111 0.23	ാ പ്ര.രാ	× (45)111	+ (61)m	า] + 0.8 x	: [(46)m	+ (57)m	+ (59)m]	
(65)m= 86.68 76		74.94	74.57	68.26	× (45)m	+ (61)m	70.71	77.64	+ (57)m 80.13	+ (59)m 85.12]	(65)
	88 81.86	74.94	74.57	68.26	67.1	71.5	70.71	77.64	80.13	85.12		(65)
(65)m= 86.68 76	88 81.86	74.94 of (65)m	74.57 only if c	68.26	67.1	71.5	70.71	77.64	80.13	85.12		(65)
(65)m= 86.68 76 include (57)m in 5. Internal gains	88 81.86 calculation see Table	74.94 of (65)m 5 and 5a	74.57 only if c	68.26	67.1	71.5	70.71	77.64	80.13	85.12		(65)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T	88 81.86 calculation see Table	74.94 of (65)m 5 and 5a	74.57 only if c	68.26	67.1	71.5 dwelling	70.71	77.64	80.13	85.12		(65)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T	88 81.86 calculation see Table able 5), Wa b Mar	74.94 of (65)m 5 and 5a	74.57 only if c	68.26 ylinder is	67.1	71.5	70.71 or hot w	77.64 ater is fr	80.13 om com	85.12 munity h		(65)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75	74.94 of (65)m 6 and 5a tts Apr 119.75	74.57 only if c): May 119.75	68.26 ylinder is Jun 119.75	67.1 s in the c	71.5 dwelling Aug 119.75	70.71 or hot w Sep 119.75	77.64 ater is fr	80.13 om com	85.12 munity h		
include (57)m in 5. Internal gains Metabolic gains (T Jan F	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A	74.94 of (65)m 6 and 5a tts Apr 119.75	74.57 only if c): May 119.75	68.26 ylinder is Jun 119.75	67.1 s in the c	71.5 dwelling Aug 119.75	70.71 or hot w Sep 119.75	77.64 ater is fr	80.13 om com	85.12 munity h		
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (calculation) (67)m= 18.93 16	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A 81 13.67	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35	74.57 only if c): May 119.75 L, equati 7.74	Jun 119.75 ion L9 o	67.1 s in the c Jul 119.75 r L9a), a 7.06	71.5 dwelling Aug 119.75 lso see 9.18	70.71 or hot w Sep 119.75 Table 5 12.32	77.64 ater is fr Oct 119.75	80.13 om com Nov 119.75	85.12 munity h		(66)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (cale (67)m= 18.93 16 Appliances gains (88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A 81 13.67 calculated i	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Append	74.57 only if c): May 119.75 L, equati 7.74 dix L, eq	Jun 119.75 ion L9 of 6.53 uation L	67.1 s in the c Jul 119.75 r L9a), a 7.06	Aug 119.75 lso see 9.18 3a), also	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal	77.64 ater is fr Oct 119.75	80.13 om com Nov 119.75	85.12 munity h		(66)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (cal- (67)m= 18.93 16 Appliances gains ((68)m= 212.17 214	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82	74.94 of (65)m 5 and 5a tts	74.57 only if c): May 119.75 L, equati 7.74 dix L, equ 182.1	Jun 119.75 ion L9 of 6.53 uation L	67.1 s in the c Jul 119.75 r L9a), a 7.06 13 or L1: 158.73	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07	77.64 ater is fr Oct 119.75 15.64 ole 5 173.88	80.13 om com Nov 119.75	85.12 munity h		(66) (67)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (call (67)m= 18.93 16 Appliances gains (68)m= 212.17 214 Cooking gains (call (68)m= 212.17 214	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82 culated in A	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Append 197.01 ppendix	74.57 only if c): May 119.75 L, equati 7.74 dix L, equati 182.1 L, equat	Jun 119.75 ion L9 o 6.53 uation L 168.09	Jul 119.75 r L9a), a 7.06 13 or L1: 158.73 or L15a)	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 , also se	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07 ee Table	77.64 ater is fr Oct 119.75 15.64 ole 5 173.88 5	80.13 om com Nov 119.75 18.25	85.12 munity h		(66) (67) (68)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (cale (67)m= 18.93 16 Appliances gains ((68)m= 212.17 214 Cooking gains (cale (69)m= 34.97 34	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A calculated i 37 208.82 culated in A 97 34.97	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Append 197.01 appendix 34.97	74.57 only if c): May 119.75 L, equati 7.74 dix L, equ 182.1	Jun 119.75 ion L9 of 6.53 uation L	67.1 s in the c Jul 119.75 r L9a), a 7.06 13 or L1: 158.73	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07	77.64 ater is fr Oct 119.75 15.64 ole 5 173.88	80.13 om com Nov 119.75	85.12 munity h		(66) (67)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (cal- (67)m= 18.93 16 Appliances gains ((68)m= 212.17 214 Cooking gains (cal- (69)m= 34.97 34 Pumps and fans gains	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82 culated in A 97 34.97 ains (Table	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Append 197.01 ppendix 34.97 5a)	74.57 only if c): May 119.75 L, equati 7.74 dix L, equ 182.1 L, equat 34.97	Jun 119.75 ion L9 of 6.53 uation L 168.09 ion L15 34.97	Jul 119.75 r L9a), a 7.06 13 or L1: 158.73 or L15a) 34.97	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 , also se 34.97	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07 ee Table 34.97	77.64 ater is fr Oct 119.75 15.64 ble 5 173.88 5 34.97	80.13 om com Nov 119.75 18.25 188.79	85.12 munity h		(66) (67) (68) (69)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (calder)m= 18.93 16 Appliances gains (68)m= 212.17 214 Cooking gains (calder)m= 34.97 34 Pumps and fans gains (70)m= 3	88 81.86 calculation see Table able 5), Wa ab Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82 culated in A 97 34.97 ains (Table	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Append 197.01 ppendix 34.97 5a) 3	74.57 only if c): May 119.75 L, equati 7.74 dix L, equ 182.1 L, equat 34.97	Jun 119.75 ion L9 o 6.53 uation L 168.09 ion L15 34.97	Jul 119.75 r L9a), a 7.06 13 or L1: 158.73 or L15a)	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 , also se	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07 ee Table	77.64 ater is fr Oct 119.75 15.64 ole 5 173.88 5	80.13 om com Nov 119.75 18.25	85.12 munity h		(66) (67) (68)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (cale (67)m= 18.93 16 Appliances gains ((68)m= 212.17 214 Cooking gains (cale (69)m= 34.97 34 Pumps and fans gains (70)m= 3 33 Losses e.g. evapo	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82 culated in A 97 34.97 ains (Table 3 cation (negative)	74.94 of (65)m 5 and 5a tts	74.57 only if c): May 119.75 L, equati 7.74 dix L, equ 182.1 L, equati 34.97 3 es) (Tab	Jun 119.75 ion L9 of 6.53 uation L 168.09 ion L15 34.97	67.1 s in the c Jul 119.75 r L9a), a 7.06 13 or L1: 158.73 or L15a) 34.97	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 , also se 34.97	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07 ee Table 34.97	77.64 ater is fr Oct 119.75 15.64 ble 5 173.88 5 34.97	80.13 om com Nov 119.75 18.25 188.79 34.97	85.12 munity h Dec 119.75 19.46 202.81		(66) (67) (68) (69) (70)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (cal- (67)m= 18.93 16 Appliances gains ((68)m= 212.17 214 Cooking gains (cal- (69)m= 34.97 34 Pumps and fans gains (cal- (70)m= 3 34.97 34 Losses e.g. evapor (71)m= -95.8 -95	88 81.86 calculation see Table able 5), Wa ab Mar .75 119.75 culated in A 81 13.67 calculated i 37 208.82 culated in A 97 34.97 ains (Table 3 ration (nega	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Append 197.01 ppendix 34.97 5a) 3	74.57 only if c): May 119.75 L, equati 7.74 dix L, equ 182.1 L, equat 34.97	Jun 119.75 ion L9 o 6.53 uation L 168.09 ion L15 34.97	Jul 119.75 r L9a), a 7.06 13 or L1: 158.73 or L15a) 34.97	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 , also se 34.97	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07 ee Table 34.97	77.64 ater is fr Oct 119.75 15.64 ble 5 173.88 5 34.97	80.13 om com Nov 119.75 18.25 188.79	85.12 munity h		(66) (67) (68) (69)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (caliform) 18.93 16 Appliances gains (68)m= 212.17 214 Cooking gains (caliform) 34.97 34 Pumps and fans gains (70)m= 3 3 Losses e.g. evapo (71)m= -95.8 -99 Water heating gain	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82 culated in A 97 34.97 ains (Table .3 3 cation (nega .8 -95.8 s (Table 5)	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Append 197.01 appendix 34.97 5a) 3 ative valu -95.8	74.57 only if c): May 119.75 L, equati 7.74 dix L, equat 182.1 L, equat 34.97 3 es) (Tab -95.8	Jun 119.75 ion L9 of 6.53 uation L 168.09 ion L15 34.97 3 le 5) -95.8	Jul 119.75 r L9a), a 7.06 13 or L12 158.73 or L15a) 34.97	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 , also se 34.97	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07 ee Table 34.97 3 -95.8	77.64 ater is fr Oct 119.75 15.64 ble 5 173.88 5 34.97 3	80.13 om com Nov 119.75 18.25 188.79 34.97	85.12 munity h Dec 119.75 19.46 202.81 34.97		(66) (67) (68) (69) (70) (71)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (cale (67)m= 18.93 16 Appliances gains ((68)m= 212.17 214 Cooking gains (cale (69)m= 34.97 34 Pumps and fans gains (cale (70)m= 3 3 Losses e.g. evapo (71)m= -95.8 -99 Water heating gains (72)m= 116.5 11	88 81.86 calculation see Table able 5), Wa eb Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82 culated in A 97 34.97 ains (Table .3 3 ation (nega .8 -95.8 s (Table 5) .4 110.03	74.94 of (65)m 5 and 5a tts	74.57 only if c): May 119.75 L, equati 7.74 dix L, equ 182.1 L, equati 34.97 3 es) (Tab	Jun 119.75 ion L9 of 6.53 uation L 168.09 ion L15 34.97 3 le 5) -95.8	67.1 s in the c Jul 119.75 r L9a), a 7.06 13 or L1: 158.73 or L15a) 34.97 3 -95.8	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 , also se 34.97 3 -95.8	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07 ee Table 34.97 3 -95.8	77.64 ater is fr Oct 119.75 15.64 ble 5 173.88 5 34.97 3 -95.8	80.13 om com Nov 119.75 18.25 188.79 34.97 3 -95.8	85.12 munity h Dec 119.75 19.46 202.81 34.97 3 -95.8		(66) (67) (68) (69) (70)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (calder)m= 18.93 16 Appliances gains ((68)m= 212.17 214 Cooking gains (calder)m= 34.97 34 Pumps and fans gains (70)m= 3 3 Losses e.g. evaporom (71)m= -95.8 -99 Water heating gains (72)m= 116.5 11 Total internal gains	88 81.86 calculation see Table able 5), Wa ab Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82 culated in A 97 34.97 ains (Table .8 -95.8 s (Table 5) .4 110.03	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Appendix 34.97 5a) 3 ative valu -95.8	74.57 only if c): May 119.75 L, equati 7.74 dix L, equ 182.1 L, equat 34.97 3 es) (Tab -95.8	Jun 119.75 ion L9 of 6.53 uation L 168.09 ion L15 34.97 3 le 5) -95.8	67.1 s in the co Jul 119.75 r L9a), a 7.06 13 or L1: 158.73 or L15a) 34.97 3 -95.8 90.19 m + (67)m	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 0, also se 34.97 3 -95.8	70.71 or hot w Sep 119.75 Table 5 12.32 see Tal 162.07 ee Table 34.97 3 -95.8	77.64 ater is fr Oct 119.75 15.64 ble 5 173.88 5 34.97 3 -95.8 104.35 70)m + (7	80.13 om com Nov 119.75 18.25 188.79 34.97 3 -95.8 111.29 1)m + (72)	85.12 munity h Dec 119.75 19.46 202.81 34.97 3 -95.8		(66) (67) (68) (69) (70) (71)
(65)m= 86.68 76 include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 119.75 119 Lighting gains (cale (67)m= 18.93 16 Appliances gains ((68)m= 212.17 214 Cooking gains (cale (69)m= 34.97 34 Pumps and fans gains (cale (70)m= 3 3 Losses e.g. evapo (71)m= -95.8 -99 Water heating gains (72)m= 116.5 11	88 81.86 calculation see Table able 5), Wa ab Mar .75 119.75 culated in A 81 13.67 calculated i .37 208.82 culated in A 97 34.97 ains (Table .8 -95.8 s (Table 5) .4 110.03	74.94 of (65)m 5 and 5a tts Apr 119.75 ppendix 10.35 n Append 197.01 appendix 34.97 5a) 3 ative valu -95.8	74.57 only if c): May 119.75 L, equati 7.74 dix L, equat 182.1 L, equat 34.97 3 es) (Tab -95.8	Jun 119.75 ion L9 of 6.53 uation L 168.09 ion L15 34.97 3 le 5) -95.8	67.1 s in the c Jul 119.75 r L9a), a 7.06 13 or L1: 158.73 or L15a) 34.97 3 -95.8	71.5 dwelling Aug 119.75 lso see 9.18 3a), also 156.52 , also se 34.97 3 -95.8	70.71 or hot w Sep 119.75 Table 5 12.32 o see Tal 162.07 ee Table 34.97 3 -95.8	77.64 ater is fr Oct 119.75 15.64 ble 5 173.88 5 34.97 3 -95.8	80.13 om com Nov 119.75 18.25 188.79 34.97 3 -95.8	85.12 munity h Dec 119.75 19.46 202.81 34.97 3 -95.8		(66) (67) (68) (69) (70) (71)

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

Orientation: Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.45	x	11.28	x	0.63	x	0.7] =	8.45	(75)
Northeast _{0.9x} 0.77	X	4.58	x	11.28	x	0.63	x	0.7	=	15.79	(75)
Northeast 0.9x 0.77	X	2.45	x	22.97	x	0.63	x	0.7	=	17.2	(75)
Northeast _{0.9x} 0.77	X	4.58	x	22.97	x	0.63	x	0.7	=	32.15	(75)
Northeast _{0.9x} 0.77	X	2.45	x	41.38	x	0.63	x	0.7	=	30.98	(75)
Northeast 0.9x 0.77	X	4.58	x	41.38	x	0.63	x	0.7	=	57.92	(75)
Northeast _{0.9x} 0.77	X	2.45	x	67.96	x	0.63	x	0.7	=	50.88	(75)
Northeast _{0.9x} 0.77	X	4.58	x	67.96	x	0.63	x	0.7	=	95.12	(75)
Northeast _{0.9x} 0.77	X	2.45	x	91.35	x	0.63	x	0.7	=	68.4	(75)
Northeast _{0.9x} 0.77	X	4.58	x	91.35	x	0.63	x	0.7	=	127.86	(75)
Northeast _{0.9x} 0.77	X	2.45	x	97.38	x	0.63	x	0.7	=	72.92	(75)
Northeast _{0.9x} 0.77	X	4.58	x	97.38	x	0.63	x	0.7	=	136.31	(75)
Northeast _{0.9x} 0.77	X	2.45	x	91.1	x	0.63	x	0.7	=	68.21	(75)
Northeast _{0.9x} 0.77	X	4.58	x	91.1	x	0.63	X	0.7	=	127.51	(75)
Northeast _{0.9x} 0.77	X	2.45	x	72.63	x	0.63	x	0.7	=	54.38	(75)
Northeast _{0.9x} 0.77	X	4.58	x	72.63	X	0.63	x	0.7	=	101.66	(75)
Northeast _{0.9x} 0.77	X	2.45	x	50.42	x	0.63	X	0.7	=	37.75	(75)
Northeast 0.9x 0.77	x	4.58	x	50.42	x	0.63	x	0.7] =	70.57	(75)
Northeast 0.9x 0.77	X	2.45	x	28.07	x	0.63	x	0.7	=	21.02	(75)
Northeast 0.9x 0.77	X	4.58	x	28.07	x	0.63	x	0.7	<u> </u>	39.29	(75)
Northeast 0.9x 0.77	X	2.45	x	14.2	x	0.63	x	0.7	=	10.63	(75)
Northeast 0.9x 0.77	X	4.58	x	14.2	x	0.63	x	0.7	=	19.87	(75)
Northeast _{0.9x} 0.77	X	2.45	x	9.21	x	0.63	X	0.7	=	6.9	(75)
Northeast _{0.9x} 0.77	X	4.58	x	9.21	X	0.63	x	0.7	=	12.9	(75)
Southeast 0.9x 0.77	X	1.68	x	36.79	X	0.63	X	0.7	=	18.89	(77)
Southeast 0.9x 0.77	X	1.68	x	62.67	x	0.63	x	0.7	=	32.18	(77)
Southeast 0.9x 0.77	X	1.68	x	85.75	x	0.63	x	0.7	=	44.03	(77)
Southeast 0.9x 0.77	X	1.68	x	106.25	x	0.63	x	0.7	=	54.55	(77)
Southeast 0.9x 0.77	X	1.68	x	119.01	x	0.63	x	0.7	=	61.1	(77)
Southeast 0.9x 0.77	X	1.68	x	118.15	x	0.63	x	0.7	=	60.66	(77)
Southeast 0.9x 0.77	X	1.68	x	113.91	x	0.63	x	0.7	=	58.48	(77)
Southeast 0.9x 0.77	X	1.68	x	104.39	x	0.63	x	0.7	=	53.6	(77)
Southeast 0.9x 0.77	X	1.68	x	92.85	x	0.63	x	0.7	=	47.67	(77)
Southeast 0.9x 0.77	X	1.68	x	69.27	x	0.63	X	0.7	=	35.56	(77)
Southeast 0.9x 0.77	X	1.68	x	44.07	x	0.63	x	0.7	=	22.63	(77)
Southeast 0.9x 0.77	x	1.68	x	31.49	x	0.63	x	0.7	j =	16.17	(77)
Southwest _{0.9x} 0.77	x	0.77	x	36.79		0.63	x	0.7	j =	17.32	(79)
Southwest _{0.9x} 0.77	x	1.7	x	36.79]	0.63	x	0.7	j =	38.23	(79)
Southwest _{0.9x} 0.77	X	0.52	X	36.79		0.63	X	0.7	=	5.85	(79)

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Southwest _{0.9x}	0.77	X	0.77	X	62.67		0.63	X	0.7	=	29.5	(79)
Southwest _{0.9x}	0.77	X	1.7	Х	62.67		0.63	X	0.7	=	65.12	(79)
Southwest _{0.9x}	0.77	X	0.52	X	62.67		0.63	X	0.7] =	9.96	(79)
Southwest _{0.9x}	0.77	X	0.77	X	85.75		0.63	X	0.7	=	40.36	(79)
Southwest _{0.9x}	0.77	X	1.7	X	85.75		0.63	X	0.7	=	89.1	(79)
Southwest _{0.9x}	0.77	X	0.52	X	85.75		0.63	X	0.7	=	13.63	(79)
Southwest _{0.9x}	0.77	X	0.77	X	106.25		0.63	X	0.7	=	50.01	(79)
Southwest _{0.9x}	0.77	X	1.7	X	106.25		0.63	X	0.7	=	110.4	(79)
Southwest _{0.9x}	0.77	X	0.52	X	106.25		0.63	X	0.7	=	16.89	(79)
Southwest _{0.9x}	0.77	X	0.77	X	119.01		0.63	X	0.7	=	56.01	(79)
Southwest _{0.9x}	0.77	X	1.7	x	119.01		0.63	X	0.7	=	123.66	(79)
Southwest _{0.9x}	0.77	X	0.52	X	119.01		0.63	X	0.7	=	18.91	(79)
Southwest _{0.9x}	0.77	X	0.77	x	118.15		0.63	X	0.7	=	55.61	(79)
Southwest _{0.9x}	0.77	X	1.7	X	118.15		0.63	X	0.7	=	122.77	(79)
Southwest _{0.9x}	0.77	X	0.52	X	118.15		0.63	X	0.7	=	18.78	(79)
Southwest _{0.9x}	0.77	X	0.77	x	113.91		0.63	x	0.7	=	53.61	(79)
Southwest _{0.9x}	0.77	X	1.7	x	113.91		0.63	x	0.7	=	118.36	(79)
Southwest _{0.9x}	0.77	X	0.52	x	113.91		0.63	x	0.7	=	18.1	(79)
Southwest _{0.9x}	0.77	x	0.77	x	104.39		0.63	x	0.7	=	49.13	(79)
Southwest _{0.9x}	0.77	X	1.7	x	104.39		0.63	X	0.7	=	108.47	(79)
Southwest _{0.9x}	0.77	X	0.52	x	104.39		0.63	x	0.7	=	16.59	(79)
Southwest _{0.9x}	0.77	X	0.77	x	92.85		0.63	x	0.7	=	43.7	(79)
Southwest _{0.9x}	0.77	X	1.7	x	92.85		0.63	X	0.7	=	96.48	(79)
Southwest _{0.9x}	0.77	X	0.52	x	92.85		0.63	X	0.7	=	14.76	(79)
Southwest _{0.9x}	0.77	X	0.77	x	69.27		0.63	x	0.7	=	32.6	(79)
Southwest _{0.9x}	0.77	X	1.7	x	69.27		0.63	X	0.7	=	71.97	(79)
Southwest _{0.9x}	0.77	x	0.52	x	69.27		0.63	x	0.7	=	11.01	(79)
Southwest _{0.9x}	0.77	X	0.77	x	44.07		0.63	x	0.7	=	20.74	(79)
Southwest _{0.9x}	0.77	X	1.7	х	44.07		0.63	X	0.7	=	45.79	(79)
Southwest _{0.9x}	0.77	X	0.52	х	44.07		0.63	x	0.7	=	7	(79)
Southwest _{0.9x}	0.77	x	0.77	x	31.49		0.63	x	0.7] =	14.82	(79)
Southwest _{0.9x}	0.77	x	1.7	x	31.49		0.63	x	0.7] =	32.72	(79)
Southwest _{0.9x}	0.77	x	0.52	x	31.49		0.63	x	0.7] =	5	(79)
Northwest _{0.9x}	0.77	x	1.68	x	11.28	x	0.63	x	0.7] =	5.79	(81)
Northwest _{0.9x}	0.77	х	0.76	x	11.28	x	0.63	x	0.7] =	2.62	(81)
Northwest _{0.9x}	0.77	x	1.68	x	22.97	x	0.63	x	0.7	j =	11.79	(81)
Northwest _{0.9x}	0.77	x	0.76	x	22.97	x	0.63	x	0.7	=	5.33	(81)
Northwest _{0.9x}	0.77	x	1.68	x	41.38	x	0.63	x	0.7	j =	21.25	(81)
Northwest _{0.9x}	0.77	x	0.76	x	41.38	x	0.63	x	0.7] =	9.61	(81)
Northwest _{0.9x}	0.77	x	1.68	x	67.96	x	0.63	x	0.7	=	34.89	(81)
Northwest _{0.9x}	0.77	x	0.76	x	67.96	x	0.63	x	0.7	=	15.78	(81)
_		-		•		'		•		•		_

Northwest 0.9x 0.77	X	1.6	8	X	91	1.35	x	0.63	X	0.7	=	46.9	(81)
Northwest 0.9x 0.77	x	0.7	'6	X	91	1.35	x	0.63	x	0.7		21.22	(81)
Northwest 0.9x 0.77	х	1.6	18	X	97	7.38	x	0.63	x	0.7	_ =	50	(81)
Northwest 0.9x 0.77	х	0.7	6	X	97	7.38	x	0.63	x	0.7	=	22.62	(81)
Northwest 0.9x 0.77	х	1.6	i8	X	9	1.1	х	0.63	x	0.7	=	46.77	(81)
Northwest 0.9x 0.77	х	0.7	6	X	9	1.1	х	0.63	x	0.7	=	21.16	(81)
Northwest 0.9x 0.77	x	1.6	i8	X	72	2.63	x	0.63	x	0.7	=	37.29	(81)
Northwest 0.9x 0.77	х	0.7	6	X	72	2.63	x	0.63	x	0.7	=	16.87	(81)
Northwest 0.9x 0.77	х	1.6	i8	X	50).42	х	0.63	x	0.7	=	25.89	(81)
Northwest 0.9x 0.77	x	0.7	6	X	50).42	x	0.63	x	0.7	=	11.71	(81)
Northwest 0.9x 0.77	х	1.6	i8	X	28	3.07	x	0.63	x	0.7	=	14.41	(81)
Northwest 0.9x 0.77	x	0.7	' 6	X	28	3.07	x	0.63	x	0.7	=	6.52	(81)
Northwest 0.9x 0.77	x	1.6	i8	X	1.	4.2	x	0.63	x	0.7	=	7.29	(81)
Northwest 0.9x 0.77	х	0.7	6	X	1.	4.2	x	0.63	x	0.7	=	3.3	(81)
Northwest 0.9x 0.77	x	1.6	i8	X	9.	.21	x	0.63	x	0.7	=	4.73	(81)
Northwest 0.9x 0.77	x	0.7	6	X	9.	.21	x	0.63	×	0.7	=	2.14	(81)
	•						•						
Solar gains in watts, calcul	atad	for each	n month	,			(83)m	n = Sum(74)m	(82)m				
(83)m= 112.94 203.23 306	-	428.52	524.06	$\overline{}$	39.66	512.22	437		232.3	1	95.38	٦	(83)
Total gains – internal and							437	.90 340.34	232.3	0 137.23	95.56	J	(00)
		` 		-	<u> </u>		704	74 000 05	500 4	-	100.07	٦	(0.4)
(84)m= 522.47 610.73 701	.32	801.9	876.06	۱×	71.01	830.12	761	.71 683.05	588.1	7 517.51	493.97		(84)
							_			_			
7. Mean internal temperat	ure (heating	seasor	า)									
7. Mean internal temperate Temperature during heati					area fr	rom Tat	ole 9	, Th1 (°C)				21	(85)
·	ng pe	eriods ir	the liv	ing			ole 9	, Th1 (°C)				21	(85)
Temperature during heati	ng pe	eriods ir	the liv	ing n (s				, Th1 (°C)	Oct	Nov	Dec	21	(85)
Temperature during heati Utilisation factor for gains	ng pe for li lar	eriods ir ving are	the live a, h1,n	ing n (s	ee Tab	ole 9a)		ug Sep	Oct	: Nov 0.99	Dec 1	21	(85)
Temperature during heati Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0.99	ng pe for li lar	eriods ir ving are Apr 0.94	n the liv ea, h1,n May	ing n (s	ee Tab Jun 0.67	Jul 0.51	A 0.5	ug Sep 57 0.82		+		21	
Temperature during heati Utilisation factor for gains Jan Feb N (86)m= 1 0.99 0.99 Mean internal temperature	ng pe for li lar 98	eriods ir ving are Apr 0.94 iving are	n the liv ea, h1,n May 0.84 ea T1 (f	ing n (s	ee Tak Jun 0.67	ole 9a) Jul 0.51 os 3 to 7	0.5 7 in T	ug Sep 57 0.82 Table 9c)	0.97	0.99	1	21	(86)
Temperature during heati Utilisation factor for gains Jan Feb N (86)m= 1 0.99 0.99 Mean internal temperature (87)m= 19.59 19.77 20	for li lar 98 e in li	eriods ir ving are Apr 0.94 iving are 20.45	n the livea, h1,n May 0.84 ea T1 (f	ing n (s	Jun 0.67 w step	ole 9a) Jul 0.51 os 3 to 7 20.99	0.5 7 in T 20.	ug Sep 57 0.82 Table 9c) 98 20.85		0.99		21	
Temperature during heati Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0. Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heati	for li lar 98 e in li 07	eriods ir ving are Apr 0.94 iving are 20.45 eriods ir	n the livea, h1,n May 0.84 ea T1 (f 20.77	ing n (s follo	ee Tab Jun 0.67 ow step 20.94	Jul 0.51 os 3 to 7 20.99 from Ta	A 0.57 in T 20.	ug Sep 57 0.82 Table 9c) 98 20.85 9, Th2 (°C)	0.97	0.99	19.56	21	(86)
Temperature during heati Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0. Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heati	for li lar 98 e in li	eriods ir ving are Apr 0.94 iving are 20.45	n the livea, h1,n May 0.84 ea T1 (f	ing n (s follo	Jun 0.67 w step	ole 9a) Jul 0.51 os 3 to 7 20.99	0.5 7 in T 20.	ug Sep 57 0.82 Table 9c) 98 20.85 9, Th2 (°C)	0.97	0.99	1	21	(86)
Temperature during heati Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0. Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heati	for li far 98 e in li 07 ng pe	eriods ir ving are Apr 0.94 iving are 20.45 eriods ir 19.83	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of	ing n (s	Jun 0.67 w step 0.94 velling 9.84	Jul 0.51 os 3 to 7 20.99 from Ta	A 0.57 in T 20.	ug Sep 57 0.82 Table 9c) 98 20.85 9, Th2 (°C)	0.97	0.99	19.56	21	(86)
Temperature during heati Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0. Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heati (88)m= 19.81 19.82 19	for li for li far for li far for li for re	eriods ir ving are Apr 0.94 iving are 20.45 eriods ir 19.83	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of	ing (something) in (s	Jun 0.67 w step 0.94 velling 9.84	Jul 0.51 os 3 to 7 20.99 from Ta	A 0.57 in T 20.	ug Sep 57 0.82 Table 9c) 98 20.85 9, Th2 (°C) 85 19.84	0.97	0.99	19.56	21	(86)
Temperature during heating to the state of t	for li lar 98 e in li 07 ng pe 82 for re	eriods ir ving are Apr 0.94 iving are 20.45 eriods ir 19.83 est of do	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of 19.83 welling, 0.79	ing n (s	Jun 0.67 w step 0.94 relling 9.84 m (see	Jul 0.51 0.53 to 7 20.99 from Ta 19.84 e Table 0.38	A 0.57 in T 20.42 able 9 19.42 9a)	ug Sep 57 0.82 Table 9c) 98 20.85 9, Th2 (°C) 85 19.84	0.97 20.43 19.83	0.99	19.56	21	(86) (87) (88)
Temperature during heati Utilisation factor for gains Jan Feb N (86)m= 1 0.99 0.9 Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heati (88)m= 19.81 19.82 19 Utilisation factor for gains	for lillar lar lar lar lar lar lar lar lar lar	eriods ir ving are Apr 0.94 iving are 20.45 eriods ir 19.83 est of do	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of 19.83 welling, 0.79	ing n (s	Jun 0.67 w step 0.94 relling 9.84 m (see	Jul 0.51 0.53 to 7 20.99 from Ta 19.84 e Table 0.38	A 0.57 in T 20.42 able 9 19.42 9a)	ug Sep 67 0.82 Fable 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 to 7 in Tab	0.97 20.43 19.83	0.99 3 19.94 3 19.83 0.99	19.56		(86) (87) (88)
Temperature during heating the strict of the	for lillar lar lar lar lar lar lar lar lar lar	eriods ir ving are Apr 0.94 iving are 20.45 eriods ir 19.83 est of do 0.92 he rest	may the livea, h1,n May 0.84 ea T1 (for 20.77 in rest of 19.83 welling, 0.79 of dwelling	ing n (s	ee Tab Jun 0.67 w step 20.94 velling 9.84 m (see 0.57 T2 (fo	Jul 0.51 0.53 to 7 20.99 from Ta 19.84 e Table 0.38	A 0.5.7 in T 20. 20. 19. 19. 9a) 0.4	ug Sep 57 0.82 Sable 9c) 98 20.85 9, Th2 (°C) 85 19.84 to 7 in Tab 84 19.72	0.97 20.43 19.83 0.95 le 9c) 19.19	0.99 3 19.94 3 19.83 0.99	1 19.56 19.82 1 17.93		(86) (87) (88) (89)
Temperature during heating Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0.5 Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heating (88)m= 19.81 19.82 19 Utilisation factor for gains (89)m= 1 0.99 0.5 Mean internal temperature (90)m= 17.96 18.23 18	for li lar lar	eriods in ving are Apr 0.94 iving are 20.45 eriods in 19.83 est of do 0.92 he rest	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of 19.83 welling, 0.79 of dwel 19.62	ing (s)	ee Tab Jun 0.67 w step 20.94 relling 9.84 m (see 0.57 T2 (fo	Jul 0.51 0.51 0.53 to 7 20.99 from Ta 19.84 e Table 0.38 ollow ste	A 0.5 of 19.	ug Sep 67 0.82 Table 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 to 7 in Tab 84 19.72	0.97 20.43 19.83 0.95 le 9c) 19.19	0.99 3 19.94 3 19.83 0.99	1 19.56 19.82 1 17.93	0.37	(86) (87) (88) (89)
Temperature during heating Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0.5 Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heating (88)m= 19.81 19.82 19 Utilisation factor for gains (89)m= 1 0.99 0.5 Mean internal temperature (90)m= 17.96 18.23 18	for li lar lar	Apr 0.94 iving are 20.45 eriods in 19.83 est of do 0.92 he rest 19.2	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of 19.83 welling, 0.79 of dwel 19.62	ing (s)	ee Tab Jun 0.67 w step 20.94 relling 9.84 m (see 0.57 T2 (fo	Jul 0.51 0.51 0.53 to 7 20.99 from Ta 19.84 e Table 0.38 ollow ste	A 0.5 of 19.	ug Sep 67 0.82 Table 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 to 7 in Tab 84 19.72	0.97 20.43 19.83 0.95 le 9c) 19.19	0.99 3 19.94 3 19.83 0.99	1 19.56 19.82 1 17.93 4) =		(86) (87) (88) (89)
Temperature during heating Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0.5 Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heating (88)m= 19.81 19.82 19 Utilisation factor for gains (89)m= 1 0.99 0.5 Mean internal temperature (90)m= 17.96 18.23 18	for li lar	eriods in ving are Apr 0.94 iving are 20.45 eriods in 19.83 est of do 0.92 he rest	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of 19.83 welling, 0.79 of dwel 19.62	ing n (s follo f dw h2 fling 1	ee Tab Jun 0.67 w step 20.94 relling 9.84 m (see 0.57 T2 (fo	Jul 0.51 0.51 0.53 to 7 20.99 from Ta 19.84 e Table 0.38 ollow ste	A 0.5 of 19.	ug Sep 7 0.82 able 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 to 7 in Tab 84 19.72 — fLA) × T2	0.97 20.43 19.83 0.95 le 9c) 19.19	0.99 19.94 19.83 0.99 18.49 ving area ÷ (-	1 19.56 19.82 1 17.93		(86) (87) (88) (89)
Temperature during heating Utilisation factor for gains Jan Feb M (86)m= 1 0.99 0.5 Mean internal temperature (87)m= 19.59 19.77 20 Temperature during heating (88)m= 19.81 19.82 19 Utilisation factor for gains (89)m= 1 0.99 0.5 Mean internal temperature (90)m= 17.96 18.23 18 Mean internal temperature (92)m= 18.56 18.79 19 Apply adjustment to the meaning sains Apply adjustment to the meaning sains Utilisation factor for gains (89)m= 1 0.99 0.5 Mean internal temperature (90)m= 17.96 18.23 18	for li lar lar	eriods in ving are Apr 0.94 iving are 20.45 eriods in 19.83 est of do 0.92 he rest 19.2 the wh 19.66	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of 19.83 welling, 0.79 of dwel 19.62 ole dwe 20.04	ing (second second seco	ee Tab Jun 0.67 www step 0.94 relling 9.84 m (see 0.57 T2 (fo 9.81 g) = fL	Jul 0.51 0.51 0.51 0.59 from Ta 19.84 e Table 0.38 sllow ste 19.84 A × T1 20.26	A A 0.57 in T 20.	ug Sep 67 0.82 Fable 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 15 7 in Tab 84 19.72 — fLA) × T2 25 20.13	0.97 20.43 19.83 0.95 le 9c) 19.19 14.4 = Livitation 19.65	0.99 19.94 19.83 0.99 18.49 ving area ÷ (-	1 19.56 19.82 1 17.93 4) =		(86) (87) (88) (89) (90) (91)
Temperature during heating the state of the	for li lar lar	eriods in ving are Apr 0.94 iving are 20.45 eriods in 19.83 est of do 0.92 he rest 19.2 the wh 19.66	n the livea, h1,n May 0.84 ea T1 (f 20.77 n rest of 19.83 welling, 0.79 of dwel 19.62 ole dwe 20.04	ing n (s follo f dw h2 fling 1 h2 ratu	ee Tab Jun 0.67 www step 0.94 relling 9.84 m (see 0.57 T2 (fo 9.81 g) = fL	Jul 0.51 0.51 0.51 0.59 from Ta 19.84 e Table 0.38 sllow ste 19.84 A × T1 20.26	A A 0.57 in T 20.	ug Sep 67 0.82 Table 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 15 7 in Tab 84 19.72 — fLA) × T2 25 20.13 where appre	0.97 20.43 19.83 0.95 le 9c) 19.19 14.4 = Livitation 19.65	0.99 19.94 19.83 0.99 18.49 ving area ÷ (-	1 19.56 19.82 1 17.93 4) =		(86) (87) (88) (89) (90) (91)
Temperature during heating the state of the	for li lar lar	eriods in ving are Apr 0.94 iving are 20.45 eriods in 19.83 est of dv 0.92 he rest 19.2 the wh 19.66 internal	n the livea, h1,n May 0.84 ea T1 (for 20.77 en rest of 19.83 evelling, 0.79 en declared of dwelling, 0.62 en declared of dwelling, 0.62 en declared en	ing n (s follo f dw h2 fling 1 h2 ratu	ee Tak Jun 0.67 w step 0.94 velling 9.84 m (see 0.57 T2 (fo 9.81 g) = fL	Jul 0.51 os 3 to 7 20.99 from Ta 19.84 e Table 0.38 ollow ste 19.84 A × T1 20.26 m Table	A 0.5 7 in T 20. able 9 9a) 0.4 eps 3 19. + (1 20. able 4 4e,	ug Sep 67 0.82 Table 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 15 7 in Tab 84 19.72 — fLA) × T2 25 20.13 where appre	0.97 20.43 19.83 0.95 le 9c) 19.19 fLA = Li ^o 19.65 opriate	0.99 19.94 19.83 0.99 18.49 ving area ÷ (-	1 19.56 19.82 1 17.93 4) =		(86) (87) (88) (89) (90) (91)
Temperature during heating the state of the	for li lar lar	eriods in ving are Apr 0.94 iving are 20.45 eriods in 19.83 est of do 0.92 he rest 19.2 the who 19.66 internal 19.66 internal 19.66	n the lives, h1,n May 0.84 ea T1 (for 20.77 en rest of 19.83 evelling, 0.79 en dwelling, 0.79 en dwelling, 0.04 tempe 20.04 en	ing n (s follo follo ling 1 h2 ling 1 ratu	ee Tak Jun 0.67 w step 0.94 relling 9.84 m (see 0.57 T2 (fo 9.81 g) = fL 20.22 ure from 20.22	Jul 0.51 os 3 to 7 20.99 from Ta 19.84 e Table 0.38 ollow ste 19.84 A × T1 20.26 m Table 20.26	9a) 0.4 0.5 4eps 3 19.	ug Sep 67 0.82 Table 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 15 7 in Tab 84 19.72 — fLA) × T2 25 20.13 where apprecess 25 20.13	0.97 20.43 19.83 0.95 le 9c) 19.19 19.65 ppriate 19.65	0.99 19.94 19.83 0.99 18.49 ving area ÷ (1 19.56 19.82 1 17.93 4) =	0.37	(86) (87) (88) (89) (90) (91)
Temperature during heating the state of the	for li lar lar	eriods in ving are Apr 0.94 iving are 20.45 eriods in 19.83 est of do 0.92 he rest 19.2 the who 19.66 internal 19.66 internal 19.66	n the lives, h1,n May 0.84 ea T1 (for 20.77 en rest of 19.83 evelling, 0.79 en dwelling, 0.79 en dwelling, 0.04 tempe 20.04 en	ing n (s follo follo ling 1 h2 ling 1 ratu	ee Tak Jun 0.67 w step 0.94 relling 9.84 m (see 0.57 T2 (fo 9.81 g) = fL 20.22 ure from 20.22	Jul 0.51 os 3 to 7 20.99 from Ta 19.84 e Table 0.38 ollow ste 19.84 A × T1 20.26 m Table 20.26	9a) 0.4 0.5 4eps 3 19.	ug Sep 67 0.82 Table 9c) 98 20.85 9, Th2 (°C) 85 19.84 14 0.74 15 7 in Tab 84 19.72 — fLA) × T2 25 20.13 where apprecess 25 20.13	0.97 20.43 19.83 0.95 le 9c) 19.19 19.65 ppriate 19.65	0.99 19.94 19.83 0.99 18.49 ving area ÷ (1 19.56 19.82 1 17.93 4) =	0.37	(86) (87) (88) (89) (90) (91)

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Utilisatio	on factor for	gains, hr	n:										
	0.99 0.99	0.97	0.92	0.8	0.61	0.43	0.49	0.76	0.95	0.99	0.99		(94)
Useful (gains, hmGr	n , W = (9	4)m x (8	4)m		l			l	l			
(95)m= 5	519.03 602.6	1 679.67	735.72	700.67	529.63	358.6	373.77	522.2	556.31	510.89	491.41		(95)
Monthly	/ average ex	ternal ter	nperature	from Ta	able 8								
(96)m=	4.3 4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
	ss rate for m		 	î e		T			·				
` ′ _	456.51 1415.3		<u> </u>	836.32	558.3	363.33	382.05	601.73	907.35	1200.75	1449.6		(97)
	heating requ								<u> </u>				
(98)m= 6	597.48 546.1	8 452.5	249	100.92	0	0	0	0	261.18	496.7	712.89		7(00)
							Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	3516.84	(98)
Space h	heating requ	irement ir	n kWh/m²	²/year								45.92	(99)
9a. Ener	gy requirem	ents – Ind	dividual h	eating s	ystems i	ncluding	micro-C	CHP)					
-	heating:												_
Fraction	n of space h	eat from s	secondar	y/supple	mentary	system						0	(201)
Fraction	n of space h	eat from r	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction	n of total hea	ating from	main sys	stem 1			(204) = (2	02) x [1 –	(203)] =			1	(204)
Efficien	cy of main s	pace hea	ting syste	em 1								93.5	(206)
Efficien	cy of secon	dary/supp	lementar	y heatin	g systen	າ, %						0	(208)
	Jan Fel	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	– ar
Space I	heating requ	irement (calculate	d above)		•						
6	546.1	8 452.5	249	100.92	0	0	0	0	261.18	496.7	712.89		
(211)m =	= {[(98)m x (204)] } x	100 ÷ (20	06)									(211)
7	745.97 584.1	5 483.96	266.31	107.94	0	0	0	0	279.33	531.23	762.45		
							Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	F	3761.33	(211)
Space h	heating fuel	(seconda	ry), kWh/	month									_
	n x (201)] } x		1	i	i		i	i					
(215)m=	0 0	0	0	0	0	0	0	0	0	0	0		_
							lota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water he	_			l									
	rom water h		162	158.77	141.89	136.29	149.52	149.25	167.98	177.59	190.48		
	y of water h		1									79.8	(216)
	87.92 87.68		85.96	83.64	79.8	79.8	79.8	79.8	85.99	87.41	88.01		(217)
` ' _	water heatin					1				• • • • • • • • • • • • • • • • • • • •			, ,
	= (64)m x 1	-											
(219)m= 2	221.98 196.2	207.29	188.46	189.82	177.81	170.79	187.37	187.03	195.36	203.17	216.43		
							Tota	I = Sum(2	19a) ₁₁₂ =			2341.71	(219)
Annual t									k'	Wh/year		kWh/year	¬
-	eating fuel u		n system	1								3761.33	╛
Water he	eating fuel u	sed										2341.71	
Electricit	y for pumps	, fans and	l electric	keep-ho	t								

central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (230	0a)(230g) =		75	(231)
Electricity for lighting				334.34	(232)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b) =			6512.37	(338)
12a. CO2 emissions – Individual heating system	s including micro-CHP				
	Energy kWh/year	Emission fackg CO2/kWh		Emissions kg CO2/yea	ır
Space heating (main system 1)	(211) x	0.216	=	812.45	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	505.81	(264)
Space and water heating	(261) + (262) + (263) + (264) =			1318.25	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	=	173.52	(268)
Total CO2, kg/year	sur	m of (265)(271) =		1530.7	(272)
					_

TER =

(273)

29.45