#### **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 14:55:29* 

Project Information:

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

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 76.52m<sup>2</sup>

Site Reference: Fosters Estate Block D

Plot Reference: D2-08

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) 28.9 kg/m<sup>2</sup>

Dwelling Carbon Dioxide Emission Rate (DER) 12.40 kg/m<sup>2</sup> OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 59.9 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 53.7 kWh/m²

OK
2 Fabric U-values

Element Average Highest

External wall 0.15 (max. 0.30) 0.20 (max. 0.70) OK

Floor (no floor)

Roof 0.10 (max. 0.20) 0.10 (max. 0.35) **OK**Openings 1.35 (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 <sup>2</sup> K	
Community heating, heat from electric heat pump		

#### **Predicted Energy Assessment**

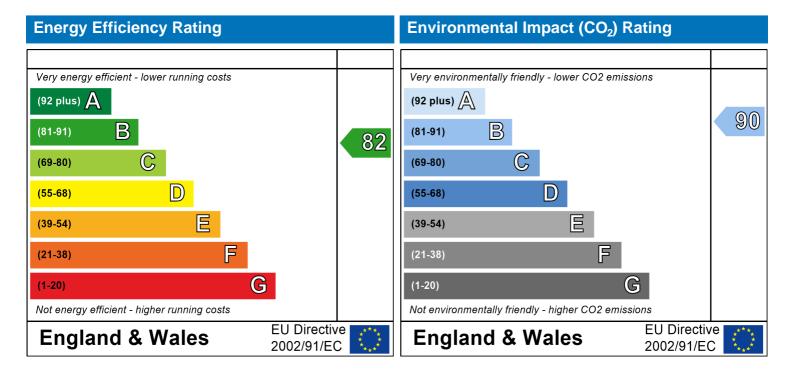


Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Mid floor Flat 13 October 2022 Ben Talbutt 76.52 m<sup>2</sup>

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.

#### **SAP Input**

#### Property Details: D2-08

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 76.52 m<sup>2</sup> 2.82 m

Living area: 27.76 m<sup>2</sup> (fraction 0.363)

Front of dwelling faces: Unspecified

#### Opening types:

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 F	actor: g-value:	U-value:	Area:	No. of (
Front Door	mm	1	0	0.91	2.52	1
Win 1	16mm or more	0.8	0.4	1.4	2.87	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	8.0	0.4	1.4	0.91	2
Win 5	16mm or more	0.8	0.4	1.4	2.01	2
Win 6	16mm or more	0.8	0.4	1.4	0.62	1
Win 7	16mm or more	0.8	0.4	1.4	0.91	1
Win 8	16mm or more	0.8	0.4	1.4	2.01	2

Name: Front Door	Type-Name:	Location: Ext Wall	Orient: North West	Width: 1.05	Height: 2.4
Win 1		Ext Wall	North East	1.471	1.95
Win 2		Ext Wall	North East	2.26	2.4
Win 3		Ext Wall	North West	1.02	1.95
Win 4		Ext Wall	South West	0.46	1.97
Win 5		Ext Wall	South West	1.02	1.97
Win 6		Ext Wall	South West	0.46	1.35
Win 7		Ext Wall	South East	0.46	1.97

Openings:

#### **SAP Input**

South East Win 8 Ext Wall 1.02 1.97 Overshading: Average or unknown Type: Gross area: Openings: Net area: U-value: Ru value: Curtain wall: Kappa: **External Elements** Ext Wall 77.35 24.19 53.16 0.14 0 False N/A Concrete Column 5.64 0 5.64 0.2 0 False N/A 21.34 0 21.34 0.9 False Common Area 0.2 N/A Roof 76.52 0 76.52 0.1 0 N/A **Internal Elements** Party Elements User-defined (individual PSI-values) Y-Value = 0.0672 Thermal bridges: Length Psi-value Other lintels (including other steel lintels) [Approved] 11.721 0.3 E2 Sill [Approved] 8.411 0.04 E3 [Approved] 47.68 0.05 E4 Jamb Party floor between dwellings (in blocks of flats) [Approved] 27.82 0.07 E7 E16 Corner (normal) 14.1 0.09 [Approved] Corner (inverted internal area greater than external area) [Approved] 2.82 -0.09E17 36.99 0.08 E14 Flat roof [Approved] E5 Ground floor (normal) 0 0.16 Intermediate floor within a dwelling [Approved] 0 0.07 E6 Exposed floor (normal) 0 0.32 E20 Party wall between dwellings [Approved] 0 0.06 E18 0 0.24 Р8 Exposed floor (inverted) P4 Roof (insulation at ceiling level) 0 0.24 Yes (As designed) Pressure test: Balanced with heat recovery Ventilation: 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: 0 Number of passive stacks: Number of sides sheltered: 2 Pressure test: 3 Main heating system: Community heating schemes 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 Main heating Control: thermostats Control code: 2312

None

Secondary heating system:

#### **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	
Software Name.		Property	Address		51011.		VEISIC	)II. 1.0.3.1 <i>1</i>	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			a(m²)	(1a) v		ight(m)	1(20)	Volume(m <sup>3</sup>	<u>^</u>
	-) . (4 -) . (4 -) . (4 -  ) . (4			(1a) x	2	.82	(2a) =	215.79	(3a)
·	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	76.52	(4)					_
Dwelling volume				(3a)+(3b	)+(3c)+(3c	d)+(3e)+	.(3n) =	215.79	(5)
2. Ventilation rate:	main seconda	r\/	other		total			m³ per hou	ır
N. adam of all lands	heating heating	<u> </u>		, ,			10		_
Number of chimneys	0 + 0	╛╵┢	0	<u> </u>	0		40 =	0	(6a)
Number of open flues	0 + 0	+	0	] = [	0		20 =	0	(6b)
Number of intermittent fa	ns				0	x 1	10 =	0	(7a)
Number of passive vents					0	x 1	10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	our.
Infiltration due to chimne	ve flues and fans (62) (6b) (	7a\	(70) -	Г					_
'	ys, flues and fans = $(6a)+(6b)+(6b)+(6b)$ een carried out or is intended, proceed			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		,,			(-)	/		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are particles of openial deducting areas of openial deductions.	resent, use the value corresponding t ngs); if equal user 0.35	o the grea	ter wall are	a (after					
If suspended wooden to	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
-	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-	. (45)		0	(15)
Infiltration rate	q50, expressed in cubic metro	oe por b	(8) + (10)				oroo	0	(16)
•	lity value, then $(18) = [(17) \div 20] +$	•		•	elle oi e	invelope	aica	0.15	(17)
•	es if a pressurisation test has been do				is being u	sed		0.10	()
Number of sides sheltered	ed							2	(19)
Shelter factor			(20) = 1 -		19)] =			0.85	(20)
Infiltration rate incorporat	•		(21) = (18	) x (20) =				0.13	(21)
Infiltration rate modified f	<del>- 1                                   </del>	1 11		Con	Oct	Nov	Doo	]	
Jan Feb	Mar   Apr   May   Jun	Jul	Aug	Sep	Oct	INOV	Dec		
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
\ -/···   \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-       3.0	1	1 ""	<u> </u>	<u> </u>	1	L	I	
Wind Factor (22a)m = (2	<del></del>							1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rate	e (allowi	ng for sh	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 effe		•	rate for t	he appli	cable ca	ise		!			!	· 	
If mechanic			o dia N. 70	10h) (00		( (	\(\f\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		\ (00-)			0.5	(23a
If exhaust air h		0		, ,	,	. ,	,, .	,	) = (23a)			0.5	(23b
If balanced with		-	-	_					<b>.</b>		4 (00 )	74.8	(230
a) If balance	ed mecha	anical ve		with he	i	ery (MVI 0.25	HR) (248   <sub>0.24</sub>	a)m = (22) 0.25	<del> </del>		1 – (23c) 0.28	i ÷ 100] I	(24a
(24a)m= 0.29			0.27	l .	0.25			<u> </u>	0.26	0.27	0.26	J	(246
b) If balance	ed mecha 0	anicai ve	ontilation	without	neat red	covery (r	0 0	0)m = $(22$	2b)m + (. 0	23D) 0		1	(24b
` '			<u> </u>	ļ	<u> </u>	<u> </u>	<u> </u>		0	0	0	J	(24)
c) If whole h	nouse ext m < 0.5 ×			•	•				5 x (23h	)			
(24c)m = 0	0.0%	0	0	0	0	0	0) = (22.	0	0	0	0	]	(240
d) If natural	ventilatio	n or wh	ole hous	ļ	<u> </u>	ventilatio	on from	<u> </u>				J	
,	m = 1, the			•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change	rate - er	nter (24a	) or (24k	o) or (24	c) or (24	d) in bo	(25)				•	
(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)
3. Heat losse	es and he	at loss r	narameti	or.									
ELEMENT	Gros area	S	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	<b>〈</b> )	k-value kJ/m²-l		A X k kJ/K
Doors					2.52	X	0.91		2.2932				(26)
Windows Type	e 1				2.87	x1,	/[1/( 1.4 )+	0.04] =	3.8	=			(27)
Windows Type	e 2					_ ,							
Windows Type	e 3				5.42	x1	/[1/( 1.4 )+	0.04] =	7.19				(27)
Mindows To	-				1.99		/[1/( 1.4 )+ /[1/( 1.4 )+	L	7.19				, ,
vviriaows Type					1.99	x1		0.04] =	2.64				(27)
• •	e 4				1.99	x1 x1	/[1/( 1.4 )+	0.04] = [ 0.04] = [	2.64 1.21				(27) (27)
Windows Type	e 4 e 5				1.99 0.91 2.01	x1 x1 x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+	$0.04$ ] = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$	2.64 1.21 2.66				(27) (27) (27)
Windows Type Windows Type	e 4 e 5 e 6				1.99 0.91 2.01 0.62	x1 x1 x1 x1 x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+	0.04] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [	2.64 1.21 2.66 0.82				(27) (27) (27) (27)
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Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Roof Total area of e * for windows and ** include the area Fabric heat los	e 4 e 5 e 6 e 7 e 8  77.33  76.52 elements, d roof windo as on both s ss, W/K = Cm = S(A	4 2 , m <sup>2</sup> pws, use e sides of in = S (A x A x k)	0 0 0 effective winternal walk	indow U-va	1.99 0.91 2.01 0.62 0.91 2.01 53.16 5.64 21.32 76.52 180.8 alue calculatitions	x1 x	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 	$0.04] = \begin{bmatrix} \\ 0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix} + (32) = ((28)$	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13 3.62 7.65	2) + (32a).		50.86	(27) (27) (27) (27) (27) (29) (29) (29) (30) (31)

can be u	ısed instea	ad of a de	tailed calc	ulation.										
			x Y) cal		using Ap	pendix I	K						12.16	(36)
	_	,	are not kn		• .	•								` ′
Total fa	abric hea	at loss							(33) +	(36) =			63.02	(37)
Ventila	tion hea	t loss ca	alculated	monthly	у				(38)m	= 0.33 × (	25)m x (5)	)	_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	20.55	20.32	20.09	18.96	18.73	17.6	17.6	17.37	18.05	18.73	19.19	19.64		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m		_	
(39)m=	83.57	83.34	83.11	81.98	81.75	80.62	80.62	80.39	81.07	81.75	82.21	82.66		
Heat Ic	ss para	meter (H	HLP), W	m²K						Average = = (39)m ÷		12 /12=	81.92	(39)
(40)m=	1.09	1.09	1.09	1.07	1.07	1.05	1.05	1.05	1.06	1.07	1.07	1.08		
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) <sub>1</sub>	12 /12=	1.07	(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:	
Λ	رمم مما		N I										1	(40)
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 (	ΓFA -13.		.39		(42)
Annual	l averag	e hot wa						(25 x N)				.05	]	(43)
		_	hot water person per			_	_	to achieve	a water us	se target o	f		4	
1101 111010					<u> </u>	i .	•	T .	0	0.1	N	<u> </u>	1	
Hot wate	Jan er usage in	Feb	Mar day for ea	Apr ach month	May $Vd.m = fa$	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	100.15	96.51	92.87	89.23	85.58	81.94	81.94	85.58	89.23	92.87	96.51	100.15	1	
(44)111=	100.13	90.51	92.01	09.23	05.50	01.94	01.94	00.00		Total = Su	<u> </u>		1092.55	(44)
Energy o	content of	hot water	used - cal	culated me	onthly $= 4$ .	190 x Vd,r	m x nm x L	OTm / 3600					1092.55	(
(45)m=	148.52	129.9	134.04	116.86	112.13	96.76	89.66	102.89	104.12	121.34	132.45	143.83	]	
			!		!					Total = Su	m(45) <sub>112</sub> =	-	1432.51	(45)
If instant	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46	) to (61)					
(46)m=	22.28	19.48	20.11	17.53	16.82	14.51	13.45	15.43	15.62	18.2	19.87	21.58		(46)
	storage		includir	na anv si	olar or M	WHRS	etorada	within sa	ma vas	دما		0	1	(47)
_		` ,	ind no ta	•			_		illic ves	9 <u>C</u> I		0		(47)
	-	_			_			mbi boil	ers) ente	er '0' in (	47)			
	storage			(					,		, ,			
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0	]	(48)
Tempe	rature fa	actor fro	m Table	2b								0	]	(49)
• • • • • • • • • • • • • • • • • • • •			storage	-				(48) x (49)	=		1	10	]	(50)
•			eclared o	-									- 1	,= ··
		_	factor free section		le ∠ (KVV	n/ntre/da	1y <i>)</i>				0.	.02	J	(51)
	e factor	_		511 T.U							1.	.03	1	(52)
			m Table	2b								0.6	1	(53)
													•	

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	)3		(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 32.0	1 30.98	32.01		(56)
If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷	(50), else (57)m = (56)m whe	re (H11) is fror	n Appendi	кН	
(57)m= 32.01 28.92 32.01 30.98 32.01 30.98 32.01	32.01 30.98 32.0	30.98	32.01		(57)
Primary circuit loss (annual) from Table 3		0	)		(58)
Primary circuit loss calculated for each month (59)m = (58) ÷ 3	365 × (41)m				
(modified by factor from Table H5 if there is solar water hea	ting and a cylinder ther	mostat)			
(59)m= 23.26 21.01 23.26 22.51 23.26 22.51 23.26	23.26 22.51 23.2	26 22.51	23.26		(59)
Combi loss calculated for each month (61)m = (60) $\div$ 365 x (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 month	$h (62)m = 0.85 \times (45)m$	ı + (46)m + (	(57)m +	(59)m + (61)m	
(62)m= 203.8 179.82 189.32 170.35 167.41 150.25 144.94	158.17 157.61 176.0	62 185.95	199.11		(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quan	ity) (enter '0' if no solar contri	ibution to water	r heating)		
(add additional lines if FGHRS and/or WWHRS applies, see A	ppendix G)				
(63)m= 0 0 0 0 0 0	0 0 0	0	0		(63)
Output from water heater					
(64)m= 203.8 179.82 189.32 170.35 167.41 150.25 144.94	158.17 157.61 176.0	62 185.95	199.11		
	Output from water he	ater (annual) 1	.12	2083.35	(64)
Heat gains from water heating, kWh/month 0.25 ´ [0.85 × (45)	m + (61)ml + 0.8 x [(46)	)m + (57)m ·	+ (59)m	1	
	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	, (3.,	. (00)	1	
(65)m= 93.6 83.13 88.79 81.65 81.5 74.97 74.03	78.43 77.41 84.5	<u> </u>	92.05	I	(65)
(65)m= 93.6 83.13 88.79 81.65 81.5 74.97 74.03 include (57)m in calculation of (65)m only if cylinder is in the	78.43 77.41 84.5	86.84	92.05		(65)
` '	78.43 77.41 84.5	86.84	92.05		(65)
include (57)m in calculation of (65)m only if cylinder is in the 5. Internal gains (see Table 5 and 5a):	78.43 77.41 84.5	86.84	92.05		(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	78.43 77.41 84.5 dwelling or hot water is	86.84 s from comr	92.05		(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	78.43 77.41 84.5 dwelling or hot water is	s from comr	92.05 munity he		(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  Jan Feb Mar Apr May Jun Jul (66)m= 143.61 143.61 143.61 143.61 143.61 143.61 143.61	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Oc  143.61 143.61 143.6	s from comr	92.05 munity he		
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	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Oc  143.61 143.61 143.6	86.84 s from comr	92.05 munity he		
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= 143.61 14	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Oc  143.61 143.61 143.6 also see Table 5  22.9 30.74 39.0	86.84 s from comr	92.05 munity he		(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= 143.61 143.61 143.61 143.61 143.61 143.61  Lighting gains (calculated in Appendix L, equation L9 or L9a),	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Oc 143.61 143.61 143.6 also see Table 5 22.9 30.74 39.0 13a), also see Table 5	86.84 s from comment	92.05 munity he		(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= 143.61 14	78.43 77.41 84.5  dwelling or hot water is  Aug Sep Oc  143.61 143.61 143.6  also see Table 5  22.9 30.74 39.0  13a), also see Table 5  233.45 241.72 259.3	86.84 s from comment	92.05 munity he Dec 143.61		(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= 143.61 14	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Oc  143.61 143.61 143.6 also see Table 5 22.9 30.74 39.0 13a), also see Table 5 233.45 241.72 259.3 a), also see Table 5	86.84 s from comr  the Nov 61 143.61 s 45.56 s 45.56	92.05 munity he Dec 143.61		(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= 143.61 14	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Oc  143.61 143.61 143.6 also see Table 5 22.9 30.74 39.0 13a), also see Table 5 233.45 241.72 259.3 a), also see Table 5	86.84 s from comr  t Nov 61 143.61  33 45.56	92.05 munity he Dec 143.61 48.57		(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= 143.61 14	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Oc  143.61 143.61 143.6 also see Table 5 22.9 30.74 39.0 13a), also see Table 5 233.45 241.72 259.3 a), also see Table 5 51.75 51.75 51.7	86.84   86.84   s from comment   86.84   s fro	92.05 munity he  Dec 143.61  48.57  302.48		(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= 143.61 14	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Oc  143.61 143.61 143.6 also see Table 5 22.9 30.74 39.0 13a), also see Table 5 233.45 241.72 259.3 a), also see Table 5	86.84 s from comr  t Nov 61 143.61  33 45.56	92.05 munity he Dec 143.61 48.57		(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= 143.61 14	78.43 77.41 84.5  dwelling or hot water is  Aug Sep Oct 143.61 143.61 143.6  also see Table 5  22.9 30.74 39.0  13a), also see Table 5  233.45 241.72 259.3  a), also see Table 5  51.75 51.75 51.7	86.84 s from comr  Ct Nov 61 143.61 s 45.56 s 51.75 s 51.75	92.05 munity he  Dec 143.61  48.57  302.48		(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= 143.61 14	78.43 77.41 84.5  dwelling or hot water is  Aug Sep Oct 143.61 143.61 143.6  also see Table 5  22.9 30.74 39.0  13a), also see Table 5  233.45 241.72 259.3  a), also see Table 5  51.75 51.75 51.7	86.84 s from comr  Ct Nov 61 143.61 s 45.56 s 51.75 s 51.75	92.05 munity he  Dec 143.61  48.57  302.48		(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= 143.61 14	78.43 77.41 84.5 dwelling or hot water is  Aug Sep Occ 143.61 143.61 143.6 also see Table 5 22.9 30.74 39.0 13a), also see Table 5 233.45 241.72 259.3 a), also see Table 5 51.75 51.75 51.7 0 0 0 0	86.84   86.84   s from comment   86.84   s fro	92.05 munity he Dec 143.61 48.57 302.48 51.75 0		(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= 143.61 14	78.43 77.41 84.5  dwelling or hot water is  Aug Sep Occ 143.61 143.61 143.6  also see Table 5 22.9 30.74 39.0  13a), also see Table 5 3 233.45 241.72 259.3  a), also see Table 5 51.75 51.75 51.7  0 0 0 0  -95.74 -95.74 -95.7  105.42 107.52 113.6	86.84   86.84   s from common	92.05 munity he  Dec 143.61  48.57  302.48  51.75  0  -95.74		(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in the state of the state	78.43 77.41 84.5  dwelling or hot water is  Aug Sep Occ 143.61 143.61 143.6  also see Table 5 22.9 30.74 39.0  13a), also see Table 5 3 233.45 241.72 259.3  a), also see Table 5 51.75 51.75 51.7  0 0 0  -95.74 -95.74 -95.7  105.42 107.52 113.6  m + (68)m + (69)m + (70)m -	86.84   86.84   s from comment   86.84   s fro	92.05 munity he Dec 143.61 48.57 302.48 51.75 0 -95.74		(66) (67) (68) (69) (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= 143.61 14	78.43 77.41 84.5  dwelling or hot water is  Aug Sep Occ 143.61 143.61 143.6  also see Table 5 22.9 30.74 39.0  13a), also see Table 5 3 233.45 241.72 259.3  a), also see Table 5 51.75 51.75 51.7  0 0 0  -95.74 -95.74 -95.7  105.42 107.52 113.6  m + (68)m + (69)m + (70)m -	86.84   86.84   s from comment   86.84   s fro	92.05 munity he  Dec 143.61  48.57  302.48  51.75  0  -95.74		(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	or	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.87	x	11.28	x	0.4	x	0.8	=	7.18	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	11.28	x	0.4	x	0.8	=	13.56	(75)
Northeast 0.9x 0.77	X	2.87	x	22.97	x	0.4	x	0.8	=	14.62	(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	2.87	x	41.38	x	0.4	x	0.8	=	26.34	(75)
Northeast 0.9x 0.77	X	5.42	x	41.38	x	0.4	x	0.8	=	49.73	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	67.96	x	0.4	X	0.8	=	43.25	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	67.96	x	0.4	x	0.8	=	81.68	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	91.35	x	0.4	x	0.8	=	58.14	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	91.35	x	0.4	x	0.8	=	109.79	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	97.38	x	0.4	x	0.8	=	61.98	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	97.38	x	0.4	x	0.8	=	117.05	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	91.1	x	0.4	x	0.8	=	57.98	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	91.1	x	0.4	x	0.8	=	109.5	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	72.63	x	0.4	x	0.8	=	46.22	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	72.63	x	0.4	X	0.8	=	87.29	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	50.42	x	0.4	x	0.8	=	32.09	(75)
Northeast 0.9x 0.77	X	5.42	x	50.42	x	0.4	x	0.8	=	60.6	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	28.07	x	0.4	X	0.8	=	17.86	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	28.07	x	0.4	x	0.8	=	33.74	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	14.2	x	0.4	x	0.8	=	9.04	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	14.2	x	0.4	X	0.8	=	17.06	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	9.21	x	0.4	x	0.8	=	5.86	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	9.21	x	0.4	x	0.8	=	11.07	(75)
Southeast 0.9x 0.77	X	0.91	x	36.79	x	0.4	x	0.8	=	7.43	(77)
Southeast 0.9x 0.77	X	2.01	x	36.79	x	0.4	x	0.8	=	32.8	(77)
Southeast 0.9x 0.77	X	0.91	x	62.67	x	0.4	x	0.8	=	12.65	(77)
Southeast 0.9x 0.77	X	2.01	X	62.67	x	0.4	X	0.8	=	55.87	(77)
Southeast 0.9x 0.77	X	0.91	x	85.75	x	0.4	X	0.8	=	17.31	(77)
Southeast 0.9x 0.77	X	2.01	x	85.75	x	0.4	X	0.8	=	76.45	(77)
Southeast 0.9x 0.77	X	0.91	x	106.25	x	0.4	X	0.8	=	21.44	(77)
Southeast 0.9x 0.77	X	2.01	x	106.25	x	0.4	X	0.8	=	94.72	(77)
Southeast 0.9x 0.77	X	0.91	x	119.01	x	0.4	x	0.8	=	24.02	(77)
Southeast 0.9x 0.77	X	2.01	x	119.01	x	0.4	x	0.8	=	106.1	(77)
Southeast 0.9x 0.77	X	0.91	x	118.15	x	0.4	x	0.8	=	23.84	(77)
Southeast 0.9x 0.77	X	2.01	x	118.15	x	0.4	x	0.8	=	105.33	(77)
Southeast 0.9x 0.77	X	0.91	x	113.91	x	0.4	x	0.8	=	22.99	(77)
Southeast 0.9x 0.77	X	2.01	x	113.91	x	0.4	x	0.8	=	101.55	(77)
Southeast 0.9x 0.77	x	0.91	×	104.39	×	0.4	x	0.8	=	21.07	(77)

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Southeast 0.9x	0.77	X	2.01	X	104.39	X	0.4	X	0.8	=	93.06	(77)
Southeast <sub>0.9x</sub>	0.77	X	0.91	X	92.85	X	0.4	X	0.8	=	18.74	(77)
Southeast <sub>0.9x</sub>	0.77	X	2.01	X	92.85	X	0.4	X	0.8	=	82.78	(77)
Southeast <sub>0.9x</sub>	0.77	X	0.91	X	69.27	X	0.4	X	0.8	=	13.98	(77)
Southeast 0.9x	0.77	X	2.01	x	69.27	x	0.4	X	0.8	=	61.75	(77)
Southeast 0.9x	0.77	X	0.91	X	44.07	x	0.4	X	0.8	=	8.89	(77)
Southeast 0.9x	0.77	X	2.01	x	44.07	x	0.4	X	0.8	=	39.29	(77)
Southeast 0.9x	0.77	X	0.91	x	31.49	x	0.4	x	0.8	=	6.35	(77)
Southeast 0.9x	0.77	X	2.01	X	31.49	x	0.4	x	0.8	=	28.07	(77)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	36.79	]	0.4	x	0.8	] =	14.85	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	36.79	]	0.4	x	0.8	=	32.8	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	36.79	]	0.4	x	0.8	=	5.06	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	62.67	]	0.4	x	0.8	=	25.3	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	62.67	]	0.4	x	0.8	=	55.87	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	62.67	]	0.4	x	0.8	=	8.62	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	85.75	]	0.4	x	0.8	=	34.61	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	85.75	]	0.4	X	0.8	=	76.45	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	85.75	]	0.4	x	0.8	=	11.79	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	106.25	]	0.4	x	0.8	=	42.88	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	106.25	]	0.4	x	0.8	=	94.72	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	106.25	]	0.4	x	0.8	=	14.61	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	119.01	]	0.4	x	0.8	=	48.03	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	119.01	]	0.4	X	0.8	=	106.1	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	119.01	]	0.4	x	0.8	=	16.36	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	118.15	]	0.4	X	0.8	=	47.69	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	118.15	]	0.4	x	0.8	=	105.33	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	118.15	]	0.4	x	0.8	=	16.24	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	113.91	]	0.4	x	0.8	=	45.97	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	113.91	]	0.4	x	0.8	=	101.55	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	113.91	]	0.4	x	0.8	=	15.66	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	104.39	]	0.4	x	0.8	=	42.13	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	104.39	]	0.4	x	0.8	=	93.06	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	104.39	]	0.4	x	0.8	=	14.35	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	92.85	]	0.4	x	0.8	=	37.48	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	92.85	]	0.4	x	0.8	=	82.78	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	92.85	]	0.4	x	0.8	=	12.77	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	69.27	]	0.4	x	0.8	=	27.96	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	69.27	]	0.4	x	0.8	=	61.75	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.62	x	69.27	]	0.4	x	0.8	=	9.52	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	44.07	]	0.4	x	0.8	=	17.79	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	44.07	]	0.4	x	0.8	=	39.29	(79)

								_						
Southwest <sub>0.9x</sub>	0.77	X	0.6	62	X	4	4.07	]	0.4	X	0.8	=	6.06	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.9	91	X	3	1.49	]	0.4	X	0.8	=	12.71	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.0	)1	X	3	1.49	]	0.4	X	0.8	=	28.07	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.6	62	X	3	1.49	]	0.4	x	0.8	=	4.33	(79)
Northwest 0.9x	0.77	х	1.9	99	X	1	1.28	x	0.4	x	0.8	=	4.98	(81)
Northwest 0.9x	0.77	x	1.9	99	X	2	2.97	x	0.4	x	0.8	=	10.14	(81)
Northwest 0.9x	0.77	x	1.9	99	X	4	1.38	x	0.4	×	0.8	=	18.26	(81)
Northwest 0.9x	0.77	x	1.9	99	X	6	7.96	x	0.4	x	0.8	=	29.99	(81)
Northwest 0.9x	0.77	x	1.9	99	X	9	1.35	x	0.4	x	0.8	=	40.31	(81)
Northwest 0.9x	0.77	х	1.9	99	X	9	7.38	x	0.4	x	0.8	=	42.98	(81)
Northwest 0.9x	0.77	x	1.9	99	X	9	91.1	x	0.4	x	0.8	=	40.2	(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	1.9	99	X	5	0.42	x	0.4	×	0.8	=	22.25	(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	1.9	99	X	1	14.2	x	0.4	x	0.8	=	6.27	(81)
Northwest 0.9x	0.77	x	1.9	99	X	9	9.21	x	0.4	x	0.8	=	4.07	(81)
								-						
Solar gains in	watts, cald	culated	for eac	h month	า			(83)m	n = Sum(74)m .	(82)m	l			
(83)m= 118.66		310.93	423.29	508.84	$\overline{}$	20.44	495.4	429	.24 349.47	238.9	4 143.68	100.54	]	(83)
Total gains – ii	nternal an	d solar	(84)m =	= (73)m	+ (8	83)m	watts						4	
(84)m= 707.79	795.69	875.48	956	1008.93	9	91.19	948.89	890	.64 829.08	750.6	1 691.04	674.93	]	(84)
7. Mean inter	nal temne	ratura (	heating		- \			•		•			-	
				seasor	1									
	•	`				area f	rom Tab	ole 9	. Th1 (°C)				21	(85)
Temperature	during he	ating pe	eriods ir	n the livi	ing			ole 9	, Th1 (°C)				21	(85)
Temperature Utilisation fac	during heat	ating pe	eriods ir ving are	n the livi	ing n (s	ee Ta	ble 9a)			Oc	t Nov	Dec	21	(85)
Temperature Utilisation fac	during he	ating pe	eriods ir ving are Apr	n the livi	ing n (s	ee Ta Jun			ug Sep	Oc	+	Dec 0.99	21	(85)
Temperature Utilisation fac  Jan  (86)m= 0.99	during heator for gain	ating penns for li	eriods ir ving are Apr 0.86	n the livi ea, h1,n May	ing n (s	ee Ta Jun <sup>0.51</sup>	Jul 0.37	A 0.4	ug Sep 11 0.65	-	+		21	
Temperature Utilisation fac  Jan (86)m= 0.99  Mean interna	during heater for gain Feb 0.97	ating pens for li Mar 0.94	eriods ir ving are Apr 0.86 iving are	n the livi ea, h1,m May 0.7	ing n (s	ee Ta Jun <sup>0.51</sup> w ste	ble 9a)  Jul  0.37  ps 3 to 7	0.4	ug Sep 11 0.65 able 9c)	0.89	0.97	0.99	21	(86)
Temperature Utilisation fac  Jan  (86)m= 0.99	during heater for gain Feb 0.97	ating penns for li	eriods ir ving are Apr 0.86	n the livi ea, h1,n May	ing n (s	ee Ta Jun <sup>0.51</sup>	Jul 0.37	A 0.4	ug Sep 11 0.65 able 9c)	-	0.97		21	
Temperature  Utilisation fac  Jan  (86)m= 0.99  Mean interna (87)m= 20.13  Temperature	during heater for gain Feb 0.97 temperat 20.3 during heater temperates	ating pens for limber of the second s	eriods ir ving are Apr 0.86 iving are 20.78 eriods ir	n the living the hand may 0.7 ea T1 (for 20.94 ea T1 of	ing n (s follo	ee Ta Jun 0.51 ww ste 20.99	ble 9a)  Jul  0.37  ps 3 to 7  21  from Ta	A 0.47 in T 2 able 9	ug Sep 11 0.65 Table 9c) 1 20.97 9, Th2 (°C)	20.7	7 20.41	0.99	21	(86)
Temperature  Utilisation fac  Jan  (86)m= 0.99  Mean interna (87)m= 20.13	during heater for gain Feb 0.97 temperat 20.3 during heater temperates	ating pens for li Mar 0.94 cure in li 20.53	eriods ir ving are Apr 0.86 iving are	n the livi ea, h1,n May 0.7 ea T1 (f	ing n (s follo	ee Ta Jun 0.51 ow ste	ble 9a)  Jul  0.37  ps 3 to 7	A 0.47 in T 2	ug Sep 11 0.65 Table 9c) 1 20.97 9, Th2 (°C)	0.89	7 20.41	0.99	21	(86)
Temperature  Utilisation fac  Jan  (86)m= 0.99  Mean interna (87)m= 20.13  Temperature	during heater for gain feb 0.97 temperate 20.3 during heater 20.01	ns for li Mar 0.94 cure in li 20.53 ating pe	Apr 0.86 iving are 20.78 eriods ir	m the living the hand may not	ing (s) (s) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d	ee Ta Jun 0.51 w ste 0.99 relling	Jul 0.37 ps 3 to 7 21 from Ta 20.04	A 0.47 in T 2 able 9 20.	ug Sep 11 0.65 Table 9c) 1 20.97 9, Th2 (°C)	20.7	7 20.41	0.99	21	(86)
Temperature  Utilisation fac  Jan  (86)m= 0.99  Mean interna (87)m= 20.13  Temperature (88)m= 20.01	during heater for gain feb 0.97 temperate 20.3 during heater 20.01	ns for li Mar 0.94 cure in li 20.53 ating pe	Apr 0.86 iving are 20.78 eriods ir	m the living the hand may not	ing (s)	ee Ta Jun 0.51 w ste 0.99 relling	Jul 0.37 ps 3 to 7 21 from Ta 20.04	A 0.47 in T 2 able 9 20.	ug Sep 11 0.65  Table 9c) 1 20.97  9, Th2 (°C) 04 20.03	20.7	7 20.41	0.99	21	(86)
Temperature  Utilisation factors  Jan  (86)m= 0.99  Mean interna  (87)m= 20.13  Temperature  (88)m= 20.01  Utilisation factors  (89)m= 0.98	during heater for gain feet temperate 20.3 during heater 20.01 eter for gain 0.96	ating pens for line Mar 0.94 cure in line 20.53 ating pens 20.01 cure for reconstruction of the cure of the cure in line 20.53	eriods ir ving are Apr 0.86 iving are 20.78 eriods ir 20.02 est of d	n the living the hand the living the hand the ha	ing (s)	ee Ta Jun 0.51  ww ste 20.99  velling 20.04  m (se 0.44	ble 9a)  Jul  0.37  ps 3 to 7  21  from Ta  20.04  re Table  0.29	A 0.47 in T 2 able 9 20. 9a) 0.3	ug Sep 11 0.65  Table 9c) 1 20.97  9, Th2 (°C) 04 20.03	20.77 20.03	7 20.41	20.1	21	(86) (87) (88)
Temperature  Utilisation factors  Jan  (86)m= 0.99  Mean interna  (87)m= 20.13  Temperature  (88)m= 20.01  Utilisation factors	during heater for gain feb 0.97 ltemperate 20.3 during heater for gain 0.96 ltemperate	ating pens for line Mar 0.94 cure in line 20.53 ating pens 20.01 cure for reconstruction of the cure of the cure in line 20.53	eriods ir ving are Apr 0.86 iving are 20.78 eriods ir 20.02 est of d	n the living the hand the living the hand the ha	ing (see ) (see	ee Ta Jun 0.51  ww ste 20.99  velling 20.04  m (se 0.44	ble 9a)  Jul  0.37  ps 3 to 7  21  from Ta  20.04  re Table  0.29	A 0.47 in T 2 able 9 20. 9a) 0.3	ug Sep 11 0.65  Table 9c) 1 20.97  9, Th2 (°C) 04 20.03  10 10 10 10 10 10 10 10 10 10 10 10 10 1	20.77 20.03	7 20.41 3 20.02 0.96	20.1		(86) (87) (88)
Temperature  Utilisation fact  Jan  (86)m= 0.99  Mean interna  (87)m= 20.13  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.98  Mean interna	during heater for gain feb 0.97 ltemperate 20.3 during heater for gain 0.96 ltemperate	ating personal number of the second of the s	eriods ir ving are Apr 0.86 iving are 20.78 eriods ir 20.02 est of dentity 0.82 he rest	n the living the hand the living the hand the ha	ing (see ) (see	ee Ta Jun 0.51  w ste 20.99  velling 20.04  m (se 0.44  T2 (fo	Jul 0.37 ps 3 to 7 21 from Ta 20.04 ee Table 0.29 bllow ste	A 0.4 o.4 o.4 o.4 o.4 o.4 o.4 o.4 o.4 o.4 o	ug Sep 1 0.65 Table 9c) 1 20.97 9, Th2 (°C) 04 20.03 1 to 7 in Table 1 20.01	0.89 20.77 20.03 0.85 e 9c) 19.79	7 20.41 3 20.02 0.96	0.99 20.1 20.02 0.99	21	(86) (87) (88) (89)
Temperature Utilisation factors  Jan (86)m= 0.99  Mean interna (87)m= 20.13  Temperature (88)m= 20.01  Utilisation factors (89)m= 0.98  Mean interna (90)m= 18.88	during heater for gain feet of the feet of	ns for li Mar 0.94 cure in li 20.53 ating per 20.01 ns for re 0.92 cure in tr 19.44	eriods ir ving are Apr 0.86 iving are 20.78 eriods ir 20.02 est of do 0.82 he rest 19.79	n the living the search of the living the search of the se	n (s	ee Ta Jun 0.51  w ste 20.99  velling 20.04  m (se 0.44  T2 (fo	Jul 0.37 ps 3 to 7 21 from Ta 20.04 re Table 0.29 pllow ste 20.04	A 0.4  7 in T 2  able 9  20.  9a)  0.3	ug Sep 11 0.65  Table 9c) 11 20.97  9, Th2 (°C) 04 20.03  33 0.57  1 to 7 in Table 04 20.01	0.89 20.77 20.03 0.85 e 9c) 19.79	0.97 7 20.41 3 20.02 0.96	0.99 20.1 20.02 0.99		(86) (87) (88) (89)
Temperature Utilisation factors  Jan (86)m= 0.99  Mean interna (87)m= 20.13  Temperature (88)m= 20.01  Utilisation factors (89)m= 0.98  Mean interna (90)m= 18.88  Mean interna	during heater for gain feb 0.97 leading heater for gain 0.96 leading heater for gain 19.12 leadi	ating pens for line and line a	eriods in ving are Apr 0.86 iving are 20.78 eriods in 20.02 est of dr 0.82 he rest 19.79	m the living the livin	follo  follo  follo  follo  general filter  h2,  contact the second filter  h2 and second filter  h2 and second filter  and sec	ee Ta  Jun  0.51  w stel 20.99  velling 20.04  m (se 0.44  T2 (fo 20.03	Jul 0.37 ps 3 to 7 21 from Ta 20.04 pe Table 0.29 pllow ste 20.04  A × T1	A 0.4  7 in T 2  able 9  20.  9a)  0.3  eps 3  20.	ug Sep 1 0.65  able 9c) 1 20.97  9, Th2 (°C) 04 20.03  1 to 7 in Table 04 20.01  - fLA) × T2	0.89  20.7  20.03  0.85  le 9c)  19.79  fLA = Li	0.97  7 20.41  8 20.02  0.96  19.3  ving area ÷ (-	0.99 20.1 20.02 0.99 18.85 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation factors  Jan (86)m= 0.99  Mean interna (87)m= 20.13  Temperature (88)m= 20.01  Utilisation factors (89)m= 0.98  Mean interna (90)m= 18.88  Mean interna (92)m= 19.34	during heater for gain feet of temperate 20.3 during heater for gain 0.96 ltemperate 19.12 ltemperate 19.54	ating pens for li Mar 0.94 cure in li 20.53 ating pens for re 0.92 cure in tens for re 19.44 cure (for 19.84	eriods in ving are Apr 0.86 iving are 20.78 eriods in 20.02 est of do 0.82 he rest 19.79 r the who 20.15	n the living the livin	ing  n (s  follo  2  h2,  h2,  colored  billing  2	ee Ta  Jun  0.51  w ste  0.99  velling  0.04  T2 (fo  0.03  g) = fl  0.38	Jul 0.37 ps 3 to 7 21 from Ta 20.04 pe Table 0.29 bllow ste 20.04  A × T1 20.39	A A 0.4 of the control of the contro	ug Sep 11 0.65  Table 9c) 1 20.97  9, Th2 (°C) 04 20.03  1 to 7 in Table 04 20.01  - fLA) × T2 39 20.36	0.89  20.7  20.03  0.85  e 9c)  19.79  fLA = Li	0.97  7 20.41  8 20.02  0.96  9 19.3  ving area ÷ (-	0.99 20.1 20.02 0.99		(86) (87) (88) (89)
Temperature Utilisation fact  Jan (86)m= 0.99  Mean interna (87)m= 20.13  Temperature (88)m= 20.01  Utilisation fact (89)m= 0.98  Mean interna (90)m= 18.88  Mean interna (92)m= 19.34  Apply adjustn	during heater for gain series	ating pens for line and line a	eriods in ving are Apr 0.86 iving are 20.78 eriods in 20.02 est of do 0.82 he rest 19.79 r the who 20.15 internal	n the living the high man the living the high man the living the high man the high	ing n (s follo 2 h2, c h12, c ellin 2 rratu	ee Ta  Jun  0.51  w stel 20.99  velling 20.04  m (se 0.44  T2 (fo 20.03)  g) = fl 20.38  ure fro	Jul 0.37 ps 3 to 7 21 from Ta 20.04 pe Table 0.29 pllow ste 20.04  A × T1 20.39 m Table	A 0.4  A	ug Sep 1 0.65  able 9c) 1 20.97  9, Th2 (°C) 04 20.03  33 0.57  1 to 7 in Table 04 20.01  - fLA) × T2 39 20.36  where appre	0.89  20.7  20.03  0.85  le 9c)  19.79  fLA = Li  copriate	0.97  7 20.41  8 20.02  0.96  9 19.3  ving area ÷ (	0.99 20.1 20.02 0.99 18.85 4) =		(86) (87) (88) (89) (90) (91) (92)
Temperature Utilisation factors  Jan (86)m= 0.99  Mean interna (87)m= 20.13  Temperature (88)m= 20.01  Utilisation factors (89)m= 0.98  Mean interna (90)m= 18.88  Mean interna (92)m= 19.34  Apply adjustn (93)m= 19.34	during heater for gain feet of temperate 20.3 during heater for gain 0.96 decreased from temperate 19.12 decreased from the 19.54 decreased from t	ating pens for li Mar 0.94 cure in li 20.53 ating pens for re 0.92 cure in tens for re 0.92 cure in tens for re 19.44 cure (for 19.84 cure mean 19.84	eriods in ving are Apr 0.86 iving are 20.78 eriods in 20.02 est of do 0.82 he rest 19.79 r the who 20.15	n the living the livin	ing n (s follo 2 h2, c h12, c ellin 2 rratu	ee Ta  Jun  0.51  w ste  0.99  velling  0.04  T2 (fo  0.03  g) = fl  0.38	Jul 0.37 ps 3 to 7 21 from Ta 20.04 pe Table 0.29 bllow ste 20.04  A × T1 20.39	A A 0.4 of the control of the contro	ug Sep 1 0.65  able 9c) 1 20.97  9, Th2 (°C) 04 20.03  33 0.57  1 to 7 in Table 04 20.01  — fLA) × T2 39 20.36  where appre	0.89  20.7  20.03  0.85  e 9c)  19.79  fLA = Li	0.97  7 20.41  8 20.02  0.96  9 19.3  ving area ÷ (	0.99 20.1 20.02 0.99 18.85 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fact  Jan (86)m= 0.99  Mean interna (87)m= 20.13  Temperature (88)m= 20.01  Utilisation fact (89)m= 0.98  Mean interna (90)m= 18.88  Mean interna (92)m= 19.34  Apply adjustn (93)m= 19.34  8. Space hear	during heater for gain services for gain service	ating pens for line at	eriods in ving are Apr 0.86 iving are 20.78 eriods in 20.02 est of d 0.82 he rest 19.79 r the wh 20.15 internal 20.15	n the living the high man the living the high man the living the high man the high	ing n (s follo 2 h2, h2, c lling 2 ratu 2	ee Ta  Jun  0.51  w stel 20.99  velling 20.04  T2 (for 20.03)  g) = fl 20.38  ure fro 20.38	ble 9a)  Jul  0.37  ps 3 to 7  21  from Ta  20.04  re Table  0.29  bllow ste  20.04  A × T1  20.39  m Table  20.39	A 0.4  O.4  O.5  O.5  O.5  O.5  O.5  O.5  O	ug Sep 1 0.65  able 9c) 1 20.97  9, Th2 (°C) 04 20.03  33 0.57  1 to 7 in Table 04 20.01  - fLA) × T2 39 20.36  where appress 39 20.36	0.89  20.7  20.03  0.85  le 9c)  19.79  fLA = Li  copriate 20.19	0.97  7 20.41  8 20.02  0.96  9 19.3  ving area ÷ (4)  5 19.7	0.99  20.1  20.02  0.99  18.85 4) =  19.3	0.36	(86) (87) (88) (89) (90) (91) (92)
Temperature Utilisation fact  Jan  (86)m= 0.99  Mean interna  (87)m= 20.13  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.98  Mean interna  (90)m= 18.88  Mean interna  (92)m= 19.34  Apply adjustn  (93)m= 19.34	during heater for gain series	ating persons for line of the content of the conten	eriods in ving are Apr 0.86 iving are 20.78 eriods in 20.02 est of d 0.82 he rest 19.79 r the wh 20.15 internal 20.15	n the living the high man the living the high man the hig	ing n (s follo 2 h2, h2, c lling 2 ratu 2	ee Ta  Jun  0.51  w stel 20.99  velling 20.04  T2 (for 20.03)  g) = fl 20.38  ure fro 20.38	ble 9a)  Jul  0.37  ps 3 to 7  21  from Ta  20.04  re Table  0.29  bllow ste  20.04  A × T1  20.39  m Table  20.39	A 0.4  O.4  O.5  O.5  O.5  O.5  O.5  O.5  O	ug Sep 1 0.65  able 9c) 1 20.97  9, Th2 (°C) 04 20.03  33 0.57  1 to 7 in Table 04 20.01  - fLA) × T2 39 20.36  where appress 39 20.36	0.89  20.7  20.03  0.85  le 9c)  19.79  fLA = Li  copriate 20.19	0.97  7 20.41  8 20.02  0.96  9 19.3  ving area ÷ (4)  5 19.7	0.99  20.1  20.02  0.99  18.85 4) =  19.3	0.36	(86) (87) (88) (89) (90) (91) (92)

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Mar

Jan

Feb

Utilisation factor for gains, hm:	0.00 0.50	1 0.00	0.00	0.00		(94)
(94)m= 0.98 0.96 0.92 0.83 0.66 0.47 0.32 0 Useful gains, hmGm , W = (94)m x (84)m	0.36 0.59	0.86	0.96	0.98		(94)
	319.76 492.79	644.03	661.98	662.66		(95)
Monthly average external temperature from Table 8	·			<u> </u>		
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6	16.4 14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(	(93)m- (96)m	]				
	320.58 507.56	780.39	1035.98	1248.4		(97)
Space heating requirement for each month, kWh/month = 0.024 >	i	<del></del>		105.70		
(98)m= 420.08 306.6 224.53 95.37 26.04 0 0	0 0	101.45	269.28	435.79	4070 44	(08)
	Total per yea	r (kwh/yeai	r) = Sum(9	8) <sub>15,912</sub> =	1879.14	(98)
Space heating requirement in kWh/m²/year					24.56	(99)
9b. Energy requirements – Community heating scheme						
This part is used for space heating, space cooling or water heating Fraction of space heat from secondary/supplementary heating (Ta			unity sch	neme. [	0	(301)
	abio 11, 0 ii i	10110		[ [		(302)
Fraction of space heat from community system $1 - (301) =$	( 0115	(	- 11 1 1		1	(302)
The community scheme may obtain heat from several sources. The procedure allo includes boilers, heat pumps, geothermal and waste heat from power stations. See		up to tour	otner neat	sources; tr	ne latter	
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 communit	ity heating sys	stem		Ī	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)
				ו [ ]	1.05	(306)
Space heating		804a) x (309	5) x (306) :	[ - [	1.05 <b>kWh/ye</b>	(306)
Space heating Annual space heating requirement	(98) x (3	804a) x (30	, , ,	    - 	1.05 <b>kWh/ye</b> 1879.14	(306)
Space heating Annual space heating requirement Space heat from Community heat pump	(98) × (3 n Table 4a or <i>i</i>	804a) x (30	E)	    -   	1.05 <b>kWh/ye</b> 1879.14 1973.1	(306)
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) × (3 n Table 4a or <i>i</i>	304a) x (309 Appendix	E)	- [ [	1.05 <b>kWh/ye</b> 1879.14 1973.1	(306)  ear  (307a)  (308
Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from	(98) × (3 n Table 4a or <i>i</i>	304a) x (309 Appendix	E)	  -       	1.05 <b>kWh/ye</b> 1879.14 1973.1	(306)  ear  (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	(98) x (3 n Table 4a or 7 m (98) x (3	304a) x (309 Appendix	E) ÷ (308) =	[ ] ]	1.05 <b>kWh/ye</b> 1879.14  1973.1  0	(306)  ear  (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: Water heat from Community heat pump	(98) x (3 n Table 4a or 7 m (98) x (3	304a) x (309 Appendix 301) x 100 -	E) = (308) = 5) x (306) =	[ [ =	1.05  kWh/ye 1879.14  1973.1  0  0  2083.35	(306) ear (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) x (3 n Table 4a or 7 m (98) x (3 (64) x (3	304a) x (309 Appendix 301) x 100 -	E) = (308) = 5) x (306) =	[ [ =	1.05  kWh/ye 1879.14 1973.1 0 0 2083.35 2187.52	(306)  ear  (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) × (3 Table 4a or 7 m (98) × (3 (64) × (3 0.01 × [(307a)	304a) x (309 Appendix 301) x 100 - 303a) x (309 )(307e) +	E) = (308) = 5) x (306) =	[ [ =	1.05  kWh/ye 1879.14 1973.1 0 0 2083.35 2187.52 41.61 0	(306)  (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)	(98) × (3 Table 4a or 7 m (98) × (3 (64) × (3 0.01 × [(307a)	304a) x (309 Appendix 301) x 100 -	E) = (308) = 5) x (306) =	[ [ =	1.05  kWh/ye 1879.14 1973.1 0 0 2083.35 2187.52 41.61	(306) (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) × (3 Table 4a or 7 m (98) × (3 (64) × (3 0.01 × [(307a)	304a) x (309 Appendix 301) x 100 - 303a) x (309 )(307e) +	E) = (308) = 5) x (306) =	[ [ =	1.05  kWh/ye 1879.14 1973.1 0 0 2083.35 2187.52 41.61 0	(306)  (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) × (3 Table 4a or 7 m (98) × (3 (64) × (3 0.01 × [(307a)	304a) x (309 Appendix 301) x 100 - 303a) x (309 )(307e) +	E) = (308) = 5) x (306) =	[ [ =	1.05  kWh/ye 1879.14 1973.1 0 0 2083.35 2187.52 41.61 0 0	(306)  (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 our	(98) × (3 Table 4a or 7 m (98) × (3 (64) × (3 0.01 × [(307a)	304a) x (309 Appendix 301) x 100 - 303a) x (309 )(307e) +	E) = (308) = 5) x (306) =	[ [ =	1.05  kWh/ye 1879.14 1973.1 0 0 2083.35 2187.52 41.61 0 200.74	(306)  ear  (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 warm air heating system fans	(98) x (3 1 Table 4a or 2 m (98) x (3 (64) x (3 0.01 x [(307a) = (107) utside	304a) x (309 Appendix 301) x 100 - 303a) x (309 )(307e) +	E) ÷ (308) =  5) x (306) =  (310a)(	[ [ =	1.05  kWh/ye 1879.14 1973.1 0 0 2083.35 2187.52 41.61 0 0 200.74 0	(306)  ear  (307a)  (308  (309)  (310a)  (313)  (314)  (315)  (330a)  (330b)

Energy for lighting (calculated in Appendix	L)		333.8 (332)
Total delivered energy for all uses (307) + (	(309) + (310) + (312) + (315) + (	331) + (332)(237b) =	4695.15 (338)
10b. Fuel costs – Community heating sch	eme		
	<b>Fuel</b> kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating from CHP	(307a) x	4.24 x 0.	01 = 83.66 (340a)
Water heating from CHP	(310a) x	4.24 x 0.	01 = 92.75 (342a)
		Fuel Price	
Pumps and fans	(331)	10.10	01 = 26.48 (349)
Energy for lighting	(332)	13.19 x 0.	01 = 44.03 (350)
Additional standing charges (Table 12)			120 (351)
Total energy cost = (	(340a)(342e) + (345)(354) =		366.92 (355)
11b. SAP rating - Community heating sch	eme		
Energy cost deflator (Table 12)			0.42 (356)
Energy cost factor (ECF) [(3	55) x (356)] ÷ [(4) + 45.0] =		1.27 (357)
SAP rating (section12)			82.31 (358)
12b. CO2 Emissions – Community heating			
	Energy kWh/y	•	ctor Emissions n kg CO2/year
CO2 from other sources of space and water Efficiency of heat source 1 (%)	er heating (not CHP)  If there is CHP using two fuels rep	peat (363) to (366) for the second	nd fuel 383 (367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100	÷ (367b) x 0.52	= 563.8 (367)
Electrical energy for heat distribution	[(313) x	0.52	= 21.59 (372)
Total CO2 associated with community systematics	ems (363)(366) -	+ (368)(372)	= 585.39 (373)
CO2 associated with space heating (secon	dary) (309) x	0	= 0 (374)
CO2 associated with water from immersion	heater or instantaneous heater	(312) x 0.22	= 0 (375)
Total CO2 associated with space and wate	r heating (373) + (374)	+ (375) =	585.39 (376)
CO2 associated with electricity for pumps a	and fans within dwelling (331)) x	0.52	= 104.18 (378)
CO2 associated with electricity for lighting	(332))) x	0.52	= 173.24 (379)
Total CO2, kg/year	m of (376)(382) =		862.82 (383)
, ••	33) ÷ (4) =		11.28 (384)
El rating (section 14)			90.49 (385)
13b. Primary Energy – Community heating			
	Energ kWh/y	•	P.Energy kWh/year
Energy from other sources of space and wa Efficiency of heat source 1 (%)	ater heating (not CHP)  If there is CHP using two fuels rep	oper (362) to (366) for the coop	nd fuel 383 (367a)

Energy associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	3.07	=	3335.01	(367)
Electrical energy for heat distribution	[(313) x		=	127.73	(372)
Total Energy associated with community systems	(363)(366) + (368)(372)	)	=	3462.74	(373)
if it is negative set (373) to zero (unless specified oth	erwise, see C7 in Appendix C)	1		3462.74	(373)
Energy associated with space heating (secondary)	(309) x	0	=	0	(374)
Energy associated with water from immersion heater or	r instantaneous heater(312) x	1.22	=	0	(375)
Total Energy associated with space and water heating	(373) + (374) + (375) =			3462.74	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps and fans v	vithin dwelling (331)) x	3.07	=	616.26	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1024.77	(379)
Total Primary Energy, kWh/year sun	n of (376)(382) =			5103.77	(383)

		l Iser I	Details:						
Assessor Name: Software Name:	Ben Talbutt Stroma FSAP 2012	<u> </u>	Strom Softwa					036639 on: 1.0.5.17	
Software Name.		Property	Address		51011.		VEISIC	)II. 1.0.3.1 <i>1</i>	
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			a(m²)	(1a) v		ight(m)	1(20)	Volume(m <sup>3</sup>	<u>^</u>
	-) . (4 -) . (4 -) . (4 -  ) . (4			(1a) x	2	.82	(2a) =	215.79	(3a)
·	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	76.52	(4)					_
Dwelling volume				(3a)+(3b	)+(3c)+(3c	d)+(3e)+	.(3n) =	215.79	(5)
2. Ventilation rate:	main seconda	r\/	other		total			m³ per hou	ır
N. adam of all lands	heating heating	<u> </u>		, ,			10		_
Number of chimneys	0 + 0	╛╵┢	0	<u> </u>	0		40 =	0	(6a)
Number of open flues	0 + 0	+	0	] = [	0		20 =	0	(6b)
Number of intermittent fa	ns				0	x 1	10 =	0	(7a)
Number of passive vents					0	x 1	10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	anges per ho	our.
Infiltration due to chimne	ve flues and fans (62) (6b) (	7a\	(70) -	Г					_
'	ys, flues and fans = $(6a)+(6b)+(6b)+(6b)$ een carried out or is intended, proceed			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		,,			(-)	/		0	(9)
Additional infiltration						[(9)-	-1]x0.1 =	0	(10)
	.25 for steel or timber frame o			•	ruction			0	(11)
if both types of wall are particles of openial deducting areas of openial deducting areas of openial deductions.	resent, use the value corresponding t ngs); if equal user 0.35	o the grea	ter wall are	a (after					
If suspended wooden to	floor, enter 0.2 (unsealed) or 0	.1 (seal	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0							0	(13)
-	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	. ,	-	. (45)		0	(15)
Infiltration rate	q50, expressed in cubic metro	oe por b	(8) + (10)				oroo	0	(16)
•	lity value, then $(18) = [(17) \div 20] +$	•		•	elle oi e	invelope	aica	0.15	(17)
•	es if a pressurisation test has been do				is being u	sed		0.10	()
Number of sides sheltered	ed							2	(19)
Shelter factor			(20) = 1 -		19)] =			0.85	(20)
Infiltration rate incorporat	•		(21) = (18	) x (20) =				0.13	(21)
Infiltration rate modified f	<del>- 1                                   </del>	1 11		Con	Oct	Nov	Doo	]	
Jan Feb	Mar   Apr   May   Jun	Jul	Aug	Sep	Oct	INOV	Dec		
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
\ -/···   \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-       3.0	1	1 ""	<u> </u>	<u> </u>	1	L	I	
Wind Factor (22a)m = (2	<del></del>							1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltr	ation rate	e (allowi	ng for sh	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 effe		•	rate for t	he appli	cable ca	ise		!			!	· 	
If mechanic			o dia N. 70	10h) (00		( (	\(\f\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		\ (00-)			0.5	(23a
If exhaust air h		0		, ,	,	. ,	,, .	,	) = (23a)			0.5	(23b
If balanced with		-	-	_					<b>.</b>		4 (00 )	74.8	(230
a) If balance	ed mecha	anical ve		with he	i	ery (MVI 0.25	HR) (248   <sub>0.24</sub>	a)m = (22) 0.25	<del> </del>		1 – (23c) 0.28	i ÷ 100] I	(24a
(24a)m= 0.29			0.27	l .	0.25			<u> </u>	0.26	0.27	0.26	J	(246
b) If balance	ed mecha 0	anicai ve	ontilation	without	neat red	covery (r	0 0	0)m = $(22$	2b)m + (. 0	23D) 0		1	(24b
` '			<u> </u>	ļ	<u> </u>	<u> </u>	<u> </u>		0	0	0	J	(24)
c) If whole h	nouse ext m < 0.5 ×			•	•				5 x (23h	)			
(24c)m = 0	0.0%	0	0	0	0	0	0) = (22.	0	0	0	0	]	(240
d) If natural	ventilatio	n or wh	ole hous	ļ	<u> </u>	ventilatio	on from	<u> </u>				J	
,	m = 1, the			•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change	rate - er	nter (24a	) or (24k	o) or (24	c) or (24	d) in bo	(25)				•	
(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)
3. Heat losse	es and he	at loss r	narameti	or.									
ELEMENT	Gros area	S	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	<b>〈</b> )	k-value kJ/m²-l		A X k kJ/K
Doors					2.52	X	0.91		2.2932				(26)
Windows Type	e 1				2.87	x1,	/[1/( 1.4 )+	0.04] =	3.8	=			(27)
Windows Type	e 2					_ ,							
Windows Type	e 3				5.42	x1	/[1/( 1.4 )+	0.04] =	7.19				(27)
Mindows To	-				1.99		/[1/( 1.4 )+ /[1/( 1.4 )+	L	7.19				, ,
vviriaows Type					1.99	x1		0.04] =	2.64				(27)
• •	e 4				1.99	x1 x1	/[1/( 1.4 )+	0.04] = [ 0.04] = [	2.64 1.21				(27) (27)
Windows Type	e 4 e 5				1.99 0.91 2.01	x1 x1 x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+	$0.04$ ] = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$	2.64 1.21 2.66				(27) (27) (27)
Windows Type Windows Type	e 4 e 5 e 6				1.99 0.91 2.01 0.62	x1 x1 x1 x1 x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+	0.04] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [	2.64 1.21 2.66 0.82				(27) (27) (27) (27)
Windows Type Windows Type Windows Type	e 4 e 5 e 6 e 7				1.99 0.91 2.01 0.62 0.91	x1 x1 x1 x1 x1 x1 x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+	0.04] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [	2.64 1.21 2.66 0.82 1.21				(27) (27) (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type Windows Type Walls Type1	e 4 e 5 e 6 e 7 e 8	<u>-</u>	24.41		1.99 0.91 2.01 0.62 0.91 2.01	x1 x1 x1 x1 x1 x1 x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+	0.04] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [	2.64 1.21 2.66 0.82 1.21 2.66				(27) (27) (27) (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type Walls Type1	e 4 e 5 e 6 e 7 e 8		24.10	<u> </u>	1.99 0.91 2.01 0.62 0.91 2.01 53.16	x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+	0.04] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [ $0.04$ ] = [	2.64 1.21 2.66 0.82 1.21 2.66 7.44				(27) (27) (27) (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2	e 4 e 5 e 6 e 7 e 8  77.38	1	0	<b>∍</b>	1.99 0.91 2.01 0.62 0.91 2.01 53.16	x1 x	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 	0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13				(27) (27) (27) (27) (27) (27) (29)
Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3	e 4 e 5 e 6 e 7 e 8  77.33  5.64	4	0	<b>∂</b>	1.99 0.91 2.01 0.62 0.91 2.01 53.16 5.64 21.34	x1 x	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 	0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ = [ = [ = [ = [ = [ = [ = [ = [ = [	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13 3.62				(27) (27) (27) (27) (27) (27) (29) (29)
Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Roof	e 4 e 5 e 6 e 7 e 8  77.33  5.64  21.34	4 2	0	<u>∍</u>	1.99 0.91 2.01 0.62 0.91 2.01 53.16 5.64 21.34	x1 x	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 	0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13				(27) (27) (27) (27) (27) (29) (29) (29) (30)
Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Roof Total area of e	e 4 e 5 e 6 e 7 e 8  77.33  21.34  76.55 elements,	4 2 , m <sup>2</sup>	0 0		1.99 0.91 2.01 0.62 0.91 2.01 53.16 5.64 21.32 76.52	x1 x	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 0.14 0.2 0.17	0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ = [ = = [ = = [	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13 3.62 7.65				(27) (27) (27) (27) (27) (29) (29) (29) (29)
Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Roof Total area of e *for windows and	e 4 e 5 e 6 e 7 e 8  77.33  5.64  21.34  76.52 elements,	4 2 , m <sup>2</sup> pws, use e	0 0 0	indow U-va	1.99 0.91 2.01 0.62 0.91 2.01 53.16 5.64 21.34 76.52 180.8 alue calcul	x1 x	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 0.14 0.2 0.17	0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ 0.04] = [ = [ = = [ = = [	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13 3.62 7.65	s given in	paragraph	13.2	(27) (27) (27) (27) (27) (29) (29) (29) (29)
Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Roof Total area of e	e 4 e 5 e 6 e 7 e 8  77.33  5.64  21.34  76.55 elements, d roof windows on both seepers	4 2 , m <sup>2</sup> ows, use e	0 0 0 effective winternal walk	indow U-va	1.99 0.91 2.01 0.62 0.91 2.01 53.16 5.64 21.34 76.52 180.8 alue calcul	x1 x1 x1 x1 x1 x1 x1 x1 x1 x2 x x x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 0.14 0.2 0.17	0.04] = [ $0.04$ ] = [ $0.04$	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13 3.62 7.65	s given in	paragraph	13.2	(27) (27) (27) (27) (27) (27) (29) (29) (29) (30) (31)
Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Roof Total area of e * for windows and ** include the area	e 4 e 5 e 6 e 7 e 8  77.33  5.64  21.34  76.55 elements, d roof windows on both seeds	4 2 , m <sup>2</sup> pws, use e sides of in	0 0 0 effective winternal walk	indow U-va	1.99 0.91 2.01 0.62 0.91 2.01 53.16 5.64 21.34 76.52 180.8 alue calcul	x1 x1 x1 x1 x1 x1 x1 x1 x1 x2 x x x1	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 	0.04] = [ $0.04$ ] = [ $0.04$	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13 3.62 7.65				(29)
Windows Type Windows Type Windows Type Windows Type Walls Type1 Walls Type2 Walls Type3 Roof Total area of e * for windows and ** include the area Fabric heat los	e 4 e 5 e 6 e 7 e 8  77.33  76.52 elements, d roof windo as on both s ss, W/K = Cm = S(A	4 2 , m <sup>2</sup> pws, use e sides of in = S (A x A x k)	0 0 0 effective winternal walk	indow U-va	1.99 0.91 2.01 0.62 0.91 2.01 53.16 5.64 21.32 76.52 180.8 alue calculatitions	x1 x	/[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ /[1/( 1.4 )+ 	$0.04] = \begin{bmatrix} \\ 0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix} + (32) = ((28)$	2.64 1.21 2.66 0.82 1.21 2.66 7.44 1.13 3.62 7.65	2) + (32a).		50.86	(27) (27) (27) (27) (27) (29) (29) (29) (30) (31)

can be u	ısed instea	ad of a de	tailed calc	ulation.										
			x Y) cal		using Ap	pendix I	K						12.16	(36)
	_	,	are not kn		• .	•								` ′
Total fa	abric hea	at loss							(33) +	(36) =			63.02	(37)
Ventila	tion hea	t loss ca	alculated	monthly	у				(38)m	= 0.33 × (	25)m x (5)	)	_	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	20.55	20.32	20.09	18.96	18.73	17.6	17.6	17.37	18.05	18.73	19.19	19.64		(38)
Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (37)	38)m		_	
(39)m=	83.57	83.34	83.11	81.98	81.75	80.62	80.62	80.39	81.07	81.75	82.21	82.66		
Heat Ic	ss para	meter (H	HLP), W	m²K						Average = = (39)m ÷		12 /12=	81.92	(39)
(40)m=	1.09	1.09	1.09	1.07	1.07	1.05	1.05	1.05	1.06	1.07	1.07	1.08		
Numbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) <sub>1</sub>	12 /12=	1.07	(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:	
Λ	رمم مما		N I										1	(40)
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 (	ΓFA -13.		.39		(42)
Annual	l averag	e hot wa						(25 x N)				.05	]	(43)
		_	hot water person per			_	_	to achieve	a water us	se target o	f		4	
1101 111010					<u> </u>	i .	•	T .	0	0.1	N		1	
Hot wate	Jan er usage in	Feb	Mar day for ea	Apr ach month	May $Vd.m = fa$	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	100.15	96.51	92.87	89.23	85.58	81.94	81.94	85.58	89.23	92.87	96.51	100.15	1	
(44)111=	100.13	90.51	92.01	09.23	05.50	01.94	01.94	00.00		Total = Su	<u> </u>		1092.55	(44)
Energy o	content of	hot water	used - cal	culated me	onthly $= 4$ .	190 x Vd,r	m x nm x L	OTm / 3600					1092.55	(
(45)m=	148.52	129.9	134.04	116.86	112.13	96.76	89.66	102.89	104.12	121.34	132.45	143.83	]	
			!		!					Total = Su	m(45) <sub>112</sub> =	-	1432.51	(45)
If instant	taneous w	ater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46	) to (61)					
(46)m=	22.28	19.48	20.11	17.53	16.82	14.51	13.45	15.43	15.62	18.2	19.87	21.58		(46)
	storage		includir	na anv si	olar or M	////HRS	etorada	within sa	ma vas	دما		0	1	(47)
_		` ,	ind no ta	•			_		illic ves	9 <u>C</u> I		0		(47)
	-	_			_			mbi boil	ers) ente	er '0' in (	47)			
	storage			(					,		, ,			
a) If m	anufact	urer's de	eclared I	oss facto	or is kno	wn (kWł	n/day):					0	]	(48)
Tempe	rature fa	actor fro	m Table	2b								0	]	(49)
• • • • • • • • • • • • • • • • • • • •			storage	-				(48) x (49)	=		1	10	]	(50)
•			eclared o	-									- 1	,= ··
		_	factor free section		le ∠ (KVV	n/ntre/da	1y <i>)</i>				0.	.02	J	(51)
	e factor	_		511 T.U							1.	.03	1	(52)
			m Table	2b								0.6	1	(53)
													•	

3, 3 ,	Nh/year		(47) x (51)	x (52) x (5	3) =	1.	03		(54)
Enter (50) or (54) in (55)						1.	03		(55)
Water storage loss calculated for e	each month		((56)m = (56)m)	55) × (41)m	1				
(56)m= 32.01 28.92 32.01 30	0.98 32.01	30.98 32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains dedicated solar storage	e, (57)m = (56)m x	[(50) – (H11)] ÷ (50	3), else (57	7)m = (56)n	n where (I	H11) is fro	m Append	ix H	
(57)m= 32.01 28.92 32.01 30	0.98 32.01	30.98 32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit loss (annual) from	Table 3						0		(58)
Primary circuit loss calculated for e	each month (59	$9)m = (58) \div 36$	55 × (41)	m					
(modified by factor from Table H	15 if there is so	lar water heatir	ng and a	cylinder	thermo	stat)			
(59)m= 23.26 21.01 23.26 22	2.51 23.26	22.51 23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculated for each mo	onth (61)m = (6	60) ÷ 365 × (41)	)m						
(61)m= 0 0 0	0 0	0 0	0	0	0	0	0		(61)
Total heat required for water heating	ng calculated for	or each month	(62)m =	0.85 × (4	45)m + (	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 203.8 179.82 189.32 17	70.35 167.41 1	150.25 144.94	158.17	157.61	176.62	185.95	199.11		(62)
Solar DHW input calculated using Appendix	ix G or Appendix H	I (negative quantity	/) (enter '0'	if no solar	contributi	on to wate	er heating)		
(add additional lines if FGHRS and	d/or WWHRS a	applies, see Ap	pendix C	3)					
(63)m= 0 0 0	0 0	0 0	0	0	0	0	0		(63)
Output from water heater	•	•		•					
(64)m= 203.8 179.82 189.32 17	70.35 167.41 1	150.25 144.94	158.17	157.61	176.62	185.95	199.11		
		<u> </u>	Outp	out from wa	ter heater	(annual)₁	12	2083.35	(64)
Heat gains from water heating, kW	Vh/month 0.25	´[0.85 × (45)m	+ (61)m	ı] + 0.8 x	[(46)m	+ (57)m	+ (59)m	1	
		74.97 74.03	78.43	77.41	84.57	86.84	92.05		(65)
include (57)m in calculation of (6	65)m only if cyl								
	oojiii oiliy ii cyl	linder is in the c	dwelling	or hot wa	ater is fr	om com	munity h	eating	
5. Internal gains (see Table 5 an	, ,	linder is in the o	dwelling	or hot wa	ater is fr	om com	munity h	eating	
5. Internal gains (see Table 5 an	, ,	linder is in the o	dwelling	or hot wa	ater is fr	om com	munity h	eating	
Metabolic gains (Table 5), Watts	nd 5a):							eating	
Metabolic gains (Table 5), Watts  Jan Feb Mar A	nd 5a): Apr May	Jun Jul	Aug	Sep	Oct	Nov	Dec	eating	(66)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11	Apr May 9.68 119.68 1	Jun         Jul           119.68         119.68	Aug 119.68	Sep 119.68	Oct			eating	(66)
Metabolic gains (Table 5), Watts  Jan Feb Mar A  (66)m= 119.68 119.68 119.68 11  Lighting gains (calculated in Apper	Apr May 9.68 119.68 1	Jun Jul 119.68 119.68 n L9 or L9a), a	Aug 119.68	Sep 119.68	Oct 119.68	Nov 119.68	Dec 119.68	eating	, ,
Metabolic gains (Table 5), Watts         Jan       Feb       Mar       A         (66)m=       119.68       119.68       11         Lighting gains (calculated in Apper (67)m=       18.9       16.79       13.65       10	Apr May 9.68 119.68 1 ndix L, equation 0.34 7.73	Jun         Jul           119.68         119.68           In L9 or L9a), a         6.52           7.05         7.05	Aug 119.68 Iso see 7 9.16	Sep 119.68 Table 5 12.3	Oct 119.68	Nov	Dec	eating	(66) (67)
Metabolic gains (Table 5), Watts  Jan Feb Mar A  (66)m= 119.68 119.68 119.68 111  Lighting gains (calculated in Apper  (67)m= 18.9 16.79 13.65 10  Appliances gains (calculated in Apper	Apr May 9.68 119.68 1 ndix L, equation 0.34 7.73	Jun Jul 119.68 119.68 In L9 or L9a), a 6.52 7.05 ation L13 or L13	Aug 119.68 Iso see 7 9.16 3a), also	Sep 119.68 Table 5 12.3 see Tab	Oct 119.68 15.61 ble 5	Nov 119.68	Dec 119.68	eating	(67)
Metabolic gains (Table 5), Watts         Jan       Feb       Mar       A         (66)m=       119.68       119.68       119.68       11         Lighting gains (calculated in Apper (67)m=       18.9       16.79       13.65       10         Appliances gains (calculated in Apper (68)m=       212.01       214.21       208.67       19	Apr May 19.68 119.68 1 ndix L, equation 0.34 7.73 2 ppendix L, equation 16.87 181.97 1	Jun Jul 119.68 119.68 In L9 or L9a), a 6.52 7.05 In L13 or L13 167.97 158.61	Aug 119.68 Iso see 7 9.16 3a), also	Sep 119.68 Fable 5 12.3 see Tab 161.96	Oct 119.68 15.61 ble 5 173.76	Nov 119.68	Dec 119.68	eating	, ,
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (19.2)m         19.00         19.00         19.00         19.00	Apr May 9.68 119.68 1  ndix L, equation 0.34 7.73 2  ppendix L, equation 16.87 181.97 1	Jun Jul 119.68 119.68 In L9 or L9a), a 6.52 7.05 In L13 or L13 In L15 or L15a	Aug 119.68 Iso see 7 9.16 3a), also 156.41	Sep 119.68 Table 5 12.3 see Table ee Table	Oct 119.68 15.61 ble 5 173.76	Nov 119.68 18.22	Dec 119.68 19.43 202.66	eating	(67) (68)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Application (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97         34.97         34.97         34.97         34.97	Apr May 9.68 119.68 1  ndix L, equation 0.34 7.73 2  ppendix L, equation 16.87 181.97 1	Jun Jul 119.68 119.68 In L9 or L9a), a 6.52 7.05 In L13 or L13 167.97 158.61	Aug 119.68 Iso see 7 9.16 3a), also	Sep 119.68 Fable 5 12.3 see Tab 161.96	Oct 119.68 15.61 ble 5 173.76	Nov 119.68	Dec 119.68	eating	(67)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97         34.97         34.97         34.97         34.97           Pumps and fans gains (Table 5a)	Apr May 19.68 119.68 1  ndix L, equation 0.34 7.73 2  ppendix L, equation 16.87 181.97 19  endix L, equation 14.97 34.97	Jun Jul 119.68 119.68 In L9 or L9a), a 6.52 7.05 In L13 or L13 167.97 158.61 In L15 or L15a) 34.97 34.97	Aug 119.68 Iso see 7 9.16 3a), also 156.41 ), also se 34.97	Sep 119.68 Table 5 12.3 see Tab 161.96 ee Table 34.97	Oct 119.68 15.61 ble 5 173.76 5 34.97	Nov 119.68 18.22 188.66	Dec 119.68 19.43 202.66 34.97	eating	(67) (68) (69)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97         34.97         34.97         34.97         34.97         34.97           Pumps and fans gains (Table 5a)         0         0         0         0	Apr May 9.68 119.68 1  ndix L, equation 0.34 7.73    opendix L, equation 16.87 181.97 1  endix L, equation 14.97 34.97    0 0	Jun         Jul           119.68         119.68           In L9 or L9a), a         6.52         7.05           ation L13 or L13         158.61           In L15 or L15a         34.97         34.97           In L15 or L15a         0         0	Aug 119.68 Iso see 7 9.16 3a), also 156.41	Sep 119.68 Table 5 12.3 see Table ee Table	Oct 119.68 15.61 ble 5 173.76	Nov 119.68 18.22	Dec 119.68 19.43 202.66	eating	(67) (68)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97         34.97         34.97         34.97         34.97         34.97           Pumps and fans gains (Table 5a)         0         0         0         0         0           Losses e.g. evaporation (negative         119.00         0         0         0         0	Apr May 9.68 119.68 1  ndix L, equation 0.34 7.73 2  opendix L, equation 181.97 1  endix L, equation 14.97 34.97 34.97 34.97 34.97 34.97	Jun Jul 119.68 119.68 In L9 or L9a), at 6.52 7.05 Intion L13 or L13 167.97 158.61 In L15 or L15a) 34.97 34.97  0 0 In the state of the	Aug 119.68 Iso see 7 9.16 3a), also 156.41 ), also se 34.97	Sep 119.68 Table 5 12.3 see Table 161.96 ee Table 34.97	Oct 119.68  15.61 ble 5 173.76 5 34.97	Nov 119.68 18.22 188.66 34.97	Dec 119.68 19.43 202.66 34.97	eating	(67) (68) (69) (70)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97         34.97         34.97         34.97         34.97           Pumps and fans gains (Table 5a)         (70)m=         0         0         0         0           Losses e.g. evaporation (negative (71)m=         -95.74         -95.74         -95.74         -95.74         -95.74         -95.74         -95.74	Apr May 9.68 119.68 1  ndix L, equation 0.34 7.73 2  opendix L, equation 181.97 1  endix L, equation 14.97 34.97 34.97 34.97 34.97 34.97	Jun         Jul           119.68         119.68           In L9 or L9a), a         6.52         7.05           ation L13 or L13         158.61           In L15 or L15a         34.97         34.97           In L15 or L15a         0         0	Aug 119.68 Iso see 7 9.16 3a), also 156.41 ), also se 34.97	Sep 119.68 Table 5 12.3 see Tab 161.96 ee Table 34.97	Oct 119.68 15.61 ble 5 173.76 5 34.97	Nov 119.68 18.22 188.66	Dec 119.68 19.43 202.66 34.97	eating	(67) (68) (69)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97         34.97         34.97         34.97         34.97           Pumps and fans gains (Table 5a)         (70)m=         0         0         0         0           Losses e.g. evaporation (negative (71)m=         -95.74         -95.74         -95.74         -95.74         -95.74           Water heating gains (Table 5)         -95.74         -95.74         -95.74         -95.74	Apr May 9.68 119.68 1 ndix L, equation 0.34 7.73 2 ppendix L, equation 181.97 1 endix L, equation 4.97 34.97 2 0 0 0 0 0 e values) (Table 15.74 -95.74 -	Jun Jul 119.68 119.68 In L9 or L9a), a 6.52 7.05 Intion L13 or L13 167.97 158.61 In L15 or L15a) 34.97 34.97  0 0 In L15 or L15a) 34.97 34.97	Aug 119.68 Iso see 7 9.16 3a), also 156.41 ), also se 34.97	Sep 119.68 Table 5 12.3 See Tab 161.96 ee Table 34.97 0 -95.74	Oct 119.68  15.61 ble 5 173.76 5 34.97 0 -95.74	Nov 119.68 18.22 188.66 34.97	Dec 119.68 19.43 202.66 34.97	eating	(67) (68) (69) (70) (71)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97         34.97         34.97         34.97         34.97           Pumps and fans gains (Table 5a)         (70)m=         0         0         0         0           Losses e.g. evaporation (negative (71)m=         -95.74         -95.74         -95.74         -95.74         -95.74         -95.74           Water heating gains (Table 5)         -95.74	Apr May 9.68 119.68 1 ndix L, equation 0.34 7.73 2 ppendix L, equation 181.97 1 endix L, equation 4.97 34.97 2 0 0 0 0 0 e values) (Table 15.74 -95.74 -	Jun Jul 119.68 119.68 In L9 or L9a), at 6.52 7.05 Intion L13 or L13 167.97 158.61 In L15 or L15a) 34.97 34.97  0 0 In the state of the	Aug 119.68 Iso see 7 9.16 3a), also 156.41 ), also se 34.97	Sep 119.68 Table 5 12.3 See Tab 161.96 ee Table 34.97	Oct 119.68  15.61 ble 5 173.76 5 34.97	Nov 119.68 18.22 188.66 34.97	Dec 119.68 19.43 202.66 34.97	eating	(67) (68) (69) (70)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97         34.97         34.97         34.97         34.97           Pumps and fans gains (Table 5a)         (70)m=         0         0         0         0           Losses e.g. evaporation (negative (71)m=         -95.74         -95.74         -95.74         -95.74         -95.74           Water heating gains (Table 5)         -95.74         -95.74         -95.74         -95.74	Apr May 9.68 119.68 1 ndix L, equation 0.34 7.73 2 ppendix L, equation 181.97 1 endix L, equation 4.97 34.97 2 0 0 0 0 0 e values) (Table 15.74 -95.74 -	Jun Jul 119.68 119.68 In L9 or L9a), a 6.52 7.05 Intion L13 or L13 167.97 158.61 In L15 or L15a) 34.97 34.97  0 0 In L15 or L15a) 34.97 34.97	Aug 119.68 Iso see 7 9.16 3a), also 156.41 0, also se 34.97	Sep 119.68   Table 5 12.3   See Table 6 34.97   0   -95.74   107.52	Oct 119.68  15.61  ble 5 173.76  5 34.97  0  -95.74	Nov 119.68 18.22 188.66 34.97 0	Dec 119.68 19.43 202.66 34.97 0 -95.74	eating	(67) (68) (69) (70) (71)
Metabolic gains (Table 5), Watts           Jan         Feb         Mar         A           (66)m=         119.68         119.68         119.68         11           Lighting gains (calculated in Apper (67)m=         18.9         16.79         13.65         10           Appliances gains (calculated in Apper (68)m=         212.01         214.21         208.67         19           Cooking gains (calculated in Apper (69)m=         34.97	Apr May 9.68 119.68 1  ndix L, equation 0.34 7.73 2  ppendix L, equation 16.87 181.97 1  endix L, equation 17.97 19.00 1	Jun Jul 119.68 119.68 In L9 or L9a), at 6.52 7.05 Intion L13 or L13 167.97 158.61 In L15 or L15a) 34.97  0 0 In L15 or L15a) 34.97  0 0 In L15 or L15a) 34.97  0 0 In L15 or L15a) 34.97	Aug 119.68 Iso see 7 9.16 3a), also 156.41 0, also se 34.97	Sep 119.68   Table 5 12.3   See Table 6 34.97   0   -95.74   107.52	Oct 119.68  15.61  ble 5 173.76  5 34.97  0  -95.74	Nov 119.68 18.22 188.66 34.97 0	Dec 119.68 19.43 202.66 34.97 0 -95.74	eating	(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	or	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.87	x	11.28	x	0.4	x	0.8	=	7.18	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	11.28	x	0.4	x	0.8	=	13.56	(75)
Northeast 0.9x 0.77	X	2.87	x	22.97	x	0.4	x	0.8	=	14.62	(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	2.87	x	41.38	x	0.4	x	0.8	=	26.34	(75)
Northeast 0.9x 0.77	X	5.42	x	41.38	x	0.4	x	0.8	=	49.73	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	67.96	x	0.4	X	0.8	=	43.25	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	67.96	x	0.4	x	0.8	=	81.68	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	91.35	x	0.4	x	0.8	=	58.14	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	91.35	x	0.4	x	0.8	=	109.79	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	97.38	x	0.4	x	0.8	=	61.98	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	97.38	x	0.4	x	0.8	=	117.05	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	91.1	x	0.4	x	0.8	=	57.98	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	91.1	x	0.4	x	0.8	=	109.5	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	72.63	x	0.4	x	0.8	=	46.22	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	72.63	x	0.4	x	0.8	=	87.29	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	50.42	x	0.4	x	0.8	=	32.09	(75)
Northeast 0.9x 0.77	X	5.42	x	50.42	x	0.4	x	0.8	=	60.6	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	28.07	x	0.4	X	0.8	=	17.86	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	28.07	x	0.4	x	0.8	=	33.74	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	14.2	x	0.4	x	0.8	=	9.04	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	14.2	x	0.4	X	0.8	=	17.06	(75)
Northeast <sub>0.9x</sub> 0.77	X	2.87	x	9.21	x	0.4	x	0.8	=	5.86	(75)
Northeast <sub>0.9x</sub> 0.77	X	5.42	x	9.21	x	0.4	x	0.8	=	11.07	(75)
Southeast 0.9x 0.77	X	0.91	x	36.79	x	0.4	x	0.8	=	7.43	(77)
Southeast 0.9x 0.77	X	2.01	x	36.79	x	0.4	x	0.8	=	32.8	(77)
Southeast 0.9x 0.77	X	0.91	x	62.67	x	0.4	x	0.8	=	12.65	(77)
Southeast 0.9x 0.77	X	2.01	X	62.67	x	0.4	X	0.8	=	55.87	(77)
Southeast 0.9x 0.77	X	0.91	x	85.75	x	0.4	X	0.8	=	17.31	(77)
Southeast 0.9x 0.77	X	2.01	x	85.75	x	0.4	X	0.8	=	76.45	(77)
Southeast 0.9x 0.77	X	0.91	x	106.25	x	0.4	X	0.8	=	21.44	(77)
Southeast 0.9x 0.77	X	2.01	x	106.25	x	0.4	X	0.8	=	94.72	(77)
Southeast 0.9x 0.77	X	0.91	x	119.01	x	0.4	x	0.8	=	24.02	(77)
Southeast 0.9x 0.77	X	2.01	x	119.01	x	0.4	x	0.8	=	106.1	(77)
Southeast 0.9x 0.77	X	0.91	x	118.15	x	0.4	x	0.8	=	23.84	(77)
Southeast 0.9x 0.77	X	2.01	x	118.15	x	0.4	x	0.8	=	105.33	(77)
Southeast 0.9x 0.77	X	0.91	x	113.91	x	0.4	x	0.8	=	22.99	(77)
Southeast 0.9x 0.77	X	2.01	x	113.91	x	0.4	x	0.8	=	101.55	(77)
Southeast 0.9x 0.77	x	0.91	×	104.39	×	0.4	x	0.8	=	21.07	(77)

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Southeast 0.9x	0.77	X	2.01	X	104.39	X	0.4	X	0.8	=	93.06	(77)
Southeast 0.9x	0.77	X	0.91	X	92.85	X	0.4	X	0.8	=	18.74	(77)
Southeast 0.9x	0.77	X	2.01	X	92.85	x	0.4	X	0.8	=	82.78	(77)
Southeast <sub>0.9x</sub>	0.77	X	0.91	X	69.27	X	0.4	X	0.8	=	13.98	(77)
Southeast <sub>0.9x</sub>	0.77	X	2.01	X	69.27	X	0.4	X	0.8	=	61.75	(77)
Southeast <sub>0.9x</sub>	0.77	X	0.91	X	44.07	x	0.4	X	0.8	=	8.89	(77)
Southeast 0.9x	0.77	X	2.01	x	44.07	x	0.4	x	0.8	=	39.29	(77)
Southeast 0.9x	0.77	X	0.91	X	31.49	x	0.4	X	0.8	=	6.35	(77)
Southeast 0.9x	0.77	X	2.01	X	31.49	X	0.4	X	0.8	=	28.07	(77)
Southwest <sub>0.9x</sub>	0.77	X	0.91	x	36.79	]	0.4	X	0.8	] =	14.85	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	36.79	]	0.4	x	0.8	=	32.8	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.62	x	36.79	]	0.4	x	0.8	=	5.06	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	62.67	]	0.4	x	0.8	=	25.3	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	62.67	]	0.4	x	0.8	=	55.87	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.62	x	62.67	]	0.4	x	0.8	=	8.62	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	85.75	]	0.4	x	0.8	=	34.61	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	85.75	]	0.4	X	0.8	=	76.45	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	85.75	]	0.4	x	0.8	=	11.79	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	106.25	]	0.4	X	0.8	=	42.88	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.01	x	106.25	]	0.4	X	0.8	=	94.72	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.62	x	106.25	]	0.4	x	0.8	=	14.61	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	119.01	]	0.4	X	0.8	=	48.03	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	119.01	]	0.4	x	0.8	=	106.1	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	119.01	]	0.4	x	0.8	=	16.36	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	118.15	]	0.4	x	0.8	] =	47.69	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	118.15	]	0.4	x	0.8	<b>=</b>	105.33	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.62	x	118.15	]	0.4	x	0.8	=	16.24	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	113.91	]	0.4	x	0.8	] =	45.97	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	113.91	]	0.4	x	0.8	<b>=</b>	101.55	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.62	x	113.91	]	0.4	x	0.8	=	15.66	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	104.39	]	0.4	x	0.8	] =	42.13	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	104.39	]	0.4	x	0.8	] =	93.06	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.62	x	104.39	]	0.4	x	0.8	=	14.35	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	92.85	]	0.4	x	0.8	] =	37.48	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	92.85	Ī	0.4	x	0.8	] =	82.78	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.62	x	92.85	Ī	0.4	x	0.8	] =	12.77	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	69.27	]	0.4	x	0.8	] =	27.96	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	x	69.27	Ī	0.4	x	0.8	=	61.75	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.62	x	69.27	Ī	0.4	x	0.8	j =	9.52	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.91	x	44.07	]	0.4	x	0.8	] =	17.79	(79)
Southwest <sub>0.9x</sub>	0.77	x	2.01	×	44.07	Ī	0.4	x	0.8	j =	39.29	(79)
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Southwest <sub>0.9x</sub>	0.77	X	0.6	32	X	4	4.07		0.4	:	x L	0.8		=	6.06	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.9	91	X	3	1.49	]	0.4		x	0.8		=	12.71	(79)
Southwest <sub>0.9x</sub>	0.77	X	2.0	)1	X	3	1.49	]	0.4		x	0.8		=	28.07	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.6	62	X	3	1.49	]	0.4		x	0.8		=	4.33	(79)
Northwest 0.9x	0.77	x	1.9	9	X	1	1.28	x	0.4		x [	0.8		=	4.98	(81)
Northwest 0.9x	0.77	X	1.9	9	X	2	2.97	x	0.4	:	x	0.8		=	10.14	(81)
Northwest 0.9x	0.77	x	1.9	9	X	4	1.38	х	0.4		x	0.8		=	18.26	(81)
Northwest 0.9x	0.77	x	1.9	9	X	6	7.96	x	0.4		x [	0.8		=	29.99	(81)
Northwest 0.9x	0.77	x	1.9	9	X	9	1.35	x	0.4		x [	0.8		= [	40.31	(81)
Northwest 0.9x	0.77	x	1.9	9	X	9	7.38	x	0.4		x [	0.8		=	42.98	(81)
Northwest 0.9x	0.77	x	1.9	9	X	9	91.1	x	0.4		x [	0.8		= [	40.2	(81)
Northwest 0.9x	0.77	x	1.9	9	X	7	2.63	x	0.4		x [	0.8		=	32.05	(81)
Northwest 0.9x	0.77	x	1.9	9	X	5	0.42	x	0.4		x [	0.8		=	22.25	(81)
Northwest 0.9x	0.77	X	1.9	9	X	2	8.07	x	0.4		x	0.8		=	12.39	(81)
Northwest 0.9x	0.77	x	1.9	9	X	1	14.2	x	0.4		x [	0.8		=	6.27	(81)
Northwest <sub>0.9x</sub>	0.77	x	1.9	9	X	9	9.21	x	0.4		x [	0.8		=	4.07	(81)
								-								
Solar gains in	watts, calc	culated	for eacl	h month	า			(83)m	n = Sum(74)n	n(82	)m					
(83)m= 118.66	210.66	310.93	423.29	508.84	5	20.44	495.4	429	.24 349.47	7 238	3.94	143.68	100.5	54		(83)
Total gains – i	nternal and	d solar	(84)m =	= (73)m	+ (8	83)m	, watts									
(84)m= 534.29	624.27	711.5	802.8	866.99	8	57.95	819.47	759	.14 690.15	600	0.88	530.07	505.2	25		(84)
7. Mean inter	nal tempe	rature (	heating	seasor	n)					·						
7. Mean inter Temperature	•	`				area f	rom Tal	ole 9	, Th1 (°C)						21	(85)
	during hea	ating pe	eriods ir	the liv	ing			ole 9	, Th1 (°C)						21	(85)
Temperature	during hea	ating pe	eriods ir	the liv	ing n (s				, Th1 (°C)	) C	Oct	Nov	De	c	21	(85)
Temperature Utilisation fac	during hea	ating pe	eriods ir	the livea, h1,n	ing n (s	ee Ta	ble 9a)		ug Sep	+	Oct 95	Nov 0.99	De 1	c	21	(85)
Temperature Utilisation fac  Jan  (86)m= 1	during heat tor for gain Feb	ating pens for li	eriods ir ving are Apr 0.92	n the liv ea, h1,n May	ing n (s	ee Ta Jun <sup>0.59</sup>	Jul 0.43	A 0.4	ug Sep	+				С	21	
Temperature Utilisation fac	during heater for gain Feb 0.99	ating pens for li	eriods ir ving are Apr 0.92	n the liv ea, h1,n May	ing n (s	ee Ta Jun <sup>0.59</sup>	Jul 0.43	A 0.4	ug Sep 18 0.74 Table 9c)	0.9					21	
Temperature  Utilisation factors  Jan  (86)m= 1  Mean interna (87)m= 19.93	during heater for gain Feb 0.99 I temperate 20.1	ns for li Mar 0.97 ure in li 20.36	eriods ir ving are Apr 0.92 iving are 20.68	n the livea, h1,n May 0.78 ea T1 (f	ing n (s l follo	ee Ta Jun 0.59 w ste	ble 9a)  Jul  0.43  ps 3 to 7  21	A 0.47 in T 2	ug Sep 18 0.74 Table 9c) 1 20.94	20	95	0.99	1		21	(86)
Temperature  Utilisation factors  Jan  (86)m= 1  Mean interna (87)m= 19.93  Temperature	during heater for gain Feb 0.99 I temperat 20.1 during heater for gain feet and the second feet and the se	ns for li Mar 0.97 ure in li 20.36	eriods ir ving are Apr 0.92 iving are 20.68	n the livea, h1,n May 0.78 ea T1 (f	ing n (s follo	ee Ta Jun 0.59 www.ste 20.98	Jul 0.43 ps 3 to 7 21 from Ta	A 0.47 in T 2 able 9	ug Sep 18 0.74 Table 9c) 1 20.94 20.94	20	95	0.99	19.9	)	21	(86)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01	tor for gain Feb 0.99 I temperate 20.1 during hea	ns for li Mar 0.97 ure in li 20.36 ating pe	eriods ir ving are Apr 0.92 iving are 20.68 eriods ir 20.02	m the livea, h1,n May 0.78 ea T1 (for 20.9 m) rest of 20.03	ing (s) (s) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d	Jun 0.59 w ste 20.98 velling 20.04	Jul 0.43 ps 3 to 7 21 from Ta 20.04	A 0.47 in T 2 able 9 20.	ug Sep 18 0.74 Table 9c) 1 20.94 20.94	20	95	0.99	1	)	21	(86)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact	tor for gair Feb 0.99 I temperate 20.1 during hea 20.01	ns for li Mar 0.97 ure in li 20.36 ating pe	eriods ir ving are Apr 0.92 iving are 20.68 eriods ir 20.02	n the livea, h1,n May 0.78 ea T1 (f 20.9 n rest of 20.03 welling,	ing (something) (s	ee Ta Jun 0.59 ow ste 0.98 velling 0.04 ,m (se	Jul 0.43 ps 3 to 7 21 from Ta 20.04 pe Table	A 0.47 in T 2 able 9 20.	ug Sep 18 0.74 Table 9c) 1 20.94 9, Th2 (°C) 04 20.03	20	.65	20.23	19.9	)	21	(86) (87) (88)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01	tor for gair Feb 0.99 I temperate 20.1 during hea 20.01	ns for li Mar 0.97 ure in li 20.36 ating pe	eriods ir ving are Apr 0.92 iving are 20.68 eriods ir 20.02	m the livea, h1,n May 0.78 ea T1 (for 20.9 m) rest of 20.03	ing (something) (s	Jun 0.59 w ste 20.98 velling 20.04	Jul 0.43 ps 3 to 7 21 from Ta 20.04	A 0.47 in T 2 able 9 20.	ug Sep 18 0.74 Table 9c) 1 20.94 9, Th2 (°C) 04 20.03	20	95	0.99	19.9	)	21	(86)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.99  Mean interna	during heater for gair Feb 0.99 I temperate 20.1 ctor for gair 0.99 I temperate 1.99	ns for li Mar 0.97 ure in li 20.36 ating per 20.01 ns for re 0.96 ure in t	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do 0.89 he rest	m the live a, h1,n May 0.78 ea T1 (for 20.9 morest of 20.03 elling, 0.73 of dwel	ing (see see see see see see see see see se	ee Ta Jun 0.59 w ste 20.98 velling 20.04 m (se 0.5	Jul 0.43 ps 3 to 7 21 from Ta 20.04 pe Table 0.34 pllow ste	A 0.4 7 in T 2 20. 9a) 0.3	ug Sep 18 0.74 Table 9c) 1 20.94 20.94 20.03 18 0.66 10 7 in Ta	0.9 20 ) 20 0.9 ble 90	95	0.99 20.23 20.02 0.99	19.9	2	21	(86) (87) (88) (89)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.99	during heater for gair Feb 0.99 I temperate 20.1 ctor for gair 0.99 I temperate 1.99	ns for li Mar 0.97 ure in li 20.36 ating per 20.01 ns for re 0.96	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do	n the livea, h1,n May 0.78 ea T1 (f 20.9 n rest of 20.03 welling, 0.73	ing (see see see see see see see see see se	ee Ta Jun 0.59 ww ste 20.98 velling 20.04 m (se 0.5	Jul 0.43 ps 3 to 7 21 from Ta 20.04 ee Table 0.34	A 0.47 in T 2 able 9 20. 9a) 0.3	ug Sep 18 0.74 Table 9c) 1 20.94 20.94 20.03 18 0.66 10 7 in Ta	0.3 200 0.3 0.3 0.3 0.3 19	95 65 03 93 64	0.99 20.23 20.02 0.99	19.9	2	21	(86) (87) (88) (89)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.99  Mean interna	during heater for gair Feb 0.99 I temperate 20.1 ctor for gair 0.99 I temperate 1.99	ns for li Mar 0.97 ure in li 20.36 ating per 20.01 ns for re 0.96 ure in t	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do 0.89 he rest	m the live a, h1,n May 0.78 ea T1 (for 20.9 morest of 20.03 elling, 0.73 of dwel	ing (see see see see see see see see see se	ee Ta Jun 0.59 w ste 20.98 velling 20.04 m (se 0.5	Jul 0.43 ps 3 to 7 21 from Ta 20.04 pe Table 0.34 pllow ste	A 0.4 7 in T 2 20. 9a) 0.3	ug Sep 18 0.74 Table 9c) 1 20.94 20.94 20.03 18 0.66 10 7 in Ta	0.3 200 0.3 0.3 0.3 0.3 19	95 65 03 93 64	0.99 20.23 20.02 0.99	19.9	2	21	(86) (87) (88) (89)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.99  Mean interna	during heater for gair Feb 0.99 I temperate 20.01 Etor for gair 0.99 I temperate 18.84	ns for li Mar 0.97 ure in li 20.36 ating per 20.01 ns for re 0.96 ure in t	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do 0.89 he rest 19.66	n the livea, h1,n May 0.78 ea T1 (f 20.9 n rest of 20.03 welling, 0.73 of dwel 19.93	ing (s)	ee Ta Jun 0.59 w ste 20.98 relling 20.04 m (se 0.5 T2 (fc	Jul 0.43 ps 3 to 7 21 from Ta 20.04 re Table 0.34 pllow ste 20.04	A 0.4 7 in T 2 able 9 20. 9a) 0.3	ug Sep 18 0.74 Table 9c) 1 20.94 9, Th2 (°C) 04 20.03 18 0.66 to 7 in Ta 19.99	0.9 20 0.9 ble 90 19 fLA =	95 65 03 93 64	0.99 20.23 20.02 0.99	19.9	2		(86) (87) (88) (89)
Temperature Utilisation fact  Jan  (86)m= 1  Mean interna (87)m= 19.93  Temperature (88)m= 20.01  Utilisation fact (89)m= 0.99  Mean interna (90)m= 18.59	during heater for gair Feb 0.99 I temperate 20.01 Etor for gair 0.99 I temperate 18.84 I temperate	ns for li Mar 0.97 ure in li 20.36 ating per 20.01 ns for re 0.96 ure in t	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do 0.89 he rest 19.66	n the livea, h1,n May 0.78 ea T1 (f 20.9 n rest of 20.03 welling, 0.73 of dwel 19.93	follo  follo  follo  follo  g  h2,  h2,  elling	ee Ta Jun 0.59 w ste 20.98 relling 20.04 m (se 0.5 T2 (fc	Jul 0.43 ps 3 to 7 21 from Ta 20.04 re Table 0.34 pllow ste 20.04	A 0.4 7 in T 2 able 9 20. 9a) 0.3	ug Sep 8 0.74 Table 9c) 1 20.94 9, Th2 (°C) 04 20.03 8 0.66 to 7 in Ta 04 19.99 - fLA) × T	0.9 20 0.9 0.9 ble 90 19 fLA =	95 65 03 93 64	0.99 20.23 20.02 0.99	19.9	2 5		(86) (87) (88) (89)
Temperature Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.99  Mean interna  (90)m= 18.59	during heater for gair Feb 0.99 I temperate 20.01 Etor for gair 0.99 I temperate 18.84 I temperate 19.3	ns for li  Mar  0.97  ure in li  20.36  ating per  20.01  ns for re  0.96  ure in t  19.22  ure (for	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do 0.89 he rest 19.66 r the wh 20.03	n the livea, h1,n May 0.78 ea T1 (for 20.9) n rest of 20.03 welling, 0.73 of dwel 19.93 ole dwe 20.28	ing  n (s  follo  follo  ph2,  h2,  h2,  selling  2	ee Ta  Jun  0.59  w ste  0.98  velling  0.04  m (se  0.5  T2 (fo  0.03  g) = fl	Jul 0.43 ps 3 to 7 21 from Ta 20.04 pe Table 0.34 pllow ste 20.04  A × T1 20.39	A A 0.4  O.4  O.4  O.5  O.5  O.5  O.5  O.5  O	ug Sep 8 0.74  Table 9c) 1 20.94  9, Th2 (°C) 04 20.03  8 0.66  to 7 in Ta 04 19.99  - fLA) × T 39 20.34	0.9 20 0.9 0.9 0.9 19 fLA =	95 65 03 93 64 Livi	0.99 20.23 20.02 0.99 19.04 ing area ÷ (4	1 19.9 20.03 1 18.55	2 5		(86) (87) (88) (89) (90) (91)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.99  Mean interna  (90)m= 18.59  Mean interna  (92)m= 19.07	during heat tor for gair Feb 0.99 I temperate 20.01 Etor for gair 0.99 I temperate 18.84 I temperate 19.3 Inent to the	ns for li  Mar  0.97  ure in li  20.36  ating per  20.01  ns for re  0.96  ure in t  19.22  ure (for	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do 0.89 he rest 19.66 r the wh 20.03	n the livea, h1,n May 0.78 ea T1 (for 20.9) n rest of 20.03 welling, 0.73 of dwel 19.93 ole dwe 20.28	ing n (s follo 2 h2, h2, cellin 2 rratu	ee Ta  Jun  0.59  w ste  0.98  velling  0.04  m (se  0.5  T2 (fo  0.03  g) = fl	Jul 0.43 ps 3 to 7 21 from Ta 20.04 pe Table 0.34 pllow ste 20.04  A × T1 20.39	A A 0.4  O.4  O.4  O.5  O.5  O.5  O.5  O.5  O	ug Sep  8 0.74  able 9c) 1 20.94  9, Th2 (°C) 04 20.03  8 0.66  to 7 in Ta 04 19.99  - fLA) × T 39 20.34  where app	0.9 20 0.9 0.9 19 fLA = 22 20 20 20 20 20 20 20 20 20 20 20 20 2	95 65 03 93 64 Livi	0.99 20.23 20.02 0.99 19.04 ing area ÷ (4	1 19.9 20.03 1 18.55	5		(86) (87) (88) (89) (90) (91)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.99  Mean interna  (90)m= 18.59  Mean interna  (92)m= 19.07  Apply adjustn	during heater for gair Feb 0.99 I temperate 20.01 Etor for gair 0.99 I temperate 18.84 I temperate 19.3 Inent to the 19.3	ns for li  Mar  0.97  ure in li  20.36  ating per  20.01  ns for re  0.96  ure in t  19.22  ure (for  19.63  mean  19.63	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do 0.89 he rest 19.66 r the wh 20.03 internal	n the livea, h1,n May 0.78 ea T1 (for 20.9) n rest of 20.03 welling, 0.73 of dwel 19.93 ole dwel 20.28 tempe	ing n (s follo 2 h2, h2, cellin 2 rratu	ee Ta  Jun  0.59  w stel  0.98  velling  0.04  m (se  0.5  T2 (fo  0.03)  g) = fl  0.37  ure fro	Jul 0.43 ps 3 to 7 21 from Ta 20.04 pe Table 0.34 pllow ste 20.04  A × T1 20.39 m Table	A	ug Sep  8 0.74  Table 9c) 1 20.94  9, Th2 (°C) 04 20.03  8 0.66  to 7 in Ta 04 19.99  - fLA) × T 39 20.34  where app	0.9 20 0.9 0.9 19 fLA = 22 20 20 20 20 20 20 20 20 20 20 20 20 2	95 65 03 93 64 Livi	0.99  20.23  20.02  0.99  19.04  ing area ÷ (4	1 19.9 20.02 1 18.55 4) =	5		(86) (87) (88) (89) (90) (91)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.93  Temperature  (88)m= 20.01  Utilisation fact  (89)m= 0.99  Mean interna  (90)m= 18.59  Mean interna  (92)m= 19.07  Apply adjustn  (93)m= 19.07	during heat tor for gair Feb 0.99 I temperate 20.01 Etor for gair 0.99 I temperate 18.84 I temperate 19.3 Inent to the 19.3 Iting requiremean inter	ating pens for li Mar   0.97   ure in li 20.36   ating pens for record on the limit of the limit	eriods in ving are Apr 0.92 iving are 20.68 eriods in 20.02 est of do 0.89 he rest 19.66 r the wh 20.03 internal 20.03	n the livea, h1,n May 0.78 ea T1 (for 20.9) n rest of 20.03 welling, 0.73 of dwel 19.93 ole dwel 20.28 tempe 20.28 re obtain	ing n (s follo 2 h2, h2, lling 2 ratu 2	ee Ta  Jun  0.59  w stel 20.98  velling 20.04  m (se 0.5  T2 (fo 20.03)  g) = fl 20.37  ure fro 20.37	Jul 0.43 ps 3 to 7 21 from Ta 20.04 re Table 0.34 pllow ste 20.04  A × T1 20.39 m Table 20.39	A 0.4  A	ug Sep  8 0.74  able 9c) 1 20.94  9, Th2 (°C) 04 20.03  8 0.66  to 7 in Ta 04 19.99  - fLA) × T 39 20.34  where app 39 20.34	0.9 20 0.9 0.9 19 fLA = 22 20 20 20 20 20 20 20 20 20 20 20 20 2	95 65 03 93 64 Livi	0.99  20.23  20.02  0.99  19.04  19.47	1 19.9 20.00 1 18.55 4) =	5 4	0.36	(86) (87) (88) (89) (90) (91)

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Utilisation factor for gains, hm:	0.40	<u>co   o o</u>	0.00	1 0 00		(94)
(94)m= 0.99 0.98 0.96 0.89 0.74 0.53 0.37 Useful gains, hmGm , W = (94)m x (84)m	0.42 0.	.69 0.9	0.98	0.99		(94)
	318.7 47	6.1 556.	25 521.96	502.5		(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	4.1 10.	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [	<del>-                                    </del>	6)m ]	-1			
		5.58 768.		1226.8		(97)
Space heating requirement for each month, kWh/month = $0.024$ (98)m= $523.91$ 393.5 303.6 142.41 43.64 0 0		- (95)m] x 0 158.	<u> </u>	538.88		
(98)m= 523.91 393.5 303.6 142.41 43.64 0 0	I		rear) = Sum(9	٠	2460.56	(98)
Space heating requirement in kW/h/m²///ear	rotal per	year (RVVIII)	car) = ourne	JO)15,912 —		=
Space heating requirement in kWh/m²/year				<u> </u>	32.16	(99)
9b. Energy requirements – Community heating scheme	a providos	d by a aan	munitu oo	homo		
This part is used for space heating, space cooling or water heating Fraction of space heat from secondary/supplementary heating (Ta			imunity SC	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 up to f	our other hear	ا t sources: th	ne latter	`
includes boilers, heat pumps, geothermal and waste heat from power stations. Se						
Fraction of heat from Community heat pump					1	(303a)
Fraction of total space heat from Community heat pump			(302) x (303	3a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for communi	itv heating	ı svetem			1	(305)
	,	Joystoni			Į.	(000)
Distribution loss factor (Table 12c) for community heating system		gayatani		l [	1.05	(306)
Distribution loss factor (Table 12c) for community heating system Space heating		y System		[		(306)
, , , , , , , , , , , , , , , , , , , ,		gayatani		   	1.05	(306)
Space heating			(305) x (306)	[ = [	1.05 <b>kWh/ye</b>	(306)
Space heating Annual space heating requirement	(98)	) x (304a) x	, , , ,	    - 	1.05 <b>kWh/ye</b> 2460.56	(306) ar
Space heating Annual space heating requirement Space heat from Community heat pump	(98) n Table 4a	) x (304a) x or Appen	, , , ,	    -   	1.05 <b>kWh/ye</b> 2460.56 2583.59	(306) <b>ar</b> (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	) x (304a) x or Appen	dix E)	= [	1.05 <b>kWh/ye</b> 2460.56 2583.59	(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	) x (304a) x or Appen	dix E)	= [	1.05 <b>kWh/ye</b> 2460.56 2583.59	(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) n Table 4a m (98)	) x (304a) x or Appen ) x (301) x 1	dix E) 00 ÷ (308) =	[	1.05  kWh/ye 2460.56 2583.59  0  0  2083.35	(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) n Table 4a m (98)	) x (304a) x or Appen ) x (301) x 1 ) x (303a) x	dix E) 00 ÷ (308) = (305) x (306)	=	1.05 <b>kWh/ye</b> 2460.56 2583.59 0	(306)  ar  (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:	(98) n Table 4a m (98)	) x (304a) x or Appen ) x (301) x 1 ) x (303a) x	dix E) 00 ÷ (308) =	=	1.05  kWh/ye 2460.56 2583.59  0  0  2083.35	(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) n Table 4a m (98)	) x (304a) x or Appen ) x (301) x 1 ) x (303a) x	dix E) 00 ÷ (308) = (305) x (306)	=	1.05  kWh/ye 2460.56 2583.59 0 0 2083.35 2187.52	(306)  ar  (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) n Table 4a m (98) (64) 0.01 × [(3	) x (304a) x or Appen ) x (301) x 1 ) x (303a) x	dix E) 00 ÷ (308) = (305) x (306) e) + (310a)	=	1.05  kWh/ye 2460.56 2583.59 0 0 2083.35 2187.52 47.71	(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) n Table 4a m (98) (64) 0.01 × [(3)	) x (304a) x or Appen ) x (301) x 1 ) x (303a) x 307a)(307	dix E) 00 ÷ (308) = (305) x (306) e) + (310a)	=	1.05  kWh/ye 2460.56 2583.59 0 0 2083.35 2187.52 47.71 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) n Table 4a m (98) (64) 0.01 × [(3)	) x (304a) x or Appen ) x (301) x 1 ) x (303a) x 307a)(307	dix E) 00 ÷ (308) = (305) x (306) e) + (310a)	=	1.05  kWh/ye 2460.56 2583.59 0 0 2083.35 2187.52 47.71 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 or	(98) n Table 4a m (98) (64) 0.01 × [(3)	) x (304a) x or Appen ) x (301) x 1 ) x (303a) x 307a)(307	dix E) 00 ÷ (308) = (305) x (306) e) + (310a)	=	1.05  kWh/ye 2460.56 2583.59 0 0 2083.35 2187.52 47.71 0 0 200.74	(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 or warm air heating system fans	(98) n Table 4a m (98) (64) 0.01 × [(3) = (1)	) x (304a) x or Appen ) x (301) x 1 ) x (303a) x 307a)(307	dix E) 00 ÷ (308) = (305) x (306) e) + (310a)	=	1.05  kWh/ye 2460.56 2583.59 0 0 2083.35 2187.52 47.71 0 0 200.74 0	(306)  ar  (307a)  (308  (309)  (310a)  (313)  (314)  (315)  (330a)  (330b)

(332)Energy for lighting (calculated in Appendix L) 333.8 Total delivered energy for all uses (307) + (309) + (310) + (312) + (315) + (331) + (332)...(237b) =5305.64 (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)646.53 0.52 Electrical energy for heat distribution [(313) x (372)0.52 24.76 Total CO2 associated with community systems (363)...(366) + (368)...(372)(373)671.29 CO2 associated with space heating (secondary) (309) x (374)0 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)671.29 CO2 associated with electricity for pumps and fans within dwelling (331)) x (378)0.52 104.18 CO2 associated with electricity for lighting (332))) x 0.52 (379)173.24 sum of (376)...(382) =Total CO2, kg/year (383)948.71 **Dwelling CO2 Emission Rate**  $(383) \div (4) =$ (384)12.4

El rating (section 14)

(385)

89.54

		l lser I	Details:						
Assessor Name:	Ben Talbutt Stroma FSAP 2012	<u> </u>	Strom					036639 on: 1.0.5.17	
Software Name:		Property	<b>Softwa</b> Address		rsion:		versic	on: 1.0.5.17	
Address :	'	торстту	Addiess	. DZ 00					
1. Overall dwelling dime	ensions:								
		Are	a(m²)	1	Av. He	ight(m)	1	Volume(m	<u> </u>
Ground floor			76.52	(1a) x	2	2.82	(2a) =	215.79	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	76.52	(4)					
Dwelling volume				(3a)+(3b	)+(3c)+(3c	d)+(3e)+	(3n) =	215.79	(5)
2. Ventilation rate:			_						
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+	0	=	0	X 4	10 =	0	(6a)
Number of open flues	0 + 0	+	0	] = [	0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				3	x 1	10 =	30	(7a)
Number of passive vents	3			Ē	0	x 1	10 =	0	(7b)
Number of flueless gas f	ires			F	0	x 4	10 =	0	(7c)
				L					
							Air ch	anges per ho	our
	ys, flues and fans = $(6a)+(6b)+(6b)$				30		÷ (5) =	0.14	(8)
If a pressurisation test has be Number of storeys in t	peen carried out or is intended, procee he dwelling (ns)	ed to (17),	otherwise (	continue fr	rom (9) to	(16)			<b>—</b> (0)
Additional infiltration	ne aweiling (ns)					[(9)-	·1]x0.1 =	0	(9) (10)
	.25 for steel or timber frame o	r 0.35 fo	r masoni	ry consti	ruction	[(0)	.,	0	(11)
	resent, use the value corresponding t	o the grea	ter wall are	a (after					
deducting areas of opening	ngs);    if equal user 0.35 floor, enter 0.2 (unsealed) or (	) 1 (spal	مرا/ مادم	antar ()					(12)
If no draught lobby, en	,	. i (Scai	eu), eise	enter 0				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration	0 11		0.25 - [0.2	2 x (14) ÷ 1	100] =			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	5	(17)
•	lity value, then $(18) = [(17) \div 20] +$							0.39	(18)
Air permeability value applie  Number of sides sheltere	es if a pressurisation test has been do ad	ne or a de	egree air pe	rmeability	is being u	sed			(19)
Shelter factor	su .		(20) = 1 -	[0.075 x (	19)] =			0.85	(20)
Infiltration rate incorpora	ting shelter factor		(21) = (18	s) x (20) =				0.33	(21)
Infiltration rate modified f	or 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>÷ 1</i>								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
(-20)	1.50   0.50	1 0.00	1 0.02	<u> </u>	1	12		I	

Adjusted infiltration rate (allowing for sh	elter and wind spee	ed) = (21a) x (22a)m				
0.42 0.41 0.41 0.36	0.36 0.31 0.	.31 0.31 0.33	0.36 0.37	0.39		
Calculate effective air change rate for the	ne applicable case	•	'		·	<b>–</b> , .
If mechanical ventilation:  If exhaust air heat pump using Appendix N, (2)	2b) - (22c) - Emy (cause	tion (NE)) othorwing (22)	a) - (22a)		0	(23a)
If balanced with heat recovery: efficiency in %			)) = (23a)		0	(23b)
	_		2h)m + (22h) +	[4 (220)	0 . 1001	(23c)
a) If balanced mechanical ventilation (24a)m= 0 0 0 0	<del></del>	$\begin{array}{c c} (WVHK) & (24a)III = (24a$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\frac{1-(230)}{0}$	+ 100j	(24a)
b) If balanced mechanical ventilation			<u> </u>			, ,
(24b)m= 0 0 0 0	1	$\frac{1}{0}$ $\frac{1}{0}$ $\frac{1}{0}$ $\frac{1}{0}$		0		(24b)
c) If whole house extract ventilation of if (22b)m < 0.5 × (23b), then (24c)	•		.5 × (23b)		I	
(24c)m= 0 0 0 0	<u> </u>	0 0 0	0 0	0		(24c)
d) If natural ventilation or whole hous	e positive input ven	tilation from loft		·	l	
if (22b)m = 1, then (24d)m = (22b	)m otherwise (24d)	$m = 0.5 + [(22b)m^2 x]$	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		(24d)
Effective air change rate - enter (24a)	<del>```'``</del>	<del>``'</del>			1	
(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 losses and heat loss parameter	r:					
ELEMENT Gross Opening area (m²) m		U-value W/m2K	A X U (W/K)	k-value kJ/m²-		X k J/K
Doors	2.52	x 1 =	2.52			(26)
Windows Type 1	2.2	$x^{1/[1/(1.4)+0.04]} =$	2.92			(27)
Windows Type 2	4.15	$x^{1/[1/(1.4)+0.04]} =$	5.5			(27)
Windows Type 3	1.53	$x^{1/[1/(1.4)+0.04]} =$	2.03			(27)
Windows Type 4	0.7	$x^{1/[1/(1.4)+0.04]} =$	0.93			(27)
Windows Type 5	1.54	$x^{1/[1/(1.4)+0.04]} =$	2.04			(27)
Windows Type 6	0.48	$x^{1/[1/(1.4)+0.04]} =$	0.64			(27)
Windows Type 7	0.7	$\chi 1/[1/(1.4) + 0.04] =$	0.93			(27)
Windows Type 8	1.54	$\chi 1/[1/(1.4) + 0.04] =$	2.04			(27)
Walls Type1 77.35 19.14	58.21	x 0.18 =	10.48			(29)
Walls Type2 5.64 0	5.64	x 0.18 =	1.02			(29)
Walls Type3 21.34 0	21.34	x 0.18 =	3.84			(29)
Roof 76.52 0	76.52	x 0.13 =	9.95			(30)
Total area of elements, m <sup>2</sup>	180.85					(31)
* for windows and roof windows, use effective wir ** include the areas on both sides of internal walk		using formula 1/[(1/U-val	ue)+0.04] as given i	n paragrapl	3.2	
Fabric heat loss, $W/K = S (A \times U)$		(26)(30) + (32) =			49.84	(33)
Heat capacity Cm = S(A x k)		((28).	(30) + (32) + (32a)	)(32e) =	0	(34)
Thermal mass parameter (TMP = Cm ÷	TFΔ) in k I/m²K	Indica	ative Value: Medium		050	(25)
morniar mass parameter (11111 - 5111 ;	11 74) 111 10/111 10				250	(35)

can be used	instead of a d	etailed calc	ulation										
	ridges : S (			using Ap	pendix l	K						9.31	(36)
	hermal bridgin	,		٠.	•							0.01	(00)
Total fabri	c heat loss							(33) +	(36) =			59.15	(37)
Ventilation	Ventilation heat loss calculated monthly $(38)m = 0.33 \times (25)m \times (5)$										_		
J	lan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 41	1.93 41.69	41.45	40.32	40.1	39.12	39.12	38.94	39.5	40.1	40.53	40.98		(38)
Heat trans	sfer coefficie	ent, W/K		-	-			(39)m	= (37) + (	38)m	-		
(39)m= 10	1.08 100.84	100.6	99.46	99.25	98.27	98.27	98.08	98.65	99.25	99.68	100.13	]	
Heat loss	parameter (	(HLP), W	/m²K			•	•		Average = = (39)m ÷	Sum(39) <sub>1</sub> · (4)	12 /12=	99.46	(39)
(40)m= 1.	.32 1.32	1.31	1.3	1.3	1.28	1.28	1.28	1.29	1.3	1.3	1.31	]	
Number o	f days in mo	onth (Tab	le 1a)					,	Average =	Sum(40) <sub>1</sub>	12 /12=	1.3	(40)
J	lan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	]	
(41)m=	31 28	31	30	31	30	31	31	30	31	30	31		(41)
	•	•	•	•	•	•	•		•	•	•	•	
4. Water	heating en	ergy requ	irement:								kWh/y	ear:	
Δ		<b>N</b> 1										1	
if TFA >	occupancy, · 13.9, N = 1 : 13.9, N = 1	+ 1.76 x	([1 - exp	(-0.0003	349 x (TF	FA -13.9	)2)] + 0.0	0013 x (	TFA -13		.39	l	(42)
	erage hot w		ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		91	.05	1	(43)
	annual averag at 125 litres pei				_	_	to achieve	a water us	se target o	f		J	
	<u> </u>	1					Ι.					1	
	lan Feb	Mar er day for ea	Apr	Vd m = fa	tor from	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
	0.15 96.51	92.87	89.23	85.58	81.94	81.94	85.58	89.23	92.87	96.51	100.15	1	
(44)111= 10	0.15 90.51	92.07	09.23	05.50	01.94	01.94	00.00		<u> </u>	m(44) <sub>112</sub> =		1092.55	(44)
Energy conte	ent of hot wate	r used - cal	lculated m	onthly $= 4$ .	190 x Vd,ı	m x nm x L	OTm / 3600					1002.00	(```
(45)m= 14	8.52 129.9	134.04	116.86	112.13	96.76	89.66	102.89	104.12	121.34	132.45	143.83	]	
	<b>!</b>				l				Total = Su	m(45) <sub>112</sub> =	=	1432.51	(45)
If instantane	ous water hea	ting at point	t of use (no	hot water	r storage),	enter 0 in	boxes (46	) to (61)				•	
	2.28 19.48	20.11	17.53	16.82	14.51	13.45	15.43	15.62	18.2	19.87	21.58		(46)
Water stor	rage loss: olume (litres	s) includir	na anv si	olar or M	/WHRS	storage	within s	ame ves	امء		150	1	(47)
•	nity heating	•				•		arric ves	301		150	J	(47)
	if no stored			•			. ,	ers) ente	er '0' in (	47)			
Water stor			`					,	`	,			
a) If manu	ufacturer's o	declared I	oss fact	or is kno	wn (kWl	n/day):				1.	.39	]	(48)
Temperati	ure factor fr	om Table	2b							0.	.54	]	(49)
	st from water	-	-				(48) x (49)	) =		0.	.75	]	(50)
•	ufacturer's o		-									1	(54)
	storage los nity heating			ı <del>c</del> ∠ (KVV	i // ii ii e/Uč	ау <i>)</i>					0	J	(51)
	ctor from Ta		-								0	]	(52)
Temperati	ure factor fr	om Table	2b								0	]	(53)

Charge last from water stores a LVMb/veer	(47) (54) (50) (50)		(5.4)
Energy lost from water storage, kWh/year Enter (50) or (54) in (55)	(47) x (51) x (52) x (53) =	0.75	(54) (55)
Water storage loss calculated for each month	$((56)m = (55) \times (41)m$	0.73	(00)
(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 dedicated solar storage, (57)m = (56)m x [(50) – (H11)] ÷			` '
(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) from Table 3	<u> </u>	0	(58)
Primary circuit loss calculated for each month $(59)$ m = $(58) \div 3$	365 × (41)m		
(modified by factor from Table H5 if there is solar water hea	ting and a cylinder thermo	ostat)	
(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 calculated for each month (61)m = (60) $\div$ 365 x (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 mont	$h (62)m = 0.85 \times (45)m +$	(46)m + (57)m +	(59)m + (61)m
(62)m= 195.12 171.98 180.64 161.95 158.73 141.85 136.26	149.48 149.21 167.93	177.54 190.43	(62)
Solar DHW input calculated using Appendix G or Appendix H (negative quant	ity) (enter '0' if no solar contribu	tion to water heating)	
(add additional lines if FGHRS and/or WWHRS applies, see A	ppendix G)		•
(63)m= 0 0 0 0 0 0 0	0 0 0	0 0	(63)
Output from water heater			•
(64)m= 195.12 171.98 180.64 161.95 158.73 141.85 136.26	149.48 149.21 167.93	177.54 190.43	
	Output from water heate	er (annual) <sub>112</sub>	1981.13 (64)
Heat gains from water heating, kWh/month $0.25 \cdot [0.85 \times (45)]$	m + (61)m] + 0.8 x [(46)m	+ (57)m + (59)m	]
(65)m= 86.66 76.86 81.84 74.93 74.56 68.25 67.09	71.49 70.69 77.62	80.11 85.1	(65)
(65)m= 86.66 76.86 81.84 74.93 74.56 68.25 67.09 include (57)m in calculation of (65)m only if cylinder is in the		ļ <u> </u>	` ′
` '		ļ <u> </u>	` ′
include (57)m in calculation of (65)m only if cylinder is in the	dwelling or hot water is f	ļ <u> </u>	` ′
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	dwelling or hot water is f  Aug Sep Oct	rom community h	neating
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= 119.68 119.68 119.68 119.68 119.68 119.68 119.68	Aug Sep Oct	rom community h	` ′
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= 119.68 119.68 119.68 119.68 119.68 119.68 119.68  Lighting gains (calculated in Appendix L, equation L9 or L9a),	Aug Sep Oct 119.68 119.68 119.68 also see Table 5	Nov Dec 119.68	neating (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= 119.68 11	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63	rom community h	neating
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= 119.68 11	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5	Nov Dec 119.68 119.68	(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= 119.68 11	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76	Nov Dec 119.68	neating (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= 119.68 11	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5	Nov Dec 119.68 119.68 18.24 19.44	(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= 119.68 11	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76	Nov Dec 119.68 119.68	(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	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5 34.97 34.97 34.97	Nov Dec 119.68 119.68 18.24 19.44 188.66 202.66 34.97 34.97	(66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is in the second	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5	Nov Dec 119.68 119.68 18.24 19.44	(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	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5 34.97 34.97 34.97	Nov Dec 119.68 119.68 18.24 19.44 188.66 202.66 34.97 34.97	(66) (67) (68) (69) (70)
include (57)m in calculation of (65)m only if cylinder is in the second	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5 34.97 34.97 34.97	Nov Dec 119.68 119.68 18.24 19.44 188.66 202.66 34.97 34.97	(66) (67) (68) (69)
include (57)m in calculation of (65)m only if cylinder is in the state of the state	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5 34.97 34.97 34.97  3 3 3 3  -95.74 -95.74 -95.74	Nov Dec 119.68 119.68 18.24 19.44 188.66 202.66 34.97 34.97 3 3 3 -95.74 -95.74	(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= 119.68 11	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5 34.97 34.97 34.97  3 3 3 3  -95.74 -95.74 -95.74	Nov Dec 119.68 119.68 18.24 19.44 188.66 202.66 34.97 34.97 34.97 34.97 111.27 114.38	(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= 119.68 11	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5 34.97 34.97 34.97  3 3 3 3  -95.74 -95.74 -95.74  96.08 98.18 104.33 m + (68)m + (69)m + (70)m + (	Nov Dec 119.68 119.68 119.68 134.97 34.97 34.97 34.97 34.97 34.97 111.27 114.38 71)m + (72)m	(66) (67) (68) (69) (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= 119.68 11	Aug Sep Oct 119.68 119.68 119.68 also see Table 5 9.17 12.31 15.63 13a), also see Table 5 156.41 161.96 173.76 a), also see Table 5 34.97 34.97 34.97  3 3 3 3  -95.74 -95.74 -95.74  96.08 98.18 104.33 m + (68)m + (69)m + (70)m + (	Nov Dec 119.68 119.68 18.24 19.44 188.66 202.66 34.97 34.97 34.97 34.97 111.27 114.38	(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 Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.2	x	11.28	x	0.63	x	0.7	] =	7.59	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	х	11.28	X	0.63	X	0.7	=	14.31	(75)
Northeast 0.9x 0.77	x	2.2	х	22.97	x	0.63	x	0.7	=	15.44	(75)
Northeast 0.9x 0.77	x	4.15	x	22.97	x	0.63	x	0.7	] =	29.13	(75)
Northeast 0.9x 0.77	x	2.2	x	41.38	x	0.63	x	0.7	=	27.82	(75)
Northeast 0.9x 0.77	x	4.15	х	41.38	x	0.63	x	0.7	=	52.48	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	х	67.96	X	0.63	X	0.7	=	45.69	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	x	67.96	x	0.63	X	0.7	=	86.19	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	х	91.35	x	0.63	x	0.7	=	61.42	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	х	91.35	X	0.63	X	0.7	=	115.85	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	x	97.38	x	0.63	X	0.7	=	65.48	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	x	97.38	x	0.63	x	0.7	=	123.51	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	x	91.1	x	0.63	x	0.7	=	61.25	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	x	91.1	x	0.63	x	0.7	=	115.54	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	x	72.63	x	0.63	x	0.7	=	48.83	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	x	72.63	x	0.63	x	0.7	=	92.11	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	x	50.42	x	0.63	x	0.7	=	33.9	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	x	50.42	x	0.63	x	0.7	=	63.95	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	x	28.07	x	0.63	X	0.7	=	18.87	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	x	28.07	x	0.63	x	0.7	=	35.6	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	x	14.2	x	0.63	x	0.7	=	9.55	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	x	14.2	X	0.63	X	0.7	=	18.01	(75)
Northeast <sub>0.9x</sub> 0.77	x	2.2	x	9.21	x	0.63	x	0.7	=	6.2	(75)
Northeast <sub>0.9x</sub> 0.77	x	4.15	x	9.21	x	0.63	x	0.7	=	11.69	(75)
Southeast 0.9x 0.77	x	0.7	x	36.79	x	0.63	x	0.7	=	7.87	(77)
Southeast 0.9x 0.77	x	1.54	x	36.79	x	0.63	x	0.7	=	34.63	(77)
Southeast 0.9x 0.77	x	0.7	x	62.67	x	0.63	x	0.7	=	13.41	(77)
Southeast 0.9x 0.77	x	1.54	x	62.67	X	0.63	x	0.7	=	58.99	(77)
Southeast 0.9x 0.77	x	0.7	x	85.75	X	0.63	X	0.7	=	18.34	(77)
Southeast 0.9x 0.77	x	1.54	X	85.75	X	0.63	X	0.7	=	80.72	(77)
Southeast 0.9x 0.77	x	0.7	X	106.25	X	0.63	X	0.7	=	22.73	(77)
Southeast 0.9x 0.77	x	1.54	x	106.25	X	0.63	X	0.7	=	100.01	(77)
Southeast 0.9x 0.77	x	0.7	x	119.01	x	0.63	x	0.7	=	25.46	(77)
Southeast 0.9x 0.77	x	1.54	x	119.01	x	0.63	x	0.7	=	112.02	(77)
Southeast 0.9x 0.77	x	0.7	x	118.15	x	0.63	x	0.7	=	25.28	(77)
Southeast 0.9x 0.77	x	1.54	x	118.15	x	0.63	x	0.7	=	111.21	(77)
Southeast 0.9x 0.77	x	0.7	x	113.91	x	0.63	x	0.7	=	24.37	(77)
Southeast 0.9x 0.77	x	1.54	x	113.91	x	0.63	x	0.7	=	107.22	(77)
Southeast 0.9x 0.77	x	0.7	×	104.39	×	0.63	x	0.7	=	22.33	(77)

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Southeast 0.9x	0.77	X	1.54	X	104.39	X	0.63	X	0.7	=	98.26	(77)
Southeast 0.9x	0.77	X	0.7	X	92.85	X	0.63	X	0.7	=	19.86	(77)
Southeast 0.9x	0.77	X	1.54	X	92.85	X	0.63	X	0.7	=	87.4	(77)
Southeast 0.9x	0.77	X	0.7	X	69.27	X	0.63	X	0.7	=	14.82	(77)
Southeast 0.9x	0.77	X	1.54	X	69.27	X	0.63	X	0.7	=	65.2	(77)
Southeast 0.9x	0.77	X	0.7	X	44.07	X	0.63	X	0.7	=	9.43	(77)
Southeast 0.9x	0.77	X	1.54	X	44.07	X	0.63	X	0.7	=	41.48	(77)
Southeast 0.9x	0.77	X	0.7	X	31.49	X	0.63	X	0.7	=	6.74	(77)
Southeast 0.9x	0.77	X	1.54	X	31.49	x	0.63	X	0.7	=	29.64	(77)
Southwest <sub>0.9x</sub>	0.77	X	0.7	x	36.79	]	0.63	X	0.7	=	15.74	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	X	36.79	]	0.63	x	0.7	=	34.63	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.48	x	36.79	]	0.63	x	0.7	=	5.4	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.7	x	62.67	]	0.63	x	0.7	=	26.82	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	x	62.67	]	0.63	x	0.7	=	58.99	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.48	x	62.67	]	0.63	x	0.7	=	9.19	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.7	x	85.75	]	0.63	x	0.7	] =	36.69	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	x	85.75	]	0.63	x	0.7	] =	80.72	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.48	x	85.75	]	0.63	x	0.7	] =	12.58	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.7	x	106.25	Ī	0.63	x	0.7	] =	45.46	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	x	106.25	Ī	0.63	x	0.7	] =	100.01	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.48	x	106.25	ĺ	0.63	x	0.7	j =	15.59	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.7	x	119.01	ĺ	0.63	x	0.7	] =	50.92	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	x	119.01	ĺ	0.63	x	0.7	j =	112.02	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.48	x	119.01	ĺ	0.63	x	0.7	j =	17.46	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.7	x	118.15	ĺ	0.63	x	0.7	] =	50.55	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	x	118.15	ĺ	0.63	x	0.7	j =	111.21	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.48	x	118.15	ĺ	0.63	x	0.7	j =	17.33	(79)
Southwest <sub>0.9x</sub>	0.77	х	0.7	х	113.91	j	0.63	x	0.7	j =	48.74	(79)
Southwest <sub>0.9x</sub>	0.77	х	1.54	х	113.91	j	0.63	x	0.7	j =	107.22	(79)
Southwest <sub>0.9x</sub>	0.77	х	0.48	х	113.91	j	0.63	x	0.7	j =	16.71	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.7	x	104.39	j	0.63	x	0.7	j =	44.66	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	x	104.39	j	0.63	x	0.7	j =	98.26	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.48	x	104.39	j	0.63	x	0.7	j =	15.31	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.7	x	92.85	j	0.63	x	0.7	j =	39.73	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	x	92.85	ĺ	0.63	x	0.7	j =	87.4	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.48	x	92.85	j	0.63	x	0.7	=	13.62	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.7	x	69.27	j	0.63	x	0.7	=	29.64	(79)
Southwest <sub>0.9x</sub>	0.77	X	1.54	x	69.27	ĺ	0.63	x	0.7	, ] =	65.2	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.48	X	69.27	ĺ	0.63	x	0.7	,   =	10.16	(79)
Southwest <sub>0.9x</sub>	0.77	X	0.7	x	44.07	ĺ	0.63	x	0.7	] =	18.86	(79)
Southwest <sub>0.9x</sub>	0.77	x	1.54	X	44.07	ĺ	0.63	x	0.7	] =	41.48	(79)
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Southwest <sub>0.9x</sub>	0.77	х	0.4	18	x	4	4.07		0.63	X	0.7	=	6.46	(79)
Southwest <sub>0.9x</sub>	0.77	x	0.	7	x	3	1.49		0.63	х	0.7	=	13.47	(79)
Southwest <sub>0.9x</sub>	0.77	X	1.5	54	x	3	1.49		0.63	x	0.7	=	29.64	(79)
Southwest <sub>0.9x</sub>	0.77	х	0.4	18	x	3	1.49		0.63	x	0.7	=	4.62	(79)
Northwest <sub>0.9x</sub>	0.77	х	1.5	53	x	1	1.28	x	0.63	×	0.7	_ =	5.28	(81)
Northwest 0.9x	0.77	x	1.5	53	x	2	2.97	x	0.63	x	0.7	_ =	10.74	(81)
Northwest 0.9x	0.77	X	1.5	53	x	4	1.38	x	0.63	×	0.7	_ =	19.35	(81)
Northwest <sub>0.9x</sub>	0.77	х	1.5	53	x	6	7.96	x	0.63	×	0.7	=	31.78	(81)
Northwest <sub>0.9x</sub>	0.77	X	1.5	53	x	9	1.35	x	0.63	×	0.7	_ =	42.71	(81)
Northwest 0.9x	0.77	X	1.5	53	x	9	7.38	х	0.63	x	0.7	=	45.54	(81)
Northwest 0.9x	0.77	х	1.5	53	x	9	91.1	x	0.63	×	0.7	_ =	42.6	(81)
Northwest 0.9x	0.77	X	1.5	53	x	7	2.63	x	0.63	x	0.7		33.96	(81)
Northwest 0.9x	0.77	х	1.5	53	x	5	0.42	x	0.63	x	0.7		23.58	(81)
Northwest 0.9x	0.77	X	1.5	53	x	2	8.07	x	0.63	x	0.7	=	13.12	(81)
Northwest 0.9x	0.77	X	1.5	53	x		14.2	x	0.63	x	0.7	=	6.64	(81)
Northwest 0.9x	0.77	х	1.5	53	x	9	9.21	x	0.63	x	0.7		4.31	(81)
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Solar gains in	watts, ca	lculated	for eac	h mont	h			(83)m	ı = Sum(74)m .	(82)m				
(83)m= 125.45	222.71	328.7	447.46	537.87	' 5	50.11	523.65	453	.74 369.44	252.6	1 151.9	106.3		(83)
Total gains – i	nternal a	nd solar	(84)m =	= (73)m	1 + (	83)m	, watts		•		-	•	_	
(84)m= 534.76	630.01	722.94	820.64	889.69	8	81.29	841.39	777	7.3 703.79	608.2	3 531.97	504.68	]	(84)
7. Mean inter	nal temp	erature (	(heating	seaso	n)									
7. Mean inter	•					area 1	from Tab	ole 9	Th1 (°C)				21	(85)
	during h	eating p	eriods ir	n the liv	/ing			ole 9	Th1 (°C)				21	(85)
Temperature	during h	eating p	eriods ir	n the liv	/ing m (s			<u> </u>	Th1 (°C)	Oct	Nov	Dec	21	(85)
Temperature Utilisation fac	during h	eating po	eriods ir	n the live a, h1,r	/ing m (s	ee Ta	ble 9a)	<u> </u>	ug Sep	Oct 0.96	Nov 0.99	Dec 1	21	(85)
Temperature Utilisation fac  Jan  (86)m= 1	during heter for garage	eating po ains for li Mar 0.98	eriods in ving are Apr 0.94	n the livea, h1,r May	ving m (s	ee Ta Jun <sup>0.66</sup>	Jul 0.5	A 0.5	ug Sep 66 0.81	-	+		21	
Temperature Utilisation fac	during heter for garage	eating po ains for li Mar 0.98	eriods in ving are Apr 0.94	n the livea, h1,r May	ving m (s	ee Ta Jun <sup>0.66</sup>	Jul 0.5	A 0.5	ug Sep 66 0.81 (able 9c)	-	0.99		21	
Temperature Utilisation factors  Jan  (86)m= 1  Mean interna (87)m= 19.62	during heter for garage from 19.81	eating positions for line Mar 0.98 ature in l	eriods ir iving are Apr 0.94 iving are 20.48	n the livea, h1,r May 0.84 ea T1 (	ring m (s r	Jun 0.66 ow ste	Jul 0.5 ps 3 to 7 20.99	A 0.57 in T 20.	ug Sep 66 0.81 (able 9c) 98 20.87	0.96	0.99	1	21	(86)
Temperature  Utilisation factors  Jan  (86)m= 1  Mean internation  (87)m= 19.62  Temperature	during heter for gase Feb 0.99 ltempera 19.81 during h	eating positions for line Mar 0.98 atture in l 20.1 eating positions	eriods in Apr 0.94 iving are 20.48 eriods in	n the lives a, h1,1 May 0.84 ea T1 ( 20.78	ring m (s r follo	ee Ta Jun 0.66 ow ste 20.95 /elling	Jul 0.5 ps 3 to 7 20.99 from Ta	A 0.57 in T 20.	ug Sep 6 0.81 Table 9c) 98 20.87 9, Th2 (°C)	0.96	0.99	19.59	21	(86)
Temperature Utilisation fact  Jan  (86)m= 1  Mean internation (87)m= 19.62  Temperature (88)m= 19.82	during heter for gase Feb 0.99 ltempera 19.81 during h	eating positions for line Mar 0.98 atture in l 20.1 eating positions for line 19.83	Apr 0.94 iving are 20.48 eriods ir	n the lives, h1,1,1 May 0.84 ea T1 ( 20.78 n rest o	ring m (s	Jun 0.66 ow ste 20.95 velling	Jul 0.5 ps 3 to 7 20.99 from Ta	A 0.57 in T 20.	ug Sep 6 0.81 Table 9c) 98 20.87 9, Th2 (°C)	0.96	0.99	1	21	(86)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact	during heter for gase sector f	eating portains for line Mar 0.98 ature in lace 20.1 eating portains for r	eriods in ving are 0.94 iving are 20.48 eriods in 19.84 est of d	n the lives, h1,1 May 0.84 ea T1 ( 20.78 n rest o 19.84 welling	ving m (s	ee Ta Jun 0.66 ow ste 20.95 velling 19.85 ,m (se	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85	A 0.57 in T 20. able 9 19. 9a)	ug Sep 6 0.81 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85	0.96 20.47 19.84	0.99	19.59	21	(86) (87) (88)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact  (89)m= 0.99	during heter for gase sector f	eating policies for line ature in line 20.1 eating policies for right 0.97	eriods in ving are 0.94 iving are 20.48 eriods in 19.84 est of di 0.91	n the lives, h1,1 May 0.84 ea T1 ( 20.78 n rest o 19.84 welling 0.78	ving m (s	ee Ta Jun 0.66 ow ste 20.95 velling 19.85 ,m (se 0.56	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 ee Table 0.38	A 0.57 in T 20.48 in 19.49 19.	ug Sep 6 0.81  Table 9c) 98 20.87  9, Th2 (°C) 86 19.85	0.96 20.47 19.84 0.94	0.99	19.59	21	(86)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact  (89)m= 0.99  Mean interna	during heter for gase sector f	eating positions for line atture in language atture in language atture in language atture in terms of language att	eriods in Apr 0.94 iving are 20.48 eriods in 19.84 est of do 0.91 he rest	n the lives, h1,1 May 0.84 ea T1 ( 20.78 n rest of 19.84 of dwe	ving m (s / / / / / / / / / / / / / / / / / /	ee Ta Jun 0.66  ow ste 20.95  velling 19.85  ,m (se 0.56	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 ee Table 0.38 ollow ste	A 0.57 in T 20.42 able 9 19.42 abs. 9a) 0.42	ug Sep 6 0.81  Table 9c) 98 20.87  9, Th2 (°C) 86 19.85  3 0.72  to 7 in Table	0.96 20.47 19.84 0.94 e 9c)	0.99 19.98 19.84 0.99	1 19.59 19.83		(86) (87) (88) (89)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact  (89)m= 0.99	during heter for gase sector f	eating policies for line ature in line 20.1 eating policies for right 0.97	eriods in ving are 0.94 iving are 20.48 eriods in 19.84 est of di 0.91	n the lives, h1,1 May 0.84 ea T1 ( 20.78 n rest o 19.84 welling 0.78	ving m (s / / / / / / / / / / / / / / / / / /	ee Ta Jun 0.66 ow ste 20.95 velling 19.85 ,m (se 0.56	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 ee Table 0.38	A 0.57 in T 20.48 in 19.49 19.	ug Sep 66 0.81  Fable 9c) 98 20.87  9, Th2 (°C) 86 19.85  10.72  to 7 in Table 85 19.75	0.96 20.47 19.84 0.94 e 9c)	0.99 19.98 19.84 0.99	1 19.59 19.83 1		(86) (87) (88) (89)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact  (89)m= 0.99  Mean interna	during heter for gase sector f	eating positions for line atture in language atture in language atture in language atture in terms of language att	eriods in Apr 0.94 iving are 20.48 eriods in 19.84 est of do 0.91 he rest	n the lives, h1,1 May 0.84 ea T1 ( 20.78 n rest of 19.84 of dwe	ving m (s / / / / / / / / / / / / / / / / / /	ee Ta Jun 0.66  ow ste 20.95  velling 19.85  ,m (se 0.56	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 ee Table 0.38 ollow ste	A 0.57 in T 20.42 able 9 19.42 abs. 9a) 0.42	ug Sep 66 0.81  Fable 9c) 98 20.87  9, Th2 (°C) 86 19.85  10.72  to 7 in Table 85 19.75	0.96 20.47 19.84 0.94 e 9c)	0.99 19.98 19.84 0.99	1 19.59 19.83 1	0.36	(86) (87) (88) (89)
Temperature  Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact  (89)m= 0.99  Mean interna	during heter for gase of the second s	eating policies for line ature in language policies for range policies	eriods in ving are 0.94 iving are 20.48 eriods in 19.84 est of do 0.91 he rest 19.25	n the livea, h1,1 May 0.84 ea T1 ( 20.78 n rest of 19.84 welling 0.78 of dwe 19.64	ving m (s	ee Ta Jun 0.66  ow ste 20.95  velling 19.85  ,m (se 0.56  T2 (fo	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 ee Table 0.38 ollow ste	A 0.5.7 in T 20.  able 9 19.  9a) 0.4  eps 3	ug Sep 6 0.81  Table 9c) 98 20.87  0, Th2 (°C) 86 19.85  13 0.72  to 7 in Table 85 19.75	0.96 20.47 19.84 0.94 e 9c)	0.99 19.98 19.84 0.99	1 19.59 19.83 1		(86) (87) (88) (89)
Temperature Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact  (89)m= 0.99  Mean interna  (90)m= 18.02	during heter for gase of the second s	eating policies for line ature in language policies for range policies	eriods in ving are 0.94 iving are 20.48 eriods in 19.84 est of do 0.91 he rest 19.25	n the livea, h1,1 May 0.84 ea T1 ( 20.78 n rest of 19.84 welling 0.78 of dwe 19.64	ving m (s / / / / / / / / / / / / / / / / / /	ee Ta Jun 0.66  ow ste 20.95  velling 19.85  ,m (se 0.56  T2 (fo	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 ee Table 0.38 ollow ste	A 0.5.7 in T 20.  able 9 19.  9a) 0.4  eps 3	ug Sep 6 0.81  Table 9c) 98 20.87  9, Th2 (°C) 86 19.85  13 0.72  to 7 in Table 85 19.75	0.96 20.47 19.84 0.94 e 9c)	0.99  19.98  19.84  0.99  18.54  ving area ÷ (4	1 19.59 19.83 1		(86) (87) (88) (89)
Temperature Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact  (89)m= 0.99  Mean interna  (90)m= 18.02	during heter for gase sector f	eating policies for line ature in land 19.83 eating policies for range of 19.83 eating for range of 19.71 eature in target of 19.71 eature (for 19.22	eriods in ving are 0.94 iving are 20.48 eriods in 19.84 est of di 0.91 he rest 19.25 r the wh	n the livea, h1,1 May 0.84 ea T1 ( 20.78 n rest of 19.84 welling 0.78 of dwe 19.64	ving m (s / l / l / l / l / l / l / l / l / l /	ee Ta  Jun  0.66  ow ste  20.95  velling  19.85  ,m (se  0.56  T2 (fo  19.82	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 pe Table 0.38 pollow ste 19.85	A 0.5. 7 in T 20. able 9 19. 9a) 0.4 eps 3 19. + (1 20.	ug Sep 6 0.81  rable 9c) 98 20.87  0, Th2 (°C) 86 19.85  13 0.72  to 7 in Table 85 19.75	0.96 20.47 19.84 0.94 e 9c) 19.24 LA = Liv	0.99  19.98  19.84  0.99  18.54  ving area ÷ (4	1 19.59 19.83 1 17.98 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fact  Jan  (86)m= 1  Mean interna (87)m= 19.62  Temperature (88)m= 19.82  Utilisation fact (89)m= 0.99  Mean interna (90)m= 18.02  Mean interna (92)m= 18.6	during heter for gase sector f	eating policies for line ature in land 19.83 eating policies for range of 19.83 eating for range of 19.71 eature in target of 19.71 eature (for 19.22	eriods in ving are 0.94 iving are 20.48 eriods in 19.84 est of di 0.91 he rest 19.25 r the wh	n the livea, h1,1 May 0.84 ea T1 ( 20.78 n rest of 19.84 welling 0.78 of dwe 19.64	ring m (s	ee Ta  Jun  0.66  ow ste  20.95  velling  19.85  ,m (se  0.56  T2 (fo  19.82	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 pe Table 0.38 pollow ste 19.85	A 0.5. 7 in T 20. able 9 19. 9a) 0.4 eps 3 19. + (1 20.	ug Sep  6 0.81  Fable 9c)  98 20.87  9, Th2 (°C)  86 19.85  13 0.72  to 7 in Table  85 19.75  — fLA) × T2  26 20.15  where approximates	0.96 20.47 19.84 0.94 e 9c) 19.24 LA = Liv	0.99  19.98  19.84  0.99  18.54  ving area ÷ (4)  19.06	1 19.59 19.83 1 17.98 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fact  Jan  (86)m= 1  Mean interna  (87)m= 19.62  Temperature  (88)m= 19.82  Utilisation fact  (89)m= 0.99  Mean interna  (90)m= 18.02  Mean interna  (92)m= 18.6  Apply adjustr	during heter for gase of the second s	eating policies for line ature in land 19.83 eature in table 19.83 eature in table 19.83 eature in table 19.22 eature mean 19.22 eature in table 19.22 eat	eriods in ving are Apr 0.94 iving are 20.48 eriods in 19.84 est of do 0.91 he rest 19.25 r the whole 19.7 internal	the lives, h1,1 May 0.84 ea T1 ( 20.78 n rest of 19.84 welling 0.78 of dwe 19.64 lole dw 20.06 I tempe	ring m (s	ee Ta  Jun  0.66  ow ste  20.95  /elling  19.85  T2 (fo  19.82  g) = fl  20.23  ure fro	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 ee Table 0.38 ollow ste 19.85  LA × T1 20.26 m Table	A 0.5 7 in T 20. able 9 19. 19. 19. 19. 19. 19. 19. 19. 19. 1	ug Sep  6 0.81  Fable 9c)  98 20.87  9, Th2 (°C)  86 19.85  13 0.72  to 7 in Table  85 19.75  — fLA) × T2  26 20.15  where approximates	0.96  20.47  19.84  0.94  e 9c)  19.24  fLA = Livitate popriate	0.99  19.98  19.84  0.99  18.54  ving area ÷ (4)  19.06	1 19.59 19.83 1 17.98 4) =		(86) (87) (88) (89) (90) (91) (92)
Temperature Utilisation fact  Jan  (86)m= 1  Mean internat (87)m= 19.62  Temperature (88)m= 19.82  Utilisation fact (89)m= 0.99  Mean internat (90)m= 18.02  Mean internat (92)m= 18.6  Apply adjustr (93)m= 18.6	during heter for gase sector f	eating policins for line ature in land 19.83 eating policins for range of 19.83 eating for range of 19.22 eating mean 19.22 eating mean line ternal ten	eriods in ving are Apr 0.94 iving are 20.48 eriods in 19.84 est of d 0.91 he rest 19.25 r the what 19.7 internal 19.7 internal 19.7	the lives, h1,1 May 0.84 ea T1 ( 20.78 n rest of 19.84 welling 0.78 of dwe 19.64 cole dw 20.06 temper	ving m (s / / / / / / / / / / / / / / / / / /	ee Ta  Jun  0.66  ow ste  20.95  velling  19.85  T2 (fo  19.82  g) = fl  20.23  ure fro  20.23	Jul 0.5 ps 3 to 7 20.99 from Ta 19.85 ee Table 0.38 ollow ste 19.85  LA × T1 20.26 m Table 20.26	9a) 0.4 0.5 4eps 3 19.	ug Sep 66 0.81  Table 9c) 98 20.87  9, Th2 (°C) 86 19.85  13 0.72  to 7 in Table 85 19.75  — fLA) × T2 26 20.15  where approace	0.96  20.47  19.84  0.94  e 9c)  19.24  fLA = Livitation   19.68	0.99  19.98  19.84  0.99  18.54  ving area ÷ (4)  19.06	1 19.59 19.83 1 17.98 4) =	0.36	(86) (87) (88) (89) (90) (91) (92)

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Mar

Jan

Feb

Utilisa	ation fac	tor for a	ains, hm	) <del>.</del>										
(94)m=	0.99	0.99	0.97	0.91	0.79	0.6	0.42	0.48	0.75	0.94	0.99	0.99		(94)
		hmGm	, W = (94		L 4)m	l	l		l	!	l			
(95)m=	530.92	620.6	698.08	747.51	703.3	527.06	355.72	371.33	526.3	571.36	524.41	501.85		(95)
Month	nly avera	age exte	rnal tem	perature	from Ta	able 8	Į.	!	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 mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m	]				
(97)m=	1445.45	1405.67	1279.43	1073.84	829.38	553.08	359.88	378.48	597.08	901.7	1192.13	1438.21		(97)
	i	<u> </u>	T T	1	r		r	24 x [(97	<del>``</del>	<del>í                                     </del>	ŕ			
(98)m=	680.4	527.56	432.53	234.96	93.8	0	0	0	0	245.77	480.75	696.65		,
								Tota	l per year	(kWh/yea	r) = Sum(9	8) <sub>15,912</sub> =	3392.44	(98)
Space	e heating	g require	ement in	kWh/m²	<sup>2</sup> /year								44.33	(99)
9a. En	ergy req	uiremer	nts – Indi	ividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
•	e heatin	_										,		,
Fracti	on of sp	ace hea	at from s	econdar	y/supple	mentary	system						0	(201)
Fracti	on of sp	ace hea	at from m	nain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fracti	on of to	tal heati	ng from	main sys	stem 1			(204) = (2	02) <b>x</b> [1 –	(203)] =			1	(204)
Efficie	ency of r	main spa	ace heat	ing syste	em 1								93.5	(206)
Efficie	ency of s	seconda	ry/suppl	ementar	y heating	g systen	າ, %						0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ır
Space	e heating	g require	ement (c	alculate	d above)	)				•				
	680.4	527.56	432.53	234.96	93.8	0	0	0	0	245.77	480.75	696.65		
(211)m	n = {[(98]	)m x (20	(4)] } x 1	00 ÷ (20	06)									(211)
	727.71	564.24	462.6	251.3	100.32	0	0	0	0	262.86	514.17	745.08		
								Tota	ıl (kWh/yea	ar) =Sum(2	211) <sub>15,1012</sub>	F	3628.28	(211)
Space	e heating	g fuel (s	econdar	y), kWh/	month									_
			00 ÷ (20											
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		٦
								lota	ıl (kWh/yea	ar) =Sum(2	215) <sub>15,1012</sub>	F	0	(215)
	heating		to# /oolo	ام اممدان	h a a \									
Output	195.12	171.98	ter (calc 180.64	161.95	158.73	141.85	136.26	149.48	149.21	167.93	177.54	190.43		
Efficier	ncy of w		ıter	<u> </u>	ļ	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		79.8	(216)
(217)m=		87.61	87.06	85.81	83.47	79.8	79.8	79.8	79.8	85.83	87.34	87.97		(217)
Fuel fo	r water	heating.	kWh/mo	onth				<u> </u>						
(219)m	1 = (64)	m x 100	÷ (217)	m										
(219)m=	222.04	196.3	207.48	188.74	190.17	177.76	170.75	187.32	186.98	195.66	203.28	216.48		,
								Tota	I = Sum(2	<u>-</u>			2342.96	(219)
	l totals	fuelues	ad main	evetom	1					k'	Wh/year	•	kWh/year	1
•	•		ed, main	ayalem)	ı								3628.28	<u> </u>
Water	heating	tuel use	d										2342.96	
Electric	city for p	umps, f	ans and	electric	keep-ho	t								

central heating pump:		30	(230c)
boiler with a fan-assisted flue		45	(230e)
Total electricity for the above, kWh/year	sum of (230a	a)(230g) =	75 (231)
Electricity for lighting			334.08 (232)
Total delivered energy for all uses (211)(221) +	(231) + (232)(237b) =		6380.32 (338)
12a. CO2 emissions – Individual heating systems	s including micro-CHP		
	<b>Energy</b> kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	783.71 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	506.08 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1289.79 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	173.39 (268)
Total CO2, kg/year	sum	n of (265)(271) =	1502.1 (272)
TER =			28.9 (273)