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 14:56:04

Project Information:

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

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 83.09m² Site Reference: Fosters Estate Block D **Plot Reference:** D1-02

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))

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

Dwelling Carbon Dioxide Emission Rate (DER) 11.98 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 58.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 52.4 kWh/m²

OK 2 Fabric U-values

Element Average

Highest External wall 0.16 (max. 0.30) 0.20 (max. 0.70) OK Party wall 0.00 (max. 0.20) **OK** Floor 0.10 (max. 0.25) 0.10 (max. 0.70) OK Roof 0.20 (max. 0.20) 0.20 (max. 0.35) OK Openings 1.41 (max. 2.00) 1.48 (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 **OK** 10.0

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	
Party Walls U-value	0 W/m²K	
Floors U-value	0.1 W/m ² K	
Community heating, heat from electric heat pump		

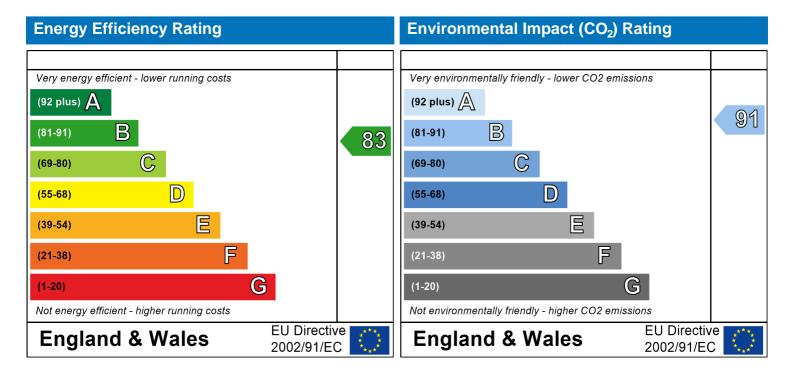
Predicted Energy Assessment



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

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

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



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

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

SAP Input

Address:

Located in: **England** Region: Thames valley

UPRN:

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

New dwelling design stage Assessment type:

New dwelling Transaction type: Tenure type: Unknown Related party disclosure: No related party Thermal Mass Parameter: Indicative Value Medium

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

505 PCDF Version:

Flat Dwelling type:

Detachment:

2022 Year Completed:

Floor Location: Floor area:

Storey height: 41.75 m² 2.82 m Floor 0 41.34 m²

33.1 m² (fraction 0.398) Living area:

Unspecified Front of dwelling faces:

Floor 1

Win 7

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	

3.15 m

Name:	Gap:	Frame F	actor: g-value:	U-value:	Area:	No. of Openings:
Front Door	mm	1	0	1.48	2.52	1
Win 1	16mm or more	0.8	0.4	1.4	0.72	1
Win 2	16mm or more	0.8	0.4	1.4	1.61	1
Win 3	16mm or more	0.8	0.4	1.4	2.01	1
Win 4	16mm or more	0.8	0.4	1.4	0.91	1
Win 5	16mm or more	0.8	0.4	1.4	5.95	1
Win 6	16mm or more	0.8	0.4	1.4	1.99	1

0.4

8.0

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		Ext Wall	South East	1.05	2.4
Win 1		Ext Wall	South East	0.3	2.4
Win 2		Ext Wall	South East	1.21	1.33
Win 3		Ext Wall	South East	1.02	1.97
Win 4		Ext Wall	South East	0.46	1.97
Win 5		Ext Wall	North West	2.48	2.4
Win 6		Ext Wall	North West	1.02	1.95
Win 7		Ext Wall	North West	0.46	1.95

16mm or more

0.9

1.4

1

SAP Input

Overshading:		Average	or unknown				
Opaque Elements:							
Type: (External Elements	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Карра:
Ext Wall	49.37	16.61	32.76	0.14	0	False	N/A
Common Area Wall	56.56	0	56.56	0.2	0.9	False	N/A
Concrete Column	2.98	0	2.98	0.2	0	False	N/A
Roof Terrace	8.03	0	8.03	0.2	0		N/A
Ground Floor	41.75			0.1			N/A
Internal Elements							
Party Elements							
Party Wall	56.48						N/A
Thermal bridges:							
Thermal bridges:					-Value = 0.0782		
-		Length			Other Blots Is (book shortles or	Alexandra al Bartala	
	Approved]	4.27	0.3		Other lintels (including o	ther steel lintels)	
	Approved]	4.49	0.04	_0	Sill Jamb		
	Approved]	32.74 18.29	0.05 0.16		Ground floor (normal)		
	Approved] Approved]	18.29	0.16		Party floor between dwe	llings (in blocks of flats)	
	Approved]	18.29	0.07		Intermediate floor within	=	
	Approved]	11.94	0.07		Corner (normal)	. a arronning	
	Approved]	11.94	0.06		Party wall between dwel	lings	
L		6.18	0.08		Flat roof	0	
		0	0.32	E20	Exposed floor (normal)		
[Approved]	0	-0.09	E17	Corner (inverted – interr	nal area greater than ext	ernal area)
		9.55	0.16	P1	Ground floor		
		9.55	0		Intermediate floor within	=	
		7.72	0		Intermediate floor between	•	of flats)
		1.83 0	0.24 0.24		Roof (insulation at ceiling Exposed floor (inverted)	g level)	
		Ü	0.24	10			
Ventilation:							
Pressure test:			designed)				
Ventilation:			d with heat recov	•			
			of wet rooms: K				
			rk: Insulation, Riç ed Installation Scl	•			
Number of chimney	10.	Αρριον ί 0	eu mstaliation sci	neme. True			
Number of open flu		0					
Number of fans:	103.	0					
Number of passive	stacks:	0					
Number of sides sh		2					
Pressure test:		3					
Main heating systen	n:						
Main heating syste	m:	Commu	nity heating sche	mes			
i iii g igiii			urce: Community				
		heat fr	om electric heat	pump, heat fr	raction 1, efficiency 38	33	
		Piping>	=1991, pre-insul	ated, low tem	p, variable flow		
Main heating Contro	ol:						
Main heating Contr	ol:	•		o use of comi	munity heating, progr	ammer and at least to	wo room
		thermos					
		Control	code: 2312				

SAP Input

Secondary heating system:

Secondary heating system: None

Water heating

Water heating: From main heating system

Water code: 901

Fuel :heat from electric heat pump

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

		User De	ataile:						
Assessor Name:	Ben Talbutt		Stroma	a Num	ber:		STRO	036639	
Software Name:	Stroma FSAP 2012	,	Softwa	re Ve	rsion:	,	Versio	n: 1.0.5.17	
	P	roperty A	\ddress:	D1-02					
Address :									
1. Overall dwelling dimer	nsions:								
		Area	(m²)		Av. Heigh	nt(m)		Volume(m³)
Ground floor		41	1.75	(1a) x	2.82	(2	2a) =	117.73	(3a)
First floor		41	1.34	(1b) x	3.15	(2	2b) =	130.22	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1r) 83	3.09	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3d)+((3e)+(3	in) =	247.96	(5)
2. Ventilation rate:									
	main secondar	y (other		total			m³ per hou	r
Number of chimneys	heating heating + 0	+ [0] = [0	x 40	=	0	(6a)
Number of open flues	0 + 0	Ī + 🗀	0	j = [0	x 20	=	0	(6b)
Number of intermittent far	ns			, L	0	x 10	=	0	(7a)
Number of passive vents				Ī	0	x 10	=	0	(7b)
Number of flueless gas fir	es			Ī	0	x 40	=	0	(7c)
				_			Air ob	anges nor he	_
				_				anges per ho	_
•	rs, flues and fans = (6a)+(6b)+(7 een carried out or is intended, proceed			ontinuo fi	0 rom (0) to (16		5) =	0	(8)
Number of storeys in th		110 (17), O	uiei wise c	onunu e n	0111 (9) 10 (10)	,		0	(9)
Additional infiltration	o awoming (no)					[(9)-1]	x0.1 =	0	(10)
	25 for steel or timber frame or	0.35 for	masonr	v consti	ruction	1(-7 -1		0	(11)
	esent, use the value corresponding to			•)` ′
=	oor, enter 0.2 (unsealed) or 0.	1 (sealed	d). else (enter 0				0	(12)
If no draught lobby, ento	,	`	,,					0	(13)
•	and doors draught stripped							0	(14)
Window infiltration	0 11	C	0.25 - [0.2	x (14) ÷ 1	100] =			0	(15)
Infiltration rate		((8) + (10) +	+ (11) + (1	12) + (13) + (1	15) =		0	(16)
Air permeability value, o	q50, expressed in cubic metre	s per hou	ur per so	quare m	etre of env	elope a	rea	3	(17)
If based on air permeabili	ty value, then $(18) = [(17) \div 20] + (8)$	3), otherwis	se (18) = (16)				0.15	(18)
Air permeability value applies	s if a pressurisation test has been don	e or a degi	ree air per	meability	is being usea	l			_
Number of sides sheltered	d							2	(19)
Shelter factor		((20) = 1 - [0.075 x (′	19)] =			0.85	(20)
Infiltration rate incorporati	ng shelter factor	((21) = (18)	x (20) =				0.13	(21)
Infiltration rate modified for	or monthly wind speed							•	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	eed from Table 7								

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor (2	22a)m =	(22)m ∸	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infiltr	ation rat	o (allowi	na for ch	oltor on	d wind c	rpood) –	(21a) v	(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	1	
Calculate effe		•	rate for t	he appli	cable ca	se	ļ		<u> </u>	ļ		J 	
If mechanica			l' N. (6		/	(1	.15\\	. (00)	\ (00 \			0.5	(23a)
If exhaust air h		0 11		, ,	, ,	. ,	,, .	,) = (23a)			0.5	(23b)
If balanced with			-	_					26\m . /	22b) [1 (22a)	74.8	(23c)
a) If balance (24a)m= 0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28	- 100] 	(24a)
b) If balance			<u> </u>	<u> </u>		<u> </u>			<u> </u>		0.20	J	(3)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	ouse ex	tract ver	tilation o	r positiv	e input v	ventilatio	on from (outside	<u>l</u>	!	!	J	
if (22b)r	n < 0.5 ×	(23b), t	hen (24	c) = (23b); other	wise (24	c) = (22l	o) m + 0.	5 × (23b)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural				•	•				0.51				
(24d)m = 0	n = 1, the	en (24a) 0	m = (22)	o)m otne	orwise (2	4a)m =	0.5 + <u>[(</u> 2	2b)m² x	0.5]	0	0	1	(24d)
Effective air						<u> </u>						J	(= 13)
(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)
	ı					<u> </u>	l	l .	l	1	I	J	
	مطالم مرمم												
3. Heat losse					Net Ar	- - -	H-val	IIA	ΔΧΙΙ		k-value	2	ΔΧΚ
3. Heat losse	s and he Gros area	SS	oarameto Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/	K)	k-value kJ/m²-l		A X k kJ/K
	Gros	SS	Openin	gs		m²				<u> </u>			
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/	<u> </u>			kJ/K
ELEMENT Doors	Gros area	SS	Openin	gs	A ,r	m² x x1.	W/m2	2K = [0.04] = [(W/ 3.7296	<u> </u>			kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	gs	A ,r 2.52	m² x x1. x1.	W/m2 1.48 /[1/(1.4)+		3.7296 0.95	<u> </u>			kJ/K (26) (27)
Doors Windows Type Windows Type	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 2.52 0.72	x1. x1. x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & \\ & & 0.04 & & \\ & & 0.04 & & \\ & & 0.04 & & \\ & & & 0.04 & & \\ \end{array} $	0.95 2.13	<u> </u>			kJ/K (26) (27) (27)
Doors Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4	SS	Openin	gs	A ,r 2.52 0.72 1.61 2.01	x1. x1. x1. x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \end{bmatrix}$	0.95 2.13 2.66	<u> </u>			kJ/K (26) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4	SS	Openin	gs	A ,r 2.52 0.72 1.61 2.01 0.91	x1. x1. x1. x1. x1. x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{c} 2K \\ \hline \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \\ 0.04] = \begin{bmatrix} \\ 0.04] = \\ \\ 0.04] = \\ \end{bmatrix}$	(W// 3.7296 0.95 2.13 2.66 1.21	<u> </u>			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type	Gros area 1 2 2 3 4 4 5 5 6 6	SS	Openin	gs	A ,r 2.52 0.72 1.61 2.01 0.91 5.95	x1. x1. x1. x1. x1. x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & & \\ & & & & \\ & & & & \\ & & & &$	(W// 3.7296 0.95 2.13 2.66 1.21 7.89	<u> </u>			kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type	Gros area 1 2 2 3 4 4 5 5 6 6	SS	Openin	gs	A ,r 2.52 0.72 1.61 2.01 0.91 5.95	x1. x1. x1. x1. x1. x1. x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & & & & \\ & & & & \\ & & & & \\ & & & &$	(W// 3.7296 0.95 2.13 2.66 1.21 7.89 2.64	<u> </u>			kJ/K (26) (27) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type	Gros area 1 2 2 3 4 4 5 5 6 6	ss (m²)	Openin	gs ₁ 2	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99	x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = [0.04] = [(W// 3.7296 0.95 2.13 2.66 1.21 7.89 2.64	<u> </u>			kJ/K (26) (27) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type Floor	Gros area 4 4 5 5 6 6 7	ss (m²)	Openin m	gs ₁ 2	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 0.9 41.75	x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = [0.04] = [(W// 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19	<u> </u>			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (27
ELEMENT Doors Windows Type Floor Walls Type1	Gros area 1 2 3 4 4 5 5 6 6 7 49.3	ss (m²)	Openin m	gs ₁ 2	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 0.9 41.75	x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1	EK = [0.04] = [(W// 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59	<u> </u>			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28)
ELEMENT Doors Windows Type	Gros area 1 2 2 3 4 4 5 5 6 6 7 49.3	ss (m²)	Openin m	gs ₁ 2	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 32.76	x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.17	EK = [0.04] = [(W// 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59 9.59	<u> </u>			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29)
ELEMENT Doors Windows Type	Gros area 41 42 43 49.3 56.5 2.96 8.03	ss (m²)	16.6 0	gs ₁ 2	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 56.56 2.98	x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2	EK = [0.04] = [(W// 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59 9.59 0.6	<u> </u>			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (29) (29)
ELEMENT Doors Windows Type Tloor Walls Type1 Walls Type2 Walls Type3 Roof Total area of e	Gros area 4 1 4 2 4 3 4 4 5 5 6 6 7 56.5 2.99 8.00	65 (m²) 66 8 3 , m²	16.6 0	gs ₁₂	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 56.56 2.98 8.03 158.6	x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.17 0.2 0.2	EK = [0.04] =	(W// 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59 9.59 0.6 1.61		kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29) (29) (30)
ELEMENT Doors Windows Type Roor Walls Type1 Walls Type2 Walls Type3 Roof Total area of e	Gros area 9 1 9 2 9 3 9 4 9 5 9 6 9 7 49.3 56.5 8.03 8.03	ss (m²) 66 8 3 , m²	Openin m 16.6 0 0 orange of the control of the	gs 1 1 Indow U-ve	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 56.56 2.98 8.03 158.6 56.48 alue calcul	x1.	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.17 0.2 0.2	EK = [0.04] =	(W// 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59 9.59 0.6 1.61		kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (29) (29) (30) (31)

Heat capacit	tv Cm = S((Axk)						((28)	.(30) + (32	2) + (32a).	(32e) =	0	(34)
Thermal ma	•	,	P = Cm -	: TFA) ir	n kJ/m²K			Indica	tive Value:	Medium	, ,	250	(35)
For design asse	•	•		•			ecisely the	indicative	values of	TMP in Ta	able 1f	200	(00)
can be used ins	stead of a dea	tailed calcı	ulation.										
Thermal brid	lges : S (L	x Y) cal	culated (using Ap	pendix I	K						12.4	(36)
if details of ther Total fabric h		are not kn	own (36) =	= 0.05 x (3	1)			(22)	(26)		1		
Ventilation h		alaulatad	l manthl						(36) =	25)m x (5)		55.36	(37)
		Mar	· ·	<u> </u>	lup	1,,1	Λιια	` '	,	, , , ,	_		
(38)m= 23.6°	_	23.09	Apr 21.79	May 21.53	Jun 20.22	Jul 20.22	Aug 19.96	Sep 20.74	Oct 21.53	Nov 22.05	22.57		(38)
			21.70	21.00	20.22	20.22	10.00				22.01		(00)
Heat transfe	_		77.45	70.00	75.50	75.50	75.00	·	= (37) + (3		77.00	1	
(39)m= 78.98	8 78.71	78.45	77.15	76.89	75.59	75.59	75.32	76.11	76.89	77.41 Sum(39) _{1.}	77.93	77.08	(39)
Heat loss pa	rameter (H	HLP), W/	m²K						= (39)m ÷		12 / 12=	77.00	(00)
(40)m= 0.95	0.95	0.94	0.93	0.93	0.91	0.91	0.91	0.92	0.93	0.93	0.94		
								,	Average =	Sum(40) ₁ .	12 /12=	0.93	(40)
Number of d	lays in mor	nth (Tab	le 1a)	i	i							ı	
Jar	n 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 he	eating ener	rgy requi	rement:								kWh/ye	ear:	
Assumed oc if TFA > 1			[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	ΓFA -13.		52		(42)
if TFA > 1: if TFA £ 1:	3.9, N = 1 3.9, N = 1	+ 1.76 x		`	,	•	, -	,	ΓFA -13.		52		(42)
if TFA > 1: if TFA £ 1: Annual aver	3.9, N = 1 3.9, N = 1 age hot wa	+ 1.76 x ater usaç	e in litre	s per da	ay Vd,av	erage =	(25 x N)	+ 36		9)	.02		(42)
if TFA > 1: if TFA £ 1:	3.9, N = 1 3.9, N = 1 age hot wa nual average	+ 1.76 x ater usag hot water	ge in litre	es per da 5% if the a	ay Vd,av Iwelling is	erage = designed	(25 x N)	+ 36		9)			` ,
if TFA > 1: if TFA £ 1: Annual aver: Reduce the annual mot more that 1:	3.9, N = 1 3.9, N = 1 age hot wa nual average 25 litres per p	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w	es per da 5% if the d rater use, I	ay Vd,av welling is not and co	erage = designed i ld)	(25 x N) to achieve	+ 36 a water us	se target o	9) 94	.02		` ,
if TFA > 13 if TFA £ 13 Annual avers Reduce the and	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per p	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		9)			` ,
if TFA > 1: if TFA £ 1: Annual aver: Reduce the ani not more that 1: Jan	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per	+ 1.76 x ater usag hot water person per	ge in litre usage by day (all w	es per da 5% if the d vater use, I	ay Vd,av Iwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	9) 94	.02		` ,
if TFA > 1: if TFA £ 1: Annual aver: Reduce the ani not more that 1: Jar Hot water usag	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa	ay Vd,av Iwelling is that and co Jun ctor from	erage = designed in the designed in the designed in the designed in the design in thed	(25 x N) to achieve Aug (43)	+ 36 a water us Sep 92.14	Oct	9) 94 Nov	.02 Dec	1128.28	` ,
if TFA > 1: if TFA £ 1: Annual aver: Reduce the ani not more that 1: Jar Hot water usag	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per per per per litres per per litres per li	+ 1.76 x ater usage hot water person per Mar day for ear	ge in litre usage by a day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fa 88.38	ay Vd,av Iwelling is not and co Jun ctor from	erage = designed in display Jul Table 1c x 84.62	(25 x N) o achieve Aug (43) 88.38	+ 36 a water us Sep 92.14	Oct 95.9 Total = Sur	9) Nov 99.66 m(44) ₁₁₂ =	.02 Dec 103.43	1128.28	(43)
if TFA > 1: if TFA £ 1: Annual avera Reduce the ann not more that 1: Jan Hot water usag (44)m= 103.4	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per per in Feb e in litres per 3 99.66	+ 1.76 x ater usage hot water person per Mar day for ear	ge in litre usage by a day (all w Apr ach month	es per da 5% if the day vater use, I May Vd,m = fa 88.38	ay Vd,av Iwelling is not and co Jun ctor from	erage = designed in display Jul Table 1c x 84.62	(25 x N) o achieve Aug (43) 88.38	+ 36 a water us Sep 92.14	Oct 95.9 Total = Sur	9) Nov 99.66 m(44) ₁₁₂ =	.02 Dec 103.43	1128.28	(43)
if TFA > 1: if TFA £ 1: Annual aver: Reduce the ani not more that 1: Jar Hot water usag (44)m= 103.4 Energy content (45)m= 153.3	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per p Feb e in litres per 3 99.66 of hot water 8 134.14	+ 1.76 x ater usag hot water person per Mar r day for ea 95.9 used - calc 138.43	ge in litre usage by day (all w Apr ach month 92.14 culated me	es per da 5% if the orater use, I May Vd,m = far 88.38 onthly = 4.	ay Vd,av lwelling is not and co Jun ctor from 7 84.62 190 x Vd,r	erage = designed and designed a	(25 x N) o achieve Aug (43) 88.38 07m / 3600 106.25	+ 36 a water us Sep 92.14 0 kWh/mon 107.52	Oct 95.9 Total = Sunth (see Ta	9) Nov 99.66 m(44) ₁₁₂ = ables 1b, 1	.02 Dec 103.43 c, 1d) 148.54	1128.28	(43)
if TFA > 1: if TFA £ 1: Annual aver: Reduce the ani not more that 1: Jar Hot water usag (44)m= 103.4 Energy content (45)m= 153.3	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per p Feb e in litres per 3 99.66 for hot water 18 134.14	+ 1.76 x ater usag hot water person per Mar day for ea 95.9 used - calc 138.43	ge in litre usage by day (all w Apr ach month 92.14 culated me 120.68	es per da 5% if the a vater use, I May Vd,m = fa 88.38 onthly = 4.	ay Vd,av Iwelling is not and co Jun ctor from 7 84.62 190 x Vd,r 99.92	erage = designed in did) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in	(25 x N) o achieve Aug (43) 88.38 0Tm / 3600 106.25 boxes (46)	+ 36 a water us Sep 92.14 0 kWh/mort 107.52	Oct 95.9 Total = Sur 125.31 Total = Sur	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ =	.02 Dec 103.43 c, 1d) 148.54		(43) (44) (45)
if TFA > 1: if TFA £ 1: Annual aver: Reduce the ani not more that 1: Jar Hot water usag (44)m= 103.4 Energy content (45)m= 153.3 If instantaneous (46)m= 23.0	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per p	+ 1.76 x ater usag hot water person per Mar r day for ea 95.9 used - calc 138.43	ge in litre usage by day (all w Apr ach month 92.14 culated me	es per da 5% if the orater use, I May Vd,m = far 88.38 onthly = 4.	ay Vd,av lwelling is not and co Jun ctor from 7 84.62 190 x Vd,r	erage = designed and designed a	(25 x N) o achieve Aug (43) 88.38 07m / 3600 106.25	+ 36 a water us Sep 92.14 0 kWh/mon 107.52	Oct 95.9 Total = Sunth (see Ta	9) 94 Nov 99.66 m(44) ₁₁₂ = sbles 1b, 1 136.78	.02 Dec 103.43 c, 1d) 148.54		(43)
if TFA > 1: if TFA £ 1: Annual averageduce the annual not more that 1: Jar Hot water usage (44)m= 103.4 Energy content (45)m= 153.3 If instantaneous (46)m= 23.0 Water storage	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per p a Feb e in litres per a 99.66 for hot water a 134.14 s water heatin 1 20.12 ge loss:	+ 1.76 x ater usage hot water person per Mar day for early 138.43 ng at point 20.76	ge in litre usage by a day (all w Apr ach month 92.14 culated mo 120.68 of use (no	es per da 5% if the da vater use, I May Vd,m = fa 88.38	ay Vd,av Iwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 r storage),	erage = designed in did) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in 13.89	(25 x N) o achieve Aug (43) 88.38 0Tm / 3600 106.25 boxes (46) 15.94	+ 36 a water us Sep 92.14 0 kWh/mort 107.52 0 to (61) 16.13	Oct 95.9 Fotal = Surith (see Tail 125.31 Fotal = Surith 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ =	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46)
if TFA > 1: if TFA £ 1: Annual aver: Reduce the annual more that 1: Jan Hot water usag (44)m= 103.4 Energy content (45)m= 153.3 If instantaneous (46)m= 23.0 Water storage Storage volume	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per p Feb e in litres per 3 99.66 of hot water 8 134.14 s water heatin 1 20.12 ge loss: ume (litres)	+ 1.76 x ater usag hot water person per Mar day for ea 95.9 used - calc 138.43 ng at point 20.76	ge in litre usage by day (all w Apr ach month 92.14 culated me 120.68 of use (no	es per da 5% if the orater use, I May Vd,m = far 88.38 onthly = 4. 115.8 o hot water 17.37	ay Vd,av Iwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 storage),	erage = designed and designed a	(25 x N) o achieve Aug (43) 88.38 0Tm / 3600 106.25 boxes (46) 15.94 within sa	+ 36 a water us Sep 92.14 0 kWh/mort 107.52 0 to (61) 16.13	Oct 95.9 Fotal = Surith (see Tail 125.31 Fotal = Surith 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ =	.02 Dec 103.43 c, 1d) 148.54		(43) (44) (45)
if TFA > 1: if TFA £ 1: Annual averageduce the annual not more that 1: Jar Hot water usage (44)m= 103.4 Energy content (45)m= 153.3 If instantaneous (46)m= 23.0 Water storage	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per p a Feb e in litres per a 99.66 for hot water a 134.14 s water heatin 1 20.12 ge loss: ume (litres) y heating a	the table and the table and the table and tabl	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 of use (no 18.1 ng any so ank in dw	es per da 5% if the of the orater use, if the or	ay Vd,av Iwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 r storage), 14.99	erage = designed in designed i	(25 x N) o achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 0 kWh/mort 107.52 16.13 ame vess	Oct 95.9 Total = Sunth (see Tail 125.31) Total = Sunth (see Tail 18.8) 18.8	9) Nov 99.66 m(44) ₁₁₂ = 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46)
if TFA > 1: if TFA £ 1: Annual averageduce the annual not more that 1: Jan Hot water usage (44)m= 103.4 Energy content (45)m= 153.3 If instantaneous (46)m= 23.0 Water storage Storage volution	3.9, N = 1 3.9, N = 1 age hot wan average 25 litres per	the table and the table and the table and tabl	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 of use (no 18.1 ng any so ank in dw	es per da 5% if the of the orater use, if the or	ay Vd,av Iwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 r storage), 14.99	erage = designed in designed i	(25 x N) o achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 0 kWh/mort 107.52 16.13 ame vess	Oct 95.9 Total = Sunth (see Tail 125.31) Total = Sunth (see Tail 18.8) 18.8	9) Nov 99.66 m(44) ₁₁₂ = 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46)
if TFA > 1: if TFA £ 1: Annual averageduce the annual not more that 1: Jar	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per	+ 1.76 x ater usage hot water person per Mar ray for ear 95.9 used - calcal 138.43 and at point 20.76 including and no tal hot water water series are raised as the control of the con	ge in litre usage by day (all w Apr ach month 92.14 culated me 120.68 of use (no 18.1 ag any so nk in dw er (this in	es per da 5% if the o rater use, I May Vd,m = far 88.38 onthly = 4. 115.8 o hot water 17.37 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 storage), 14.99 /WHRS nter 110	erage = designed in designed i	(25 x N) o achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 0 kWh/mort 107.52 16.13 ame vess	Oct 95.9 Total = Sunth (see Tail 125.31) Total = Sunth (see Tail 18.8) 18.8	9) Nov 99.66 m(44) ₁₁₂ = sbles 1b, 1 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46)
if TFA > 1: if TFA £ 1: Annual aver: Reduce the annual more that 1: Jan Hot water usag (44)m= 103.4 Energy content (45)m= 153.3 If instantaneous (46)m= 23.0 Water storag Storage volution If community Otherwise if Water storag	3.9, N = 1 3.9, N = 1 age hot wan average 25 litres per	+ 1.76 x ater usage hot water person per Mar 95.9 used - calcal 138.43 and at point 20.76 including and no talk hot water eclared legerater water sectors.	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 of use (no 18.1 ag any so ank in dw er (this in	es per da 5% if the o rater use, I May Vd,m = far 88.38 onthly = 4. 115.8 o hot water 17.37 olar or W relling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 storage), 14.99 /WHRS nter 110	erage = designed in designed i	(25 x N) o achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 0 kWh/mort 107.52 16.13 ame vess	Oct 95.9 Total = Sunth (see Tail 125.31) Total = Sunth (see Tail 18.8) 18.8	9) Nov 99.66 m(44) ₁₁₂ = 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46) (47)
if TFA > 1: if TFA £ 1: Annual averageduce the annual not more that 1: Jar	3.9, N = 1 3.9, N = 1 age hot wanted average 25 litres per	ater usage hot water person per Mar 95.9 used - calc 138.43 ng at point 20.76 including and no talc hot water eclared lem Table storage	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 of use (no 18.1 ng any so nk in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the a vater use, I May $Vd,m = fa$ 88.38 and 115.8 a hot water 17.37 blar or Wielling, encludes it or is known ear	ay Vd,av lwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 r storage), 14.99 /WHRS nter 110 nstantar	erage = designed in designed i	(25 x N) o achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 0 kWh/mor 107.52 0 to (61) 16.13 ame vess ers) ente	Oct 95.9 Total = Sunth (see Tail 125.31) Total = Sunth (see Tail 18.8) 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46) (47)
if TFA > 1: if TFA £ 1: Annual avera Reduce the ann not more that 1: Jar Hot water usag (44)m= 103.4 Energy content (45)m= 153.3 If instantaneous (46)m= 23.0 Water storag Storage volutif community Otherwise if Water storag a) If manufater	3.9, N = 1 3.9, N = 1 age hot wanted average 25 litres per	ater usage hot water person per Mar 95.9 used - calc 138.43 ng at point 20.76 including and no talc hot water eclared lem Table storage	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 of use (no 18.1 ng any so nk in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the a vater use, I May $Vd,m = fa$ 88.38 and 115.8 a hot water 17.37 blar or Wielling, encludes it or is known ear	ay Vd,av lwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 r storage), 14.99 /WHRS nter 110 nstantar	erage = designed in designed i	(25 x N) o achieve Aug (43) 88.38 0Tm / 3600 106.25 boxes (46) 15.94 within sa (47) mbi boil	+ 36 a water us Sep 92.14 0 kWh/mor 107.52 0 to (61) 16.13 ame vess ers) ente	Oct 95.9 Total = Sunth (see Tail 125.31) Total = Sunth (see Tail 18.8) 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28 0		(43) (44) (45) (46) (47) (48) (49)

Hot water storage loss factor for	•	h/litre/da	ıy)				0.	02		(51)
If community heating see secti	on 4.3								Ī	(==)
Volume factor from Table 2a Temperature factor from Table	2h							03		(52) (53)
•				(47) (54)	(50) (50)		.6		` '
Energy lost from water storage Enter (50) or (54) in (55)	e, kvvn/year			(47) X (51)	x (52) x (53) =	-	03		(54) (55)
, , , , , ,	for each month			((EG)m - (EE) (41)	~	1.	03		(55)
Water storage loss calculated			·	,, ,	55) × (41)ı				I	(==)
(56)m= 32.01 28.92 32.01 If cylinder contains dedicated solar sto	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	i 1.1	(56)
· .	1	-	,- ,	,		,				(57)
(57)m= 32.01 28.92 32.01	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit loss (annual) fro		E0\m /	(EQ) . 26	·E (44)				0		(58)
Primary circuit loss calculated (modified by factor from Tab	,	•	` '	, ,		r thermo	etat)			
(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)
` '		<u> </u>							l	,
Combi loss calculated for each	1 i '	`	<u> </u>		_				ı	(04)
(61)m= 0 0 0	0 0	0	0	0	0	0	0	0		(61)
Total heat required for water h	eating calculated	for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 208.65 184.07 193.7	174.18 171.07	153.42	147.87	161.53	161.02	180.58	190.28	203.81		(62)
Solar DHW input calculated using App						r contribut	ion to wate	er heating)		
(add additional lines if FGHRS	and/or WWHRS	applies	, see Ap	pendix ()				•	
(63)m= 0 0	0 0	0	0	0	0	0	0	0		(63)
Output from water heater										
									_	
(64)m= 208.65 184.07 193.7	174.18 171.07	153.42	147.87	161.53	161.02	180.58	190.28	203.81		_
(64)m= 208.65 184.07 193.7	174.18 171.07	153.42	147.87				190.28 r (annual) ₁		2130.19	(64)
(64)m= 208.65 184.07 193.7 Heat gains from water heating				Outp	out from wa	ater heate	I r (annual)₁	12		(64)
				Outp	out from wa	ater heate	I r (annual)₁	12		(64) (65)
Heat gains from water heating	, kWh/month 0.25	5 ´ [0.85 76.02	× (45)m	Outp + (61)m 79.55	out from wa n] + 0.8 x 78.55	ater heate ([(46)m 85.89	r (annual) ₁ + (57)m 88.28	+ (59)m 93.61]], ,
Heat gains from water heating (65)m= 95.22 84.55 90.25	, kWh/month 0.29 82.92 82.72 of (65)m only if c	5 ´ [0.85 76.02	× (45)m	Outp + (61)m 79.55	out from wa n] + 0.8 x 78.55	ater heate ([(46)m 85.89	r (annual) ₁ + (57)m 88.28	+ (59)m 93.61]], ,
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5	, kWh/month 0.29 82.92 82.72 of (65)m only if c 5 and 5a):	5 ´ [0.85 76.02	× (45)m	Outp + (61)m 79.55	out from wa n] + 0.8 x 78.55	ater heate ([(46)m 85.89	r (annual) ₁ + (57)m 88.28	+ (59)m 93.61]], ,
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation	, kWh/month 0.29 82.92 82.72 of (65)m only if cost and 5a):	5 ´ [0.85 76.02	× (45)m	Outp + (61)m 79.55 dwelling	78.55 or hot w	ater heate ([(46)m 85.89	r (annual) ₁ + (57)m 88.28	+ (59)m 93.61]], ,
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), Water 1975 (1975) Water 1975 (, kWh/month 0.29 82.92 82.72 of (65)m only if c 5 and 5a):	5 ´ [0.85 76.02 ylinder is	× (45)m 75.01 s in the c	Outp + (61)m 79.55	out from wa n] + 0.8 x 78.55	ater heate ([(46)m 85.89 ater is fr	+ (57)m 88.28 rom com	+ (59)m 93.61 munity h]], ,
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5) Water and Table 5), Water and	, kWh/month 0.29 82.92 82.72 of (65)m only if control of the second 5a): tts Apr May 151.13 151.13	5 ´ [0.85 76.02 cylinder is Jun 151.13	x (45)m 75.01 s in the c	Outp + (61)m 79.55 dwelling Aug 151.13	out from wa n] + 0.8 x 78.55 or hot w Sep 151.13	ater heate ([(46)m 85.89 ater is fr	+ (57)m 88.28 com com	+ (59)m 93.61 munity h]	(65)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5) Metabolic gains (Table 5), Wat Jan Feb Mar	, kWh/month 0.29 82.92 82.72 of (65)m only if control of the second 5a): tts Apr May 151.13 151.13	5 ´ [0.85 76.02 cylinder is Jun 151.13	x (45)m 75.01 s in the c	Outp + (61)m 79.55 dwelling Aug 151.13	out from wa n] + 0.8 x 78.55 or hot w Sep 151.13	ater heate ([(46)m 85.89 ater is fr	+ (57)m 88.28 com com	+ (59)m 93.61 munity h]	(65)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Wat Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in A) (67)m= 50.86 45.17 36.74	, kWh/month 0.29 82.92 82.72 of (65)m only if cond 5a): tts Apr May 151.13 151.13 ppendix L, equati 27.81 20.79	5 ´ [0.85 76.02 rylinder is Jun 151.13 ion L9 or	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96	Outp + (61)m 79.55 dwelling Aug 151.13 lso see	Sep 151.13 Table 5	oter heate x [(46)m 85.89 ater is fr Oct 151.13	+ (57)m 88.28 rom com Nov 151.13	+ (59)m 93.61 munity h Dec 151.13]	(65)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Water Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in Applications)	, kWh/month 0.29 82.92 82.72 of (65)m only if cond 5a): tts Apr May 151.13 151.13 ppendix L, equati 27.81 20.79	5 ´ [0.85 76.02 rylinder is Jun 151.13 ion L9 or	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96	Outp + (61)m 79.55 dwelling Aug 151.13 lso see	Sep 151.13 Table 5	oter heate x [(46)m 85.89 ater is fr Oct 151.13	+ (57)m 88.28 rom com Nov 151.13	+ (59)m 93.61 munity h Dec 151.13]	(65)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Water Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in Appliances gains (calculated in Appliances gains (calculated in (68)m= 336.98 340.48 331.67	, kWh/month 0.29 82.92 82.72 of (65)m only if compositions and 5a): tts Apr May 151.13 151.13 ppendix L, equations 27.81 20.79 n Appendix L, equations 1312.91 289.23	Jun 151.13 ion L9 of 17.55 uation L	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96 13 or L1: 252.1	Outp + (61)m 79.55 dwelling Aug 151.13 lso see 24.65 3a), also 248.6	Sep 151.13 Table 5 33.09 see Tal 257.42	Oct 151.13 42.01 ble 5 276.18	(annual), + (57)m 88.28 rom com Nov 151.13	+ (59)m 93.61 munity h Dec 151.13]	(65) (66) (67)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Water Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in A (67)m= 50.86 45.17 36.74 Appliances gains (calculated in	, kWh/month 0.29 82.92 82.72 of (65)m only if compositions and 5a): tts Apr May 151.13 151.13 ppendix L, equations 27.81 20.79 n Appendix L, equations 1312.91 289.23	Jun 151.13 ion L9 of 17.55 uation L	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96 13 or L1: 252.1	Outp + (61)m 79.55 dwelling Aug 151.13 lso see 24.65 3a), also 248.6	Sep 151.13 Table 5 33.09 see Tal 257.42	Oct 151.13 42.01 ble 5 276.18	(annual), + (57)m 88.28 rom com Nov 151.13	+ (59)m 93.61 munity h Dec 151.13]	(65) (66) (67)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Water Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in A (67)m= 50.86 45.17 36.74 Appliances gains (calculated in 68)m= 336.98 340.48 331.67 Cooking gains (calculated in A (69)m= 52.63 52.63 52.63	, kWh/month 0.29 82.92 82.72 of (65)m only if control of control o	Jun 151.13 ion L9 or 17.55 uation L 266.97	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96 13 or L1: 252.1 or L15a)	Outp + (61)m 79.55 dwelling Aug 151.13 lso see 24.65 3a), also 248.6	Sep 151.13 Table 5 33.09 see Table 257.42	Oct 151.13 42.01 ble 5 276.18	(annual), + (57)m 88.28 com com Nov 151.13 49.03	+ (59)m 93.61 munity h Dec 151.13]	(65) (66) (67) (68)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Wat Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in A 667)m= 50.86 45.17 36.74 Appliances gains (calculated in (68)m= 336.98 340.48 331.67 Cooking gains (calculated in A 69)m= 52.63 52.63 52.63 Pumps and fans gains (Table 5)	, kWh/month 0.29 82.92 82.72 of (65)m only if control of control o	Jun 151.13 ion L9 or 17.55 uation L 266.97	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96 13 or L1: 252.1 or L15a)	Outp + (61)m 79.55 dwelling Aug 151.13 lso see 24.65 3a), also 248.6	Sep 151.13 Table 5 33.09 see Table 257.42	Oct 151.13 42.01 ble 5 276.18	(annual), + (57)m 88.28 com com Nov 151.13 49.03	+ (59)m 93.61 munity h Dec 151.13]	(65) (66) (67) (68)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Water Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in Appliances gains (calculated in (68)m= 336.98 340.48 331.67 Cooking gains (calculated in A (69)m= 52.63 52.63 52.63 Pumps and fans gains (Table 5), Water Jan Feb Mar (68)m= 336.98 340.48 331.67 Cooking gains (calculated in A (69)m= 52.63 52.63 52.63	, kWh/month 0.29 82.92 82.72 of (65)m only if companies to the second se	Jun 151.13 ion L9 or 17.55 uation L 266.97 tion L15 52.63	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96 13 or L1: 252.1 or L15a) 52.63	Outp + (61)m 79.55 dwelling Aug 151.13 lso see 24.65 3a), also 248.6 , also se 52.63	Sep 151.13 Table 5 33.09 See Tal 257.42 Ee Table 52.63	Oct 151.13 42.01 ble 5 276.18 5 52.63	(annual), + (57)m 88.28 rom com Nov 151.13 49.03	+ (59)m 93.61 munity h Dec 151.13 52.27]	(65) (66) (67) (68) (69)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Water Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in A (67)m= 50.86 45.17 36.74 Appliances gains (calculated in (68)m= 336.98 340.48 331.67 Cooking gains (calculated in A (69)m= 52.63 52.63 52.63 Pumps and fans gains (Table 5) (70)m= 0 0 0 Losses e.g. evaporation (negative forms and fans gains (negative forms and fans	, kWh/month 0.29 82.92 82.72 of (65)m only if composition of the second 5a): Itts Apr May 151.13 151.13 ppendix L, equation 27.81 20.79 n Appendix L, equation 312.91 289.23 ppendix L, equation 52.63 52.63 5a) 0 0 Itive values) (Tab	Jun 151.13 ion L9 or 17.55 uation L 266.97 tion L15 52.63	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96 13 or L1 252.1 or L15a) 52.63	Outp + (61)m 79.55 dwelling Aug 151.13 lso see 24.65 3a), also 248.6 , also se 52.63	Sep 151.13 Table 5 33.09 see Tal 257.42 ee Table 52.63	Oct 151.13 42.01 ble 5 276.18 5 52.63	(annual), + (57)m 88.28 rom com Nov 151.13 49.03 299.86 52.63	+ (59)m 93.61 munity h Dec 151.13 52.27 322.11]	(65) (66) (67) (68) (69) (70)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Water Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in Appliances gains (calcul	, kWh/month 0.29 82.92 82.72 of (65)m only if companies to the second se	Jun 151.13 ion L9 or 17.55 uation L 266.97 tion L15 52.63	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96 13 or L1: 252.1 or L15a) 52.63	Outp + (61)m 79.55 dwelling Aug 151.13 lso see 24.65 3a), also 248.6 , also se 52.63	Sep 151.13 Table 5 33.09 See Tal 257.42 Ee Table 52.63	Oct 151.13 42.01 ble 5 276.18 5 52.63	(annual), + (57)m 88.28 rom com Nov 151.13 49.03	+ (59)m 93.61 munity h Dec 151.13 52.27]	(65) (66) (67) (68) (69)
Heat gains from water heating (65)m= 95.22 84.55 90.25 include (57)m in calculation 5. Internal gains (see Table 5), Water Jan Feb Mar (66)m= 151.13 151.13 151.13 Lighting gains (calculated in A (67)m= 50.86 45.17 36.74 Appliances gains (calculated in (68)m= 336.98 340.48 331.67 Cooking gains (calculated in A (69)m= 52.63 52.63 52.63 Pumps and fans gains (Table 5) (70)m= 0 0 0 Losses e.g. evaporation (negative forms and fans gains (negative forms and fans	, kWh/month 0.29 82.92 82.72 of (65)m only if composition of the second 5a): Itts Apr May 151.13 151.13 ppendix L, equation 27.81 20.79 n Appendix L, equation 312.91 289.23 ppendix L, equation 52.63 52.63 5a) 0 0 Itive values) (Tab	Jun 151.13 ion L9 or 17.55 uation L 266.97 tion L15 52.63	x (45)m 75.01 s in the c Jul 151.13 r L9a), a 18.96 13 or L1 252.1 or L15a) 52.63	Outp + (61)m 79.55 dwelling Aug 151.13 lso see 24.65 3a), also 248.6 , also se 52.63	Sep 151.13 Table 5 33.09 see Tal 257.42 ee Table 52.63	Oct 151.13 42.01 ble 5 276.18 5 52.63	(annual), + (57)m 88.28 rom com Nov 151.13 49.03 299.86 52.63	+ (59)m 93.61 munity h Dec 151.13 52.27 322.11]	(65) (66) (67) (68) (69) (70)

Total internal	gains =	ŧ			(66	6)m + (67)m	ı + (68	3)m +	(69)m + (1	70)m +	(71)m + (72)	m		
(73)m= 618.83	614.47	592.71	558.9	524.21	493.11	474.89	483	.19	502.6	536.63	3 574.5	603.21		(73)
6. Solar gains	S:					,		-						
Solar gains are o	alculated	using sola	r flux from	Table 6a	and asso	ciated equa	tions	to cor	nvert to the	e applic	able orientat	ion.		
Orientation: A			Area	l		ux			g_ 		FF		Gains	
_	able 6d		m²			able 6a			able 6b		Table 6c		(W)	
Southeast 0.9x	0.77	X	0.	72	x	36.79	X		0.4	x	0.8	=	5.87	(77)
Southeast 0.9x	0.77	X	1.	61	x	36.79	X		0.4	x	0.8	=	13.14	(77)
Southeast 0.9x	0.77	X	2.	01	x	36.79	X		0.4	x	0.8	=	16.4	(77)
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	0.	72	X	62.67	X		0.4	x	0.8	=	10.01	(77)
Southeast 0.9x	0.77	X	1.	61	X	62.67	X		0.4	x	0.8	=	22.38	(77)
Southeast 0.9x	0.77	X	2.	01	X	62.67	X		0.4	x	0.8	=	27.94	(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	0.	72	x	85.75	X		0.4	x	0.8	=	13.69	(77)
Southeast 0.9x	0.77	X	1.	61	X	85.75	X		0.4	x	0.8	=	30.62	(77)
Southeast 0.9x	0.77	X	2.	01	X	85.75	X		0.4	x	0.8	=	38.22	(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	0.	72	X	106.25	X		0.4	x	0.8	=	16.96	(77)
Southeast 0.9x	0.77	X	1.	61	X	106.25	X		0.4	x	0.8	=	37.94	(77)
Southeast _{0.9x}	0.77	X	2.	01	X	106.25	X		0.4	x	0.8	=	47.36	(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	Х	0.	72	X	119.01	X		0.4	x	0.8	=	19	(77)
Southeast 0.9x	0.77	Х	1.	61	X	119.01	X		0.4	x	0.8	=	42.49	(77)
Southeast _{0.9x}	0.77	X	2.	01	X	119.01	X		0.4	x	0.8	=	53.05	(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	Х	0.	72	X	118.15	X		0.4	X	0.8	=	18.86	(77)
Southeast _{0.9x}	0.77	X	1.	61	X	118.15	X		0.4	x	0.8	=	42.18	(77)
Southeast 0.9x	0.77	Х	2.	01	X	118.15	X		0.4	x	0.8	=	52.66	(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	0.	72	X	113.91	X		0.4	x	0.8	=	18.19	(77)
Southeast _{0.9x}	0.77	X	1.	61	X	113.91	X		0.4	x	0.8	=	40.67	(77)
Southeast 0.9x	0.77	X	2.	01	X	113.91	X		0.4	x	0.8	=	50.77	(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	0.	72	X	104.39	X		0.4	x	0.8	=	16.67	(77)
Southeast 0.9x	0.77	X	1.	61	X	104.39	X		0.4	x	0.8	=	37.27	(77)
Southeast 0.9x	0.77	X	2.	01	X	104.39	X		0.4	×	0.8	=	46.53	(77)
Southeast 0.9x	0.77	X	0.	91	X	104.39	X		0.4	x	0.8	=	21.07	(77)
Southeast 0.9x	0.77	X	0.	72	х	92.85	X		0.4	x	0.8	=	14.83	(77)
Southeast 0.9x	0.77	X	1.	61	x	92.85	X		0.4	X	0.8	=	33.15	(77)

Southeast 0.9x	0.77	٦ ,	2.04	1 .	00.05	1 .	0.4	l	0.0	1 _	44.00	(77)
Southeast 0.9x	0.77] X]	2.01	X 	92.85] X]	0.4	X	0.8] =]	41.39	= '
Southeast 0.9x	0.77	X	0.91	X	92.85	X	0.4	X	0.8] = 1	18.74	(77)
Southeast 0.9x	0.77] X]	0.72	X 	69.27] X]	0.4	X I	0.8] =]	11.06	(77)
Southeast 0.9x	0.77	X	1.61	X	69.27] X]	0.4	X	0.8] = 1	24.73	(77)
<u> </u>	0.77	X	2.01	X	69.27	X	0.4	Х	0.8] = 1	30.88	(77)
Southeast 0.9x	0.77	X	0.91	X	69.27	X	0.4	X	0.8] = 1	13.98	(77)
Southeast 0.9x	0.77	X	0.72	X	44.07	X	0.4	Х	0.8] = 1	7.04	(77)
Southeast 0.9x	0.77	X	1.61	X	44.07	X	0.4	Х	0.8] = 1	15.73	(77)
Southeast 0.9x	0.77	X	2.01	X	44.07	X	0.4	X	0.8] =	19.64	(77)
Southeast 0.9x	0.77	X	0.91	X	44.07	X	0.4	Х	0.8	=	8.89	(77)
Southeast 0.9x	0.77	X	0.72	X	31.49	X	0.4	Х	0.8	=	5.03	(77)
Southeast 0.9x	0.77	X	1.61	X	31.49	X	0.4	X	0.8	=	11.24	(77)
Southeast _{0.9x}	0.77	X	2.01	X	31.49	X	0.4	Х	0.8	=	14.04	(77)
Southeast _{0.9x}	0.77	X	0.91	X	31.49	X	0.4	Х	0.8	=	6.35	(77)
Northwest _{0.9x}	0.77	X	5.95	X	11.28	X	0.4	X	0.8	=	14.89	(81)
Northwest _{0.9x}	0.77	X	1.99	X	11.28	X	0.4	X	0.8	=	4.98	(81)
Northwest _{0.9x}	0.77	X	0.9	X	11.28	X	0.4	X	0.8	=	2.25	(81)
Northwest _{0.9x}	0.77	X	5.95	X	22.97	X	0.4	X	0.8	=	30.3	(81)
Northwest _{0.9x}	0.77	X	1.99	x	22.97	x	0.4	x	0.8	=	10.14	(81)
Northwest _{0.9x}	0.77	X	0.9	X	22.97	X	0.4	X	0.8	=	4.58	(81)
Northwest 0.9x	0.77	X	5.95	x	41.38	X	0.4	X	0.8	=	54.6	(81)
Northwest _{0.9x}	0.77	X	1.99	x	41.38	x	0.4	x	0.8	=	18.26	(81)
Northwest _{0.9x}	0.77	X	0.9	x	41.38	x	0.4	x	0.8	=	8.26	(81)
Northwest _{0.9x}	0.77	X	5.95	x	67.96	x	0.4	x	0.8	=	89.67	(81)
Northwest _{0.9x}	0.77	X	1.99	x	67.96	х	0.4	х	0.8	=	29.99	(81)
Northwest _{0.9x}	0.77	X	0.9	x	67.96	x	0.4	x	0.8	=	13.56	(81)
Northwest _{0.9x}	0.77	X	5.95	x	91.35	x	0.4	x	0.8	=	120.53	(81)
Northwest _{0.9x}	0.77	X	1.99	x	91.35	x	0.4	x	0.8	=	40.31	(81)
Northwest _{0.9x}	0.77	X	0.9	x	91.35	x	0.4	x	0.8	=	18.23	(81)
Northwest 0.9x	0.77	x	5.95	x	97.38	х	0.4	х	0.8] =	128.5	(81)
Northwest _{0.9x}	0.77	x	1.99	x	97.38	х	0.4	х	0.8	=	42.98	(81)
Northwest _{0.9x}	0.77	x	0.9	x	97.38	x	0.4	х	0.8	=	19.44	(81)
Northwest 0.9x	0.77	X	5.95	x	91.1	x	0.4	х	0.8] =	120.21	(81)
Northwest _{0.9x}	0.77	x	1.99	x	91.1	x	0.4	х	0.8	=	40.2	(81)
Northwest 0.9x	0.77	x	0.9	x	91.1	x	0.4	x	0.8] =	18.18	(81)
Northwest 0.9x	0.77	X	5.95	x	72.63	x	0.4	х	0.8	j =	95.83	(81)
Northwest _{0.9x}	0.77	x	1.99	x	72.63	x	0.4	x	0.8] =	32.05	(81)
Northwest _{0.9x}	0.77	x	0.9	x	72.63	x	0.4	x	0.8] =	14.5	(81)
Northwest _{0.9x}	0.77	x	5.95	x	50.42	x	0.4	x	0.8	=	66.53	(81)
Northwest _{0.9x}	0.77	x	1.99	x	50.42	x	0.4	x	0.8	=	22.25	(81)
Northwest _{0.9x}	0.77	×	0.9	x	50.42	x	0.4	x	0.8	=	10.06	(81)

Northwest 0.9	× 0.77	×	5.9	95	x	28	8.07	X		0.4	x	0.8	=	37.03	(81)
Northwest 0.9	× 0.77	×	1.9	99	x	28	8.07	x		0.4	x [0.8	=	12.39	(81)
Northwest 0.9	× 0.77	×	0.	9	x	28	8.07	x		0.4	x	0.8	=	5.6	(81)
Northwest 0.9	× 0.77	×	5.9	95	x	1	4.2	x		0.4	x [0.8	=	18.73	(81)
Northwest 0.9	× 0.77	×	1.9	99	x	1	4.2	x		0.4	x [0.8	=	6.27	(81)
Northwest 0.9	x 0.77	×	0.	9	x	1	4.2	x		0.4	x	0.8	=	2.83	(81)
Northwest 0.9	x 0.77	×	5.9	95	x	9).21	x		0.4	x	0.8	=	12.16	(81)
Northwest 0.9	× 0.77	×	1.9	99	x	9).21	x		0.4	x	0.8	=	4.07	(81)
Northwest 0.9	× 0.77	×	0.	9	x	9	9.21	x		0.4	x	0.8	=	1.84	(81)
					-			_							
Solar gains	in watts, c	alculated	d for eac	h month				(83)m	n = Su	ım(74)m .	(82)m				
(83)m= 64.9	6 117.99	180.95	256.92	317.63	32	28.46	311.21	263	.91	206.94	135.67	79.14	54.72		(83)
Total gains	- internal	and solar	r (84)m =	= (73)m	+ (8	33)m ,	watts							_	
(84)m= 683.7	79 732.46	773.67	815.82	841.84	82	21.58	786.1	747	7.1	709.55	672.3	653.64	657.94		(84)
7. Mean in	ternal tem	perature	(heating	season)										
Temperatu			`			area f	rom Tal	ole 9.	, Th1	I (°C)				21	(85)
Utilisation t	•	• .			•			,	,	,					
Jai	`	Mar	Apr	May	r	Jun	Jul	Α	ug	Sep	Oct	Nov	Dec]	
(86)m= 0.99	0.98	0.96	0.91	0.78	C).58	0.42	0.4	 +	0.7	0.92	0.98	0.99		(86)
Mean inter	nal tempe	rature in	livina ar	oo T1 /f/	الد	w stor	nc 3 to 7	7 in T		, Oc)		1	I	J	
(87)m= 20.2		20.54	20.77	20.93		0.99	21	2		20.97	20.79	20.49	20.23	1	(87)
` '								L			200	1 -00]	(- /
Temperatu	 _		i e	i e	_				$\overline{}$	<u> </u>	00.45	1 00 44	00.44	1	(00)
(88)m= 20.1	2 20.13	20.13	20.14	20.15	2	0.16	20.16	20.	16	20.15	20.15	20.14	20.14		(88)
Utilisation t	actor for g	gains for	rest of d	welling,	h2,	m (se	e Table	9a)					•	1	
(89)m= 0.99	0.98	0.95	0.88	0.73	C).51	0.34	0.3	38	0.63	0.89	0.97	0.99		(89)
Mean inter	nal tempe	rature in	the rest	of dwell	ing	T2 (fc	ollow ste	eps 3	8 to 7	in Tabl	e 9c)				
(90)m= 19.1	4 19.3	19.56	19.89	20.08	2	0.15	20.16	20.	16	20.13	19.91	19.5	19.12]	(90)
	•	•	•	•	•	•		•	•	f	LA = Livi	ng area ÷ (4) =	0.4	(91)
Mean inter	nal tamna	rature (fo	or the wh	ole dwe	lling	م/ _ fl	Δ ~ T1	 /1	_ fl /	Δ) ~ T2					
(92)m= 19.5		19.95	20.24	20.42	- `	0.49	20.49	20.		20.47	20.26	19.89	19.56	1	(92)
Apply adju			<u> </u>					L						J	` '
(93)m= 19.5		19.95	20.24	20.42	_	0.49	20.49	20.	$\overline{}$	20.47	20.26	19.89	19.56]	(93)
8. Space h	eating reg	uirement													
Set Ti to th	Ĭ			re obtair	ned	at ste	ep 11 of	Tabl	le 9b	, so tha	t Ti,m=	(76)m an	d re-cal	culate	
the utilisati			•								,			_	
Jar	n Feb	Mar	Apr	May	,	Jun	Jul	Α	ug	Sep	Oct	Nov	Dec		
Utilisation 1	actor for g	gains, hm	n:									•		•	
(94)m= 0.98	0.97	0.95	0.89	0.74	C).54	0.37	0.4	41	0.66	0.9	0.97	0.99		(94)
Useful gair	s, hmGm	- `	- ` `	4)m	_									1	
(95)m= 673.0		736.24	722.01	626.77	<u> </u>	10.01	293.82	307	7.6	468.15	602.55	633.93	649.31		(95)
Monthly av		1	i –	e from T	able	e 8			,					1	
(96)m= 4.3		6.5	8.9	11.7		14.6	16.6	16		14.1	10.6	7.1	4.2		(96)
Heat loss r	1			· ·	1		-	-``				1	ı	1	
(97)m= 1206.	67 1166.57	1055.28	874.91	670.44	44	14.95	294.29	308	.42	484.52	742.88	990.14	1197.02	J	(97)

Space heating requirement for each month,	kWh/mor	nth = 0.02	24 x [(97)m – (95	5)ml x (4	1)m		
(98)m= 397.04 304.05 237.37 110.09 32.49		0	0	0	104.4	256.47 407.5	7	
	•		Tota	l per year	(kWh/yea	$r) = Sum(98)_{15,912} =$	1849.41	(98)
Space heating requirement in kWh/m²/year							22.26	(99)
9b. Energy requirements – Community heati	ng schem	е						
This part is used for space heating, space confirmation of space heat from secondary/supplements.						unity scheme.	0	(301)
Fraction of space heat from community syste	•	ŭ		, -			1	(302)
The community scheme may obtain heat from several s	ources. The	, procedure	allows for	CHP and	up to four	other heat sources;	the latter	
includes boilers, heat pumps, geothermal and waste he	at from powe	er stations.	See Appe	ndix C.				7(2020)
Fraction of heat from Community heat pump	boot num				(2	(202c) (202c)	1	(303a)
Fraction of total space heat from Community	•	•	unitu da a	utin a our		(303a) =	1	(304a)
Factor for control and charging method (Table 10a) for severe	. ,,		•	iting sys	stem		1	(305)
Distribution loss factor (Table 12c) for comm	unity neat	ing syste	m				1.05	(306)
Space heating Annual space heating requirement							kWh/year 1849.41	7
Space heat from Community heat pump				(98) x (3	04a) x (30	5) x (306) =	1941.89	(307a)
Efficiency of secondary/supplementary heati	ng system	in % (fro	om Table	4a or A	ppendix	: E)	0	(308
Space heating requirement from secondary/s	supplemer	ntary sys	tem	(98) x (3	01) x 100	÷ (308) =	0	(309)
Water heating								_
Annual water heating requirement							2130.19	
If DHW from community scheme: Water heat from Community heat pump				(64) x (3	03a) x (30	5) x (306) =	2236.7	(310a)
Electricity used for heat distribution			0.01	× [(307a)	(307e) +	- (310a)(310e)] =	41.79	(313)
Cooling System Energy Efficiency Ratio							0	(314)
Space cooling (if there is a fixed cooling syst	em, if not	enter 0)		= (107) -	÷ (314) =		0	(315)
Electricity for pumps and fans within dwelling mechanical ventilation - balanced, extract or			outside				230.66	(330a)
warm air heating system fans							0	(330b)
pump for solar water heating							0	(330g)
Total electricity for the above, kWh/year				=(330a)	+ (330b) +	· (330g) =	230.66	
Energy for lighting (calculated in Appendix L))						359.26	(332)
Total delivered energy for all uses (307) + (3)) + (312)) + (315)	+ (331)	+ (332).	(237b) =	4768.51	(338)
10b. Fuel costs – Community heating scher	, ,	·	<u> </u>	, , , , , , , , , , , , , , , , , , ,	· ·			
	Fı	ıel Vh/year			Fuel P (Table		Fuel Cost £/year	

(307a) x

Space heating from CHP

(340a)

82.34

x 0.01 =

4.24

Water heating from CHP	(310a) x		4.24 × 0.01 =	94.84	(342a)
		Fue	l Price		
Pumps and fans	(331)		x 0.01 =	30.42	(349)
Energy for lighting	(332)		13.19 × 0.01 =	47.39	(350)
Additional standing charges (Table 12)				120	(351)
Total energy cost	= (340a)(342e) + (345)(354	.) =		374.98	(355)
11b. SAP rating - Community heating	scheme				
Energy cost deflator (Table 12)				0.42	(356)
Energy cost factor (ECF)	[(355) x (356)] ÷ [(4) + 45.0] =			1.23	(357)
SAP rating (section12)				82.85	(358)
12b. CO2 Emissions – Community hea	ting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh		
000 from other courses of course and	veter le estice (rest OUD)	Kvvii/yeai	kg CO2/kWii	kg CO2/year	
CO2 from other sources of space and v Efficiency of heat source 1 (%)	If there is CHP using tw	o fuels repeat (363) to	(366) for the second fue	383	(367a)
CO2 associated with heat source 1	[(307b)+(31	0b)] x 100 ÷ (367b) x	0.52	566.24	(367)
Electrical energy for heat distribution	[(31	(3) x	0.52	21.69	(372)
Total CO2 associated with community	systems (36	3)(366) + (368)(372) =	587.92	(373)
CO2 associated with space heating (se	econdary) (30	9) x	0 =	0	(374)
CO2 associated with water from immer	sion heater or instantaneou	s heater (312) x	0.52	0	(375)
Total CO2 associated with space and v	vater heating (37	3) + (374) + (375) =		587.92	(376)
CO2 associated with electricity for pur	ps and fans within dwelling	(331)) x	0.52	119.71	(378)
CO2 associated with electricity for light	ing (33	2))) x	0.52	186.46	(379)
Total CO2, kg/year	sum of (376)(382) =			894.09	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			10.76	(384)
El rating (section 14)				90.65	(385)
13b. Primary Energy - Community hea	ting scheme				
		Energy kWh/year	Primary factor	P.Energy kWh/year	
Energy from other sources of space an	d water heating (not CHP)	Kirinyoa.	racto.	Kirinyou.	
Efficiency of heat source 1 (%)	If there is CHP using tw	o fuels repeat (363) to	(366) for the second fue	383	(367a)
Energy associated with heat source 1	[(307b)+(31	0b)] x 100 ÷ (367b) x	3.07	3349.42	(367)
Electrical energy for heat distribution	[(31	(3) x	=	128.28	(372)
Total Energy associated with communi	ty systems (36	3)(366) + (368)(372)	3477.7	(373)
if it is negative set (373) to zero (unle	ess specified otherwise, see	e C7 in Appendix C)	3477.7	(373)
Energy associated with space heating	(secondary) (30	9) x	0 =	0	(374)
Energy associated with water from imn	nersion heater or instantane	eous heater(312) x	3.07	0	(375)

Total Energy associated with space and water heating	(373) + (374) + (375) =			3477.7	(376)
Energy associated with space cooling	(315) x	3.07	=	0	(377)
Energy associated with electricity for pumps and fans within	dwelling (331)) x	3.07	=	708.13	(378)
Energy associated with electricity for lighting	(332))) x	3.07	=	1102.93	(379)
Total Primary Energy, kWh/year sum of (3)	76)(382) =		Г	5288.76	(383)

			User D	etails:						
Assessor Name: Software Name:	Ben Talbutt Stroma FSAP 2	2012		Stroma Softwa					036639 n: 1.0.5.17	
		Pr	operty .	Address	: D1-02					
Address :										
1. Overall dwelling dimen	sions:									
			Area	a(m²)	Ī	Av. Hei	ight(m)	7	Volume(m ³	_
Ground floor			4	1.75	(1a) x	2.	.82	(2a) =	117.73	(3a)
First floor			4	1.34	(1b) x	3.	.15	(2b) =	130.22	(3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+	(1e)+(1n)	8	3.09	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)+	.(3n) =	247.96	(5)
2. Ventilation rate:										
	main	secondary	,	other		total			m³ per hou	r
Number of chimneys	heating +	heating 0] + [0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 +	0]] + [0	 	0	x	20 =	0	(6b)
Number of intermittent fan	s		J L			0	x ·	10 =	0	(7a)
Number of passive vents					L	0	x	10 =	0	` / (7b)
Number of flueless gas fire	2 S				<u> </u>	0	x	40 =	0	(7c)
rtarribor or nacioco gao int	30				L				U	(10)
								Air ch	anges per ho	ur
Infiltration due to chimneys	s, flues and fans =	: (6a)+(6b)+(7a	a)+(7b)+(7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has be					continue fr			. (=)		(=/
Number of storeys in the	e dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0.2					•	ruction			0	(11)
if both types of wall are pre deducting areas of opening		rresponding to	the great	er wall are	a (after					
If suspended wooden flo		ealed) or 0.1	l (seale	ed), else	enter 0				0	(12)
If no draught lobby, ente	,	•	`	,,					0	(13)
Percentage of windows	and doors draugh	t stripped							0	(14)
Window infiltration				0.25 - [0.2	! x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13) +	+ (15) =		0	(16)
Air permeability value, q	50, expressed in	cubic metres	per ho	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeabilit	y value, then (18) =	= [(17) ÷ 20]+(8)), otherwi	ise (18) = ((16)				0.15	(18)
Air permeability value applies		t has been done	or a deg	gree air pe	rmeability	is being us	sed			_
Number of sides sheltered				(20) = 1 -	[0 075 v (*	10)] _			2	(19)
Shelter factor					`	19)] =			0.85	(20)
Infiltration rate incorporation	-	!		(21) = (18)) x (20) =				0.13	(21)
Infiltration rate modified fo		1 1	, .	_			N 1		1	
		ay Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind spe	ed from Table 7			•		•			ı	

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

vviila i actor (2	22a)m =	(22)m ÷	4								_	-	
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltr	ation rat	e (allowi	ng for sh	nelter an	d wind s	peed) =	(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 effective of the control o		•	rate for t	ne appli	cable ca	se						0.5	(23a
If exhaust air h			endix N, (2	3b) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0.5	(23b
If balanced with	h heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (fron	n Table 4h	ı) =				74.8	
a) If balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (2	2b)m + (23b) × [1 – (23c)) ÷ 100]	
(24a)m= 0.29	0.29	0.28	0.27	0.26	0.25	0.25	0.24	0.25	0.26	0.27	0.28]	(24a
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)		-	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b
c) If whole h		tract ven (23b), t		•	•				.5 × (23h	o)			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0	1	(24c)
d) If natural	ventilatio	on or wh	ole hous	e positiv	re input	ventilatio	on from	loft	!	!		1	
,		en (24d)		•					0.5]			-	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24d
Effective air			<u> </u>	<u> </u>	_	_		``			1	7	
(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)
							I.	·	•	·	•	_	
3. Heat losse	s and he	eat loss p	paramete	er:					•			4	
3. Heat losse ELEMENT	s and he Gros area	SS	oaramete Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value		A X k kJ/K
	Gros	SS	Openin	gs		n²				K)			
ELEMENT Doors	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K =	(W/	K)			kJ/K
ELEMENT Doors	Gros area	SS	Openin	gs	A ,r	m² x x1	W/m2	2K = - 0.04] =	(W/ 3.7296	K)			kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	gs	A ,r 2.52 0.72	m² x x1 x1	W/m2 1.48 /[1/(1.4)+	2K = - 0.04] = - 0.04] =	(W/ 3.7296 0.95	K)			kJ/K (26) (27)
ELEMENT Doors Windows Type Windows Type	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 2.52 0.72	x x1 x1 x1	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = \\ & 0.04 \\ & 0.04 \\ & = \\ & 0.04 \\ & = \\ \end{array} $	(W/ 3.7296 0.95 2.13	K)			(26) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4	SS	Openin	gs	A ,r 2.52 0.72 1.61 2.01	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{ccc} 2K & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$	(W/ 3.7296 0.95 2.13 2.66	K)			kJ/K (26) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4	SS	Openin	gs	A ,r 2.52 0.72 1.61 2.01 0.91	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = - 0.04] =	(W/ 3.7296 0.95 2.13 2.66 1.21	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4 e 5 e 6	SS	Openin	gs	A ,r 2.52 0.72 1.61 2.01 0.91 5.95	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04 =	(W/ 3.7296 0.95 2.13 2.66 1.21 7.89	K)			kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type	Gros area e 1 e 2 e 3 e 4 e 5 e 6	SS	Openin	gs	A ,r 2.52 0.72 1.61 2.01 0.91 5.95	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04 =	(W/ 3.7296 0.95 2.13 2.66 1.21 7.89 2.64	K)			kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type	Gros area e 1 e 2 e 3 e 4 e 5 e 6	ss (m²)	Openin	gs ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04] = 0	(W/ 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type Floor	Gros area e 1 e 2 e 3 e 4 e 5 e 6 e 7	ss (m²)	Openin m	gs ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 0.9 41.75	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04 =	(W/ 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (27
ELEMENT Doors Windows Type Floor Walls Type1	Gros area 1 2 2 3 4 4 5 5 6 6 7 49.3	SS (m²)	Openin m	gs ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1	EK = 0.04 =	(W/ 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28)
ELEMENT Doors Windows Type	Gros area 1 2 2 3 4 4 5 5 6 6 7 49.3	37 56 8	16.6°	gs ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 32.76	x1 x2 x3 x4 x5 x <td>W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1 0.14</td> <td>2K = 0.04] = 0</td> <td>(W/ 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59 9.59</td> <td>K)</td> <td></td> <td></td> <td>kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29)</td>	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1 0.14	2K = 0.04] = 0	(W/ 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59 9.59	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29)
ELEMENT Doors Windows Type Wi	Gros area 1 1 2 2 3 3 4 4 5 5 6 6 7 49.3 56.5 2.9 8.0	37 56 8 3	16.6· 0 0	gs ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 32.76 56.56 2.98	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2	EK = 0.04 =	(W/ 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59 9.59 0.6	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (29)
ELEMENT Doors Windows Type Floor Walls Type1 Walls Type2 Walls Type3 Roof	Gros area 1 1 2 2 3 3 4 4 5 5 6 6 7 49.3 56.5 2.9 8.0	37 56 8 3	16.6· 0 0	gs ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 56.56 2.98 8.03	m ²	W/m2 1.48 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.1 0.14 0.2	EK = 0.04 =	(W/ 3.7296 0.95 2.13 2.66 1.21 7.89 2.64 1.19 4.175 4.59 9.59 0.6	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29) (29) (30)

(26)...(30) + (32) =

Fabric heat loss, $W/K = S (A \times U)$

42.96

(33)

Heat capacity $Cm = S(A \times k)$ ((28)((30) + (32) + (32a)(32	2e) = 0	(34)
	ve Value: Medium	250	(35)
For design assessments where the details of the construction are not known precisely the indicative v can be used instead of a detailed calculation.	values of TMP in Table		(0.07)
Thermal bridges: S (L x Y) calculated using Appendix K		12.4	(36)
if details of thermal bridging are not known (36) = $0.05 \times (31)$			`` ′
Total fabric heat loss (33) + (3	36) =	55.36	(37)
Ventilation heat loss calculated monthly (38)m =	= 0.33 × (25)m × (5)		
Jan Feb Mar Apr May Jun Jul Aug Sep	Oct Nov [Dec	
(38)m= 23.61 23.35 23.09 21.79 21.53 20.22 20.22 19.96 20.74	21.53 22.05 22	2.57	(38)
Heat transfer coefficient, W/K (39)m =	= (37) + (38)m		
(39)m= 78.98 78.71 78.45 77.15 76.89 75.59 75.59 75.32 76.11	76.89 77.41 77	7.93	
	verage = Sum(39) ₁₁₂ /1 = (39)m ÷ (4)	2= 77.08	(39)
(40)m= 0.95 0.95 0.94 0.93 0.93 0.91 0.91 0.91 0.92	0.93 0.93 0	.94	
Number of days in month (Table 1a)	verage = Sum(40) ₁₁₂ /1	2= 0.93	(40)
Jan Feb Mar Apr May Jun Jul Aug Sep	Oct Nov [Dec	
(41)m= 31 28 31 30 31 30 31 30		31	(41)
	I		
4. Water heating energy requirement:	k۷	Vh/year:	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - $exp(-0.000349 \text{ x (TFA } -13.9)2)] + 0.0013 \text{ x (TFA } f TFA £ 13.9, N = 1$	2.52 FA -13.9)		(42)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36	94.02		(43)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use not more that 125 litres per person per day (all water use, hot and cold)			(10)
Jan Feb Mar Apr May Jun Jul Aug Sep	Oct Nov [Dec	
Hot water usage in litres per day for each month $Vd,m = factor from Table 1c x (43)$			
(44)m= 103.43 99.66 95.9 92.14 88.38 84.62 84.62 88.38 92.14	95.9 99.66 10	3.43	
To	otal = Sum(44) ₁₁₂ =	1128.28	(44)
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month	h (see Tables 1b, 1c, 1d	d)	
(45)m= 153.38 134.14 138.43 120.68 115.8 99.92 92.6 106.25 107.52	125.31 136.78 14	8.54	
To If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)	otal = Sum(45) ₁₁₂ =	1479.35	(45)
	40.0 0.50 0.50	200	(46)
(46)m= 23.01 20.12 20.76 18.1 17.37 14.99 13.89 15.94 16.13 Water storage loss:	18.8 20.52 22	2.28	(46)
Storage volume (litres) including any solar or WWHRS storage within same vesse	el 0		(47)
If community heating and no tank in dwelling, enter 110 litres in (47)			` '
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter Water storage loss:	r '0' in (47)		
a) If manufacturer's declared loss factor is known (kWh/day):	0		(48)
Temperature factor from Table 2b	0		(49)
Energy lost from water storage, kWh/year (48) x (49) =	110		(50)
b) If manufacturer's declared cylinder loss factor is not known:			V = 7

Hot water storage loss factor fr	`	h/litre/da	ıy)				0.	.02		(51)
If community heating see section	on 4.3								Ī	(==)
Volume factor from Table 2a Temperature factor from Table	2h							.03		(52) (53)
•				(47) (54)	··· (50) ··· (E0)		0.6]	` '
Energy lost from water storage Enter (50) or (54) in (55)	, kvvn/year			(47) X (51)	x (52) x (53) =	-	.03		(54) (55)
, , , , , ,	for each month			((EG)m - (EE) (41)	~	1.	.03		(55)
Water storage loss calculated f	 	ı	·	,, ,	55) × (41)ı	1		1	1	(==)
(56)m= 32.01 28.92 32.01 If cylinder contains dedicated solar sto	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01	 	(56)
	· · · · ·	-	,- ,	,	, , ,	· · · · ·]	(57)
(57)m= 32.01 28.92 32.01	30.98 32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		. ,
Primary circuit loss (annual) fro		E0\m /	(EQ) . 26	·E (44)	m			0		(58)
Primary circuit loss calculated to (modified by factor from Tab	,	•	` '	, ,		r thermo	etat)			
(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	1	(59)
. ,	l l							1 =0:=0	l	()
Combi loss calculated for each	- i 	ì	<u> </u>					1	1	(04)
(61)m= 0 0 0	0 0	0	0	0	0	0	0	0		(61)
Total heat required for water he	eating calculated	for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 208.65 184.07 193.7	174.18 171.07	153.42	147.87	161.53	161.02	180.58	190.28	203.81		(62)
Solar DHW input calculated using App						r contribut	ion to wate	er heating)		
(add additional lines if FGHRS	and/or WWHRS	applies	, see Ap	pendix (3)				•	
(63)m= 0 0	0 0	0	0	0	0	0	0	0		(63)
Output from water heater										
									_	
(64)m= 208.65 184.07 193.7	174.18 171.07	153.42	147.87	161.53	161.02	180.58	190.28	203.81		_
(64)m= 208.65 184.07 193.7	174.18 171.07	153.42	147.87				190.28 r (annual) ₁		2130.19	(64)
(64)m= 208.65 184.07 193.7 Heat gains from water heating,				Outp	out from wa	ater heate	I r (annual)₁	12		(64)
				Outp	out from wa	ater heate	I r (annual)₁	12		(64) (65)
Heat gains from water heating,	kWh/month 0.25	5 ´ [0.85	× (45)m	Outp + (61)m 79.55	out from wa n] + 0.8 x 78.55	ater heate ([(46)m 85.89	r (annual) ₁ + (57)m 88.28	+ (59)m]], ,
Heat gains from water heating, (65)m= 95.22 84.55 90.25	kWh/month 0.25 82.92 82.72 of (65)m only if c	5 ´ [0.85	× (45)m	Outp + (61)m 79.55	out from wa n] + 0.8 x 78.55	ater heate ([(46)m 85.89	r (annual) ₁ + (57)m 88.28	+ (59)m]], ,
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of 5. Internal gains (see Table 5	kWh/month 0.25 82.92 82.72 of (65)m only if c	5 ´ [0.85	× (45)m	Outp + (61)m 79.55	out from wa n] + 0.8 x 78.55	ater heate ([(46)m 85.89	r (annual) ₁ + (57)m 88.28	+ (59)m]], ,
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of	kWh/month 0.25 82.92 82.72 of (65)m only if c	5 ´ [0.85	× (45)m	Outp + (61)m 79.55	out from wa n] + 0.8 x 78.55	ater heate ([(46)m 85.89	r (annual) ₁ + (57)m 88.28	+ (59)m]], ,
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second s	kWh/month 0.29 82.92 82.72 of (65)m only if c and 5a):	5 ´ [0.85 76.02 ylinder is	× (45)m 75.01 s in the c	Outp + (61)m 79.55 dwelling	78.55 or hot w	ater heate ([(46)m 85.89 ater is fr	+ (57)m 88.28 rom com	+ (59)m 93.61 munity h]], ,
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.25 82.92 82.72 of (65)m only if c and 5a): ts Apr May 125.94 125.94	5 ´ [0.85 76.02 ylinder is Jun 125.94	× (45)m 75.01 s in the c	Outp + (61)m 79.55 dwelling Aug 125.94	out from wa n] + 0.8 x 78.55 or hot w Sep 125.94	ater heate ([(46)m 85.89 ater is fr	+ (57)m 88.28 com com	+ (59)m 93.61 munity h]	(65)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second s	kWh/month 0.25 82.92 82.72 of (65)m only if c and 5a): ts Apr May 125.94 125.94	5 ´ [0.85 76.02 ylinder is Jun 125.94	× (45)m 75.01 s in the c	Outp + (61)m 79.55 dwelling Aug 125.94	out from wa n] + 0.8 x 78.55 or hot w Sep 125.94	ater heate ([(46)m 85.89 ater is fr	+ (57)m 88.28 com com	+ (59)m 93.61 munity h]	(65)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.25 82.92 82.72 of (65)m only if compositions and 5a): ts Apr May 125.94 125.94 opendix L, equations 11.12 8.32	Jun 125.94 17.02	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59	Outp + (61)m 79.55 dwelling Aug 125.94 lso see	Sep 125.94 Table 5	ater heate ([(46)m 85.89 ater is fr Oct 125.94	(annual), + (57)m 88.28 rom com Nov 125.94	+ (59)m 93.61 munity h Dec 125.94]	(65)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.25 82.92 82.72 of (65)m only if compositions and 5a): ts Apr May 125.94 125.94 opendix L, equations 11.12 8.32	Jun 125.94 17.02	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59	Outp + (61)m 79.55 dwelling Aug 125.94 lso see	Sep 125.94 Table 5	ater heate ([(46)m 85.89 ater is fr Oct 125.94	(annual), + (57)m 88.28 rom com Nov 125.94	+ (59)m 93.61 munity h Dec 125.94]	(65)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.28 82.92 82.72 of (65)m only if c and 5a): ts Apr May 125.94 125.94 opendix L, equati 11.12 8.32 Appendix L, eq 209.65 193.78	Jun 125.94 ion L9 of 7.02 uation L	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59 13 or L1: 168.91	Outp + (61)m 79.55 dwelling Aug 125.94 lso see 9.86 3a), also	Sep 125.94 Table 5 13.23 See Tal	oter heate ([(46)m 85.89 ater is fr Oct 125.94 16.8 ble 5	(annual), + (57)m 88.28 rom com Nov 125.94	+ (59)m 93.61 munity h Dec 125.94]	(65) (66) (67)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.28 82.92 82.72 of (65)m only if c and 5a): ts Apr May 125.94 125.94 opendix L, equati 11.12 8.32 Appendix L, eq 209.65 193.78	Jun 125.94 ion L9 of 7.02 uation L	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59 13 or L1: 168.91	Outp + (61)m 79.55 dwelling Aug 125.94 lso see 9.86 3a), also	Sep 125.94 Table 5 13.23 See Tal	oter heate ([(46)m 85.89 ater is fr Oct 125.94 16.8 ble 5	(annual), + (57)m 88.28 rom com Nov 125.94	+ (59)m 93.61 munity h Dec 125.94]	(65) (66) (67)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.25 82.92 82.72 of (65)m only if control is and 5a): ts Apr May 125.94 125.94 opendix L, equation 11.12 8.32 Appendix L, equation 209.65 193.78 opendix L, equation 209.65 193.78	Jun 125.94 ion L9 or 178.87 ion L15	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59 13 or L1: 168.91 or L15a)	Outp + (61)m 79.55 dwelling Aug 125.94 lso see 9.86 3a), also 166.57	Sep 125.94 Table 5 13.23 See Table Table 5	oter heate ([(46)m 85.89 ater is fr Oct 125.94 16.8 ble 5 185.04	(annual), + (57)m 88.28 com com Nov 125.94 19.61	+ (59)m 93.61 munity h Dec 125.94 20.91]	(65) (66) (67) (68)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second	kWh/month 0.25 82.92 82.72 of (65)m only if control is and 5a): ts Apr May 125.94 125.94 opendix L, equation 11.12 8.32 Appendix L, equation 209.65 193.78 opendix L, equation 209.65 193.78	Jun 125.94 ion L9 or 178.87 ion L15	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59 13 or L1: 168.91 or L15a)	Outp + (61)m 79.55 dwelling Aug 125.94 lso see 9.86 3a), also 166.57	Sep 125.94 Table 5 13.23 See Table Table 5	oter heate ([(46)m 85.89 ater is fr Oct 125.94 16.8 ble 5 185.04	(annual), + (57)m 88.28 com com Nov 125.94 19.61	+ (59)m 93.61 munity h Dec 125.94 20.91]	(65) (66) (67) (68)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.25 82.92 82.72 of (65)m only if c and 5a): ts Apr May 125.94 125.94 opendix L, equati 11.12 8.32 o Appendix L, equati 209.65 193.78 opendix L, equati 35.59 35.59 oa) 0 0	Jun 125.94 ion L9 or 178.87 ion L15 35.59	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59 13 or L1: 168.91 or L15a) 35.59	Outp + (61)m 79.55 dwelling Aug 125.94 lso see 9.86 3a), also 166.57 a, also se 35.59	Sep 125.94 Table 5 13.23 See Tal 172.47 ee Table 35.59	oter heate ([(46)m 85.89 ater is fr Oct 125.94 16.8 ble 5 185.04 5 35.59	(annual), + (57)m 88.28 rom com Nov 125.94 19.61 200.9	+ (59)m 93.61 munity h Dec 125.94 20.91 215.82]	(65) (66) (67) (68) (69)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.29 82.92	Jun 125.94 ion L9 or 7.02 uation L 178.87 ion L15 35.59	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59 13 or L1 168.91 or L15a) 35.59	Outp + (61)m 79.55 dwelling Aug 125.94 lso see 9.86 3a), also 166.57 a, also se 35.59	Sep 125.94 Table 5 13.23 o see Tal 172.47 ee Table 35.59	oter heate ([(46)m 85.89 ater is fr Oct 125.94 16.8 ble 5 185.04 5 35.59	(annual), + (57)m 88.28 rom com Nov 125.94 19.61 200.9	+ (59)m 93.61 munity h Dec 125.94 20.91 215.82]	(65) (66) (67) (68) (69) (70)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.25 82.92 82.72 of (65)m only if c and 5a): ts Apr May 125.94 125.94 opendix L, equati 11.12 8.32 o Appendix L, equati 209.65 193.78 opendix L, equati 35.59 35.59 oa) 0 0	Jun 125.94 ion L9 or 178.87 ion L15 35.59	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59 13 or L1: 168.91 or L15a) 35.59	Outp + (61)m 79.55 dwelling Aug 125.94 lso see 9.86 3a), also 166.57 a, also se 35.59	Sep 125.94 Table 5 13.23 See Tal 172.47 ee Table 35.59	oter heate ([(46)m 85.89 ater is fr Oct 125.94 16.8 ble 5 185.04 5 35.59	(annual), + (57)m 88.28 rom com Nov 125.94 19.61 200.9	+ (59)m 93.61 munity h Dec 125.94 20.91 215.82]	(65) (66) (67) (68) (69)
Heat gains from water heating, (65)m= 95.22 84.55 90.25 include (57)m in calculation of the second o	kWh/month 0.29 82.92	Jun 125.94 ion L9 or 7.02 uation L 178.87 ion L15 35.59	x (45)m 75.01 s in the c Jul 125.94 r L9a), a 7.59 13 or L1 168.91 or L15a) 35.59	Outp + (61)m 79.55 dwelling Aug 125.94 lso see 9.86 3a), also 166.57 a, also se 35.59	Sep 125.94 Table 5 13.23 o see Tal 172.47 ee Table 35.59	oter heate ([(46)m 85.89 ater is fr Oct 125.94 16.8 ble 5 185.04 5 35.59	(annual), + (57)m 88.28 rom com Nov 125.94 19.61 200.9	+ (59)m 93.61 munity h Dec 125.94 20.91 215.82]	(65) (66) (67) (68) (69) (70)

Total internal gains =	=			(66)m + (67)n	า + (68	s)m + (69)m +	· (70)m +	(71)m + (72))m		
(73)m= 434.89 432.78	418.99	396.72	374.07	352.26	338.1	344.	13 355.58	378.0	6 403.9	423.33		(73)
6. Solar gains:												
Solar gains are calculated	using sola	r flux from	Table 6a	and assoc	iated equa	ations t	convert to t	he applic	able orienta	tion.		
Orientation: Access F		Area		Flu			g_ 		FF		Gains	
Table 6d		m²		Ta	ble 6a		Table 6b)	Table 6c		(W)	
Southeast 0.9x 0.77	Х	0.7	' 2	x;	36.79	X	0.4	X	0.8	=	5.87	(77)
Southeast 0.9x 0.77	X	1.6	51	x	36.79	X	0.4	X	0.8	=	13.14	(77)
Southeast 0.9x 0.77	X	2.0)1	x	36.79	X	0.4	X	0.8	=	16.4	(77)
Southeast 0.9x 0.77	×	0.9	91	x;	36.79	X	0.4	X	0.8	=	7.43	(77)
Southeast 0.9x 0.77	x	0.7	' 2	x	62.67	X	0.4	X	0.8	=	10.01	(77)
Southeast 0.9x 0.77	x	1.6	51	x	62.67	X	0.4	X	0.8	=	22.38	(77)
Southeast 0.9x 0.77	X	2.0)1	x (62.67	X	0.4	X	0.8	=	27.94	(77)
Southeast 0.9x 0.77	x	0.9	91	x	62.67	X	0.4	X	0.8	=	12.65	(77)
Southeast 0.9x 0.77	x	0.7	' 2	x {	35.75	X	0.4	X	0.8	=	13.69	(77)
Southeast 0.9x 0.77	X	1.6	51	x {	35.75	X	0.4	X	0.8	=	30.62	(77)
Southeast 0.9x 0.77	x	2.0)1	x {	35.75	X	0.4	X	0.8	=	38.22	(77)
Southeast 0.9x 0.77	X	0.9	91	x {	35.75	X	0.4	X	0.8	=	17.31	(77)
Southeast 0.9x 0.77	X	0.7	'2	x 1	06.25	X	0.4	X	0.8	=	16.96	(77)
Southeast 0.9x 0.77	X	1.6	51	x 1	06.25	X	0.4	X	0.8	=	37.94	(77)
Southeast 0.9x 0.77	×	2.0)1	x 1	06.25	X	0.4	X	0.8	=	47.36	(77)
Southeast 0.9x 0.77	X	0.9	91	x 1	06.25	X	0.4	X	0.8	=	21.44	(77)
Southeast 0.9x 0.77	x	0.7	′2	x 1	19.01	X	0.4	X	0.8	=	19	(77)
Southeast 0.9x 0.77	Х	1.6	51	x 1	19.01	X	0.4	X	0.8	=	42.49	(77)
Southeast 0.9x 0.77	x	2.0)1	x 1	19.01	X	0.4	X	0.8	=	53.05	(77)
Southeast 0.9x 0.77	Х	0.9	91	x 1	19.01	X	0.4	X	0.8	=	24.02	(77)
Southeast 0.9x 0.77	Х	0.7	' 2	x 1	18.15	X	0.4	X	0.8	=	18.86	(77)
Southeast 0.9x 0.77	x	1.6	51	x 1	18.15	X	0.4	X	0.8	=	42.18	(77)
Southeast 0.9x 0.77	Х	2.0)1	x 1	18.15	X	0.4	X	0.8	=	52.66	(77)
Southeast 0.9x 0.77	x	0.9	91	x 1	18.15	X	0.4	X	0.8	=	23.84	(77)
Southeast 0.9x 0.77	X	0.7	7 2	x 1	13.91	X	0.4	X	0.8	=	18.19	(77)
Southeast 0.9x 0.77	x	1.6	61	x 1	13.91	X	0.4	X	0.8	=	40.67	(77)
Southeast 0.9x 0.77	X	2.0)1	x 1	13.91	X	0.4	X	0.8	=	50.77	(77)
Southeast 0.9x 0.77	x	0.9)1	x 1	13.91	X	0.4	X	0.8	=	22.99	(77)
Southeast 0.9x 0.77	x	0.7	' 2	x 1	04.39	X	0.4	X	0.8	=	16.67	(77)
Southeast 0.9x 0.77	X	1.6	51	x 1	04.39	X	0.4	X	0.8	=	37.27	(77)
Southeast 0.9x 0.77	X	2.0)1	x 1	04.39	x	0.4	X	0.8	=	46.53	(77)
Southeast 0.9x 0.77	X	0.9	91	x 1	04.39	X	0.4	X	0.8	=	21.07	(77)
Southeast 0.9x 0.77	х	0.7	<u></u>	x (92.85	X	0.4	х	0.8	=	14.83	(77)
Southeast _{0.9x} 0.77	X	1.6	51	x 9	92.85	X	0.4	X	0.8	=	33.15	(77)

Southeast 0.9x	0.77	٦ ,	2.04	1 .	00.05	1 .	0.4	l	0.0	1 _	44.00	(77)
Southeast 0.9x	0.77] X]	2.01	X 	92.85] X]	0.4	X	0.8] =]	41.39	= '
Southeast 0.9x	0.77	X	0.91	X	92.85	X	0.4	X	0.8] = 1	18.74	(77)
Southeast 0.9x	0.77] X]	0.72	X 	69.27] X]	0.4	X I	0.8] =]	11.06	(77)
Southeast 0.9x	0.77	X	1.61	X	69.27] X]	0.4	X	0.8] = 1	24.73	(77)
<u> </u>	0.77	X	2.01	X	69.27	X	0.4	Х	0.8] = 1	30.88	(77)
Southeast 0.9x	0.77	X	0.91	X	69.27	X	0.4	X	0.8] = 1	13.98	(77)
Southeast 0.9x	0.77	X	0.72	X	44.07	X	0.4	Х	0.8] = 1	7.04	(77)
Southeast 0.9x	0.77	X	1.61	X	44.07	X	0.4	Х	0.8] = 1	15.73	(77)
Southeast 0.9x	0.77	X	2.01	X	44.07	X	0.4	X	0.8] =	19.64	(77)
Southeast 0.9x	0.77	X	0.91	X	44.07	X	0.4	Х	0.8	=	8.89	(77)
Southeast 0.9x	0.77	X	0.72	X	31.49	X	0.4	Х	0.8	=	5.03	(77)
Southeast 0.9x	0.77	X	1.61	X	31.49	X	0.4	X	0.8	=	11.24	(77)
Southeast _{0.9x}	0.77	X	2.01	X	31.49	X	0.4	Х	0.8	=	14.04	(77)
Southeast _{0.9x}	0.77	X	0.91	X	31.49	X	0.4	Х	0.8	=	6.35	(77)
Northwest _{0.9x}	0.77	X	5.95	X	11.28	X	0.4	X	0.8	=	14.89	(81)
Northwest _{0.9x}	0.77	X	1.99	X	11.28	X	0.4	X	0.8	=	4.98	(81)
Northwest _{0.9x}	0.77	X	0.9	X	11.28	X	0.4	X	0.8	=	2.25	(81)
Northwest _{0.9x}	0.77	X	5.95	X	22.97	X	0.4	X	0.8	=	30.3	(81)
Northwest _{0.9x}	0.77	X	1.99	x	22.97	x	0.4	x	0.8	=	10.14	(81)
Northwest 0.9x	0.77	X	0.9	X	22.97	X	0.4	X	0.8	=	4.58	(81)
Northwest 0.9x	0.77	X	5.95	x	41.38	X	0.4	X	0.8	=	54.6	(81)
Northwest _{0.9x}	0.77	X	1.99	x	41.38	x	0.4	x	0.8	=	18.26	(81)
Northwest _{0.9x}	0.77	X	0.9	x	41.38	x	0.4	x	0.8	=	8.26	(81)
Northwest _{0.9x}	0.77	X	5.95	x	67.96	x	0.4	x	0.8	=	89.67	(81)
Northwest _{0.9x}	0.77	X	1.99	x	67.96	х	0.4	х	0.8	=	29.99	(81)
Northwest _{0.9x}	0.77	X	0.9	x	67.96	x	0.4	x	0.8	=	13.56	(81)
Northwest _{0.9x}	0.77	X	5.95	x	91.35	x	0.4	x	0.8	=	120.53	(81)
Northwest _{0.9x}	0.77	X	1.99	x	91.35	x	0.4	x	0.8	=	40.31	(81)
Northwest _{0.9x}	0.77	X	0.9	x	91.35	x	0.4	x	0.8	=	18.23	(81)
Northwest 0.9x	0.77	x	5.95	x	97.38	х	0.4	х	0.8] =	128.5	(81)
Northwest _{0.9x}	0.77	x	1.99	x	97.38	х	0.4	х	0.8	=	42.98	(81)
Northwest _{0.9x}	0.77	x	0.9	x	97.38	x	0.4	х	0.8	=	19.44	(81)
Northwest 0.9x	0.77	X	5.95	x	91.1	x	0.4	х	0.8] =	120.21	(81)
Northwest _{0.9x}	0.77	x	1.99	x	91.1	x	0.4	х	0.8	=	40.2	(81)
Northwest _{0.9x}	0.77	×	0.9	x	91.1	x	0.4	x	0.8] =	18.18	(81)
Northwest 0.9x	0.77	X	5.95	x	72.63	x	0.4	х	0.8	j =	95.83	(81)
Northwest _{0.9x}	0.77	x	1.99	x	72.63	x	0.4	x	0.8] =	32.05	(81)
Northwest _{0.9x}	0.77	x	0.9	x	72.63	x	0.4	x	0.8] =	14.5	(81)
Northwest _{0.9x}	0.77	x	5.95	x	50.42	x	0.4	x	0.8	=	66.53	(81)
Northwest _{0.9x}	0.77	x	1.99	x	50.42	x	0.4	x	0.8	=	22.25	(81)
Northwest _{0.9x}	0.77	×	0.9	x	50.42	x	0.4	x	0.8	=	10.06	(81)

_					_										
Northwest 0.9x	0.77	×	5.9	95	x	2	8.07	X		0.4	X	0.8	=	37.03	(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	0.9	9	x [2	8.07	x		0.4	x	0.8	=	5.6	(81)
Northwest 0.9x	0.77	X	5.9	95	x	1	4.2	X		0.4	x [0.8	=	18.73	(81)
Northwest 0.9x	0.77	X	1.9	9	x [1	4.2	X		0.4	x [0.8	=	6.27	(81)
Northwest 0.9x	0.77	X	0.9	9	x	1	4.2	X		0.4	x	0.8	=	2.83	(81)
Northwest 0.9x	0.77	X	5.9	95	x [9).21	x		0.4	x [0.8	=	12.16	(81)
Northwest 0.9x	0.77	X	1.9	9	x [9).21	X		0.4	x [0.8	=	4.07	(81)
Northwest _{0.9x}	0.77	Х	0.9	9	x	9).21	X		0.4	x	0.8	=	1.84	(81)
Solar gains in	watts, ca	alculated	for eac	h month				(83)m	ı = Su	ım(74)m .	(82)m	_		_	
(83)m= 64.96	117.99	180.95	256.92	317.63	32	28.46	311.21	263	.91	206.94	135.67	79.14	54.72		(83)
Total gains – ii	nternal a	ınd solar	(84)m =	= (73)m ·	+ (8	33)m ,	watts					_		-	
(84)m= 499.84	550.77	599.95	653.64	691.7	68	30.72	649.3	608	.04	562.52	513.73	483.04	478.05		(84)
7. Mean inter	nal temp	erature	(heating	season)										
Temperature	during h	eating p	eriods ir	the livi	ng a	area f	rom Tal	ole 9,	Th1	I (°C)				21	(85)
Utilisation fac	tor for g	ains for I	living are	ea, h1,m	ı (se	ee Tal	ble 9a)			` '					
Jan	Feb	Mar	Apr	May	Ė	Jun	Jul	Aı	ug	Sep	Oct	Nov	Dec		
(86)m= 1	1	0.99	0.96	0.87	0).68	0.51	0.5	- 	0.83	0.97	1	1		(86)
Mean interna	l temner	ature in	living ar	22 T1 (fo	الد	w ster	ns 3 to 7	7 in T	ahle	, Qc)				_	
(87)m= 20.04	20.16	20.36	20.64	20.87		0.98	21	20.9	$\overline{}$	20.93	20.65	20.3	20.02	1	(87)
` '								<u> </u>				1			()
Temperature					_	 				<u> </u>	00.45	1 00 44	00.44	1	(00)
(88)m= 20.12	20.13	20.13	20.14	20.15		0.16	20.16	20.	16	20.15	20.15	20.14	20.14		(88)
Utilisation fac	tor for g	ains for I	rest of d	welling,	h2,	m (se	e Table	9a)						7	
(89)m= 1	0.99	0.99	0.95	0.83	(0.6	0.41	0.4	16	0.76	0.96	0.99	1		(89)
Mean interna	l temper	ature in	the rest	of dwelli	ing	T2 (fc	ollow ste	ps 3	to 7	in Tabl	e 9c)				
(90)m= 18.83	19.01	19.31	19.72	20.01	20	0.14	20.16	20.	16	20.1	19.73	19.23	18.82		(90)
						_				f	LA = Livi	ng area ÷ (4) =	0.4	(91)
Mean interna	l temper	ature (fo	r the wh	ole dwe	llind	ו) = fl	A x T1	+ (1	_ fl .	A) x T2					
(92)m= 19.31	19.47	19.73	20.08	20.35	_	0.48	20.49	20.4		20.43	20.1	19.65	19.3		(92)
Apply adjustn	nent to t	he mean	ı ı internal		ı atu	re fro	m Table	4e.	whe	re appro	boriate		<u> </u>		
(93)m= 19.31	19.47	19.73	20.08	20.35	_	0.48	20.49	20.4	$\overline{}$	20.43	20.1	19.65	19.3		(93)
8. Space hea	ting requ	uirement						<u> </u>							
Set Ti to the r	mean int	ernal ter	mperatui	e obtair	ned	at ste	p 11 of	Tabl	e 9b	, so tha	t Ti,m=	(76)m an	d re-cal	culate	
the utilisation							·							-	
Jan	Feb	Mar	Apr	May	L.	Jun	Jul	Αι	ug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm): •										1	7	
(94)m= 1	0.99	0.98	0.95	0.84	0).63	0.45	0.5	5	0.78	0.96	0.99	1		(94)
Useful gains,		<u> </u>	<u> </u>		_	-						1		٦	
(95)m= 498.02	546.93	589.75	618.53	581.08	<u> </u>	32.09	292.88	305	.81	440.99	493.56	479.27	476.69		(95)
Monthly avera			i e		_				,	-		1	ı	7	(a.c.)
(96)m= 4.3	4.9	6.5	8.9	11.7	<u> </u>	4.6	16.6	16.		14.1	10.6	7.1	4.2		(96)
Heat loss rate					_		-, ,	- `	́ т	<u> </u>		T 0=1 ==		7	(07)
(97)m= 1185.72	1146.54	1037.73	862.84	665.42	L 44	14.14	294.19	308	.23	481.64	730.17	971.86	1176.6	_	(97)

(98)m= 511.65 402.94 333.29 175.9 62.75 0 0	0	0	176.04	354.66 520.73]	
	Tota	l per year	(kWh/year	r) = Sum(98) _{15,912} =	2537.97	(98)
Space heating requirement in kWh/m²/year					30.54	(99)
b. Energy requirements – Community heating scheme						
This part is used for space heating, space cooling or water heati Fraction of space heat from secondary/supplementary heating (7				unity scheme.	0	(301
Fraction of space heat from community system 1 – (301) =	1 4510 1	., •	0110		1	(302
The community scheme may obtain heat from several sources. The procedure a	llows for	CHP and	up to four (other heat sources; t		`
ncludes boilers, heat pumps, geothermal and waste heat from power stations. S			•	,		
Fraction of heat from Community heat pump					1	(303
Fraction of total space heat from Community heat pump				02) x (303a) =	1	(304
Factor for control and charging method (Table 4c(3)) for commu	•	iting sys	tem		1	(305
Distribution loss factor (Table 12c) for community heating systen	n				1.05	(306
Space heating Annual space heating requirement					kWh/yea 2537.97	ar
Space heat from Community heat pump		(98) v (3	142) v (304	5) x (306) =	2664.87	(307
Efficiency of secondary/supplementary heating system in % (from	n Tahle				0	(30)
Space heating requirement from secondary/supplementary system			01) x 100 ÷	,	0	(30)
space heating requirement from secondary/supplementary system	5111	(30) X (3	51) X 100 -	- (500) =		(50.
Nater heating Annual water heating requirement					2130.19	
f DHW from community scheme: Vater heat from Community heat pump		(64) x (3	03a) x (305	5) x (306) =	2236.7	(310
Electricity used for heat distribution	0.01	× [(307a)	(307e) +	· (310a)(310e)] =	49.02	(313
Cooling System Energy Efficiency Ratio					0	(314
Space cooling (if there is a fixed cooling system, if not enter 0)		= (107) ÷	- (314) =		0	(31
Electricity for pumps and fans within dwelling (Table 4f): nechanical ventilation - balanced, extract or positive input from a	outside				230.66	(330
varm air heating system fans					0	(330
oump for solar water heating					0	(330
orotal electricity for the above, kWh/year		=(330a)	+ (330b) +	(330g) =	230.66	(33
Energy for lighting (calculated in Appendix L)					359.26	(33
otal delivered energy for all uses (307) + (309) + (310) + (312)	+ (315)	+ (331)	+ (332).	(237b) =	5491.5	(33
2b. CO2 Emissions – Community heating scheme						
		ergy h/year		mission factor g CO2/kWh	Emissions kg CO2/year	

If there is CHP using two fuels repeat (363) to (366) for the second fuel

Efficiency of heat source 1 (%)

383

(367a)

CO2 associated with heat source 1	[(307b	o)+(310b)] x 100 ÷ (367b) x	0.52	=	664.21	(367)
Electrical energy for heat distribution		[(313) x	0.52	=	25.44	(372)
Total CO2 associated with community s	ystems	(363)(366) + (368)(372)		=	689.65	(373)
CO2 associated with space heating (see	condary)	(309) x	0	=	0	(374)
CO2 associated with water from immers	sion heater or instanta	neous heater (312) x	0.52	=	0	(375)
Total CO2 associated with space and w	ater heating	(373) + (374) + (375) =			689.65	(376)
CO2 associated with electricity for pump	os and fans within dwe	elling (331)) x	0.52	=	119.71	(378)
CO2 associated with electricity for lighting	ng	(332))) x	0.52	=	186.46	(379)
Total CO2, kg/year	sum of (376)(382) =				995.82	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =				11.98	(384)
El rating (section 14)					89.58	(385)

		User D	etails:						
Assessor Name: Software Name:	Ben Talbutt Stroma FSAP 2012		Stroma Softwa	are Ve				036639 on: 1.0.5.17	
A 1.1	Р	roperty .	Address:	: D1-02					
Address: 1. Overall dwelling dimer	acione:								
1. Overall dwelling diffier	1510115.	۸ro	a(m²)		Av. Hei	aht(m)		Volume(m³	١
Ground floor			<u> </u>	(1a) x		9114(111) 82	(2a) =	117.73) (3a)
First floor				(1b) x	3.](2b) =	130.22	(3b)
	a)+(1b)+(1c)+(1d)+(1e)+(1r			(4)	<u> </u>]```'	100.22	
Dwelling volume	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	'/	55.09)+(3c)+(3d)	+(3e)+	.(3n) =	0.47.00	7(5)
				(00)1(00	,,,,(00),(00)	(00)	.(011) –	247.96	(5)
2. Ventilation rate:	main secondar	v	other		total			m³ per hou	r
Niverban of alchements	heating heating	· - –		- -			40 =		_
Number of chimneys]	0] = [0			0	(6a)
Number of open flues	0 + 0	+	0] = [0		20 =	0	(6b)
Number of intermittent far	ns				3	X	10 =	30	(7a)
Number of passive vents					0	X	10 =	0	(7b)
Number of flueless gas fir	es				0	X	40 =	0	(7c)
							Δir ch	nanges per ho	ur
Infiltration due to chimney	vs, flues and fans = (6a)+(6b)+(7	'a)+(7h)+(70) -	Г		_		r	_
•	een carried out or is intended, proceed			continue fi	30 rom (9) to (÷ (5) =	0.12	(8)
Number of storeys in th		(//			() (,		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	25 for steel or timber frame or			•	ruction			0	(11)
if both types of wall are pro deducting areas of opening	esent, use the value corresponding to gs): if equal user 0.35	the great	er wall are	a (after					
=	oor, enter 0.2 (unsealed) or 0.	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, ent	er 0.05, else enter 0							0	(13)
Percentage of windows	and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2		_			0	(15)
Infiltration rate			. , . ,		12) + (13) +	, ,		0	(16)
•	q50, expressed in cubic metre	•		•	etre of e	nvelope	area	5	(17)
·	ty value, then $(18) = [(17) \div 20] + (8)$. , .			0.37	(18)
Number of sides sheltered	s if a pressurisation test has been don	e or a deg	gree air pei	rmeability	is being us	ea			7(40)
Shelter factor	u		(20) = 1 -	[0.075 x (19)] =			0.85	(19) (20)
Infiltration rate incorporati	ng shelter factor		(21) = (18)					0.32	(21)
Infiltration rate modified for	•			-				U.02	」 ` ′
	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind spe					<u>. </u>		1	ı	

4.9

4.4

4.3

3.8

3.8

3.7

4.3

4.5

4.7

5

Wind Factor (2	22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infiltr	ation rat	e (allowi	na for st	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
0.4	0.39	0.39	0.35	0.34	0.3	0.3	0.29	0.32	0.34	0.35	0.37		
Calculate effective of the control o		•	rate for t	he appli	cable ca	se						,	(22-)
If exhaust air h			endix N. (2	23b) = (23a	a) × Fmv (e	eguation (I	N5)) . othe	rwise (23b) = (23a)			0	(23a) (23b)
If balanced with									, (===,			0	(23c)
a) If balance	ed mech	anical ve	entilation	with hea	at recove	ery (MVI	HR) (24a	a)m = (2:	2b)m + (23b) × [1 – (23c)		(===)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	ed mech	anical ve	entilation	without	heat red	covery (I	MV) (24b	o)m = (2	2b)m + (23b)			
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h if (22b)r		tract ven							.5 × (23t	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural	ventilatio	on or wh	ole hous	se positiv	e input	ventilatio	on from	loft	1	1	1	1	
<u> </u>		en (24d)	<u>`</u>				- `	- 	-			1	
(24d)m= 0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(24d)
Effective air	change _{0.58}	rate - er 0.57	nter (24a 0.56	or (24b) 0.56	o) or (24) 0.54	c) or (24 0.54	ld) in box	x (25) 0.55	0.56	0.56	0.57	1	(25)
	<u> </u>	l		l	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(23)
2 Hoot loose	مطالم مرم												
			paramet										
ELEMENT	Gros area	SS	oaramet Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-l		A X k kJ/K
	Gros	SS	Openin	ıgs		m²							
ELEMENT	Gros area	SS	Openin	ıgs	A ,r	m² x	W/m2	2K =	(W/				kJ/K
ELEMENT Doors	Gros area	SS	Openin	ıgs	A ,r	m² x x1	W/m2	2K = = 0.04] =	(W/ 2.52				kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	ıgs	A ,r 2.52 0.72	m² x x1 x1	W/m2 1 /[1/(1.4)+	2K = - 0.04] = - 0.04] =	2.52 0.95				kJ/K (26) (27)
ELEMENT Doors Windows Type Windows Type	Gros area e 1 e 2 e 3	SS	Openin	ıgs	A ,r 2.52 0.72	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	2K = 0.04] = 0.04] = 0.04] =	2.52 0.95 2.13				kJ/K (26) (27) (27)
Doors Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4	SS	Openin	ıgs	A ,r 2.52 0.72 1.61 2.01	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	eK = 0.04] =	(W// 2.52 0.95 2.13 2.66				kJ/K (26) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4	SS	Openin	ıgs	A ,r 2.52 0.72 1.61 2.01 0.91	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04] =	(W// 2.52 0.95 2.13 2.66 1.21				kJ/K (26) (27) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4 e 5 e 6	SS	Openin	ıgs	A ,r 2.52 0.72 1.61 2.01 0.91 5.95	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04] = 0	(W// 2.52 0.95 2.13 2.66 1.21 7.89				kJ/K (26) (27) (27) (27) (27) (27)
Doors Windows Type	Gros area e 1 e 2 e 3 e 4 e 5 e 6	SS	Openin	ıgs	A ,r 2.52 0.72 1.61 2.01 0.91 5.95	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04] = 0	(W/ 2.52 0.95 2.13 2.66 1.21 7.89 2.64	K)			kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type	Gros area e 1 e 2 e 3 e 4 e 5 e 6	ss (m²)	Openin	gs 1 ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = 0.04] = 0	(W/ 2.52 0.95 2.13 2.66 1.21 7.89 2.64 1.19	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type Floor	Gros area 4 4 5 5 6 6 7	ss (m²)	Openin m	gs 1 ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 0.9 41.75	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = 0.04] = 0	(W// 2.52 0.95 2.13 2.66 1.21 7.89 2.64 1.19 5.4275	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (27
ELEMENT Doors Windows Type	Gros area 1 2 3 4 4 5 5 6 6 7 49.3	SS (m²)	Openin	gs 1 ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18	2K = 0.04] = 0	(W// 2.52 0.95 2.13 2.66 1.21 7.89 2.64 1.19 5.4275	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (27
ELEMENT Doors Windows Type	Gros area 1 2 2 3 4 4 5 5 6 6 7 49.3	37 56 8	Openin m	gs 1 ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 32.76	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18	2K = 0.04] = 0	(W// 2.52 0.95 2.13 2.66 1.21 7.89 2.64 1.19 5.4275 5.9	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29)
ELEMENT Doors Windows Type	Gros area 1 1 2 2 3 3 4 4 5 5 6 6 7 49.3 56.5 2.9 8.0	37 56 8 3	16.6 0	gs 1 ²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 56.56 2.98	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18	2K = 0.04] = 0	(W// 2.52 0.95 2.13 2.66 1.21 7.89 2.64 1.19 5.4275 5.9 10.18	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29) (29)
ELEMENT Doors Windows Type Walls Type1 Walls Type2 Walls Type3 Roof Total area of e	Gros area 1 1 2 2 3 3 4 4 5 5 6 6 6 7 56.5 2.9 8.00 8lements	87 66 8 3 3, m ²	16.6 0	ngs n²	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 56.56 2.98 8.03 158.6	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18 0.18 0.13	2K = 0.04] = 0	(W// 2.52 0.95 2.13 2.66 1.21 7.89 2.64 1.19 5.4275 5.9 10.18 0.54 1.04	K)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29) (29) (30)
ELEMENT Doors Windows Type Floor Walls Type1 Walls Type2 Walls Type3 Roof Total area of e	Gros area 9 1 9 2 9 3 9 4 9 5 9 6 9 7 49.3 2.9 8.0: 8.0: 8.0: 8.0: 8.0: 8.0: 1 roof wind	37 56 8 3 3, m ² ows, use e	Openin m 16.6 0 0 overfective with the state of the s	igs 1 1 	A ,r 2.52 0.72 1.61 2.01 0.91 5.95 1.99 41.75 56.56 2.98 8.03 158.6 56.48 alue calcul	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.18 0.18 0.13	2K = 0.04] = 0	(W// 2.52 0.95 2.13 2.66 1.21 7.89 2.64 1.19 5.4275 5.9 10.18 0.54 1.04	K)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29) (29) (30) (31)

Heat capa	city Cm = S	(Axk)						((28)	.(30) + (32	2) + (32a)	(32e) =	0	(34)
•	nass parame	,	P = Cm -	: TFA) ir	n kJ/m²K			., ,	tive Value:	, , ,	,	250	(35)
	ssessments wi	`		,			ecisely the				able 1f	230	(00)
can be used	instead of a de	etailed calcu	ulation.				-						
Thermal b	ridges : S (L	x Y) cal	culated i	using Ap	pendix I	K						9.12	(36)
	nermal bridging	are not kn	own (36) =	= 0.05 x (3	1)			(00)	(0.0)				–
	otal fabric heat loss (33) + (36) = entilation heat loss calculated monthly (38)m = $0.33 \times (25)$ m × (5)										53.4	(37)	
				ĺ		l		· · ·	,			1	
<u> </u>	an Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(20)
` ′	.53 47.27	47.02	45.84	45.61	44.58	44.58	44.39	44.98	45.61	46.06	46.53		(38)
Heat trans	fer coefficie	nt, W/K				,		(39)m	= (37) + (3	38)m		•	
(39)m= 100	0.93 100.67	100.42	99.24	99.02	97.99	97.99	97.8	98.38	99.02	99.47	99.93		_
Heat loss	parameter (HLP), W/	/m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	99.24	(39)
(40)m= 1.	21 1.21	1.21	1.19	1.19	1.18	1.18	1.18	1.18	1.19	1.2	1.2		
Niverbox		nth /Tab	la 4a\					,	Average =	Sum(40) ₁ .	12 /12=	1.19	(40)
	f days in mo an Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	31 28	31	30	31	30	31	31	30	31	30	31		(41)
(**/***													, ,
1 \\/atox	h a a ti a a a a a	" " " " " " " " " " " " " " " " " " " "									Id Mile by	204	
4. Water	heating ene	rgy requi	irement.								kWh/y	al.	
Assumed	occupancy	N I										i	
if TFA >	13.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.		52		(42)
if TFA > if TFA £	13.9, N = 1 13.9, N = 1	+ 1.76 x							ΓFA -13.	9)			, ,
if TFA > if TFA £ Annual av Reduce the a	13.9, N = 1 13.9, N = 1 erage hot w annual average	+ 1.76 x ater usaç hot water	ge in litre usage by	es per da 5% if the o	ay Vd,av Iwelling is	erage = designed t	(25 x N)	+ 36		9)	.02		(42)
if TFA > if TFA £ Annual av Reduce the a not more tha	13.9, N = 1 13.9, N = 1 erage hot w annual average t 125 litres per	+ 1.76 x ater usage that water person per	ge in litre usage by day (all w	es per da 5% if the d vater use, I	ay Vd,av Iwelling is thot and co	erage = designed t ld)	(25 x N) to achieve	+ 36 a water us	e target o	9) 94	.02		, ,
if TFA \$\int TFA \$\mathbb{L}\$ Annual av Reduce the a not more tha	13.9, N = 1 13.9, N = 1 erage hot w annual average t 125 litres per	+ 1.76 x ater usage hot water person per	ge in litre usage by day (all w	es per da 5% if the d vater use, I	ay Vd,av welling is not and co	erage = designed t ld)	(25 x N) to achieve	+ 36		9)			, ,
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us	13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres pe	+ 1.76 x ater usage hot water person per Mar r day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, I May Vd,m = fa	ay Vd,av Iwelling is that and co Jun ctor from T	erage = designed id) Jul Table 1c x	(25 x N) to achieve Aug (43)	+ 36 a water us Sep	e target of	9) 94 Nov	.02 Dec		, ,
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us	13.9, N = 1 13.9, N = 1 erage hot w annual average t 125 litres per	+ 1.76 x ater usage hot water person per	ge in litre usage by day (all w	es per da 5% if the d vater use, I	ay Vd,av welling is not and co	erage = designed t ld)	(25 x N) to achieve	+ 36 a water us Sep	Oct	9) 94 Nov 99.66	.02 Dec 103.43	1129 29	(43)
if TFA sif TFA £ Annual av Reduce the anot more than Hot water us (44)m= 10:	13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres pe	+ 1.76 x ater usage hot water person per Mar r day for ear	ge in litre usage by day (all w Apr ach month 92.14	es per da 5% if the d vater use, I May Vd,m = fa 88.38	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed to ld) Jul Table 1c x 84.62	(25 x N) to achieve Aug (43) 88.38	+ 36 a water us Sep	Oct 95.9 Fotal = Sur	9) 94 Nov 99.66 m(44)112 =	.02 Dec 103.43	1128.28	, ,
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 10: Energy conte	13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres pe	+ 1.76 x ater usage hot water person per Mar r day for ear	ge in litre usage by day (all w Apr ach month 92.14	es per da 5% if the d vater use, I May Vd,m = fa 88.38	ay Vd,av Iwelling is not and co Jun ctor from 1	erage = designed to ld) Jul Table 1c x 84.62	(25 x N) to achieve Aug (43) 88.38	+ 36 a water us Sep	Oct 95.9 Fotal = Sur	9) 94 Nov 99.66 m(44)112 =	.02 Dec 103.43	1128.28	(43)
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 103 Energy conte (45)m= 153	13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres pe 3.43 99.66 ent of hot water 3.38 134.14	ater usage hot water person per Mar r day for ear 95.9	ge in litre usage by day (all w Apr ach month 92.14 culated me 120.68	es per da 5% if the orater use, I May $Vd,m = fa$ 88.38 $onthly = 4$.	ay Vd,av lwelling is not and co Jun ctor from 7 84.62 190 x Vd,r	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6	(25 x N) to achieve Aug (43) 88.38 07m / 3600 106.25	+ 36 a water us Sep 92.14 0 kWh/mon 107.52	Oct 95.9 Fotal = Sur th (see Ta	9) Nov 99.66 m(44) ₁₁₂ = ables 1b, 1	.02 Dec 103.43 c, 1d) 148.54	1128.28	(43)
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 10: Energy conte (45)m= 15:	13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres per 3.43 99.66 ent of hot water 3.38 134.14 ous water heat	ater usage hot water person per Mar r day for ear 95.9 sused - call 138.43	Apr Apr ach month 92.14 culated mo 120.68	es per da 5% if the of water use, I May Vd,m = far 88.38 onthly = 4.	ay Vd,av lwelling is not and co Jun ctor from 7 84.62 190 x Vd,r 99.92	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in	(25 x N) to achieve Aug (43) 88.38 0Tm / 3600 106.25 boxes (46)	+ 36 a water us Sep 92.14 0 kWh/mon 107.52	Oct 95.9 Fotal = Sur th (see Ta 125.31	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ =	.02 Dec 103.43 c, 1d) 148.54		(43)
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us (44)m= 10: Energy conte (45)m= 15: If instantance (46)m= 23:	13.9, N = 1 13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres per 3.43 99.66 ent of hot water 3.38 134.14 bus water heat	ater usage hot water person per Mar r day for ear 95.9	ge in litre usage by day (all w Apr ach month 92.14 culated me 120.68	es per da 5% if the orater use, I May $Vd,m = fa$ 88.38 $onthly = 4$.	ay Vd,av lwelling is not and co Jun ctor from 7 84.62 190 x Vd,r	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6	(25 x N) to achieve Aug (43) 88.38 07m / 3600 106.25	+ 36 a water us Sep 92.14 0 kWh/mon 107.52	Oct 95.9 Fotal = Sur th (see Ta	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78	.02 Dec 103.43 c, 1d) 148.54		(43)
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 10: Energy conte (45)m= 15: If instantanee (46)m= 23 Water stor	13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres pe 3.43 99.66 ent of hot water 3.38 134.14 bus water heat 5.01 20.12 rage loss:	ater usage hot water person per Mar r day for ea 95.9 138.43 138.43	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 for use (no	es per da 5% if the a rater use, I May Vd,m = fa 88.38	ay Vd,av lwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 r storage),	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in 13.89	(25 x N) to achieve Aug (43) 88.38 0Tm / 3600 106.25 boxes (46,	+ 36 a water us Sep 92.14 0 kWh/mon 107.52 0 to (61) 16.13	Oct 95.9 Fotal = Sunth (see Tail 125.31 Fotal = Sunth 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46)
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 10: Energy conte (45)m= 15: If instantance (46)m= 23 Water stor Storage vo	13.9, N = 1 13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres per 3.43 99.66 ent of hot water 3.38 134.14 bus water heat 5.01 20.12 rage loss: blume (litres	ater usage hot water person per Mar r day for ear 95.9 138.43 138.43 ing at point 20.76	ge in litre usage by day (all w Apr ach month 92.14 culated me 120.68 for use (no	es per da 5% if the of vater use, I May Vd,m = far 88.38 onthly = 4. 115.8 o hot water 17.37 olar or W	ay Vd,av welling is not and co Jun ctor from 7 84.62 190 x Vd,r 99.92 storage),	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in 13.89 storage	(25 x N) to achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa	+ 36 a water us Sep 92.14 0 kWh/mon 107.52 0 to (61) 16.13	Oct 95.9 Fotal = Sunth (see Tail 125.31 Fotal = Sunth 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54		(43)
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 10: Energy conte (45)m= 15: If instantanee (46)m= 23 Water stor Storage vo If commun Otherwise	13.9, N = 1 13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres per 3.43 99.66 ent of hot water 3.38 134.14 ous water heat age loss: blume (litres if no stored	ater usage hot water person per Mar r day for ear 95.9 138.43 138.43 109.76	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 for use (no 18.1 ng any so ank in dw	es per da 5% if the of rater use, I May Vd,m = fat 88.38 onthly = 4. 115.8 o hot water 17.37 colar or Water velling, e	ay Vd,av Iwelling is not and co Jun ctor from 1 84.62 190 x Vd,r 99.92 r storage), 14.99	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in 13.89 storage) litres in	(25 x N) to achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 0 kWh/mon 107.52 0 to (61) 16.13 ame vess	Oct 95.9 Fotal = Sur 125.31 Fotal = Sur 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46)
if TFA > if TFA £ Annual av Reduce the a not more that Hot water us (44)m= 10: Energy conte (45)m= 15: If instantanee (46)m= 23 Water stor Storage vo If commun Otherwise Water stor	13.9, N = 1 13.9,	ater usage hot water person per Mar r day for ear 95.9 138.43 138.43 ing at point 20.76) including and no tall hot water	ge in litre usage by day (all w Apr ach month 92.14 culated me 120.68 18.1 ag any so ank in dw er (this in	es per da 5% if the of water use, I May Vd,m = fact 88.38 onthly = 4. 115.8 o hot water 17.37 olar or W welling, e	ay Vd,av welling is not and co Jun ctor from 7 84.62 190 x Vd,r 99.92 r storage), 14.99 /WHRS nter 110	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in 13.89 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 0 kWh/mon 107.52 0 to (61) 16.13 ame vess	Oct 95.9 Fotal = Sur 125.31 Fotal = Sur 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = sbles 1b, 1 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28		(43) (44) (45) (46) (47)
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 10: Energy conte (45)m= 15: If instantanee (46)m= 23 Water stor Storage vo If commun Otherwise Water stor a) If manual	13.9, N = 1 13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres per 3.43 99.66 ent of hot water 3.38 134.14 cus water heat cus water he	ater usage hot water person per Mar r day for ear 95.9 sused - call 138.43 ing at point 20.76) including and no tall hot water eclared left.	Apr Apr Ach month 92.14 culated mo 120.68 for use (no 18.1) and any so ank in dw er (this in	es per da 5% if the of water use, I May Vd,m = fact 88.38 onthly = 4. 115.8 o hot water 17.37 olar or W welling, e	ay Vd,av welling is not and co Jun ctor from 7 84.62 190 x Vd,r 99.92 r storage), 14.99 /WHRS nter 110	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in 13.89 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 0 kWh/mon 107.52 0 to (61) 16.13 ame vess	Oct 95.9 Fotal = Sur 125.31 Fotal = Sur 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = 136.78 m(45) ₁₁₂ = 20.52	.02 Dec 103.43 c, 1d) 148.54 22.28 150		(43) (44) (45) (46) (47)
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 10: Energy conte (45)m= 15: If instantanee (46)m= 23 Water stor Storage vo If commun Otherwise Water stor a) If manu Temperate	13.9, N = 1 13.9, N = 1 13.9, N = 1 erage hot we annual average to 125 litres per an Feb age in litres per 3.43 99.66 ent of hot water heat ous water heat of 120.12 age loss: blume (litres between the store of 120.12 age loss:	ater usage hot water person per Mar r day for ear 95.9 Tused - call 138.43 ing at point 20.76) including and no tall hot water eclared lear man talle om Table	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 for use (no 18.1 ag any so ank in dw er (this in oss facto 2b	es per da 5% if the of water use, I May Vd,m = fat 88.38 onthly = 4. 115.8 o hot water 17.37 colar or W welling, e ncludes i	ay Vd,av welling is not and co Jun ctor from 7 84.62 190 x Vd,r 99.92 r storage), 14.99 /WHRS nter 110	erage = designed to ld) Jul Table 1c x 84.62 m x nm x E 92.6 enter 0 in 13.89 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 88.38 0Tm / 3600 106.25 boxes (46) 15.94 within sa (47) ombi boil	+ 36 a water us Sep 92.14 107.52 16.13 ame vess ers) ente	Oct 95.9 Fotal = Sur 125.31 Fotal = Sur 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ = 20.52 47) 1 0.	.02 Dec 103.43 c, 1d) 148.54 22.28 150		(43) (44) (45) (46) (47) (48) (49)
if TFA > if TFA £ Annual av Reduce the a not more tha Hot water us (44)m= 10: Energy conte (45)m= 15: If instantanee (46)m= 23 Water stor Storage vo If commun Otherwise Water stor a) If manu Temperatu Energy los	13.9, N = 1 13.9, N = 1 13.9, N = 1 erage hot wannual average t 125 litres per an Feb age in litres per 3.43 99.66 ent of hot water 3.38 134.14 cus water heat cus water he	ater usage hot water person per Mar r day for ear 95.9 Tused - call 138.43 ing at point 20.76) including and no tall hot water eclared lear man taller r storage	ge in litre usage by day (all w Apr ach month 92.14 culated mo 120.68 for use (no 18.1 ng any so ank in dw er (this in oss facto 2b c, kWh/ye	es per da 5% if the of water use, I May Vd,m = far 88.38 onthly = 4. 115.8 o hot water 17.37 colar or Water velling, encludes in or is knownear	ay Vd,av Iwelling is not and co Jun 84.62 190 x Vd,r 99.92 r storage), 14.99 IWHRS nter 110 nstantar	erage = designed to designed t	(25 x N) to achieve Aug (43) 88.38 07m / 3600 106.25 boxes (46) 15.94 within sa (47)	+ 36 a water us Sep 92.14 107.52 16.13 ame vess ers) ente	Oct 95.9 Fotal = Sur 125.31 Fotal = Sur 18.8	9) 94 Nov 99.66 m(44) ₁₁₂ = ables 1b, 1 136.78 m(45) ₁₁₂ = 20.52 47) 1 0.	.02 Dec 103.43 c, 1d) 148.54 22.28 150		(43) (44) (45) (46) (47)

Hot water storage loss factor from	,	n/litre/da	y)					0		(51)
If community heating see section	4.3								l	(==)
Volume factor from Table 2a Temperature factor from Table 2b								0		(52) (53)
·				(47) (54)	(50) (1	- 0\		0		` '
Energy lost from water storage, kl Enter (50) or (54) in (55)	/vn/year			(47) x (51)	X (52) X (03) =		0		(54)
. , , , , ,	aaab manth			((56)m = (EE) (44).	~	0.	75		(55)
Water storage loss calculated for e				```	, , ,			1	ı	(==)
(56)m= 23.33 21.07 23.33 22 If cylinder contains dedicated solar storage	2.58 23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	:	(56)
	2.58 23.33	22.58	23.33	23.33	22.58	23.33	22.58	23.33	IX П 	(57)
		22.36	23.33	23.33	22.56	23.33	ļ			` '
Primary circuit loss (annual) from		-0) (- (44)				0		(58)
Primary circuit loss calculated for	,	,		, ,		r tharma	otot)			
(modified by factor from Table F (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)
					22.31	23.20	22.31	23.20		(55)
Combi loss calculated for each mo	onth (61)m = (60) ÷ 36	65 × (41)	m			,		•	
(61)m= 0 0 0	0 0	0	0	0	0	0	0	0		(61)
Total heat required for water heati	ing calculated	for each	n month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 199.97 176.23 185.02 16	55.77 162.39	145.02	139.19	152.85	152.62	171.9	181.88	195.13		(62)
Solar DHW input calculated using Appendi	ix G or Appendix I	H (negativ	ve quantity) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add additional lines if FGHRS and	d/or WWHRS	applies,	see Ap	pendix (3)					
(63)m= 0 0 0	0 0	0	0	0	0	0	0	0		(63)
Output from water heater										
(64)m= 199.97 176.23 185.02 16	55.77 162.39	145.02	139.19	152.85	152.62	171.9	181.88	195.13		
				102.00	102.02	171.5	101.00	195.15		_
							r (annual) ₁	l .	2027.97	(64)
Heat gains from water heating, kW	Vh/month 0.25			Outp	out from wa	ater heate	I r (annual)₁	12		(64)
	Wh/month 0.25			Outp	out from wa	ater heate	I r (annual)₁	12		(64) (65)
	76.2 75.78	5 ´ [0.85 69.3	× (45)m	Outp + (61)m 72.61	out from wa a] + 0.8 x 71.82	ater heate ([(46)m 78.94	r (annual)₁ + (57)m 81.55	+ (59)m 86.66]	Ι` ΄
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (6	76.2 75.78 65)m only if cy	5 ´ [0.85 69.3	× (45)m	Outp + (61)m 72.61	out from wa a] + 0.8 x 71.82	ater heate ([(46)m 78.94	r (annual)₁ + (57)m 81.55	+ (59)m 86.66]	Ι` ΄
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (65). Internal gains (see Table 5 and	76.2 75.78 65)m only if cy	5 ´ [0.85 69.3	× (45)m	Outp + (61)m 72.61	out from wa a] + 0.8 x 71.82	ater heate ([(46)m 78.94	r (annual)₁ + (57)m 81.55	+ (59)m 86.66]	Ι` ΄
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (65). Internal gains (see Table 5 and Metabolic gains (Table 5), Watts	76.2 75.78 65)m only if cy	6 ^ [0.85 69.3 /linder is	× (45)m 68.06 s in the c	Outp + (61)m 72.61 dwelling	71.82 or hot w	(46)m 78.94 ater is fr	+ (57)m 81.55 om com	+ (59)m 86.66 munity h]	Ι` ΄
include (57)m in calculation of (65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (65). Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar	76.2 75.78 65)m only if cy	5 ´ [0.85 69.3	× (45)m	Outp + (61)m 72.61	out from wa a] + 0.8 x 71.82	ater heate ([(46)m 78.94	r (annual)₁ + (57)m 81.55	+ (59)m 86.66]	Ι` ΄
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (65). Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar (66)m= 125.94 125.94 125.94 12	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94	6 ' [0.85 69.3 /linder is Jun 125.94	× (45)m 68.06 s in the c	Outp + (61)m 72.61 dwelling Aug 125.94	out from wa 1] + 0.8 x 71.82 or hot w Sep 125.94	78.94 ater is fr	+ (57)m 81.55 om com	+ (59)m 86.66 munity h]	(65)
include (57)m in calculation of (65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (65)m (5. Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar (66)m= 125.94 125.9	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 ndix L, equation	Jun 125.94 on L9 or	x (45)m 68.06 s in the c Jul 125.94 r L9a), a	Outp + (61)m 72.61 dwelling Aug 125.94	yut from wa 71.82 or hot w Sep 125.94 Γable 5	78.94 ater is fr Oct 125.94	(annual), + (57)m 81.55 com com Nov 125.94	+ (59)m 86.66 munity h Dec 125.94]	(65)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (65). Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar (66)m= 125.94	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 ndix L, equation 1.36 8.49	Jun 125.94 0n L9 or	x (45)m 68.06 s in the c Jul 125.94 L9a), a 7.74	Outp + (61)m 72.61 dwelling Aug 125.94 lso see	Sep 125.94 Table 5	oter heater (46)m 78.94 atter is fr Oct 125.94	+ (57)m 81.55 om com	+ (59)m 86.66 munity h]	(65)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (6 5. Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar Mar (66)m= 125.94 125.94 125.94 12 Lighting gains (calculated in Apple (67)m= 20.77 18.45 15 1 Appliances gains (calculated in Apple gains (calculated in Apple gains) 12 12 12 14	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 ndix L, equation 1.36 8.49 appendix L, equation 1.46 sequences 1.46 se	Jun 125.94 on L9 or 7.17	x (45)m 68.06 s in the c Jul 125.94 r L9a), a 7.74	Outp + (61)m 72.61 dwelling Aug 125.94 lso see 10.07	Sep 125.94 Table 5 13.51 see Tal	Oct 125.94	(annual), + (57)m 81.55 om com Nov 125.94	+ (59)m 86.66 munity h Dec 125.94]	(65) (66) (67)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (6 5. Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar 7 (66)m= 125.94 125.94 125.94 12 Lighting gains (calculated in Appe (67)m= 20.77 18.45 15 15 Appliances gains (calculated in Applianc	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 1.36 8.49 pendix L, equation 1.36 193.78	Jun 125.94 on L9 or 7.17 uation L'	y (45)m 68.06 s in the c Jul 125.94 L9a), a 7.74 13 or L13	Outp + (61)m 72.61 dwelling Aug 125.94 lso see 10.07 3a), also	Sep 125.94 Fable 5 13.51 see Tal	Oct 125.94 17.16 ole 5 185.04	(annual), + (57)m 81.55 com com Nov 125.94	+ (59)m 86.66 munity h Dec 125.94]	(65)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (6 5. Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar Mar (66)m= 125.94 125.94 125.94 12 Lighting gains (calculated in Appe (67)m= 20.77 18.45 15 15 Appliances gains (calculated in Application (68)m= 225.78 228.12 222.22 20 Cooking gains (calculated in Apple	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 ndix L, equation 1.36 8.49 ppendix L, equation 1.36 193.78 endix L, equation 1.36 193.78 pendix L,	Jun 125.94 on L9 or 7.17 uation L' 178.87	x (45)m 68.06 s in the c Jul 125.94 r L9a), a 7.74 13 or L1: 168.91 or L15a)	Outp + (61)m 72.61 dwelling Aug 125.94 lso see 10.07 3a), also 166.57	Sep 125.94 Fable 5 13.51 see Table	Oct 125.94 17.16 ole 5 185.04	(annual), + (57)m 81.55 om com Nov 125.94 20.02	+ (59)m 86.66 munity h Dec 125.94 21.35]	(65) (66) (67) (68)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (65). Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar 7 (66)m= 125.94 125.94 125.94 12 Lighting gains (calculated in Appe (67)m= 20.77 18.45 15 15 Appliances gains (calculated in Appe (68)m= 225.78 228.12 222.22 20 Cooking gains (calculated in Appe (69)m= 35.59 35.59 35.59 35.59 35.59	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 1.36 8.49 pendix L, equation 1.36 193.78	Jun 125.94 on L9 or 7.17 uation L'	y (45)m 68.06 s in the c Jul 125.94 L9a), a 7.74 13 or L13	Outp + (61)m 72.61 dwelling Aug 125.94 lso see 10.07 3a), also	Sep 125.94 Fable 5 13.51 see Tal	Oct 125.94 17.16 ole 5 185.04	(annual), + (57)m 81.55 om com Nov 125.94	+ (59)m 86.66 munity h Dec 125.94]	(65) (66) (67)
(65)m=	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 ndix L, equation 1.36 8.49 pendix L, equation 1.36 193.78 endix L, equ	Jun 125.94 on L9 or 7.17 uation L' 178.87 on L15	x (45)m 68.06 s in the c Jul 125.94 r L9a), a 7.74 13 or L1: 168.91 or L15a) 35.59	Outp + (61)m 72.61 dwelling Aug 125.94 lso see 10.07 3a), also 166.57 , also se 35.59	Sep 125.94 Fable 5 13.51 see Tale 172.47 ee Table 35.59	Oct 125.94 17.16 ole 5 185.04 5 35.59	(annual), + (57)m 81.55 om com Nov 125.94 20.02	+ (59)m 86.66 munity h Dec 125.94 21.35 215.82]	(65) (66) (67) (68) (69)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (6 5. Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar Mar (66)m= 125.94 125.94 125.94 12 Lighting gains (calculated in Appe (67)m= 20.77 18.45 15 17 Appliances gains (calculated in Application (68)m= 225.78 228.12 222.22 20 Cooking gains (calculated in Apple (69)m= 35.59 35.59 35.59 35.59 35.59 35.79 Pumps and fans gains (Table 5a) (70)m= 3 3 3 3	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.99 125.59 12	Jun 125.94 on L9 or 7.17 uation L' 178.87 on L15	x (45)m 68.06 s in the c Jul 125.94 r L9a), a 7.74 13 or L1: 168.91 or L15a)	Outp + (61)m 72.61 dwelling Aug 125.94 lso see 10.07 3a), also 166.57	Sep 125.94 Fable 5 13.51 see Table	Oct 125.94 17.16 ole 5 185.04	(annual), + (57)m 81.55 om com Nov 125.94 20.02	+ (59)m 86.66 munity h Dec 125.94 21.35]	(65) (66) (67) (68)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (6 5. Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar Mar (66)m= 125.94 125.94 125.94 12 Lighting gains (calculated in Appe (67)m= 20.77 18.45 15 15 Appliances gains (calculated in Appe (68)m= 225.78 228.12 222.22 20 Cooking gains (calculated in Appe (69)m= 35.59 35.59 35.59 35.59 35.59 Pumps and fans gains (Table 5a) (70)m= 3 3 3 Losses e.g. evaporation (negative	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.99 125.59 12	Jun 125.94 on L9 or 7.17 uation L7 178.87 on L15 35.59	x (45)m 68.06 s in the constitution of the con	Outp + (61)m 72.61 dwelling 125.94 lso see 10.07 3a), also 166.57 , also se 35.59	Sep 125.94 Table 5 13.51 see Tal 172.47 ee Table 35.59	Oct 125.94 17.16 ole 5 185.04 5 35.59	(annual), + (57)m 81.55 om com Nov 125.94 20.02 200.9	+ (59)m 86.66 munity h Dec 125.94 21.35 215.82]	(65) (66) (67) (68) (69) (70)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (6 5. Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar And Mar (66)m= 125.94 <	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.99 125.59 12	Jun 125.94 on L9 or 7.17 uation L' 178.87 on L15	x (45)m 68.06 s in the c Jul 125.94 r L9a), a 7.74 13 or L1: 168.91 or L15a) 35.59	Outp + (61)m 72.61 dwelling Aug 125.94 lso see 10.07 3a), also 166.57 , also se 35.59	Sep 125.94 Fable 5 13.51 see Tale 172.47 ee Table 35.59	Oct 125.94 17.16 ole 5 185.04 5 35.59	(annual), + (57)m 81.55 om com Nov 125.94 20.02	+ (59)m 86.66 munity h Dec 125.94 21.35 215.82]	(65) (66) (67) (68) (69)
(65)m= 88.27 78.27 83.3 7 include (57)m in calculation of (6 5. Internal gains (see Table 5 and Metabolic gains (Table 5), Watts Jan Feb Mar Mar (66)m= 125.94 125.94 125.94 12 Lighting gains (calculated in Appe (67)m= 20.77 18.45 15 15 Appliances gains (calculated in Appe (68)m= 225.78 228.12 222.22 20 Cooking gains (calculated in Appe (69)m= 35.59 35.59 35.59 35.59 35.59 Pumps and fans gains (Table 5a) (70)m= 3 3 3 Losses e.g. evaporation (negative (71)m= -100.76 -100.76 -100.76 -100.76 -100.76 -100.76 Water heating gains (Table 5) -100.76 -100.76 -100.76 -100.76 -100.76	76.2 75.78 65)m only if cynd 5a): Apr May 25.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.94 125.99 125.59 12	Jun 125.94 on L9 or 7.17 uation L' 178.87 on L15 35.59	x (45)m 68.06 s in the constitution of the con	Outp + (61)m 72.61 dwelling 125.94 lso see 10.07 3a), also 166.57 , also se 35.59	Sep 125.94 Table 5 13.51 see Tal 172.47 ee Table 35.59	Oct 125.94 17.16 ole 5 185.04 5 35.59	(annual), + (57)m 81.55 om com Nov 125.94 20.02 200.9	+ (59)m 86.66 munity h Dec 125.94 21.35 215.82]	(65) (66) (67) (68) (69) (70)

Total internal	gains =	i				(66)m + (67)m	+ (68	3)m + (69)m +	(70)m +	(71)m + (72)	m		
(73)m= 428.98	426.83	412.97	390.62	367.91	346	.07 331.92	33	8 349.52	372.08	397.98	417.43		(73)
6. Solar gains	s:												
Solar gains are		_			and a		tions	to convert to th	e applic		ion.		
Orientation: /	Access F Table 6d		Area m²	l		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southeast 0.9x	0.77	x	0.	72	х	36.79	x	0.63	x	0.7	=	8.1	(77)
Southeast 0.9x	0.77	X	1.0	61	х	36.79	x	0.63	x	0.7	=	18.1	(77)
Southeast _{0.9x}	0.77	X	2.0	01	x	36.79	x	0.63	x	0.7	=	22.6	(77)
Southeast _{0.9x}	0.77	х	0.9	91	x $\overline{\ }$	36.79	x	0.63	x	0.7	<u> </u>	10.23	(77)
Southeast 0.9x	0.77	X	0.	72	x \Box	62.67	x	0.63	x	0.7		13.79	(77)
Southeast _{0.9x}	0.77	X	1.0	61	x	62.67	x	0.63	x	0.7	=	30.84	(77)
Southeast _{0.9x}	0.77	X	2.0	01	x	62.67	x	0.63	x	0.7	=	38.5	(77)
Southeast 0.9x	0.77	X	0.9	91	x	62.67	x	0.63	x	0.7	=	17.43	(77)
Southeast 0.9x	0.77	X	0.	72	X	85.75	x	0.63	X	0.7	=	18.87	(77)
Southeast 0.9x	0.77	X	1.0	61	x	85.75	x	0.63	X	0.7	=	42.19	(77)
Southeast _{0.9x}	0.77	X	2.0	01	x	85.75	x	0.63	X	0.7	=	52.68	(77)
Southeast 0.9x	0.77	X	0.9	91	x	85.75	X	0.63	X	0.7	=	23.85	(77)
Southeast _{0.9x}	0.77	X	0.	72	x	106.25	X	0.63	X	0.7	=	23.38	(77)
Southeast _{0.9x}	0.77	X	1.0	61	x	106.25	X	0.63	X	0.7	=	52.28	(77)
Southeast _{0.9x}	0.77	Х	2.0	01	x	106.25	X	0.63	X	0.7	=	65.27	(77)
Southeast _{0.9x}	0.77	X	0.9	91	x	106.25	X	0.63	X	0.7	=	29.55	(77)
Southeast _{0.9x}	0.77	Х	0.	72	x	119.01	X	0.63	X	0.7	=	26.19	(77)
Southeast _{0.9x}	0.77	X	1.0	61	X	119.01	X	0.63	X	0.7	=	58.56	(77)
Southeast _{0.9x}	0.77	X	2.0	01	X	119.01	X	0.63	X	0.7	=	73.11	(77)
Southeast 0.9x	0.77	X	0.9	91	x	119.01	X	0.63	X	0.7	=	33.1	(77)
Southeast 0.9x	0.77	X	0.	72	X	118.15	X	0.63	X	0.7	=	26	(77)
Southeast 0.9x	0.77	X	1.0	61	x _	118.15	X	0.63	X	0.7	=	58.13	(77)
Southeast 0.9x	0.77	X	2.0	01	x L	118.15	X	0.63	X	0.7	=	72.58	(77)
Southeast 0.9x	0.77	X	0.9	91	x	118.15	X	0.63	X	0.7	=	32.86	(77)
Southeast 0.9x	0.77	X	0.	72	X	113.91	X	0.63	X	0.7	=	25.06	(77)
Southeast 0.9x	0.77	Х	1.0	61	X	113.91	X	0.63	X	0.7	=	56.05	(77)
Southeast 0.9x	0.77	X	2.0	01	x L	113.91	X	0.63	X	0.7	=	69.97	(77)
Southeast 0.9x	0.77	X	0.9	91	x L	113.91	X	0.63	X	0.7	=	31.68	(77)
Southeast 0.9x	0.77	X	0.	72	x	104.39	X	0.63	X	0.7	=	22.97	(77)
Southeast 0.9x	0.77	X	1.0	61	x L	104.39	X	0.63	X	0.7	=	51.36	(77)
Southeast 0.9x	0.77	X	2.0	01	x L	104.39	X	0.63	X	0.7	=	64.13	(77)
Southeast 0.9x	0.77	X	0.9	91	x L	104.39	X	0.63	X	0.7	=	29.03	(77)
Southeast 0.9x	0.77	X	0.	72	× L	92.85	X	0.63	×	0.7	=	20.43	(77)
Southeast _{0.9x}	0.77	Х	1.0	61	x	92.85	X	0.63	X	0.7	=	45.69	(77)

Southeast 0.9x	0.77	٦ ,	0.04	1 .,	00.05	1 .,	0.00	l "	0.7	1 _	57.04	7(77)
Southeast 0.9x	0.77] X]	2.01	X 	92.85	X 	0.63	X	0.7] =]	57.04	(77)
Southeast 0.9x	0.77] X]	0.91	X 1	92.85	X 1	0.63	X	0.7] = 1	25.82	(77)
Southeast 0.9x	0.77] X]	0.72	X 	69.27] X]	0.63	X	0.7] =]	15.24	(77)
Southeast 0.9x	0.77	X	1.61	X	69.27	J X I	0.63	X	0.7] = 1	34.08	(77)
<u> </u>	0.77	X	2.01	X	69.27	X	0.63	X	0.7] = 1	42.55	 (77)
Southeast 0.9x	0.77	X	0.91	X	69.27	X I	0.63	X	0.7] = 1	19.26	(77)
Southeast 0.9x	0.77	X	0.72	X	44.07	X	0.63	X	0.7] = 1	9.7	(77)
Southeast 0.9x	0.77	X	1.61	X	44.07	X	0.63	X	0.7] = 1	21.68	(77)
Southeast 0.9x	0.77	X	2.01	X	44.07	X	0.63	X	0.7] =	27.07	(77)
Southeast 0.9x	0.77	X	0.91	X	44.07	X	0.63	X	0.7	=	12.26	(77)
Southeast 0.9x	0.77	X	0.72	X	31.49	X	0.63	X	0.7	=	6.93	(77)
Southeast 0.9x	0.77	X	1.61	X	31.49	X	0.63	X	0.7	=	15.49	(77)
Southeast _{0.9x}	0.77	X	2.01	X	31.49	X	0.63	X	0.7	=	19.34	(77)
Southeast _{0.9x}	0.77	X	0.91	X	31.49	X	0.63	X	0.7	=	8.76	(77)
Northwest _{0.9x}	0.77	X	5.95	X	11.28	X	0.63	X	0.7	=	20.52	(81)
Northwest _{0.9x}	0.77	X	1.99	X	11.28	X	0.63	X	0.7	=	6.86	(81)
Northwest _{0.9x}	0.77	X	0.9	X	11.28	X	0.63	X	0.7	=	3.1	(81)
Northwest _{0.9x}	0.77	X	5.95	X	22.97	X	0.63	X	0.7	=	41.76	(81)
Northwest _{0.9x}	0.77	X	1.99	x	22.97	x	0.63	X	0.7	=	13.97	(81)
Northwest _{0.9x}	0.77	X	0.9	X	22.97	X	0.63	X	0.7	=	6.32	(81)
Northwest 0.9x	0.77	X	5.95	x	41.38	x	0.63	X	0.7	=	75.24	(81)
Northwest _{0.9x}	0.77	X	1.99	x	41.38	x	0.63	x	0.7	=	25.17	(81)
Northwest _{0.9x}	0.77	X	0.9	x	41.38	x	0.63	x	0.7	=	11.38	(81)
Northwest _{0.9x}	0.77	X	5.95	x	67.96	x	0.63	x	0.7	=	123.57	(81)
Northwest _{0.9x}	0.77	X	1.99	x	67.96	x	0.63	x	0.7	=	41.33	(81)
Northwest _{0.9x}	0.77	X	0.9	x	67.96	x	0.63	X	0.7	=	18.69	(81)
Northwest _{0.9x}	0.77	X	5.95	x	91.35	x	0.63	x	0.7	=	166.1	(81)
Northwest 0.9x	0.77	X	1.99	x	91.35	x	0.63	x	0.7	=	55.55	(81)
Northwest _{0.9x}	0.77	X	0.9	x	91.35	x	0.63	x	0.7	=	25.12	(81)
Northwest 0.9x	0.77	x	5.95	x	97.38	х	0.63	x	0.7] =	177.08	(81)
Northwest _{0.9x}	0.77	x	1.99	x	97.38	x	0.63	x	0.7	=	59.23	(81)
Northwest _{0.9x}	0.77	x	0.9	x	97.38	x	0.63	x	0.7	=	26.79	(81)
Northwest 0.9x	0.77	x	5.95	x	91.1	x	0.63	x	0.7] =	165.66	(81)
Northwest _{0.9x}	0.77	x	1.99	x	91.1	x	0.63	x	0.7	=	55.4	(81)
Northwest 0.9x	0.77	x	0.9	х	91.1	x	0.63	x	0.7	j =	25.06	(81)
Northwest _{0.9x}	0.77	X	5.95	x	72.63	x	0.63	x	0.7	j =	132.06	(81)
Northwest 0.9x	0.77	X	1.99	x	72.63	x	0.63	x	0.7	j =	44.17	(81)
Northwest _{0.9x}	0.77	x	0.9	x	72.63	x	0.63	x	0.7	j =	19.98	(81)
Northwest _{0.9x}	0.77	X	5.95	x	50.42	x	0.63	x	0.7	=	91.68	(81)
Northwest _{0.9x}	0.77	X	1.99	x	50.42	x	0.63	x	0.7	=	30.66	(81)
Northwest _{0.9x}	0.77	X	0.9	x	50.42	X	0.63	x	0.7	=	13.87	(81)
L		_						ı				

_					_											_
Northwest 0.9x	0.77	×	5.9	95	x	28	3.07	X		0.63	x	0.7	=	:	51.04	(81)
Northwest 0.9x	0.77	x	1.9	99	x	28	3.07	x		0.63	x	0.7	=	: 1	7.07	(81)
Northwest 0.9x	0.77	X	0.9	9	x	28	3.07	x		0.63	X	0.7	=		7.72	(81)
Northwest 0.9x	0.77	X	5.9	95	x	1	4.2	x		0.63	x	0.7		2	25.82	(81)
Northwest 0.9x	0.77	X	1.9	99	x	1	4.2	x		0.63	x	0.7	=	-	8.63	(81)
Northwest 0.9x	0.77	X	0.9	9	x	1	4.2	x		0.63	x	0.7	=		3.9	(81)
Northwest 0.9x	0.77	Х	5.9	95	x	9	.21	x		0.63	x	0.7	=	1	6.76	(81)
Northwest 0.9x	0.77	X	1.9	9	x	9	.21	x		0.63	x	0.7	=		5.6	(81)
Northwest 0.9x	0.77	X	0.9	9	x	9	.21	x		0.63	х	0.7	=		2.53	(81)
Solar gains in	watts, ca	alculated	for eac	h month				(83)m	= Su	m(74)m .	(82)m		,	_		
(83)m= 89.52	162.61	249.38	354.07	437.73		2.66	428.88	363	3.7	285.2	186.96	109.06	75.41			(83)
Total gains – ir	nternal a		(84)m =	= (73)m ·	+ (8:	3)m ,	watts					,	1	_		
(84)m= 518.49	589.43	662.34	744.69	805.64	798	8.73	760.8	701	.7	634.72	559.04	507.04	492.84	1		(84)
7. Mean inter	nal temp	erature	(heating	season)											
Temperature	during h	eating p	eriods ir	n the livi	ng a	rea f	rom Tab	ole 9,	Th1	(°C)					21	(85)
Utilisation fac	tor for g	ains for I	iving are	ea, h1,m	(se	e Tal	ole 9a)									_
Jan	Feb	Mar	Apr	May	J	lun	Jul	Αι	ug	Sep	Oct	Nov	Dec	;		
(86)m= 1	1	0.99	0.96	0.88	0.	.72	0.55	0.6	1	0.86	0.98	1	1			(86)
Mean interna	l temper	ature in	living are	ea T1 (fo	ollov	v ster	os 3 to 7	in T	able	9c)						
(87)m= 19.69	19.84	20.1	20.46	20.76).94	20.99	20.9	$\overline{}$	20.85	20.46	20.02	19.67	7		(87)
Temperature	during h	eating n	eriods ir	rest of	dwe	lling	from Ta	ماما	Th	2 (°C)						
(88)m= 19.91	19.91	19.91	19.92	19.93	_	0.94	19.94	19.9	_	19.93	19.93	19.92	19.92			(88)
` '					<u> </u>			٥-١					<u> </u>			
Utilisation fac	0.99	0.98	0.95	0.83	_	n (se . ₆₂	0.43	9a) 0.4	a T	0.79	0.96	0.99	1	7		(89)
				l	<u> </u>			<u> </u>				0.99				(00)
Mean interna	 			i —	-	`			_					_		<i>1</i>
(90)m= 18.18	18.4	18.77	19.28	19.69	19	9.9	19.93	19.9	93	19.81	19.29	18.66	18.15			(90)
										ī	LA = LIVII	ng area ÷ (4	4) =		0.4	(91)
Mean interna	temper	ature (fo	r the wh	ole dwe	lling) = fL	.A × T1	+ (1 -	– fL/	A) × T2		_		_		
(92)m= 18.78	18.97	19.3	19.75	20.12	20).31	20.35	20.3	35	20.22	19.76	19.2	18.75			(92)
Apply adjustn					_			r	$\overline{}$,		_		
(93)m= 18.78	18.97	19.3	19.75	20.12	20).31	20.35	20.3	35	20.22	19.76	19.2	18.75			(93)
8. Space hea																
Set Ti to the rethe utilisation					ned a	at ste	p 11 of	Table	e 9b	, so tha	t Ti,m=((76)m an	d re-ca	lculate		
Jan	Feb	Mar	Apr	May		lun	Jul	Αι	ıa T	Sep	Oct	Nov	Dec	\Box		
Utilisation fac				iviay		iuii	Jui		ug	Оер	Oct	1 1404	Dec	<u></u>		
(94)m= 1	0.99	0.98	0.94	0.84	0.	.66	0.48	0.5	4	0.81	0.96	0.99	1	7		(94)
Useful gains,				L 4)m				<u> </u>				<u> </u>				
(95)m= 516.2	584.38	649.03	701.74	679.91	526	6.63	362.3	376.	.65	513.12	537.61	502.65	491.13	3		(95)
Monthly avera	age exte	rnal tem	perature	from Ta	able	8				!	I	1		_		
(96)m= 4.3	4.9	6.5	8.9	11.7	14	4.6	16.6	16.	4	14.1	10.6	7.1	4.2			(96)
Heat loss rate	for mea	an intern	al tempe	erature,	Lm	, W =	[(39)m	x [(93	3)m–	· (96)m]			_		
(97)m= 1461.59	1416.72	1285.72	1076.82	833.64	55	9.7	367.65	386.	.03	602.48	906.79	1203.28	1454.5	2		(97)

Space heating	g require	ement fo	r each m	nonth, k\	Nh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 703.37	559.33	473.7	270.05	114.38	0	0	0	0	274.67	504.46	716.77		_
							Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	3616.72	(98)
Space heating	ig require	ement in	kWh/m²	/year							[43.53	(99)
9a. Energy red	quiremer	nts – Ind	ividual h	eating sy	ystems i	ncluding	micro-C	HP)					
Space heating	_			, .							г		7,
Fraction of sp			•		mentary	-	(000) 4	(204)			ļ	0	(201)
Fraction of sp			-	. ,			(202) = 1 -	,	(202)] _		ļ	1	(202)
Fraction of total heating from main system 1 (204) = (202) × [1 – (203)] =											1	(204)	
Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, %											ļ	93.5	(206)
-												0	(208)
Jan Space bootin	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heatin	559.33	473.7	270.05	114.38	0	0	0	0	274.67	504.46	716.77		
(211)m = {[(98													(211)
752.27	598.21	506.63	288.83	122.33	0	0	0	0	293.76	539.53	766.6		(=11)
			ļ				Tota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3868.15	(211)
Space heating	g fuel (s	econdar	y), kWh/	month									_
$= \{[(98)m \times (20)]$	ľ				I				г				
(215)m= 0	0	0	0	0	0	0	0 Tota	0	0	0 215) _{15.1012}	0		7(045)
Water beating	_						TOIA	i (KVVII/yea	ai) =Suiii(2	213) _{15,1012}	_	0	(215)
Water heating Output from w		ter (calc	ulated al	oove)									
199.97	176.23	185.02	165.77	162.39	145.02	139.19	152.85	152.62	171.9	181.88	195.13		
Efficiency of w	ater hea	ter										79.8	(216)
(217)m= 87.89	87.68	87.22	86.11	83.9	79.8	79.8	79.8	79.8	86.06	87.39	87.98		(217)
Fuel for water $(219)m = (64)$	•												
(219)m= 227.52	200.99	212.14	192.52	193.56	181.73	174.42	191.54	191.25	199.75	208.11	221.8		
							Tota	I = Sum(2	19a) ₁₁₂ =			2395.32	(219)
Annual totals									k\	Wh/year		kWh/year	
Space heating	fuel use	ed, main	system	1							Ĺ	3868.15	╛
Water heating	fuel use	d										2395.32	
Electricity for p	oumps, fa	ans and	electric	keep-ho	t								
central heatir	ng pump:										30		(2300
boiler with a	fan-assis	ted flue									45		(230e
Total electricit	y for the	above, I	kWh/yea	r			sum	of (230a).	(230g) =		[75	(231)
Electricity for I	ighting										Ī	366.79] (232)
T											L		-
Total delivered	d enerav	for all u	ses (211)(221)	+ (231)	+ (232).	(237b)	=			l	6705.26	(338)

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216 =	835.52 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216	517.39 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1352.91 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	190.36 (268)
Total CO2, kg/year	sum	of (265)(271) =	1582.2 (272)
TER =			28 (273)