Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 *Printed on 04 November 2021 at 10:45:59*

Proiect Information:

Assessed By: Demi Beneke (STRO027754) Building Type: Mid-terrace House

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 67.4m²

Site Reference: Castle Lane 6641

Plot Reference: Plot 11

Address: Plot 11

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER)

18.89 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

18.19 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 49.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 43.8 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.21 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.16 (max. 0.25)	0.16 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.40 (max. 2.00)	1.80 (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 5.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Database: (rev 485, product index 017956):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 30

(Combi)

Efficiency 89.6 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

Cylinder insulation			
Hot water Storage:	No cylinder		
Controls			
Space heating controls	Programmer, room thermos	stat and TRVs	ок
Hot water controls:	No cylinder thermostat		
	No cylinder		
Boiler interlock:	Yes		OK
Low energy lights			
Percentage of fixed lights with	n low-energy fittings	100.0%	
Minimum		75.0%	OK
Mechanical ventilation			
Not applicable			
Summertime temperature			
Overheating risk (South Engla	and):	Slight	ок
sed on:			
Overshading:		Average or unknown	
Windows facing: South East		0.96m²	
Windows facing: South East		0.48m²	
Windows facing: North West		3.17m²	
Windows facing: North West		0.92m²	
Windows facing: South East		1.99m²	
Windows facing: North West		1.99m²	
Ventilation rate:		4.00	
Blinds/curtains:		None	
0 Key features			
0 Key features Roofs U-value		0.11 W/m²K	

Predicted Energy Assessment



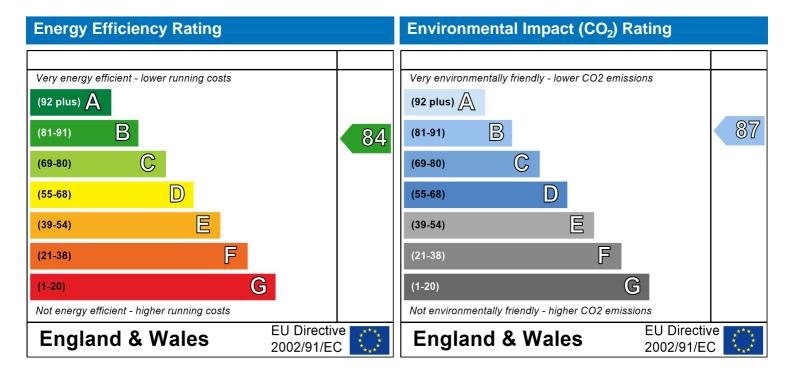
Plot 11

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

Mid-terrace House 12 March 2021 Demi Beneke 67.4 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

Property Details: Plot 11

Address: Plot 11
Located in: England
Region: South England

UPRN:

Date of assessment: 12 March 2021
Date of certificate: 04 November 2021
Assessment type: New dwelling design stage

Transaction type:

Tenure type:

Related party disclosure:

Thermal Mass Parameter:

New dwelling

Unknown

No related party

Indicative Value Medium

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

PCDF Version: 485

Property description:

Dwelling type: House
Detachment: Mid-terrace
Year Completed: 2021

Floor Location: Floor area:

Floor 0 33.7 m 2 2.42 m Floor 1 33.7 m 2 2.66 m

Living area: 17.94 m² (fraction 0.266)

Front of dwelling faces: South East

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
D1	Manufacturer	Solid			PVC-U
W1	BFRC	Windows	low-E, $En = 0.05$, soft coat	Yes	PVC-U
W2	BFRC	Windows	low-E, $En = 0.05$, soft coat	Yes	PVC-U
W3	BFRC	Windows	low-E, $En = 0.05$, soft coat	Yes	PVC-U
W4	BFRC	Windows	low-E, $En = 0.05$, soft coat	Yes	PVC-U
W5	BFRC	Windows	low-E, $En = 0.05$, soft coat	Yes	PVC-U
W7	BFRC	Windows	low-E, $En = 0.05$, soft coat	Yes	PVC-U

Storey height:

Name:	Gap:	Frame Factor	: g-value:	U-value:	Area:	No. of Openings:
D1	mm	0.7	0	1.8	2.11	1
W1	16mm or more	0	0.71	1.31	0.96	1
W2	16mm or more	0	0.71	1.31	0.48	1
W3	16mm or more	0	0.71	1.31	3.17	1

0 0.71 0.92 1 W4 16mm or more 1.31 W5 16mm or more 0 0.71 1.31 1.99 1 W7 16mm or more 0 0.71 1.31 1.99 1

Name: Type-Name: Location: Orient: Width: Height: D1 1.006 **External Walls** South East 2.1 0.91 1.05 W1 **External Walls** South East W2 External Walls South East 0.46 1.05 W3 **External Walls** North West 1.51 2.1 W4 **External Walls** North West 0.685 1.35 W5 **External Walls** 1.66 1.2 South East 1.2 W7 **External Walls** North West 1.66

Overshading: Average or unknown

Opaque Elements

Type: Gross area: Openings: Net area: U-value: Ru value: Curtain wall: Kappa:

SAP Input

External Elements							
External Walls	59.59	11.62	47.97	0.21	0	False	N/A
Plain Ceiling	33.7	0	33.7	0.11	0		N/A
Ground Floor	33.7			0.16			N/A
Internal Elements							
Party Elements							

Ther	mal	hr	ida	
HICH	шаг	ווטו	iuy	

Party Walls

Thermal bridges:	User-defined (individual PSI-\	/alues) '	Y-Value = 0.099
3	Length	Psi-value		
	7.891	0.05	E2	Other lintels (including other steel lintels)
	5.375	0.034	E3	Sill
	20.1	0.04	E4	Jamb
	11.73	0.06	E5	Ground floor (normal)
	11.73	0	E6	Intermediate floor within a dwelling
[Approved]	8	0.06	E10	Eaves (insulation at ceiling level)
	3.73	0.63	E12	Gable (insulation at ceiling level)
	10.16	0.058	E16	Corner (normal)
	10.16	0.12	E25	Staggered party wall between dwellings
[Approved]	10.16	0.06	E18	Party wall between dwellings
	13.11	0.16	P1	Ground floor
	13.11	0	P2	Intermediate floor within a dwelling
	13.11	0.24	P4	Roof (insulation at ceiling level)

Ventilation:

Pressure test: Yes (As designed)

66.59

Ventilation: Natural ventilation (extract fans)

Number of chimneys: 0
Number of open flues: 0
Number of fans: 3
Number of passive stacks: 0
Number of sides sheltered: 2
Pressure test: 5

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

Database: (rev 485, product index 017956) Efficiency: Winter 87.3 % Summer: 90.5

Brand name: Ideal Model: LOGIC COMBI Model qualifier: ESP1 30

(Combi boiler)

Systems with radiators

Central heating pump: 2013 or later Design flow temperature: Unknown

Boiler interlock: Yes

Main heating Control:

Main heating Control: Programmer, room thermostat and TRVs

Control code: 2106

Secondary heating system:

Secondary heating system: None

Water heating

Water heating: From main heating system

N/A

SAP Input

Water code: 901 Fuel :mains gas No hot water cylinder Solar panel: False

Others:

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

Low energy lights: 100%

Terrain type: Low rise urban / suburban

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

		User	Details:					
Assessor Name: Software Name:	Demi Beneke Stroma FSAP 2012		Strom Softwa				027754 n: 1.0.5.50	
		Propert	y Address	: Plot 11				
Address:	Plot 11							
1. Overall dwelling dimens	sions:							
		Ar	ea(m²)	_	Av. Heigl	ht(m)	Volume(m ³	<u>')</u>
Ground floor			33.7	(1a) x	2.42	(2a) =	81.55	(3a)
First floor			33.7	(1b) x	2.66	(2b) =	89.64	(3b)
Total floor area TFA = (1a)	+(1b)+(1c)+(1d)+(1e)+	(1n)	67.4	(4)				
Dwelling volume				(3a)+(3b)+(3c)+(3d)+((3e)+(3n) =	171.2	(5)
2. Ventilation rate:								
	main secor heating heati		other		total		m³ per hou	ır
Number of chimneys	0 + 0		0] = [0	x 40 =	0	(6a)
Number of open flues	0 + 0	+	0	Ī = [0	x 20 =	0	(6b)
Number of intermittent fans	;			- Ī	3	x 10 =	30	(7a)
Number of passive vents				Ī	0	x 10 =	0	(7b)
Number of flueless gas fire	S			Ī	0	x 40 =	0	(7c)
				_				_
				_		_ ,	anges per ho	_
Infiltration due to chimneys If a pressurisation test has bee	•			oontinuo f	30	÷ (5) =	0.18	(8)
Number of storeys in the	•	oceea to (17,	i, otrierwise (conunue n	OIII (9) 10 (10)	<i>,</i> [0	(9)
Additional infiltration	dwelling (115)					[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.2	5 for steel or timber fram	e or 0.35 f	or mason	ry const	ruction	1(*) 1 *	0	(11)
	ent, use the value correspond			-		·		` ′
If suspended wooden flo	or, enter 0.2 (unsealed)	or 0.1 (sea	ıled), else	enter 0			0	(12)
If no draught lobby, enter	r 0.05, else enter 0						0	(13)
Percentage of windows a	and doors draught strippe	ed					0	(14)
Window infiltration			0.25 - [0.2	2 x (14) ÷ 1	100] =		0	(15)
Infiltration rate			(8) + (10)	+ (11) + (12) + (13) + (1	15) =	0	(16)
Air permeability value, q	50, expressed in cubic m	etres per l	nour per s	quare m	etre of env	elope area	5	(17)
If based on air permeability	value, then $(18) = [(17) \div 2]$	20]+(8), other	rwise (18) =	(16)			0.43	(18)
Air permeability value applies i	f a pressurisation test has bee	n done or a d	legree air pe	rmeability	is being used	1		_
Number of sides sheltered			(20) – 1	[0.075 v./:	10)1 —	•	2	(19)
Shelter factor			(20) = 1 -	•	[9]] =		0.85	(20)
Infiltration rate incorporatin	-		(21) = (18) x (20) =			0.36	(21)
Infiltration rate modified for		1	—			,, _		
		un Jul	Aug	Sep	Oct	Nov Dec		
Monthly average wind spee	ed from Table 7							

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor	(22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
Adjusted infil	tration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.46	0.45	0.44	0.4	0.39	0.34	0.34	0.33	0.36	0.39	0.41	0.42		
Calculate efforting		-	rate for t	he appli	cable ca	se						0	(23a)
If exhaust air			endix N, (2	(23a) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23b)
If balanced w									, , ,			0	(23c)
a) If baland	ed mech	anical ve	entilation	with hea	at recov	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)		(200)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If baland	ed mech	anical ve	ntilation	without	heat red	overy (N	ЛV) (24k	o)m = (22	2b)m + (23b)		•	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole if (22b)	house ex m < 0.5 >			•	•				5 × (23t	o)			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natura	l ventilation	on or wh	ole hous	se positiv	/e input	ventilatio	on from	loft				1	
if (22b)	m = 1, th	en (24d)	m = (221)	o)m othe	rwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]			,	
(24d)m = 0.61	0.6	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59		(24d)
Effective a			<u> </u>	^ `	_ ` 	´`		``		1		1	(0.7)
(25)m= 0.61	0.6	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59		(25)
3. Heat loss	es and he	eat loss p	paramete	er:									
3. Heat loss		SS	oaramete 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						K)			
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/	K)			kJ/K
ELEMENT Doors	Gros area oe 1	SS	Openin	gs	A ,r	m ² x x1/	W/m2	2K = [+ 0.04] = [(W/ 3.798	K)			kJ/K (26)
ELEMENT Doors Windows Typ	Gros area pe 1 pe 2	SS	Openin	gs	A ,r 2.11	m² x x1/	W/m2 1.8 [1/(1.31)·	2K = [+ 0.04] = [+ 0.04] = [3.798 1.19	K)			kJ/K (26) (27)
Doors Windows Typ	Gros area pe 1 pe 2 pe 3	SS	Openin	gs	A ,r 2.11 0.96	m² x x1/ x1/ x1/ x1/	W/m2 1.8 [1/(1.31)·	$= \begin{bmatrix} \\ +0.04 \end{bmatrix} = \begin{bmatrix} \\ +0.04 \end{bmatrix} = \begin{bmatrix} \\ +0.04 \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix}$	3.798 1.19 0.6	K)			kJ/K (26) (27) (27)
Doors Windows Typ Windows Typ Windows Typ	Gros area ne 1 ne 2 ne 3 ne 4	SS	Openin	gs	A ,r 2.11 0.96 0.48 3.17	m² x x x x x x x x x x x x x x x x x x x	W/m2 1.8 [1/(1.31)- [1/(1.31)- [1/(1.31)-	$ \begin{array}{ccc} 2K \\ & = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ \end{array} $	3.798 1.19 0.6 3.95	K)			kJ/K (26) (27) (27) (27)
Doors Windows Typ Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3 oe 4 oe 5	SS	Openin	gs	A ,r 2.11 0.96 0.48 3.17 0.92	m²	W/m ² 1.8 [1/(1.31)· [1/(1.31)· [1/(1.31)·	$ \begin{array}{ccc} 2K \\ & = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ \end{array} $	(W// 3.798 1.19 0.6 3.95 1.15	K)			kJ/K (26) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3 oe 4 oe 5	SS	Openin	gs	A ,r 2.11 0.96 0.48 3.17 0.92	m²	W/m ² 1.8 [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)·	$ \begin{array}{ccc} 2K \\ & = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ \end{array} $	(W/) 3.798 1.19 0.6 3.95 1.15 2.48	K)			kJ/K (26) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ	Gros area oe 1 oe 2 oe 3 oe 4 oe 5	ss (m²)	Openin	gs ²	A ,r 2.11 0.96 0.48 3.17 0.92 1.99	m²	W/m2 1.8 [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)·	$ \begin{array}{ccc} 2K \\ & = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ \end{array} $	(W/) 3.798 1.19 0.6 3.95 1.15 2.48	K)			kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Floor	Gros area De 1 De 2 De 3 De 4 De 5 De 6	ss (m²)	Openin m	gs ²	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7	m²	W/m ² 1.8 [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· 0.16	$ \begin{array}{ccc} 2K \\ &= [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ \end{array} $	(W/) 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Typ Windows Typ	Gros area on a 1 on a 2 on a 3 on a 4 on a 5 on a 6 on a 3	ss (m²)	Openin	gs ²	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97	m²	W/m ² 1.8 [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- 0.16 0.21	$ \begin{array}{ccc} 2K \\ &= [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ &= [] &= [] &= [\\ &= [\\ &= [\\ &= [] &= [\\ &= [\\ &= [] &= [] &= [\\ &= [] &= [] &= [\\ &= [] $	(W// 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392	K)			kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
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ELEMENT Doors Windows Typ Floor Walls Roof Total area of	Gros area De 1 De 2 De 3 De 4 De 5 De 6	59 7 7 ows, use e	Openin m 11.62 0	gs ₁ 2 2 indow U-ve	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 33.7 126.9 66.59 alue calcul	m²	W/m2 1.8 [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- 0.16 0.21 0.11	EK = [+ 0.04] = [= = [= = [(W/) 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392 10.07 3.71		kJ/m²-l		kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (30) (31)
ELEMENT Doors Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Windows Typ Floor Walls Roof Total area of Party wall * for windows are	Gros area De 1 De 2 De 3 De 4 De 5 De 6	ss (m²) 59 7 ows, use e sides of in	Openin m 11.62 0 offective winternal walk	gs ₁ 2 2 indow U-ve	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 33.7 126.9 66.59 alue calcul	m²	W/m2 1.8 [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- 0.16 0.21 0.11	$ \begin{array}{ccc} 2K & = & \\ + 0.04 & = & \\ + 0.04 & = & \\ + 0.04 & = & \\ + 0.04 & = & \\ + 0.04 & = & \\ + 0.04 & = & \\ = & & \\ = & & \\ = & & \\ - & & \\$	(W/) 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392 10.07 3.71		kJ/m²-l		kJ/K (26) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
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40)m= 1.21	1.21	1.2	1.19	1.19	1.17	1.17	1.17	1.18	1.19	1.19	1.2		
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if TFA > 1: if TFA £ 1: Annual averageduce the annual average the annual average that 1. Jan dot water usage 44)m= 94.6° Energy content 45)m= 140.3 Vater storage Storage volute for community Otherwise if Vater storage a) If manufate temperature	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per The period of hot water 3 122.71 s water heatiff 5 18.41 ge loss: ume (litres) y heating a no stored ge loss: acturer's defendance from water acturer's defendance from water	+ 1.76 x ater usage hot water person per Mar r day for each strong at point strong at point and no tall hot water eclared learn Table r storage eclared contact and strong at point strong a	ge in litre usage by day (all w Apr ach month 84.29 culated me 110.39 of use (no 16.56 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l	es per da 5% if the d rater use, h May Vd,m = fact 80.85 onthly = 4. 105.93 o hot water 15.89 olar or W relling, e reludes in or is known ear oss factor	ay Vd,av welling is not and co Jun ctor from 77.41 190 x Vd,r 91.41 r storage), 13.71 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 77.41 84.7 enter 0 in 12.71 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 80.85 07m / 3600 97.2 boxes (46) 14.58 within sa (47) ombi boil	+ 36 a water us Sep 84.29 b kWh/mor 98.36 c) to (61) 14.75 ame vess ers) ente	Oct 87.73 Total = Sunth (see Tail 114.63 Total = Sunth (17.19 Sel	9) 86 Nov 91.17 m(44) ₁₁₂ = ables 1b, 1 125.12 m(45) ₁₁₂ = 18.77	.01 Dec 94.61 = c, 1d) 135.87 = 20.38 0		(43 (44 (46 (47 (48 (49 (50
if TFA > 1: if TFA £ 1: Annual averageduce the average	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per le in litres pe	ater usage hot water person per Mar r day for ear 87.73 used - calcondition 126.62 ng at point 18.99 including and no talcondition 18.99 celared learn Table r storage eclared of a factor fr	ge in litre usage by day (all w Apr ach month 84.29 culated mo 110.39 of use (no 16.56 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d rater use, h May Vd,m = fact 80.85 onthly = 4. 105.93 o hot water 15.89 olar or W relling, e reludes in or is known ear oss factor	ay Vd,av welling is not and co Jun ctor from 77.41 190 x Vd,r 91.41 r storage), 13.71 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 77.41 84.7 enter 0 in 12.71 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 80.85 07m / 3600 97.2 boxes (46) 14.58 within sa (47) ombi boil	+ 36 a water us Sep 84.29 b kWh/mor 98.36 c) to (61) 14.75 ame vess ers) ente	Oct 87.73 Total = Sunth (see Tail 114.63 Total = Sunth (17.19 Sel	9) 86 Nov 91.17 m(44) ₁₁₂ = ables 1b, 1 125.12 m(45) ₁₁₂ = 18.77	.01 Dec 94.61 = c, 1d) 135.87 = 20.38 0		(43 (44 (45 (46 (47 (48 (49 (50
if TFA > 1: if TFA £ 1: Annual averageduce the averageduce ave	3.9, N = 1 3.9, N = 1 age hot wanual average 25 litres per 1 Feb 1 91.17 1 of hot water 3 122.71 2 water heating 4 heating a no stored ge loss: acturer's de factor from water	ater usage hot water person per Mar r day for ear 87.73 used - calc 126.62 126.62 18.99 including and no tale hot water hot water seclared lear storage eclared of a factor frace section ble 2a	ge in litre usage by day (all w Apr ach month 84.29 culated mo 110.39 of use (no 16.56 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder I om Tabl on 4.3	es per da 5% if the d rater use, h May Vd,m = fact 80.85 onthly = 4. 105.93 o hot water 15.89 olar or W relling, e reludes in or is known ear oss factor	ay Vd,av welling is not and co Jun ctor from 77.41 190 x Vd,r 91.41 r storage), 13.71 /WHRS nter 110 nstantar wn (kWh	erage = designed id) Jul Table 1c x 77.41 84.7 enter 0 in 12.71 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 80.85 07m / 3600 97.2 boxes (46) 14.58 within sa (47) ombi boil	+ 36 a water us Sep 84.29 b kWh/mor 98.36 c) to (61) 14.75 ame vess ers) ente	Oct 87.73 Total = Sunth (see Tail 114.63 Total = Sunth (17.19 Sel	9) 86 Nov 91.17 m(44) ₁₁₂ = ables 1b, 1 125.12 m(45) ₁₁₂ = 18.77	.01 Dec 94.61 = c, 1d) 135.87 = 20.38 0		(42 (43 (44 (45 (46 (47 (48 (49 (50 (51 (52

Energy lost from w	ater storage	≥ k\/\h/\/	ear			(47) x (51)) x (52) x (53) -		0	1	(54)
Enter (50) or (54)	_	z, KVVII/ y	cai			(47) X (31)) X (32) X (55) =		0 0		(55)
Water storage loss	` '	for each	month			((56)m = (55) × (41)ı	m		0		(00)
(56)m= 0 (-	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains ded	cated solar sto	rage, (57)	m = (56)m	x [(50) – ([H11)] ÷ (5	0), else (5	7)m = (56)	m where (l ix H	` '
(57)m= 0 (0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss	(annual) fro	om Table	∋ 3		•		•			0		(58)
Primary circuit loss				59)m =	(58) ÷ 36	65 × (41)	m				•	
(modified by fact	or from Tab	le H5 if t	here is s	solar wa	ter heati	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calcula	ted for each	n month ((61)m =	(60) ÷ 30	65 × (41)m						
(61)m= 14.62 13.	18 14.55	14.04	14.47	13.97	14.41	14.45	14.01	14.52	14.1	14.6		(61)
Total heat required	for water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 154.92 135	89 141.17	124.43	120.4	105.38	99.11	111.65	112.36	129.14	139.22	150.48		(62)
Solar DHW input calcul	ated using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add additional line	s if FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water	neater											
(64)m= 154.92 135	89 141.17	124.43	120.4	105.38	99.11	111.65	112.36	129.14	139.22	150.48		_
						Outp	out from wa	ater heate	r (annual)₁	12	1524.16	(64)
Heat gains from wa	iter heating	, kWh/m	onth 0.2	5 ´ [0.85	× (45)m	+ (61)m	n] + 0.8 x	(46)m	+ (57)m	+ (59)m	1	
								- '	` ,		-	
(65)m= 50.3 44.	09 45.74	40.22	38.84	33.89	31.77	35.93	36.21	41.74	45.13	48.83		(65)
(65)m= 50.3 44. include (57)m in		<u> </u>						41.74	45.13			(65)
	calculation	of (65)m	only if c					41.74	45.13			(65)
include (57)m in	calculation see Table !	of (65)m 5 and 5a	only if c					41.74	45.13			(65)
include (57)m in 5. Internal gains Metabolic gains (T	calculation see Table !	of (65)m 5 and 5a	only if c					41.74	45.13			(65)
include (57)m in 5. Internal gains Metabolic gains (T	calculation see Table (able 5), War	of (65)m and 5a	only if o	ylinder i	s in the	dwelling	or hot w	41.74 ater is fr	45.13 rom com	munity h		(65)
include (57)m in 5. Internal gains Metabolic gains (T Jan F	calculation see Table 5 able 5), Wa b Mar 88 130.88	of (65)m 5 and 5a tts Apr 130.88	only if c): May 130.88	Jun 130.88	Jul 130.88	Aug 130.88	or hot w	41.74 ater is fr	45.13 com com	munity h		
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130	calculation see Table (able 5), Wa eb Mar 88 130.88 culated in A	of (65)m 5 and 5a tts Apr 130.88	only if c): May 130.88	Jun 130.88	Jul 130.88	Aug 130.88	or hot w	41.74 ater is fr	45.13 com com	munity h		
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calc	calculation see Table (able 5), War b Mar 88 130.88 culated in A 53 32.96	of (65)m of (65)m of and 5a tts Apr 130.88 ppendix 24.95	only if construction only if c	Jun 130.88 ion L9 o	Jul 130.88 r L9a), a	Aug 130.88 Iso see	Sep 130.88 Table 5 29.68	41.74 ater is fr Oct 130.88	45.13 rom com Nov 130.88	Dec		(66)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calc (67)m= 45.63 40.	calculation see Table 5 able 5), Wa ab Mar 88 130.88 culated in A 53 32.96 calculated in	of (65)m of (65)m of and 5a tts Apr 130.88 ppendix 24.95	only if construction only if c	Jun 130.88 ion L9 o	Jul 130.88 r L9a), a	Aug 130.88 Iso see	Sep 130.88 Table 5 29.68	41.74 ater is fr Oct 130.88	45.13 rom com Nov 130.88	Dec		(66)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calc (67)m= 45.63 40 Appliances gains (calculation see Table (able 5), Wa ab Mar 88 130.88 culated in A 53 32.96 calculated in 27 280.81	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Appendix 264.92	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03	Jul 130.88 r L9a), a 17.01 13 or L1 213.44	Aug 130.88 Iso see 22.12 3a), also 210.48	Sep 130.88 Table 5 29.68 See Tal 217.94	41.74 ater is fr Oct 130.88 37.69 ole 5 233.82	45.13 rom com Nov 130.88	Dec 130.88		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calc (67)m= 45.63 40 Appliances gains ((68)m= 285.31 288	calculation see Table (able 5), War b Mar 88 130.88 culated in A 53 32.96 calculated ii 27 280.81 culated in A	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Appendix 264.92	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03	Jul 130.88 r L9a), a 17.01 13 or L1 213.44	Aug 130.88 Iso see 22.12 3a), also 210.48	Sep 130.88 Table 5 29.68 See Tal 217.94	41.74 ater is fr Oct 130.88 37.69 ole 5 233.82	45.13 rom com Nov 130.88	Dec 130.88		(66) (67)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calc (67)m= 45.63 40 Appliances gains ((68)m= 285.31 288 Cooking gains (calc (69)m= 50.27 50	calculation see Table 5 able 5), Wa ab Mar 88 130.88 culated in A 53 32.96 calculated ii 27 280.81 culated in A 27 50.27	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Append 264.92 ppendix 50.27	only if construction only in construction only in construction only in c	Jun 130.88 ion L9 o 15.75 uation L 226.03	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a	Aug 130.88 Iso see 22.12 3a), also 210.48	Sep 130.88 Table 5 29.68 See Tal 217.94 ee Table	41.74 ater is fr Oct 130.88 37.69 ole 5 233.82 5	45.13 rom com Nov 130.88 43.99	Dec 130.88 46.9		(66) (67) (68)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (cale (67)m= 45.63 40 Appliances gains ((68)m= 285.31 288 Cooking gains (cale	calculation see Table (able 5), Wa able 5), Wa able 130.88 culated in A able 27 280.81 culated in A able 5), Wa able 5), Wa able 5), Wa able 6 able 6 able 6 able 7 able 6 able 7 able	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Append 264.92 ppendix 50.27	only if construction only in construction only in construction only in c	Jun 130.88 ion L9 o 15.75 uation L 226.03	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a	Aug 130.88 Iso see 22.12 3a), also 210.48	Sep 130.88 Table 5 29.68 See Tal 217.94 ee Table	41.74 ater is fr Oct 130.88 37.69 ole 5 233.82 5	45.13 rom com Nov 130.88 43.99	Dec 130.88 46.9		(66) (67) (68)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (cale (67)m= 45.63 40 Appliances gains ((68)m= 285.31 288 Cooking gains (cale (69)m= 50.27 50 Pumps and fans gains (70)m= 3	calculation see Table 5 able 5), Wa ab Mar 88 130.88 culated in A 53 32.96 calculated in A culated in A culat	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Appendix 264.92 ppendix 50.27 5a) 3	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03 tion L15 50.27	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a 50.27	Aug 130.88 Iso see 22.12 3a), also 210.48), also se 50.27	Sep 130.88 Table 5 29.68 See Tai 217.94 ee Table 50.27	41.74 ater is fr Oct 130.88 37.69 ble 5 233.82 5 50.27	45.13 rom com Nov 130.88 43.99 253.87	Dec 130.88 46.9 272.72		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calc (67)m= 45.63 40 Appliances gains ((68)m= 285.31 288 Cooking gains (calc (69)m= 50.27 50 Pumps and fans gains	calculation see Table sable 5), Wareb Mar 88 130.88 sulated in A 53 32.96 calculated in A 27 280.81 culated in A 27 50.27 sins (Table sation (negan	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Appendix 264.92 ppendix 50.27 5a) 3	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03 tion L15 50.27	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a 50.27	Aug 130.88 Iso see 22.12 3a), also 210.48), also se 50.27	Sep 130.88 Table 5 29.68 See Tai 217.94 ee Table 50.27	41.74 ater is fr Oct 130.88 37.69 ble 5 233.82 5 50.27	45.13 rom com Nov 130.88 43.99 253.87	Dec 130.88 46.9 272.72		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (T Jan F	calculation see Table (able 5), Wa ab Mar 88 130.88 sulated in A 53 32.96 calculated in A 27 280.81 culated in A 27 50.27 tins (Table 1 3 ation (negative 26 -87.26	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 n Append 264.92 ppendix 50.27 5a) 3 ttive valu	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03 tion L15 50.27	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a 50.27	Aug 130.88 Iso see 22.12 3a), also 210.48), also se 50.27	Sep 130.88 Table 5 29.68 See Tal 217.94 ee Table 50.27	41.74 ater is fr Oct 130.88 37.69 ble 5 233.82 5 50.27	45.13 rom com Nov 130.88 43.99 253.87 50.27	Dec 130.88 46.9 272.72 50.27		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calc (67)m= 45.63 40 Appliances gains ((68)m= 285.31 288 Cooking gains (calc (69)m= 50.27 50 Pumps and fans gains (70)m= 3 3 Losses e.g. evaporations	calculation see Table 5 able 5), War ab Mar 88 130.88 culated in A 53 32.96 calculated in A 27 280.81 culated in A 27 50.27 tins (Table 5) ation (nega 26 -87.26 s (Table 5)	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 n Append 264.92 ppendix 50.27 5a) 3 ttive valu	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03 tion L15 50.27	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a 50.27	Aug 130.88 Iso see 22.12 3a), also 210.48), also se 50.27	Sep 130.88 Table 5 29.68 See Tal 217.94 ee Table 50.27	41.74 ater is fr Oct 130.88 37.69 ble 5 233.82 5 50.27	45.13 rom com Nov 130.88 43.99 253.87 50.27	Dec 130.88 46.9 272.72 50.27		(66) (67) (68) (69)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calc (67)m= 45.63 40 Appliances gains ((68)m= 285.31 288 Cooking gains (calc (69)m= 50.27 50 Pumps and fans gains (70)m= 3 3 Losses e.g. evapor (71)m= -87.26 -87 Water heating gains (72)m= 67.61 65	calculation see Table shable 5), Wareb Mar 88 130.88 sulated in A 53 32.96 calculated in A 27 280.81 culated in A 27 50.27 sins (Table shape) 3 ation (negation (negat	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Appendix 50.27 5a) 3 ttive valu -87.26	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03 tion L15 50.27 3 ble 5) -87.26	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a 50.27	Aug 130.88 Iso see 22.12 3a), also 210.48), also se 50.27	Sep 130.88 Table 5 29.68 2 see Tal 217.94 ee Table 50.27	41.74 ater is fr Oct 130.88 37.69 ble 5 233.82 5 50.27 3 -87.26	45.13 om com Nov 130.88 43.99 253.87 50.27 3 -87.26	Dec 130.88 46.9 272.72 50.27 3		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calcomic gains) (calcomic gai	calculation see Table (able 5), Wa able 5), Wa able 5), Wa able 6 alculated in A able 27 280.81 culated in A able 7 50.27 ation (negation (ne	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Appendix 50.27 5a) 3 ttive valu -87.26	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03 tion L15 50.27 3 ble 5) -87.26	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a 50.27	Aug 130.88 Iso see 22.12 3a), also 210.48), also se 50.27	Sep 130.88 Table 5 29.68 See Tal 217.94 ee Table 50.27	41.74 ater is fr Oct 130.88 37.69 ble 5 233.82 5 50.27 3 -87.26	45.13 om com Nov 130.88 43.99 253.87 50.27 3 -87.26	Dec 130.88 46.9 272.72 50.27 3		(66) (67) (68) (69) (70)
include (57)m in 5. Internal gains Metabolic gains (T Jan F (66)m= 130.88 130 Lighting gains (calcomposition (67)m= 45.63 40.00 Appliances gains (calcomposition (68)m= 285.31 288 Cooking gains (calcomposition (69)m= 50.27 50.00 Pumps and fans gain (70)m= 3 3 3 Losses e.g. evaporation (71)m= -87.26 -87 Water heating gain (72)m= 67.61 65.00 Total internal gain	calculation see Table (able 5), Wa able 5), Wa able 5), Wa able 6 alculated in A able 27 280.81 culated in A able 7 50.27 ation (negation (ne	of (65)m 5 and 5a tts Apr 130.88 ppendix 24.95 Appendix 264.92 ppendix 50.27 5a) 3 tive valu -87.26	only if construction only if c	Jun 130.88 ion L9 o 15.75 uation L 226.03 tion L15 50.27 3 ole 5) -87.26	Jul 130.88 r L9a), a 17.01 13 or L1 213.44 or L15a 50.27	Aug 130.88 Iso see 22.12 3a), also 210.48), also se 50.27 3	Sep 130.88 Table 5 29.68 See Tal 217.94 ee Table 50.27	41.74 ater is fr Oct 130.88 37.69 ble 5 233.82 5 50.27 3 -87.26 56.11 70)m + (7	45.13 om com Nov 130.88 43.99 253.87 50.27 3 -87.26 62.68 1)m + (72)	Dec 130.88 46.9 272.72 50.27 3 -87.26 65.63 m		(66) (67) (68) (69) (70) (71)

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

	Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southeast 0.9x	0.77	X	0.96	x	36.79	x	0.71	x	1.11	=	19.31	(77)
Southeast 0.9x	0.77	X	0.48	x	36.79	x	0.71	x	1.11	j =	9.66	(77)
Southeast 0.9x	0.77	X	1.99	x	36.79	х	0.71	х	1.11] =	40.03	(77)
Southeast 0.9x	0.77	X	0.96	x	62.67	x	0.71	x	1.11] =	32.89	(77)
Southeast 0.9x	0.77	X	0.48	x	62.67	х	0.71	х	1.11] =	16.45	(77)
Southeast 0.9x	0.77	X	1.99	x	62.67	X	0.71	X	1.11	=	68.18	(77)
Southeast 0.9x	0.77	X	0.96	x	85.75	x	0.71	X	1.11	=	45.01	(77)
Southeast 0.9x	0.77	X	0.48	x	85.75	x	0.71	x	1.11	=	22.5	(77)
Southeast 0.9x	0.77	X	1.99	x	85.75	x	0.71	x	1.11	=	93.29	(77)
Southeast 0.9x	0.77	X	0.96	x	106.25	x	0.71	x	1.11	=	55.76	(77)
Southeast 0.9x	0.77	X	0.48	x	106.25	x	0.71	x	1.11	=	27.88	(77)
Southeast 0.9x	0.77	X	1.99	x	106.25	x	0.71	x	1.11	=	115.59	(77)
Southeast 0.9x	0.77	X	0.96	x	119.01	x	0.71	x	1.11	=	62.46	(77)
Southeast 0.9x	0.77	X	0.48	X	119.01	X	0.71	X	1.11	=	31.23	(77)
Southeast 0.9x	0.77	X	1.99	x	119.01	x	0.71	x	1.11	=	129.48	(77)
Southeast 0.9x	0.77	X	0.96	X	118.15	X	0.71	X	1.11	=	62.01	(77)
Southeast 0.9x	0.77	X	0.48	X	118.15	X	0.71	X	1.11	=	31	(77)
Southeast 0.9x	0.77	X	1.99	X	118.15	x	0.71	x	1.11	=	128.54	(77)
Southeast 0.9x	0.77	X	0.96	X	113.91	X	0.71	X	1.11	=	59.78	(77)
Southeast 0.9x	0.77	X	0.48	X	113.91	X	0.71	X	1.11	=	29.89	(77)
Southeast 0.9x	0.77	X	1.99	x	113.91	x	0.71	x	1.11	=	123.93	(77)
Southeast 0.9x	0.77	X	0.96	X	104.39	X	0.71	X	1.11	=	54.79	(77)
Southeast 0.9x	0.77	X	0.48	x	104.39	X	0.71	X	1.11	=	27.39	(77)
Southeast 0.9x	0.77	X	1.99	x	104.39	X	0.71	X	1.11	=	113.57	(77)
Southeast 0.9x		X	0.96	X	92.85	X	0.71	X	1.11	=	48.73	(77)
Southeast 0.9x	0.77	X	0.48	x	92.85	x	0.71	X	1.11	=	24.37	(77)
Southeast 0.9x	0.77	X	1.99	x	92.85	X	0.71	X	1.11	=	101.02	(77)
Southeast 0.9x	0.77	X	0.96	x	69.27	X	0.71	X	1.11	=	36.35	(77)
Southeast 0.9x	0.77	X	0.48	X	69.27	x	0.71	X	1.11] =	18.18	(77)
Southeast 0.9x	0.77	X	1.99	x	69.27	x	0.71	X	1.11	=	75.36	(77)
Southeast 0.9x	0.77	X	0.96	x	44.07	x	0.71	x	1.11	=	23.13	(77)
Southeast 0.9x	0.77	X	0.48	x	44.07	x	0.71	x	1.11	=	11.56	(77)
Southeast 0.9x	0.77	X	1.99	X	44.07	X	0.71	X	1.11	=	47.95	(77)
Southeast 0.9x	0.77	X	0.96	X	31.49	X	0.71	X	1.11	=	16.53	(77)
Southeast 0.9x	0.77	X	0.48	x	31.49	X	0.71	X	1.11	=	8.26	(77)
Southeast 0.9x		X	1.99	x	31.49	x	0.71	X	1.11	=	34.26	(77)
Northwest 0.9x		X	3.17	x	11.28	x	0.71	X	1.11	=	19.55	(81)
Northwest 0.9x		X	0.92	x	11.28	x	0.71	x	1.11] =	5.67	(81)
Northwest 0.9x	0.77	X	1.99	X	11.28	X	0.71	X	1.11] =	12.28	(81)

Temperature Utilisation fac	•				_			ole 9,	Th1	(°C)				21	(85)
7. Mean inter			L				000.47	L 314	.55	7 00.02	U-11.1	307.27	J 57 1.01		(७५)
Total gains – ir (84) m= 601.94	1ternal a	nd sola 770.48	r (84)i 867.		_	(83)m 930.99	, watts 886.47	814	.95	736.52	647.7	587.27	571.81	7	(84)
(83)m= 106.5	193.86	298.34	425.			545.25	516.41	437	.16	341.71	223.18	129.83	89.67	_	(83)
Solar gains in v			1					r i		m(74)m		1		7	
TYOTH I WEST U.9X	0.77	x		1.99	X		9.21	X		0.71	X	1.11	=	10.02	(81)
Northwest 0.9x	0.77	×		0.92	」× □ ▼		9.21]		0.71	」 × □	1.11	=	4.63	(81)
Northwest 0.9x	0.77	×		3.17	X		9.21	X		0.71	X	1.11	=	15.97	(81)
Northwest 0.9x	0.77	×		1.99	X		14.2	X		0.71	X	1.11	=	15.45	(81)
Northwest 0.9x	0.77	×		0.92	X		14.2	X		0.71	X	1.11	=	7.14	(81)
Northwest 0.9x	0.77	×		3.17	×		14.2	X		0.71	X	1.11	=	24.6	(81)
Northwest 0.9x	0.77	×		1.99	X	2	8.07	x		0.71	X	1.11	=	30.54	(81)
Northwest 0.9x	0.77	х		0.92	×	2	8.07	x		0.71	x	1.11	=	14.12	(81)
Northwest 0.9x	0.77	×		3.17	x	2	8.07	x		0.71	X	1.11	=	48.64	(81)
Northwest 0.9x	0.77	×		1.99	x	5	0.42	x		0.71	X	1.11	=	54.85	(81)
Northwest 0.9x	0.77	×		0.92	X	5	0.42	X		0.71	X	1.11	=	25.36	(81)
Northwest _{0.9x}	0.77	х		3.17	x	5	0.42	x		0.71	X	1.11	=	87.38	(81)
Northwest 0.9x	0.77	х		1.99	X	7	2.63	x		0.71	X	1.11	=	79.01	(81)
Northwest 0.9x	0.77	×		0.92	x	7	2.63	x		0.71	X	1.11	=	36.53	(81)
Northwest 0.9x	0.77	×		3.17	X	7	2.63	x		0.71	x	1.11	_ =	125.87	(81)
Northwest 0.9x	0.77	×		1.99	×		91.1	x		0.71	X	1.11	=	99.11	(81)
Northwest 0.9x	0.77	x		0.92	i x		91.1	X		0.71	X	1.11		45.82	(81)
Northwest 0.9x	0.77	x		3.17	╡ x		91.1	X		0.71	X	1.11	=	157.88	(81)
Northwest 0.9x	0.77			1.99	ا ا		7.38]]		0.71	」 기 x	1.11	= =	105.95	(81)
Northwest 0.9x	0.77	x		0.92	^ x		7.38) ^] _X		0.71]	1.11	= =	48.98	(81)
Northwest 0.9x	0.77	^		3.17	^ x		7.38] ^] _x		0.71	」 ^ x	1.11	\dashv	168.77	(81)
Northwest 0.9x	0.77	x		1.99	d x x		1.35] x] x		0.71	」 × □ x	1.11	=	99.38	(81)
Northwest 0.9x	0.77	×		3.17	」× ¬		1.35]		0.71	」 × ¬ 、	1.11	_ =	158.31	(81)
Northwest 0.9x	0.77	×		1.99	」× ¬		7.96] X] _v		0.71	」 × ¬ 、	1.11	╡ -	73.93	(81)
Northwest 0.9x	0.77	×		0.92	X		7.96	X		0.71	X	1.11	_ =	34.18	(81)
Northwest 0.9x	0.77	×		3.17	」 ×		7.96	X 1		0.71	X	1.11	_ =	117.77	(81)
Northwest 0.9x	0.77	×		1.99	」 ×		1.38	X 1		0.71	」 ×	1.11	=	45.02	(81)
Northwest 0.9x	0.77	×		0.92	X		1.38	X		0.71	X	1.11	=	20.81	(81)
Northwest 0.9x	0.77	×		3.17	_ X		1.38	X		0.71	X	1.11	=	71.71	(81)
Northwest 0.9x	0.77	×		1.99	X	2	2.97	X		0.71	X	1.11	=	24.99	(81)
Northwest 0.9x	0.77	×		0.92	X	2	2.97	X		0.71	X	1.11	=	11.55	(81)
Northwest 0.9x	0.77		_	3.17	╡		2.97] 		0.71	X	1.11	=	39.8	(81)

(86)m=	0.99	0.98	0.95	0.87	0.72	0.53	0.39	0.44	0.69	0.92	0.98	0.99		(86)
Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Table	e 9c)					
(87)m=	19.94	20.12	20.39	20.71	20.91	20.98	21	20.99	20.95	20.67	20.25	19.91		(87)
Temp	erature	during h	neating p	eriods ir	rest of	dwelling	from Ta	ble 9, Ti	h2 (°C)					
(88)m=	19.91	19.91	19.92	19.93	19.93	19.94	19.94	19.94	19.94	19.93	19.93	19.92		(88)
Utilisa	ation fac	tor for g	ains for	rest of d	welling, l	h2,m (se	e Table	9a)						
(89)m=	0.99	0.97	0.94	0.84	0.66	0.45	0.3	0.34	0.6	0.88	0.97	0.99		(89)
Mean	interna	l temper	ature in	the rest	of dwelli	ng T2 (f	ollow ste	eps 3 to 7	7 in Tabl	e 9c)		•		
(90)m=	18.97	19.15	19.41	19.71	19.88	19.94	19.94	19.94	19.91	19.69	19.29	18.95		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.27	(91)
Mean	interna	l temper	ature (fo	r the wh	ole dwe	llina) = fl	LA × T1	+ (1 – fL	.A) × T2			'		_
(92)m=	19.23	19.41	19.67	19.98	20.15	20.22	20.22	20.22	20.19	19.95	19.55	19.2		(92)
Apply	adjustr	nent to t	he mear	internal	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m=	19.23	19.41	19.67	19.98	20.15	20.22	20.22	20.22	20.19	19.95	19.55	19.2		(93)
			uirement											
			ternal ter or gains	•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
uie ui	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa			ains, hm	•	iviay	Ouri	<u> </u>	7.09	ОСР	001	1101	_ D00		
(94)m=	0.98	0.97	0.93	0.84	0.67	0.47	0.32	0.37	0.63	0.88	0.97	0.99		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (84	4)m	Į.	ļ.				<u> </u>	ļ.		
(95)m=	591.63	663.55	718.83	728.47	631.47	437.43	285.37	299.88	460.33	572.64	568.42	563.89		(95)
Montl	hly aver	age exte	rnal tem	perature	from Ta	able 8							1	
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
		r	an intern			1	T		<u> </u>	ī				(07)
		1180.74			675.31	443.4	286.08	301.25	482.89	747.22	999.52	1211.32		(97)
(98)m=	466.62	347.55	ement fo 260.56	114.35	32.62	/vn/mon	$\ln = 0.02$	24 X [(97))m – (95 0	129.89	310.39	481.69		
(00)=	100.02	017.00	200.00	111.00	02.02			, i	l per year			l	2143.67	(98)
Space	o hoatin	a roquir	ement in	k\Mb/m²	2/voor			. 0.0	po. you.	(,) ca.	<i>)</i> ••••••(•	715,512		」` ☐(99)
·		•											31.81	
			nts – Indi	vidual h	eating sy	ystems ı	ncluding	micro-C	CHP)					
•	e heating	_	at from s	econdar	v/supple	mentary	svstem						0	(201)
	-		at from m			momany	-	(202) = 1 -	- (201) =				1	(202)
	•		ng from	-	` ,			(204) = (2	, ,	(203)] =			1	(204)
			ace heat	-				(201) – (2	02) X [1	(200)] -				(206)
	-					a ovetom	n 0/						90.5	╡
EIIICI			ry/suppl					I	<u> </u>		Ι	1	0	(208)
0 -	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
Space	e heatin 466.62	g require 347.55	ement (c 260.56	alculate	32.62	0	0	0	0	129.89	310.39	481.69		
(044)		<u> </u>							U	129.09	310.38	401.09		(04.1)
(211)m	า = {[(98 515.61)m x (20 384.03	(4)] } x 1	00 ÷ (20 126.35	36.04	0	0	0	0	143.52	342.97	532.25		(211)
	313.01	304.03	201.81	120.33	50.04	L "	l ^o		l (kWh/yea				2368.69	(211)
									, ,,,,,,	,	r 15,1012		2000.03	١,=٠٠,

= {[(98)m x (201)] } x 100 ÷ (208)	h/month			_				_	,	
(215)m= 0 0 0 0	0	0	0	0	0	0	0	0		_
				Tota	l (kWh/yea	ar) =Sum(2	215) _{15,101}	2=	0	(215
Water heating	ahaya)									
Output from water heater (calculated 154.92 135.89 141.17 124.4		105.38	99.11	111.65	112.36	129.14	139.22	150.48]	
Efficiency of water heater	_!	l	<u> </u>	<u> </u>		l	l	<u> </u>	87.3	(216)
(217)m= 89.68 89.58 89.35 88.8	87.96	87.3	87.3	87.3	87.3	88.88	89.48	89.72		(217)
Fuel for water heating, kWh/month $(219)m = (64)m \times 100 \div (217)m$										
(219)m= 172.74 151.7 158 140.1	2 136.88	120.71	113.53	127.89	128.71	145.31	155.58	167.72]	
				Tota	I = Sum(2	19a) ₁₁₂ =			1718.9	(219)
Annual totals						k'	Wh/yeaı	r	kWh/yeaı	
Space heating fuel used, main system	n 1								2368.69	╛
Water heating fuel used									1718.9	
Electricity for pumps, fans and electricity	c keep-ho	t								
central heating pump:								30]	(230
boiler with a fan-assisted flue								45]	(230
Total electricity for the above, kWh/ye	ear			sum	of (230a).	(230g) =			75	(231)
										_
Electricity for lighting									322.33	(232)
Electricity for lighting Total delivered energy for all uses (2)	11)(221)	+ (231)	+ (232).	(237b)	=				322.33 4484.91	(232)
		+ (231)	+ (232).	(237b)	=					╡
Total delivered energy for all uses (2				(237b)	=	Fuel P	rice		4484.91	╡
Total delivered energy for all uses (2		Fu		(237b)	=	Fuel P (Table				╡
Total delivered energy for all uses (2		Fu kW	el	(237b)	=		12)	x 0.01 =	4484.91 Fuel Cost £/year	╡
Total delivered energy for all uses (2 10a. Fuel costs - individual heating		Fu kW	el /h/year	(237b)	=	(Table	12)	x 0.01 = x 0.01 =	4484.91 Fuel Cost £/year	(338)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1		Fu kW (21:	el /h/year	(237b)	=	(Table	12)		4484.91 Fuel Cost £/year 82.43	(338)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2		Fu kW (21:	el /h/year 1) x 3) x 5) x	(237b)	=	(Table 3.4	12)	x 0.01 =	4484.91 Fuel Cost £/year 82.43	(240)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary		Fu kW (21) (21)	el /h/year 1) x 3) x 5) x	(237b)	=	(Table 3.4 0 13.	12)	x 0.01 = x 0.01 =	4484.91 Fuel Cost £/year 82.43 0	(240)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to	systems:	Fu kW (21 (21) (21) (23) eparately	el /h/year 1) x 3) x 5) x 9) 1)			(Table 3.4 0 13. 13. 13. 13. 13. 13. 13. 13. 13. 13.	12) 8 19 18 19 ce accor	x = 0.01 = 0.001 = 0	4484.91 Fuel Cost £/year 82.43 0 0 59.82 9.89	(240) (241) (242) (247) (249)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting	o (230g) se	Fu kW (21: (21: (21: (21: (23:	el /h/year 1) x 3) x 5) x 9) 1)			(Table 3.4 0 13. 13. 13. 13. 13. 13. 13. 13. 13. 13.	12) 8 19 19 19 10 ce accor	x 0.01 = x 0.01 = x 0.01 = x 0.01 =	4484.91 Fuel Cost £/year 82.43 0 0 59.82 9.89	(240) (241) (242) (247)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to	o (230g) se	Fu kW (21 (21) (21) (23) eparately	el /h/year 1) x 3) x 5) x 9) 1)			(Table 3.4 0 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	12) 8 19 19 19 10 ce accor	x = 0.01 = 0.001 = 0	4484.91 Fuel Cost £/year 82.43 0 0 59.82 9.89 Table 12a	(240) (241) (242) (247) (249)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 1 Appendix Q items: repeat lines (253)	o (230g) se	Fu kW (21) (21) (21) (23) eparately (23)	el /h/year 1) x 3) x 5) x 9) 1) y as app			(Table 3.4 0 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	12) 8 19 19 19 10 ce accor	x = 0.01 = 0.001 = 0	4484.91 Fuel Cost £/year 82.43 0 59.82 9.89 Table 12a 42.51	(240) (241) (242) (247) (249) (250) (251)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 1 Appendix Q items: repeat lines (253) Total energy cost	o (230g) so 2) and (254) (245)(Fu kW (21) (21) (21) (23) eparately (23)	el /h/year 1) x 3) x 5) x 9) 1) y as app	licable a		(Table 3.4 0 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	12) 8 19 19 19 10 ce accor	x = 0.01 = 0.001 = 0	4484.91 Fuel Cost £/year 82.43 0 59.82 9.89 Table 12a 42.51	(240) (241) (242) (247) (249) (250) (251)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 1 Appendix Q items: repeat lines (253)	o (230g) so 2) and (254) (245)(Fu kW (21) (21) (21) (23) eparately (23)	el /h/year 1) x 3) x 5) x 9) 1) y as appl	licable a		(Table 3.4 0 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	12) 8 19 19 19 10 ce accor	x = 0.01 = 0.001 = 0	4484.91 Fuel Cost £/year 82.43 0 59.82 9.89 Table 12a 42.51 120	(240) (241) (242) (247) (249) (250) (251)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 1 Appendix Q items: repeat lines (253) Total energy cost	o (230g) so 2) and (254) (245)(Fu kW (21) (21) (21) (23) eparately (23)	el /h/year 1) x 3) x 5) x 9) 1) y as appl	licable a		(Table 3.4 0 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	12) 8 19 19 19 10 ce accor	x = 0.01 = 0.001 = 0	4484.91 Fuel Cost £/year 82.43 0 59.82 9.89 Table 12a 42.51 120	(240) (241) (242) (242) (247) (249) (250) (251)
Total delivered energy for all uses (2 10a. Fuel costs - individual heating Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to Energy for lighting Additional standing charges (Table 1 Appendix Q items: repeat lines (253) Total energy cost 11a. SAP rating - individual heating	o (230g) so 2) and (254) (245)(Fu kW (21) (21) (23) (23) eparately (23) as need	el /h/year 1) x 3) x 5) x 9) 1) y as appl	licable a		(Table 3.4 0 13. 13. 13. 14. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15	12) 8 19 19 19 10 ce accor	x = 0.01 = 0.001 = 0	4484.91 Fuel Cost £/year 82.43 0 0 59.82 9.89 Table 12a 42.51 120 314.66	(240) (241) (242) (247) (249) (250)

12a. CO2 emissions – Individual heating system	s including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216 =	511.64 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	371.28 (264)
Space and water heating	(261) + (262) + (263) + (264) =	=	882.92 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	167.29 (268)
Total CO2, kg/year	SU	um of (265)(271) =	1089.13 (272)
CO2 emissions per m ²	(2	72) ÷ (4) =	16.16 (273)
EI rating (section 14)			87 (274)
El rating (section 14) 13a. Primary Energy			87 (274)
· ,	Energy kWh/year	Primary factor	P. Energy kWh/year
· ,	3 7	•	P. Energy
13a. Primary Energy	kWh/year	factor	P. Energy kWh/year
13a. Primary Energy Space heating (main system 1)	kWh/year (211) x	factor =	P. Energy kWh/year 2889.8 (261)
13a. Primary Energy Space heating (main system 1) Space heating (secondary)	kWh/year (211) x (215) x	factor = 1.22 = 1.22 = 1.22 = 1.22	P. Energy kWh/year 2889.8 (261) 0 (263)
13a. Primary Energy Space heating (main system 1) Space heating (secondary) Energy for water heating	kWh/year (211) x (215) x (219) x	factor = 1.22 = 1.22 = 1.22 = 1.22	P. Energy kWh/year 2889.8 (261) 0 (263) 2097.05 (264)
Space heating (main system 1) Space heating (secondary) Energy for water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	factor = 1.22 = 1.22 = 1.22 = 1.22 = 1.22	P. Energy kWh/year 2889.8 (261) 0 (263) 2097.05 (264) 4986.86 (265)

 $(272) \div (4) =$

Primary energy kWh/m²/year

(273)

92.09

				- (- 1 -						
			User D	etails:						
Assessor Name:	Demi Beneke				a Num				027754	
Software Name:	Stroma FSAP				are Ve			Versio	n: 1.0.5.50	
A dalvage :	Plot 11	Pr	operty <i>i</i>	Address	: Plot 11					
Address: 1. Overall dwelling dimer										
1. Overall awelling aimer	iolorio.		Area	a(m²)		Av. Hei	aht(m)		Volume(m³))
Ground floor				33.7	(1a) x		42	(2a) =	81.55	(3a)
First floor			3	33.7	(1b) x	2.	66	(2b) =	89.64	(3b)
Total floor area TFA = (1a	ı)+(1b)+(1c)+(1d)-	+(1e)+(1n)) 6	67.4	(4)					
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)+	(3n) =	171.2	(5)
2. Ventilation rate:										
	main heating	secondary heating	′	other		total			m³ per houi	r
Number of chimneys	0		+	0	=	0	х	40 =	0	(6a)
Number of open flues	0	0] + [0	= [0	x	20 =	0	(6b)
Number of intermittent far	ns					3	х	10 =	30	(7a)
Number of passive vents					Ī	0	x	10 =	0	(7b)
Number of flueless gas fir	es				Ī	0	x	40 =	0	(7c)
					_			Air ch	anges per ho	
Infiltration due to chimney	e flues and fans	- (6a)+(6b)+(7a	n)+(7h)+(7	7c) =	Г			ı		(8)
If a pressurisation test has be	•				continue fr	30 rom (9) to (16)	÷ (5) =	0.18	(6)
Number of storeys in th	e dwelling (ns)								0	(9)
Additional infiltration							[(9))-1]x0.1 =	0	(10)
Structural infiltration: 0.3	25 for steel or tim	ber frame or	0.35 for	mason	ry consti	ruction			0	(11)
if both types of wall are pre deducting areas of opening		orresponding to	the greate	er wall are	ea (after					
If suspended wooden fl	- :	sealed) or 0.1	l (seale	d), else	enter 0				0	(12)
If no draught lobby, ent	er 0.05, else ente	r 0							0	(13)
Percentage of windows	and doors draugl	nt stripped						•	0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	100] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13) +	- (15) =		0	(16)
Air permeability value, o	q50, expressed in	cubic metres	per ho	ur per s	quare m	etre of e	nvelope	area	5	(17)
If based on air permeabili	ty value, then (18)	$= [(17) \div 20] + (8)$, otherwi	se (18) =	(16)				0.43	(18)
Air permeability value applies		at has been done	or a deg	ree air pe	ermeability	is being us	sed			_
Number of sides sheltered	d			(00)	10.075 (4	10)]			2	(19)
Shelter factor					[0.075 x (′	19)] =			0.85	(20)
Infiltration rate incorporati				(21) = (18	3) x (20) =				0.36	(21)
Infiltration rate modified for	 	1 1	- 1			<u> </u>		_		
Jan Feb	Mar Apr M	lay 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

4.3

4.5

4.7

(22)m=

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		
· · · · ·		<u> </u>		<u> </u>	<u> </u>	!	!		<u> </u>	!			
Adjusted infiltr						i ´	`	ì '			0.40		
0.46 Calculate effe	0.45 Ctive air	0.44 change r	0.4 ate for t	0.39 he appli	0.34 cable ca	0.34 ise	0.33	0.36	0.39	0.41	0.42		
If mechanica		-										0	(23a)
If exhaust air h	eat pump	using Appe	endix N, (2	(23a) = (23a	a) × Fmv (e	equation (I	N5)) , othe	rwise (23b) = (23a)			0	(23b)
If balanced with	h heat reco	overy: effici	ency in %	allowing f	or in-use f	actor (fron	n Table 4h	n) =				0	(23c)
a) If balance	ed mech	anical ve	ntilation	with he	at recov	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (I	MV) (24k	m = (22)	2b)m + (23b)		ı	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole h				-	-				F (00)				
		k (23b), tl	•			· ` `	í `	í –	<u> </u>	ŕ		1	(24c)
(=)	0		0	0	0	0	0	0	0	0	0		(240)
d) If natural if (22b)n		on or wno en (24d)ı		•	•				0.51				
(24d)m= 0.61	0.6	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59		(24d)
Effective air	change	rate - en	ter (24a) or (24k	o) or (24	c) or (24	d) in bo	x (25)	<u> </u>	!	ļ		
(25)m= 0.61	0.6	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.58	0.59		(25)
· ·													
3. Heat losse	s and he	eat loss r	aramet	er:									
3. Heat losse ELEMENT	s and he				Net Ar	ea	U-val	ue	AXU		k-value)	ΑΧk
3. Heat losse ELEMENT		SS	oarameto Openin m	gs	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	gs		m²							
ELEMENT	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
ELEMENT Doors	Gros area	SS	Openin	gs	A ,r	m² x x1/	W/m2	2K = [+ 0.04] = [(W/ 3.798				kJ/K (26)
ELEMENT Doors Windows Type	Gros area e 1	SS	Openin	gs	A ,r 2.11	m² x x1/	W/m2 1.8 /[1/(1.31)·	2K = [+ 0.04] = [+ 0.04] = [3.798 1.19				kJ/K (26) (27)
Doors Windows Type Windows Type	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 2.11 0.96	m² x x1/ x1/ x1/ x1/	W/m2 1.8 /[1/(1.31)- /[1/(1.31)-	$ = \begin{bmatrix} \\ +0.04 \end{bmatrix} = \begin{bmatrix} \\ +0.04 \end{bmatrix} = \begin{bmatrix} \\ +0.04 \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix} $	3.798 1.19 0.6				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 2.11 0.96 0.48 3.17	m² x x1/ x1/ x1/	W/m2 1.8 [1/(1.31)· [1/(1.31)·	$ \begin{array}{ccc} 2K \\ & = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ \end{array} $	3.798 1.19 0.6 3.95				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 2.11 0.96 0.48 3.17 0.92	m²	W/m ² 1.8 [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)·	$ \begin{array}{ccc} 2K \\ & = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ + 0.04] = [\\ \end{array} $	(W// 3.798 1.19 0.6 3.95				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	SS	Openin	gs	A ,r 2.11 0.96 0.48 3.17 0.92	m²	W/m ² 1.8 [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)·	$ 2K \\ = [+ 0.04] = [+ 0.04$	(W// 3.798 1.19 0.6 3.95 1.15 2.48				kJ/K (26) (27) (27) (27) (27) (27)
Doors Windows Type	Gros area e 1 e 2 e 3 e 4	ss (m²)	Openin	gs ₁ 2	A ,r 2.11 0.96 0.48 3.17 0.92 1.99	m²	W/m2 1.8 [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)-	$ 2K \\ = [+ 0.04] = [+ 0.04$	(W/) 3.798 1.19 0.6 3.95 1.15 2.48				kJ/K (26) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type Windows Type Windows Type Windows Type Windows Type Windows Type Floor	Gros area e 1 e 2 e 3 e 4 e 5 e 6	ss (m²)	Openin m	gs ₁ 2	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7	m ²	W/m ² 1.8 [1/(1.31): [1/(1.31): [1/(1.31): [1/(1.31): [1/(1.31): [1/(1.31): [1/(1.31):	2K = [+ 0.04] = [(W/) 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392				kJ/K (26) (27) (27) (27) (27) (27) (27) (27)
ELEMENT Doors Windows Type Wi	Gros area 1 2 2 2 3 4 4 5 5 6 6 59.5	ss (m²)	Openin	gs ₁ 2	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 47.97	m ²	W/m ² 1.8 [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)·] 0.16	2K = [+ 0.04] = [= = [(W// 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
ELEMENT Doors Windows Type Floor Walls Roof	Gros area 1 2 2 2 3 4 4 5 5 6 6 59.5	ss (m²)	Openin	gs ₁ 2	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97	m ²	W/m ² 1.8 [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)· [1/(1.31)·] 0.16	2K = [+ 0.04] = [= = [(W// 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392				kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29)
ELEMENT Doors Windows Type Tloor Walls Roof Total area of e Party wall * for windows and	Gros area e 1 e 2 e 3 e 4 e 5 e 6 59.5 elements	59 7 7 5, m ²	Openin m 11.6. 0	gs ₁ 2 2 indow U-ve	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 33.7 126.9 66.59 alue calcul	m²	W/m2 1.8 [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- 0.16 0.21 0.11	2K = [+ 0.04] = [= = [= = [(W/) 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392 10.07 3.71	k)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (30) (31)
ELEMENT Doors Windows Type Tloor Walls Roof Total area of e Party wall * for windows and ** include the area	Gros area e 1 e 2 e 3 e 4 e 5 e 6 59.5 lelements	59 7 5, m ² sides of in	Openin m 11.6. 0 ffective with ternal wall	gs ₁ 2 2 indow U-ve	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 33.7 126.9 66.59 alue calcul	m²	W/m2 1.8 [1/(1.31): [1/(1.	2K	(W/) 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392 10.07 3.71	k)	kJ/m²-l		kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Tloor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los	Gros area e 1 e 2 e 3 e 4 e 5 e 6 59.5 lelements droof wind as on both as on both as s, W/K =	59 7 5, m ² sows, use ensides of in = S (A x	Openin m 11.6. 0 ffective with ternal wall	gs ₁ 2 2 indow U-ve	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 33.7 126.9 66.59 alue calcul	m²	W/m2 1.8 [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- [1/(1.31)- 0.16 0.21 0.11	$2K = \begin{bmatrix} \\ + 0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ - \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix}$ $= \begin{bmatrix} \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix}$ $= \begin{bmatrix} \\ \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix}$ $= \begin{bmatrix} \\ \end{bmatrix}$	(W// 3.798 1.19 0.6 3.95 1.15 2.48 5.392 10.07 3.71 0 1e)+0.04] &	K)	kJ/m²-l	3.2	kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Tloor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los Heat capacity	Gros area e 1 e 2 e 3 e 4 e 5 e 6 59.5 Aroof winder as on both ss, W/K: Cm = S(59 7 6, m² sides of in = S (A x (A x k)	Openin m 11.6 0 ffective witernal wall U)	gs 2 2 Indow U-va Is and pan	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 126.9 66.59 alue calculatitions	m²	W/m2 1.8 [1/(1.31): [1/(1.	2K $= [$ $+ 0.04] = [$ $+ 0.04] = [$ $+ 0.04] = [$ $+ 0.04] = [$ $+ 0.04] = [$ $+ 0.04] = [$ $= [$ $= [$ $= [$ $//(1/U-valu)) + (32) = ((28))$	(W// 3.798 1.19 0.6 3.95 1.15 2.48 2.48 5.392 10.07 3.71 0 ue)+0.04] a	K)	kJ/m²-l	34.81	kJ/K (26) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
ELEMENT Doors Windows Type Tloor Walls Roof Total area of e Party wall * for windows and ** include the area Fabric heat los	Gros area e 1 e 2 e 3 e 4 e 5 e 6 59.5 A roof winder as on both as on both as on both as on both as parame	59 7 5, m² cows, use existes of in existes of in existes (A x k) eter (TMF)	Openin m 11.6 0 ffective with ternal wall U) P = Cm -	gs 2 Indow U-va Is and pan	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 126.9 66.59 alue calculatitions	m²	W/m ² 1.8 [1/(1.31): [1/(1.31): [1/(1.31): [1/(1.31): [1/(1.31): 0.16 0.21 0.11 0 g formula 1 (26)(30	2K $= [$ $+ 0.04] = [$ $+ 0.04] = [$ $+ 0.04] = [$ $+ 0.04] = [$ $+ 0.04] = [$ $+ 0.04] = [$ $= [$ $= [$ $= [$ $$	(W// 3.798 1.19 0.6 3.95 1.15 2.48 5.392 10.07 3.71 0 (e)+0.04] at tive Value	K)	kJ/m²·l paragraph(32e) =	3.2	kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)

can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K if details of thermal bridging are not known (36) = 0.05 x (31)	(36)
II details of thermal progring are not known (30) = 0.05 x (31)	,00)
Total fabric heat loss $(33) + (36) = 47.39$	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
(38)m= 34.25 34.01 33.79 32.71 32.51 31.58 31.58 31.4 31.94 32.51 32.92 33.34	(38)
Heat transfer coefficient, W/K (39)m = (37) + (38)m	
(39)m= 81.63 81.4 81.17 80.1 79.9 78.96 78.96 78.79 79.32 79.9 80.3 80.73	
Average = $Sum(39)_{112}/12=$ 80.1 (40)m = $(39)m \div (4)$	(39)
(40)m= 1.21 1.21 1.2 1.19 1.19 1.17 1.17 1.18 1.19 1.19 1.2	
Average = $Sum(40)_{112}/12=$ 1.19 Number of days in month (Table 1a)	(40)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
(41)m= 31 28 31 30 31 30 31 30 31 30 31 (41)m=	(41)
4. Water heating energy requirement: kWh/year:	
Assumed occupancy, N 2.18	(42)
Assumed occupancy, N $= 1 + 1.76 \times [1 - \exp(-0.000349 \times (TFA - 13.9)2)] + 0.0013 \times (TFA - 13.9)$ if TFA £ 13.9, N = 1	(42)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36	(43)
Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold)	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)	
(44)m= 94.61 91.17 87.73 84.29 80.85 77.41 77.41 80.85 84.29 87.73 91.17 94.61	
	(44)
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d)	,
(45)m= 140.3 122.71 126.62 110.39 105.93 91.41 84.7 97.2 98.36 114.63 125.12 135.87	
	(45)
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61)	
(46)m= 21.05 18.41 18.99 16.56 15.89 13.71 12.71 14.58 14.75 17.19 18.77 20.38 Water storage loss:	(46)
	(47)
If community heating and no tank in dwelling, enter 110 litres in (47)	,
Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47)	
Water storage loss:	
a) If manufacturer's declared loss factor is known (kWh/day):	(48)
Temperature factor from Table 2b 0	(49)
	(50)
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0	(51)
If community heating see section 4.3	,- 1/
	(52)
Temperature factor from Table 2b 0	(53)

Energy lost from	water s	storage	, kWh/ye	ear			(47) x (51)) x (52) x (5	53) =		0		(54)
Enter (50) or (54	4) in (55	5)									0		(55)
Water storage lo	ss calc	ulated f	or each	month			((56)m = (55) × (41)r	n				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains d	edicated	solar stor	age, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit lo	ss (ann	nual) fro	m Table	e 3							0		(58)
Primary circuit lo	ss calc	ulated f	or each	month (59)m = ((58) ÷ 36	55 × (41)	m					
(modified by fa	actor fro	m Tabl	e H5 if t	here is s	olar wat	er heatii	ng and a	cylinde	thermo	stat)		1	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calcu	ulated fo	or each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 14.62	13.18	14.55	14.04	14.47	13.97	14.41	14.45	14.01	14.52	14.1	14.6		(61)
Total heat requir	ed for w	vater he	eating ca	alculated	for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 154.92 1	35.89	141.17	124.43	120.4	105.38	99.11	111.65	112.36	129.14	139.22	150.48		(62)
Solar DHW input cal	culated us	sing Appe	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no solaı	contributi	ion to wate	er heating)	'	
(add additional li	nes if F	GHRS	and/or V	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water	er heate	er											
(64)m= 154.92 1	35.89	141.17	124.43	120.4	105.38	99.11	111.65	112.36	129.14	139.22	150.48		
•	•	•					Outp	out from wa	ater heate	r (annual) ₁	12	1524.16	(64)
Heat gains from	water h	eating,	kWh/mo	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n1 + 0 8 x	[(46)m	+ (57)m	+ (59)m	1	
						()	. (0.)	.,	ι ((10)111	. (0.)	. (00)	1	
(65)m= 50.3	44.09	45.74	40.22	38.84	33.89	31.77	35.93	36.21	41.74	45.13	48.83]	(65)
(65)m= 50.3 include (57)m			40.22	38.84	33.89	31.77	35.93	36.21	41.74	45.13	48.83		(65)
	in calcu	ulation o	40.22 of (65)m	38.84 only if c	33.89	31.77	35.93	36.21	41.74	45.13	48.83		(65)
include (57)m 5. Internal gain	in calcu	ulation o	40.22 of (65)m and 5a)	38.84 only if c	33.89	31.77	35.93	36.21	41.74	45.13	48.83		(65)
include (57)m	in calcu	ulation o	40.22 of (65)m and 5a)	38.84 only if c	33.89	31.77	35.93	36.21	41.74	45.13	48.83		(65)
include (57)m 5. Internal gain Metabolic gains Jan	in calcus (see Table 5	ulation of Table 5	40.22 of (65)m and 5a	38.84 only if c	33.89 ylinder i	31.77	35.93 dwelling	36.21 or hot w	41.74 ater is fr	45.13 om com	48.83 munity h		(65)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1	in calcus (see Table 5	lation of Table 5 5), Watt Mar 109.07	40.22 of (65)m and 5a ss Apr 109.07	38.84 only if control only if	33.89 ylinder is Jun 109.07	31.77 s in the o	35.93 dwelling Aug 109.07	36.21 or hot was	41.74 ater is fr	45.13 om com	48.83 munity h		
include (57)m 5. Internal gains Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c	in calcus (see Table 5	lation of Table 5 5), Watt Mar 109.07	40.22 of (65)m and 5a ss Apr 109.07	38.84 only if control only if	33.89 ylinder is Jun 109.07	31.77 s in the o	35.93 dwelling Aug 109.07	36.21 or hot was	41.74 ater is fr	45.13 om com	48.83 munity h		
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c) (67)m= 18.25	in calculate	Table 5 5), Watt Mar 109.07 ed in Ap	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98	38.84 only if c : May 109.07 L, equati 7.46	33.89 ylinder is Jun 109.07 ion L9 of	31.77 s in the o	35.93 dwelling Aug 109.07 lso see 8.85	36.21 or hot was Sep 109.07 Table 5	41.74 ater is fr Oct 109.07	45.13 om com Nov 109.07	48.83 munity h		(66)
include (57)m 5. Internal gains Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains	in calcus (See Table & Feb 109.07 alculate 16.21 s (calcu	Table 5 5), Watt Mar 109.07 ed in Ap	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98	38.84 only if c : May 109.07 L, equati 7.46	33.89 ylinder is Jun 109.07 ion L9 of	31.77 s in the o	35.93 dwelling Aug 109.07 lso see 8.85	36.21 or hot was Sep 109.07 Table 5	41.74 ater is fr Oct 109.07	45.13 om com Nov 109.07	48.83 munity h		(66)
include (57)m 5. Internal gains Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1	in calculate (Table \$ 109.07 alculate \$ (calculate 93.14	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14	40.22 of (65)m and 5a as Apr 109.07 pendix 9.98 Append 177.5	38.84 only if c : May 109.07 L, equati 7.46 dix L, eq 164.07	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01	35.93 dwelling Aug 109.07 lso see 8.85 3a), also	36.21 or hot was Sep 109.07 Table 5 11.87 see Tal 146.02	41.74 ater is fr Oct 109.07 15.08 ole 5 156.66	45.13 om com Nov 109.07	48.83 munity h		(66) (67)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c	in calculate (Table \$ 109.07 alculate \$ (calculate 93.14	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14	40.22 of (65)m and 5a as Apr 109.07 pendix 9.98 Append 177.5	38.84 only if c : May 109.07 L, equati 7.46 dix L, eq 164.07	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01	35.93 dwelling Aug 109.07 lso see 8.85 3a), also	36.21 or hot was Sep 109.07 Table 5 11.87 see Tal 146.02	41.74 ater is fr Oct 109.07 15.08 ole 5 156.66	45.13 om com Nov 109.07	48.83 munity h		(66) (67)
include (57)m 5. Internal gains Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91	in calculate (Table & Feb 109.07 alculate (calculate (salculate (s	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98 Append 177.5 opendix 33.91	38.84 only if c : May 109.07 L, equati 7.46 dix L, eq 164.07 L, equat	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a)	35.93 dwelling Aug 109.07 lso see 8.85 3a), also 141.02	36.21 or hot was Sep 109.07 Table 5 11.87 o see Table 146.02 ee Table	41.74 ater is fr Oct 109.07 15.08 ole 5 156.66 5	45.13 om com Nov 109.07	48.83 munity h Dec 109.07		(66) (67) (68)
include (57)m 5. Internal gains Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91 Pumps and fans	in calculate (Table & Feb 109.07 alculate (calculate (salculate (s	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98 Append 177.5 opendix 33.91	38.84 only if c : May 109.07 L, equati 7.46 dix L, eq 164.07 L, equat	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a)	35.93 dwelling Aug 109.07 lso see 8.85 3a), also 141.02	36.21 or hot was Sep 109.07 Table 5 11.87 o see Table 146.02 ee Table	41.74 ater is fr Oct 109.07 15.08 ole 5 156.66 5	45.13 om com Nov 109.07	48.83 munity h Dec 109.07		(66) (67) (68)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91 Pumps and fans (70)m= 3	in calculate (Table 5 Feb 109.07 alculate 16.21 s (calculate 33.91 gains (13 14 15 feb 109.07 feb 1	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91 Table 5	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98 Appendix 177.5 opendix 33.91 a) 3	38.84 only if colors May 109.07 L, equati 7.46 dix L, equati 164.07 L, equati 33.91	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a) 33.91	35.93 dwelling 109.07 lso see 8.85 3a), also 141.02 , also se 33.91	36.21 or hot was Sep 109.07 Table 5 11.87 o see Tale 146.02 ee Table 33.91	41.74 ater is fr Oct 109.07 15.08 ole 5 156.66 5 33.91	45.13 om com Nov 109.07 17.6	48.83 munity h Dec 109.07 18.76		(66) (67) (68) (69)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91 Pumps and fans (70)m= 3 Losses e.g. evap	in calculate (Table & Feb 109.07 alculate (16.21 93.14 calculate (1	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91 Table 5 3 (negat	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98 Appendix 177.5 opendix 33.91 a) 3	38.84 only if c): May 109.07 L, equati 7.46 dix L, eq 164.07 L, equati 33.91 3 es) (Tab	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5)	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a) 33.91	35.93 dwelling 109.07 lso see 8.85 3a), also 141.02 , also se 33.91	36.21 or hot was Sep 109.07 Table 5 11.87 o see Tale 146.02 ee Table 33.91	41.74 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91	45.13 om com Nov 109.07 17.6 170.1	48.83 munity h Dec 109.07 18.76 182.72		(66) (67) (68) (69)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91 Pumps and fans (70)m= 3 Losses e.g. evap (71)m= -87.26	in calculate (Table & Feb 109.07 alculate (16.21 93.14 calculate (1	Jation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91 Table 5 3 1 (negat -87.26	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98 Appendix 177.5 opendix 33.91 as ive valu	38.84 only if colors May 109.07 L, equati 7.46 dix L, equati 164.07 L, equati 33.91	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a) 33.91	35.93 dwelling 109.07 lso see 8.85 3a), also 141.02 , also se 33.91	36.21 or hot was Sep 109.07 Table 5 11.87 o see Tale 146.02 ee Table 33.91	41.74 ater is fr Oct 109.07 15.08 ole 5 156.66 5 33.91	45.13 om com Nov 109.07 17.6	48.83 munity h Dec 109.07 18.76		(66) (67) (68) (69) (70)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91 Pumps and fans (70)m= 3 Losses e.g. evap (71)m= -87.26 Water heating gains	in calculate (Table & Feb 109.07 alculate 16.21 alculate 33.91 gains (Table & Feb 109.07 alculate 16.21 alculat	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91 Table 5 3 (negat -87.26	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98 Appendix 33.91 ive valu -87.26	38.84 only if colors May 109.07 L, equati 7.46 dix L, equati 164.07 L, equati 33.91 3 es) (Tab	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5) -87.26	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a) 33.91 3	35.93 dwelling 109.07 lso see 8.85 3a), also 141.02 , also se 33.91	36.21 or hot was sep 109.07 Table 5 11.87 o see Table 146.02 ee Table 33.91 3	41.74 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91 3	45.13 om com Nov 109.07 17.6 170.1 33.91	48.83 munity h Dec 109.07 18.76 182.72 33.91		(66) (67) (68) (69) (70)
include (57)m 5. Internal gains Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91 Pumps and fans (70)m= 3 Losses e.g. evap (71)m= -87.26 - Water heating gains (72)m= 67.61	in calculate (Table & Feb 109.07 alculate (16.21 alculate (193.14 alculate	Jation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91 Table 5 3 1 (negat -87.26	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98 Appendix 177.5 opendix 33.91 as ive valu	38.84 only if c): May 109.07 L, equati 7.46 dix L, eq 164.07 L, equati 33.91 3 es) (Tab	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5) -87.26	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a) 33.91 3 -87.26	35.93 dwelling Aug 109.07 lso see 8.85 3a), also 141.02 , also se 33.91 3 -87.26	36.21 or hot was seep 109.07 Table 5 11.87 o see Tale 146.02 ee Table 33.91 3 -87.26	41.74 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91 3 -87.26	45.13 om com Nov 109.07 17.6 170.1 33.91 3	48.83 munity h Dec 109.07 18.76 182.72 33.91 3 -87.26		(66) (67) (68) (69) (70)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91 Pumps and fans (70)m= 3 Losses e.g. evap (71)m= -87.26 Water heating gains (72)m= 67.61 Total internal gains	in calculate (Table & Feb 109.07 alculate 16.21 s (calculate 133.91 gains (Table & Feb 109.07 s (calculate 134.91 gains (Table & Feb 136.62 s (calculate 136.62 s (calcula	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91 Table 5 3 (negat -87.26 able 5) 61.48	40.22 of (65)m and 5a and 5a as Apr 109.07 pendix 9.98 Appendix 33.91 a) 3 ive valu -87.26	38.84 only if co May 109.07 L, equati 7.46 dix L, equ 164.07 L, equati 33.91 3 es) (Tab -87.26	33.89 ylinder is Jun 109.07 fon L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5) -87.26 47.06 (66)	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a) 33.91 3 -87.26 42.7 m + (67)m	35.93 dwelling Aug 109.07 lso see 8.85 3a), also 141.02 0, also se 33.91 3 -87.26 48.29 0 + (68)m -	36.21 or hot was sep 109.07 Table 5 11.87 o see Table 33.91 3 -87.26 50.29 + (69)m + (41.74 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91 3 -87.26 56.11 70)m + (7	45.13 om com Nov 109.07 17.6 170.1 33.91 3 -87.26 62.68 1)m + (72)	48.83 munity h Dec 109.07 18.76 182.72 33.91 3 -87.26 65.63		(66) (67) (68) (69) (70) (71)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 109.07 1 Lighting gains (c (67)m= 18.25 Appliances gains (68)m= 191.15 1 Cooking gains (c (69)m= 33.91 Pumps and fans (70)m= 3 Losses e.g. evap (71)m= -87.26 Water heating gains (72)m= 67.61 Total internal gains	in calculate (Table & Feb 109.07 alculate 16.21 s (calculate 133.91 gains (Table & Feb 109.07 s (calculate 134.91 gains (Table & Feb 136.62 s (calculate 136.62 s (calcula	Ilation of Table 5 5), Watt Mar 109.07 ed in Ap 13.18 lated in 188.14 ed in Ap 33.91 Table 5 3 (negat -87.26	40.22 of (65)m and 5a as Apr 109.07 opendix 9.98 Appendix 33.91 ive valu -87.26	38.84 only if colors May 109.07 L, equati 7.46 dix L, equati 164.07 L, equati 33.91 3 es) (Tab	33.89 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5) -87.26	31.77 s in the o Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a) 33.91 3 -87.26	35.93 dwelling 109.07 lso see 8.85 3a), also 141.02 , also se 33.91 3	36.21 or hot was seep 109.07 Table 5 11.87 o see Tale 146.02 ee Table 33.91 3 -87.26	41.74 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91 3 -87.26	45.13 om com Nov 109.07 17.6 170.1 33.91 3	48.83 munity h Dec 109.07 18.76 182.72 33.91 3 -87.26		(66) (67) (68) (69) (70)

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

Orientation: Acces	s Factor 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southeast 0.9x 0	.77	x	0.96	x	36.79	x	0.71	x	1.11	=	19.31	(77)
Southeast 0.9x 0	.77	x	0.48	x	36.79	х	0.71	x	1.11	=	9.66	(77)
Southeast 0.9x 0	.77	x	1.99	x	36.79	х	0.71	x	1.11	=	40.03	(77)
Southeast 0.9x 0	.77	x	0.96	x	62.67	x	0.71	x	1.11] =	32.89	(77)
Southeast 0.9x 0	.77	x	0.48	x	62.67	х	0.71	x	1.11	=	16.45	(77)
Southeast 0.9x 0	.77	x	1.99	x	62.67	x	0.71	x	1.11	=	68.18	(77)
Southeast 0.9x 0	.77	x	0.96	x	85.75	x	0.71	x	1.11	=	45.01	(77)
Southeast 0.9x 0	.77	x	0.48	x	85.75	x	0.71	x	1.11	=	22.5	(77)
Southeast 0.9x 0	.77	x	1.99	x	85.75	x	0.71	x	1.11	=	93.29	(77)
Southeast 0.9x 0	.77	x	0.96	x	106.25	x	0.71	x	1.11	=	55.76	(77)
Southeast 0.9x 0	.77	x	0.48	x	106.25	x	0.71	x	1.11	=	27.88	(77)
Southeast 0.9x 0	.77	x	1.99	x	106.25	x	0.71	x	1.11	=	115.59	(77)
Southeast 0.9x 0	.77	x	0.96	x	119.01	x	0.71	x	1.11	=	62.46	(77)
Southeast 0.9x 0	.77	x	0.48	x	119.01	x	0.71	x	1.11	=	31.23	(77)
Southeast 0.9x 0	.77	x	1.99	x	119.01	x	0.71	x	1.11	=	129.48	(77)
Southeast 0.9x 0	.77	x	0.96	x	118.15	x	0.71	x	1.11	=	62.01	(77)
Southeast 0.9x 0	.77	x	0.48	x	118.15	x	0.71	x	1.11	=	31	(77)
Southeast 0.9x 0	.77	x	1.99	x	118.15	x	0.71	x	1.11	=	128.54	(77)
Southeast 0.9x 0	.77	x	0.96	x	113.91	x	0.71	x	1.11	=	59.78	(77)
Southeast 0.9x 0	.77	x	0.48	x	113.91	x	0.71	x	1.11	=	29.89	(77)
Southeast 0.9x 0	.77	x	1.99	x	113.91	x	0.71	x	1.11	=	123.93	(77)
Southeast 0.9x 0	.77	x	0.96	x	104.39	x	0.71	x	1.11	=	54.79	(77)
Southeast 0.9x 0	.77	x	0.48	x	104.39	X	0.71	x	1.11	=	27.39	(77)
Southeast 0.9x 0	.77	x	1.99	x	104.39	X	0.71	x	1.11	=	113.57	(77)
Southeast 0.9x 0	.77	x	0.96	X	92.85	X	0.71	X	1.11	=	48.73	(77)
Southeast 0.9x 0	.77	x	0.48	x	92.85	X	0.71	x	1.11	=	24.37	(77)
Southeast 0.9x 0	.77	x	1.99	X	92.85	X	0.71	X	1.11	=	101.02	(77)
Southeast 0.9x 0	.77	x	0.96	X	69.27	X	0.71	X	1.11	=	36.35	(77)
Southeast 0.9x 0	.77	x	0.48	x	69.27	X	0.71	X	1.11	=	18.18	(77)
Southeast 0.9x 0	.77	x	1.99	X	69.27	X	0.71	X	1.11	=	75.36	(77)
Southeast 0.9x 0	.77	x	0.96	X	44.07	x	0.71	X	1.11	=	23.13	(77)
Southeast 0.9x 0	.77	x	0.48	x	44.07	x	0.71	X	1.11	=	11.56	(77)
Southeast 0.9x 0	.77	x	1.99	x	44.07	X	0.71	X	1.11	=	47.95	(77)
Southeast 0.9x 0	.77	x	0.96	X	31.49	X	0.71	X	1.11	=	16.53	(77)
Southeast 0.9x 0	.77	x	0.48	x	31.49	x	0.71	x	1.11	=	8.26	(77)
Southeast 0.9x 0	.77	x	1.99	x	31.49	x	0.71	x	1.11	=	34.26	(77)
Northwest 0.9x 0	.77	x	3.17	x	11.28	x	0.71	x	1.11	=	19.55	(81)
Northwest 0.9x 0	.77	x	0.92	x	11.28	x	0.71	x	1.11	=	5.67	(81)
Northwest 0.9x 0	.77	x	1.99	X	11.28	×	0.71	X	1.11	=	12.28	(81)

N 4		_		_									
Northwest 0.9x	0.77	X	3.17	×	22	.97	X	0.71	×	1.11	=	39.8	(81)
Northwest 0.9x	0.77	X	0.92	X	22	.97	X	0.71	X	1.11	=	11.55	(81)
Northwest _{0.9x}	0.77	X	1.99	X	22	.97	X	0.71	×	1.11	=	24.99	(81)
Northwest 0.9x	0.77	X	3.17	X	41	.38	X	0.71	X	1.11	=	71.71	(81)
Northwest _{0.9x}	0.77	X	0.92	X	41	.38	X	0.71	X	1.11	=	20.81	(81)
Northwest _{0.9x}	0.77	X	1.99	X	41	.38	X	0.71	×	1.11	=	45.02	(81)
Northwest 0.9x	0.77	X	3.17	X	67	.96	X	0.71	X	1.11	=	117.77	(81)
Northwest _{0.9x}	0.77	X	0.92	X	67	.96	X	0.71	x	1.11	=	34.18	(81)
Northwest _{0.9x}	0.77	X	1.99	X	67	.96	X	0.71	X	1.11	=	73.93	(81)
Northwest 0.9x	0.77	X	3.17	X	91	.35	X	0.71	х	1.11	=	158.31	(81)
Northwest 0.9x	0.77	X	0.92	X	91	.35	X	0.71	X	1.11	=	45.94	(81)
Northwest _{0.9x}	0.77	X	1.99	X	91	.35	X	0.71	х	1.11	=	99.38	(81)
Northwest _{0.9x}	0.77	X	3.17	X	97	.38	X	0.71	X	1.11	=	168.77	(81)
Northwest 0.9x	0.77	X	0.92	X	97	.38	X	0.71	X	1.11	=	48.98	(81)
Northwest 0.9x	0.77	X	1.99	X	97	.38	X	0.71	X	1.11	=	105.95	(81)
Northwest _{0.9x}	0.77	x	3.17	X	9	1.1	x	0.71	х	1.11	=	157.88	(81)
Northwest _{0.9x}	0.77	X	0.92	X	9	1.1	X	0.71	X	1.11	=	45.82	(81)
Northwest _{0.9x}	0.77	x	1.99	x	9	1.1	x	0.71	x	1.11	=	99.11	(81)
Northwest _{0.9x}	0.77	x	3.17	X	72	.63	X	0.71	x	1.11	=	125.87	(81)
Northwest _{0.9x}	0.77	x	0.92	X	72	.63	X	0.71	x	1.11	=	36.53	(81)
Northwest _{0.9x}	0.77	x	1.99	x	72	.63	X	0.71	x	1.11	=	79.01	(81)
Northwest _{0.9x}	0.77	x	3.17	X	50	.42	х	0.71	x	1.11	=	87.38	(81)
Northwest _{0.9x}	0.77	x	0.92	X	50	.42	х	0.71	x	1.11	=	25.36	(81)
Northwest _{0.9x}	0.77	x	1.99	X	50	.42	х	0.71	×	1.11	=	54.85	(81)
Northwest _{0.9x}	0.77	x	3.17	x	28	.07	х	0.71	×	1.11	_ =	48.64	(81)
Northwest 0.9x	0.77	x	0.92	x	28	.07	х	0.71	×	1.11		14.12	(81)
Northwest _{0.9x}	0.77	x	1.99	x	28	.07	х	0.71	x	1.11		30.54	(81)
Northwest _{0.9x}	0.77	x	3.17	x	14	1.2	х	0.71	×	1.11		24.6	(81)
Northwest 0.9x	0.77	x	0.92	x	14	1.2	х	0.71	x	1.11	=	7.14	(81)
Northwest 0.9x	0.77	x	1.99	x	14	1.2	х	0.71	x	1.11	=	15.45	(81)
Northwest 0.9x	0.77	x	3.17	×	9.	21	х	0.71	×	1.11		15.97	(81)
Northwest 0.9x	0.77	x	0.92	x	9.	21	х	0.71	x	1.11	=	4.63	(81)
Northwest 0.9x	0.77	×	1.99	×	9.	21	х	0.71	x	1.11		10.02	(81)
_													
Solar gains in v	vatts, calcu	ılated	for each mo	onth			(83)m	= Sum(74)m	ı(82)ı	n			
(83)m= 106.5	193.86 29	98.34	425.12 526	5.79 5	45.25	516.41	437.	16 341.71	223.	18 129.83	89.67		(83)
Total gains – in	ternal and	solar	(84)m = (73)	s)m + (83)m ,	watts							
(84)m= 442.24	527.55 61	19.86	727.18 809	0.24 8	08.77	767.64	694.	.04 608.61	509.	75 438.92	415.5		(84)
7. Mean interr	nal tempera	ature (heating sea	son)									
Temperature		,	Ĭ	, i	area fr	om Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fact	or for gains	s for li	ving area, h	1,m (s	ee Tab	le 9a)							
Jan	Feb I	Mar	Apr N	lay	Jun	Jul	Αι	ug Sep	00	t Nov	Dec		
				•								_	

(86)m=	1	0.99	0.98	0.93	0.79	0.6	0.45	0.51	0.78	0.96	0.99	1		(86)
Mean	internal	temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	in Table	e 9c)				•	
(87)m=	19.73	19.91	20.21	20.59	20.86	20.97	20.99	20.99	20.9	20.53	20.06	19.7		(87)
Tempe	erature	during h	eating p	eriods ir	rest of	dwelling	from Ta	able 9, Ti	 h2 (°C)				•	
(88)m=	19.91	19.91	19.92	19.93	19.93	19.94	19.94	19.94	19.94	19.93	19.93	19.92		(88)
Utilisa	tion fac	tor for a	ains for	rest of d	wellina.	h2.m (se	e Table	9a)			•			
(89)m=	1	0.99	0.97	0.9	0.73	0.51	0.34	0.4	0.7	0.95	0.99	1		(89)
Mean	internal	temper	ature in	the rest	of dwelli	na T2 (fo	ollow ste	eps 3 to 7	7 in Tabl	e 9c)				
(90)m=	18.76	18.95	19.24	19.61	19.84	19.93	19.94	19.94	19.89	19.57	19.1	18.74		(90)
									f	LA = Livin	g area ÷ (4	4) =	0.27	(91)
Mean	internal	temper	ature (fo	r the wh	ole dwel	llina) = fl	LA × T1	+ (1 – fL	A) x T2			!		_
(92)m=	19.02	19.21	19.5	19.87	20.11	20.21	20.22	20.22	20.16	19.82	19.36	19		(92)
Apply	adjustn	nent to the	ne mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate	ļ.	ļ.		
(93)m=	19.02	19.21	19.5	19.87	20.11	20.21	20.22	20.22	20.16	19.82	19.36	19		(93)
8. Spa	ace hea	ting requ	uirement											
				•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
tne uti		Feb	or gains Mar			Jun	Jul	Λιια	Son	Oct	Nov	Doc		
_ L Itilisa	Jan tion fac		ains, hm	Apr	May	Jun	Jui	Aug	Sep	Oct	INOV	Dec		
(94)m=	0.99	0.99	0.97	0.9	0.75	0.53	0.37	0.43	0.72	0.94	0.99	1		(94)
` ′ L		hmGm .	W = (94	1)m x (84	L 4)m			<u> </u>			<u> </u>	<u> </u>		
г	439.98	521.21	599.53	653.39	603.45	432.43	284.64	298.35	438.77	480.68	434.18	413.91		(95)
Month	ıly avera	age exte	rnal tem	perature	from Ta	able 8							ı	
(96)m=	4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
		for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]			i	
(97)m=		1164.5	1055.39	878.89	672.32	442.87	286	301.08	480.6	736.87	984.38	1194.45		(97)
								 ` - ` - ` - ` - ` - ` - ` - ` - ` -)m – (95	í - `	 		I	
(98)m=	566.63	432.29	339.15	162.36	51.24	0	0	0	0	190.61	396.15	580.72		7(00)
								lota	l per year	(kWh/yeai	r) = Sum(9	8) _{15,912} =	2719.15	(98)
Space	e heating	g require	ement in	kWh/m²	² /year								40.34	(99)
9a. Ene	ergy req	uiremer	nts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
•	e heatin	_			ما مسمدار									7(204)
	•		it from so			mentary	-		(004)				0	(201)
	•		it from m	-	` ,			(202) = 1 -		,			1	(202)
			ng from	-				(204) = (204)	02) x [1 –	(203)] =			1	(204)
Efficie	ency of r	nain spa	ace heat	ing syste	em 1								90.5	(206)
Efficie	ncy of s	seconda	ry/suppl	ementar	y heating	g system	າ, %	_		_	_	_	0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space	i		ement (c										Ī	
	566.63	432.29	339.15	162.36	51.24	0	0	0	0	190.61	396.15	580.72		
(211)m	<u></u> -	<u> </u>	4)] } x 1	<u> </u>						1			1	(211)
	626.11	477.67	374.76	179.4	56.62	0	0	0	0	210.62	437.73	641.68		٦.
								Iota	l (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3004.58	(211)

Space heating fuel (secondary), kWh/month								
$= \{[(98) \text{m x } (201)]\} \text{ x } 100 \div (208)$			0	0			1	
(215)m= 0 0 0 0 0 0	0	0 Tota	0 I (kWh/yea	0 ar) =Sum(2	215)	0	0	(215)
Water heating			(,	,	715,1012		0	
Output from water heater (calculated above)								
154.92 135.89 141.17 124.43 120.4 105.38	99.11	111.65	112.36	129.14	139.22	150.48		7
Efficiency of water heater	1 07 0	07.0	07.0	00.40	00.05		87.3	(216)
(217)m= 89.79 89.71 89.54 89.08 88.23 87.3	87.3	87.3	87.3	89.18	89.65	89.82		(217)
Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m								
(219)m= 172.53 151.47 157.67 139.68 136.46 120.71	113.53	127.89	128.71	144.81	155.3	167.53		_
		Tota	I = Sum(21				1716.29	(219)
Annual totals Space heating fuel used, main system 1				k۱	Wh/year	•	kWh/year 3004.58	7
Water heating fuel used							1716.29]]
•							1710.29	_
Electricity for pumps, fans and electric keep-hot							1	,
central heating pump:						30		(230c)
boiler with a fan-assisted flue						45		(230e)
Total electricity for the above, kWh/year		sum	of (230a).	(230g) =			75	(231)
Electricity for lighting							322.33	(232)
Total delivered energy for all uses (211)(221) + (231)	+ (232).	(237b)	=				5118.2	(338)
12a. CO2 emissions – Individual heating systems incl	uding mi	cro-CHP)					
	ergy /h/year			Emiss kg CO	ion fac 2/kWh	tor	Emissions kg CO2/yea	ır
Space heating (main system 1) (21	1) x			0.2	16	=	648.99	(261)
Space heating (secondary) (21	5) x			0.5	19	=	0	(263)
Water heating (21)	9) x			0.2	16	=	370.72	(264)
Space and water heating (26	1) + (262)	+ (263) + (264) =				1019.71	(265)
Electricity for pumps, fans and electric keep-hot (23	1) x			0.5	19	=	38.93	(267)
Electricity for lighting (23)	2) x			0.5	19	=	167.29	(268)
, , ,								_
Total CO2, kg/year			sum o	f (265)(2	271) =		1225.92	(272)

El rating (section 14)

(274)

		User [Details:					
Assessor Name:	Demi Beneke		Stroma	Number:		STRO	027754	
Software Name:	Stroma FSAP 2012		Softwar	e Versior	า:	Versio	n: 1.0.5.50	
		Property	Address: F	Plot 11				
Address :	Plot 11							
1. Overall dwelling dime	nsions:	<u>.</u>	>	_				
Ground floor			a(m²)	Av. a) x	Height(m)	(2a) =	Volume(m³)	(3a)
					2.42] [81.55	_
First floor				b) x	2.66	(2b) =	89.64	(3b)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+	(1n)	67.4 (4)				
Dwelling volume			(;	3a)+(3b)+(3c)+	+(3d)+(3e)+	.(3n) =	171.2	(5)
2. Ventilation rate:								
	main secon heating heating	ndary ing	other	tota	al		m³ per hour	
Number of chimneys		0 +	0	=	0 x 4	10 =	0	(6a)
Number of open flues	0 +	0 +	0	=	0 x 2	20 =	0	(6b)
Number of intermittent far	ns			:	2 x 1	0 =	20	(7a)
Number of passive vents					0 x 1	0 =	0	(7b)
Number of flueless gas fir	res				0 x 4	10 =	0] (7c)
						L		_
						Air ch	anges per hou	ır
Infiltration due to chimney						÷ (5) =	0.12	(8)
	een carried out or is intended, p	roceed to (17),	otherwise cor	ntinue from (9)	to (16)	Г		٦
Number of storeys in the Additional infiltration	ie aweiling (ns)				[(0)	1]x0.1 =	0	(9)
	25 for steel or timber frar	no or 0 35 fo	r maconry	construction		1]XU.1 =	0	(10)
	esent, use the value correspon		-		11	l	0	<u>(11)</u>
	oor, enter 0.2 (unsealed)	or 0.1 (seal	ed), else er	nter 0		[0	(12)
If no draught lobby, ent	er 0.05, else enter 0					Ī	0	(13)
Percentage of windows	and doors draught stripp	oed				Ī	0	(14)
Window infiltration			0.25 - [0.2 x	(14) ÷ 100] =		Ì	0	(15)
Infiltration rate			(8) + (10) + ((11) + (12) + (1	13) + (15) =	Ī	0	(16)
Air permeability value,	q50, expressed in cubic r	netres per h	our per squ	are metre o	of envelope	area	5	(17)
If based on air permeabili	ty value, then (18) = [(17) ÷	20]+(8), otherw	vise (18) = (16	5)		Ì	0.37	(18)
Air permeability value applies	s if a pressurisation test has be	en done or a de	gree air perm	eability is bein	g used			_
Number of sides sheltere	d		(00)	(45)			2	(19)
Shelter factor			(20) = 1 - [0.			ļ	0.85	(20)
Infiltration rate incorporati	-		(21) = (18) x	(20) =			0.31	(21)
Infiltration rate modified for	or monthly wind speed	<u> </u>	1 1	<u> </u>				
Jan Feb	Mar Apr May	Jun Jul	Aug	Sep O	ct Nov	Dec		
Monthly average wind spe	eed from Table 7							

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

Wind Factor (22a)m =	(22)m ÷	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.4	0.39	0.38	0.34	0.34	0.3	0.3	0.29	0.31	0.34	0.35	0.37]	
Calculate effe		-	rate for t	ne appli	cable ca	ise						0	(23a)
If exhaust air h			endix N, (2	3b) = (23a	ı) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			0	(23b)
If balanced wit	h heat reco	overy: effic	iency in %	allowing f	or in-use f	actor (from	n Table 4h	n) =				0	(23c)
a) If balance	ed mecha	anical ve	entilation	with hea	at recov	ery (MVI	HR) (24a	a)m = (22	2b)m + (23b) × [1 – (23c)	÷ 100]	
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24a)
b) If balance	ed mech	anical ve	ntilation	without	heat red	covery (N	лV) (24k	o)m = (22	2b)m + (23b)		•	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24b)
c) If whole h	nouse ex m < 0.5 ×			•					.5 x (23t	o)			
(24c)m = 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural	ventilation	on or wh	ole hous	e positiv	/e input	ventilatio	on from	loft	!	•	•	J	
if (22b)	m = 1, the	en (24d)	m = (221)	o)m othe	rwise (2	24d)m =	0.5 + [(2	22b)m² x	0.5]			,	
(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			<u> </u>	<u> </u>	<u> </u>	ŕ `		x (25)				1	
(25)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]	(25)
3. Heat losse	es and he	at lose r	aramat	251									
		<i>at</i> 1033	Jaramen	∄.									
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²-		A X k kJ/K
ELEMENT Doors	Gros	SS	Openin	gs		m²							
	Gros area	SS	Openin	gs	A ,r	m² x	W/m2	2K = [(W/				kJ/K
Doors	Gros area e 1	SS	Openin	gs	A ,r	m ² x x 1/2	W/m2	2K = [- 0.04] = [(W/				kJ/K (26)
Doors Windows Typ	Gros area e 1 e 2	SS	Openin	gs	A ,r 2.11	m ² x x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1	W/m2 1 /[1/(1.4)+	2K = [-0.04] = [-0.04] = [2.11 1.27				kJ/K (26) (27)
Doors Windows Type Windows Type	Gros area e 1 e 2 e 3	SS	Openin	gs	A ,r 2.11 0.96	x10	W/m2 1 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] & = [\\ -0.04] & = [\\ -0.04] & = [\\ \end{array} $	2.11 1.27 0.64				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 2.11 0.96 0.48 3.17	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+		2.11 1.27 0.64 4.2				kJ/K (26) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4 e 5	SS	Openin	gs	A ,r 2.11 0.96 0.48 3.17 0.92	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = [\\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ \end{array} $	2.11 1.27 0.64 4.2 1.22				kJ/K (26) (27) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type	Gros area e 1 e 2 e 3 e 4 e 5	SS	Openin	gs	A ,r 2.11 0.96 0.48 3.17 0.92	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K \\ & = \begin{bmatrix} \\ -0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ -0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ -0.04 \end{bmatrix} = \begin{bmatrix} \\ \end{array} $	2.11 1.27 0.64 4.2 1.22 2.64				kJ/K (26) (27) (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	ss (m²)	Openin	gs ²	A ,r 2.11 0.96 0.48 3.17 0.92 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)+	$ \begin{array}{ccc} 2K \\ & = \begin{bmatrix} \\ -0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ -0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ -0.04 \end{bmatrix} = \begin{bmatrix} \\ \end{array} $	2.11 1.27 0.64 4.2 1.22 2.64 2.64				kJ/K (26) (27) (27) (27) (27) (27) (27)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type Windows Type Floor	Gros area e 1 e 2 e 3 e 4 e 5 e 6	ss (m²)	Openin m	gs ²	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7	m ²	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	2K = [- 0.04] = [2.11 1.27 0.64 4.2 1.22 2.64 2.64 4.381				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
Doors Windows Type Windows Type Windows Type Windows Type Windows Type Windows Type Floor Walls	Gros area e 1 e 2 e 3 e 4 e 5 e 6	ss (m²)	Openin	gs ²	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97	m ²	W/m2 1 /[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] = [= = [2.11 1.27 0.64 4.2 1.22 2.64 2.64 4.381 8.63				kJ/K (26) (27) (27) (27) (27) (27) (27) (28)
Doors Windows Type Floor Walls Roof	Gros area e 1 e 2 e 3 e 4 e 5 e 6	ss (m²)	Openin	gs ²	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97	x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2 x1/2	W/m2 1 /[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] = [= = [2.11 1.27 0.64 4.2 1.22 2.64 2.64 4.381 8.63				kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29)
Doors Windows Type Floor Walls Roof Total area of e Party wall * for windows and	Gros area e 1 e 2 e 3 e 4 e 5 e 6 59.5 elements	55 (m²) 69 7 , m²	Openin m 11.62 0	gs ² ndow U-ve	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 33.7 126.9 66.59 alue calcul	x10	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	2K = [- 0.04] =	2.11 1.27 0.64 4.2 1.22 2.64 2.64 4.381 8.63 4.38	k)	kJ/m²-	k	kJ/K (26) (27) (27) (27) (27) (27) (28) (29) (30) (31)
Doors Windows Type Floor Walls Roof Total area of e Party wall	Gros area e 1 e 2 e 3 e 4 e 5 e 6 59.5 33.1 elements	ss (m²) 69 7 7 ows, use e sides of in	Openin m 11.62 0 offective winternal walk	gs ² ndow U-ve	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 33.7 126.9 66.59 alue calcul	x1/2 x1/2 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	2K	2.11 1.27 0.64 4.2 1.22 2.64 2.64 4.381 8.63 4.38	k)	kJ/m²-	k	kJ/K (26) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
Doors Windows Type Floor Walls Roof Total area of e Party wall * for windows and ** include the are	Gros area e 1 e 2 e 3 e 4 e 5 e 6 59.5 elements d roof windows on both	iss (m²) ightarrows, use e sides of in a side of in a si	Openin m 11.62 0 offective winternal walk	gs ² ndow U-ve	A ,r 2.11 0.96 0.48 3.17 0.92 1.99 1.99 33.7 47.97 33.7 126.9 66.59 alue calcul	x1/2 x1/2 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4 x1/4	W/m2 1 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.13 0.18 0.13	2K	2.11 1.27 0.64 4.2 1.22 2.64 4.381 8.63 4.38	k)	kJ/m²-l	K	kJ/K (26) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
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entila	ition hea	at loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
3)m=	32.71	32.54	32.37	31.57	31.42	30.73	30.73	30.6	30.99	31.42	31.72	32.04	1	(;
eat tr	ansfer c	coefficier	nt, W/K			•			(39)m	= (37) + (37)	38)m		•	
9)m=	73.83	73.66	73.49	72.69	72.54	71.84	71.84	71.72	72.11	72.54	72.84	73.16]	
eat lo	oss para	meter (H	HLP), W/	m²K			•	•		Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	72.69	(
0)m=	1.1	1.09	1.09	1.08	1.08	1.07	1.07	1.06	1.07	1.08	1.08	1.09]	
ımbe	er of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁ .	12 /12=	1.08	(
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if TF if TF if TF if TF if TF if TF innua aduce t more t wate t wate t more t m	A > 13.9 A £ 13.9 I average the annual enthal 125 Jan 94.61 94.61 140.3 21.05 storage e volume munity how is eincompanie in content of annufact enthal entha	9, N = 1 9, N = 1 19, N = 1 19 hot was all average litres per properties per prop	ter usage hot water person per Mar day for ear 87.73 wsed - calc 126.62 mg at point 18.99 including and no talc hot water eclared less torage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 84.29 culated mo 110.39 of use (no 16.56 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the of water use, I May Vd,m = fact 80.85 onthly = 4. 105.93 o hot water 15.89 olar or W welling, e ncludes i or is known ar oss factor	ay Vd,av liwelling is that and co Jun ctor from 77.41 190 x Vd,r 91.41 r storage), 13.71 /WHRS enter 110 nstantar wn (kWh	rerage = designed old) Jul Table 1c x 77.41 84.7 enter 0 in 12.71 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 80.85 07m / 3600 97.2 boxes (46 14.58 within sa (47) ombi boil	+ 36 a water us Sep 84.29 0 kWh/mor 98.36 14.75 ame vess ers) ente	Oct 87.73 Total = Su 114.63 Total = Su 17.19 sel	9) 86 Nov 91.17 m(44) ₁₁₂ = ables 1b, 1 125.12 m(45) ₁₁₂ = 18.77	Dec 94.61 = c, 1d) 135.87 = 20.38		

Energy lost fro		_	, kWh/ye	ear			(47) x (51)) x (52) x (5	53) =		0		(54)
Enter (50) or (, ,	,									0		(55)
Water storage	loss cal	culated f	or each	month	-		((56)m = (55) × (41)r	n	•	,	1	
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains	dedicated	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	loss (an	inual) fro	m Table	3							0		(58)
Primary circuit				•	•	` '	, ,						
(modified by												l	(=a)
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 48.21	41.96	44.71	41.57	41.2	38.17	39.45	41.2	41.57	44.71	44.96	48.21		(61)
Total heat requ	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 188.51	164.67	171.33	151.96	147.13	129.58	124.15	138.39	139.92	159.33	170.08	184.09		(62)
Solar DHW input of	alculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	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	0		(63)
Output from wa	ater hea	ter											
(64)m= 188.51	164.67	171.33	151.96	147.13	129.58	124.15	138.39	139.92	159.33	170.08	184.09		
						•	Outp	out from wa	ater heate	r (annual)₁	12	1869.15	(64)
Heat gains fror	n water	hooting	k\N/h/m/	anth 0 2	5 ′ [O 95	(4E)m	. (04)	.1 . 0 0 .	. [/ 40\	. (57)	. (50)	1	
out ganto .ro.	II Water	nealing,	KVVII/III	JIIIII U.Z	ა [ს.ბა	× (45)111	ı + (61)m	າງ + ບ.ຮ x	(46)m	+ (57)m	+ (59)m	J	
(65)m= 58.7	51.29	53.28	47.1	45.52	39.94	38.02	42.62	43.1	49.29	+ (57)m 52.84	+ (59)m 57.23]	(65)
	51.29	53.28	47.1	45.52	39.94	38.02	42.62	43.1	49.29	52.84	57.23		(65)
(65)m= 58.7 include (57)r	51.29 n in calc	53.28 culation o	47.1 of (65)m	45.52 only if c	39.94	38.02	42.62	43.1	49.29	52.84	57.23		(65)
(65)m= 58.7 include (57)r 5. Internal ga	51.29 m in calc iins (see	53.28 culation of Table 5	47.1 of (65)m and 5a	45.52 only if c	39.94	38.02	42.62	43.1	49.29	52.84	57.23		(65)
(65)m= 58.7 include (57)r	51.29 m in calc iins (see	53.28 culation of Table 5	47.1 of (65)m and 5a	45.52 only if c	39.94	38.02	42.62 dwelling	43.1 or hot w	49.29	52.84 om com	57.23		(65)
include (57)r 5. Internal ga Metabolic gain	51.29 m in calc ins (see s (Table	53.28 culation of Table 5	47.1 of (65)m and 5a	45.52 only if c	39.94 ylinder i	38.02 s in the c	42.62	43.1	49.29 ater is fr	52.84	57.23 munity h		(65)
include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07	51.29 m in calcoins (see S (Table Feb 109.07	53.28 culation (care Table 5), Wat Mar 109.07	47.1 of (65)m of and 5a ts Apr 109.07	45.52 only if c : : : : : : : : : : : : : : : : : : :	39.94 ylinder is Jun 109.07	38.02 s in the c	42.62 dwelling Aug 109.07	43.1 or hot w Sep 109.07	49.29 ater is fr	52.84 om com	57.23 munity h		
include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains	51.29 m in calcolors (see S (Table Feb 109.07) (calculated)	53.28 culation of Table 5 Mar 109.07 ted in Ap	47.1 of (65)m and 5a ts Apr 109.07	45.52 only if c : May 109.07 L, equati	Jun 109.07	38.02 s in the o	42.62 dwelling Aug 109.07 lso see	43.1 or hot w Sep 109.07	49.29 ater is fr Oct 109.07	52.84 om com	57.23 munity h		
include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25	51.29 m in calcularins (see See Table Feb 109.07) (calcularing 16.21)	53.28 culation of Table 5 Mar 109.07 ted in Ap 13.18	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98	45.52 only if c : May 109.07 L, equati 7.46	39.94 ylinder is Jun 109.07 ion L9 of	38.02 s in the o	42.62 dwelling Aug 109.07 lso see 8.85	43.1 or hot w Sep 109.07 Table 5	49.29 ater is fr Oct 109.07	52.84 om com Nov 109.07	57.23 munity h		(66)
include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai	51.29 m in calconins (see s (Table Feb 109.07) (calculate 16.21) ns (calculate 16.21)	53.28 culation of Table 5 5), Wat Mar 109.07 ted in Ap 13.18 ulated in	47.1 of (65)m 6 and 5a ts Apr 109.07 ppendix 9.98 Append	45.52 only if c : May 109.07 L, equati 7.46 dix L, equ	Jun 109.07 ion L9 of 6.3 uation L	38.02 s in the o Jul 109.07 r L9a), a 6.81	42.62 dwelling Aug 109.07 lso see 8.85 3a), also	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal	49.29 ater is fr Oct 109.07	52.84 om com Nov 109.07	57.23 munity h		(66) (67)
include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15	51.29 m in calconins (see s (Table Feb 109.07) (calculate 16.21) ns (calculate 193.14)	53.28 culation of Table 5 Mar 109.07 ted in Ap 13.18 ulated in 188.14	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98 Appendix 177.5	45.52 only if c : May 109.07 L, equati 7.46 dix L, equali 164.07	39.94 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44	38.02 s in the o Jul 109.07 r L9a), a 6.81 13 or L1: 143.01	42.62 dwelling Aug 109.07 lso see 8.85 3a), also	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02	49.29 ater is fr Oct 109.07 15.08 ble 5 156.66	52.84 om com Nov 109.07	57.23 munity h		(66)
include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains	51.29 m in calculatins (see S (Table Feb 109.07) (calculatins (calculatins (calculatins))	53.28 culation of the Table 5	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98 a Append 177.5 opendix	45.52 only if c : May 109.07 L, equati 7.46 dix L, equati 164.07 L, equat	Jun 109.07 ion L9 o 6.3 uation L 151.44 ion L15	38.02 s in the o Jul 109.07 r L9a), a 6.81 13 or L1: 143.01 or L15a)	42.62 dwelling 109.07 lso see 8.85 3a), also 141.02	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table	49.29 ater is fr Oct 109.07 15.08 ole 5 156.66 5	52.84 om com Nov 109.07 17.6	57.23 munity h		(66) (67) (68)
include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91	51.29 m in calculatins (see S (Table Feb 109.07) (calculatins (calculatins (calculatins (calculatins 33.91)	53.28 culation of Table 5 for	47.1 of (65)m 6 and 5a ts Apr 109.07 opendix 9.98 Append 177.5 opendix 33.91	45.52 only if c : May 109.07 L, equati 7.46 dix L, equali 164.07	39.94 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44	38.02 s in the o Jul 109.07 r L9a), a 6.81 13 or L1: 143.01	42.62 dwelling Aug 109.07 lso see 8.85 3a), also	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02	49.29 ater is fr Oct 109.07 15.08 ble 5 156.66	52.84 om com Nov 109.07	57.23 munity h		(66) (67)
include (57)r include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91 Pumps and far	m in calconins (see s (Table Feb 109.07 (calcular 16.21 ns (calcular 193.14 (calcular 33.91 ns gains	53.28 culation of the Table 5	47.1 of (65)m and 5a ts Apr 109.07 opendix 9.98 Append 177.5 opendix 33.91 5a)	45.52 only if c : May 109.07 L, equati 7.46 dix L, equ 164.07 L, equati 33.91	Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91	38.02 s in the o Jul 109.07 r L9a), a 6.81 13 or L1: 143.01 or L15a) 33.91	42.62 dwelling 109.07 lso see 8.85 3a), also 141.02), also se 33.91	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table 33.91	49.29 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91	52.84 om com Nov 109.07 17.6 170.1	57.23 munity h		(66) (67) (68) (69)
include (57)r include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91 Pumps and far (70)m= 3	51.29 m in calculatins (see S (Table Feb 109.07) (calculatins (calculatins) (calculati	53.28 culation of the Table 5	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98 Append 177.5 opendix 33.91 oa 3	45.52 only if c May 109.07 L, equati 7.46 dix L, equ 164.07 L, equat 33.91	39.94 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91	38.02 s in the o Jul 109.07 r L9a), a 6.81 13 or L1: 143.01 or L15a)	42.62 dwelling 109.07 lso see 8.85 3a), also 141.02	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table	49.29 ater is fr Oct 109.07 15.08 ole 5 156.66 5	52.84 om com Nov 109.07 17.6	57.23 munity h		(66) (67) (68)
include (57)r include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91 Pumps and far (70)m= 3 Losses e.g. ev	51.29 m in calconins (see s (Table Feb 109.07) (calculate 16.21) ms (calculate 193.14) (calculate 33.91) ms gains 3 aporatio	53.28 culation of Table 5 Tabl	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98 Appendix 177.5 opendix 33.91 of sa) 3 tive value	45.52 only if c): May 109.07 L, equati 7.46 dix L, equ 164.07 L, equati 33.91 3 es) (Tab	39.94 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5)	38.02 S in the control of the contr	42.62 dwelling 109.07 lso see 8.85 3a), also 141.02), also se 33.91	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table 33.91	49.29 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91	52.84 om com Nov 109.07 17.6 170.1 33.91	57.23 munity h Dec 109.07 18.76 182.72		(66) (67) (68) (69) (70)
include (57)r include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91 Pumps and far (70)m= 3 Losses e.g. ev (71)m= -87.26	51.29 m in calculatins (see s (Table Feb 109.07) (calculatins (calculatins) (calculati	53.28 culation of the Table 5	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98 Append 177.5 opendix 33.91 oa 3	45.52 only if c May 109.07 L, equati 7.46 dix L, equ 164.07 L, equat 33.91	39.94 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91	38.02 s in the o Jul 109.07 r L9a), a 6.81 13 or L1: 143.01 or L15a) 33.91	42.62 dwelling 109.07 lso see 8.85 3a), also 141.02), also se 33.91	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table 33.91	49.29 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91	52.84 om com Nov 109.07 17.6 170.1	57.23 munity h		(66) (67) (68) (69)
include (57)r include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91 Pumps and far (70)m= 3 Losses e.g. ev (71)m= -87.26 Water heating	m in calcular sections (see se	53.28 culation of the Table 5	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98 Appendix 177.5 opendix 33.91 oa is	45.52 only if c): May 109.07 L, equati 7.46 dix L, equ 164.07 L, equat 33.91 3 es) (Tab	39.94 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5) -87.26	38.02 s in the of Jul 109.07 r L9a), a 6.81 13 or L1 143.01 or L15a) 33.91 3	42.62 dwelling 109.07 lso see 8.85 3a), also 141.02), also se 33.91	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table 33.91	49.29 ater is fr Oct 109.07 15.08 ole 5 156.66 5 33.91 3	52.84 om com Nov 109.07 17.6 170.1 33.91 3	57.23 munity h Dec 109.07 18.76 182.72 33.91 3		(66) (67) (68) (69) (70)
include (57)r include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91 Pumps and far (70)m= 3 Losses e.g. ev (71)m= -87.26 Water heating (72)m= 78.9	m in calconins (see s (Table Feb 109.07) (calculate 16.21) Ins (calculate 193.14) Ins gains 3 aporation -87.26 gains (Table 76.33)	53.28 culation of the Table 5	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98 Appendix 177.5 opendix 33.91 of sa) 3 tive value	45.52 only if c): May 109.07 L, equati 7.46 dix L, equ 164.07 L, equati 33.91 3 es) (Tab	39.94 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5) -87.26	38.02 s in the of Jul 109.07 r L9a), a 6.81 13 or L1: 143.01 or L15a) 33.91 3 -87.26	42.62 dwelling Aug 109.07 lso see 8.85 3a), also 141.02), also se 33.91 3 -87.26	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table 33.91 3	49.29 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91 3 -87.26	52.84 om com Nov 109.07 17.6 170.1 33.91 3 -87.26	57.23 munity h Dec 109.07 18.76 182.72 33.91 3 -87.26		(66) (67) (68) (69) (70)
include (57)r include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91 Pumps and far (70)m= 3 Losses e.g. ev (71)m= -87.26 Water heating (72)m= 78.9 Total internal	51.29 m in calculatins (see s (Table Feb 109.07) (calculatins (calculatins) (calculati	53.28 culation of the Table 5	47.1 of (65)m of (65)m of and 5a ts Apr 109.07 opendix 9.98 Appendix 33.91 opendix 33.91 opendix 33.91 opendix 65.41	45.52 only if c): May 109.07 L, equati 7.46 dix L, equ 164.07 L, equat 33.91 3 es) (Tab -87.26	39.94 ylinder is Jun 109.07 fon L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5) -87.26	38.02 s in the control of the contr	42.62 dwelling Aug 109.07 lso see 8.85 3a), also 141.02), also se 33.91 3 -87.26	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table 33.91 3 -87.26 59.85 + (69)m + (49.29 ater is fr Oct 109.07 15.08 ole 5 156.66 5 33.91 3 -87.26 66.25 70)m + (7	52.84 om com Nov 109.07 17.6 170.1 33.91 3 -87.26 73.39 1)m + (72)	57.23 munity h Dec 109.07 18.76 182.72 33.91 3 -87.26		(66) (67) (68) (69) (70) (71)
include (57)r include (57)r 5. Internal ga Metabolic gain Jan (66)m= 109.07 Lighting gains (67)m= 18.25 Appliances gai (68)m= 191.15 Cooking gains (69)m= 33.91 Pumps and far (70)m= 3 Losses e.g. ev (71)m= -87.26 Water heating (72)m= 78.9	51.29 m in calconins (see s (Table Feb 109.07) (calculate 16.21) ms (calculate 193.14) (calculate 33.91) ms gains 3 aporation -87.26 gains (T 76.33) gains = 344.4	53.28 culation of the Table 5	47.1 of (65)m of and 5a ts Apr 109.07 opendix 9.98 Appendix 177.5 opendix 33.91 oa is	45.52 only if c): May 109.07 L, equati 7.46 dix L, equ 164.07 L, equat 33.91 3 es) (Tab	39.94 ylinder is Jun 109.07 ion L9 of 6.3 uation L 151.44 ion L15 33.91 3 le 5) -87.26	38.02 s in the of Jul 109.07 r L9a), a 6.81 13 or L1: 143.01 or L15a) 33.91 3 -87.26	42.62 dwelling Aug 109.07 lso see 8.85 3a), also 141.02), also se 33.91 3 -87.26	43.1 or hot w Sep 109.07 Table 5 11.87 o see Tal 146.02 ee Table 33.91 3	49.29 ater is fr Oct 109.07 15.08 ble 5 156.66 5 33.91 3 -87.26	52.84 om com Nov 109.07 17.6 170.1 33.91 3 -87.26	57.23 munity h Dec 109.07 18.76 182.72 33.91 3 -87.26		(66) (67) (68) (69) (70)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southeast 0.9x	0.77	X	0.96	x	36.79	x	0.63	x	0.7	=	10.79	(77)
Southeast 0.9x	0.77	X	0.48	X	36.79	x	0.63	x	0.7	=	5.4	(77)
Southeast 0.9x	0.77	X	1.99	X	36.79	x	0.63	x	0.7	=	22.38	(77)
Southeast 0.9x	0.77	X	0.96	X	62.67	x	0.63	x	0.7	=	18.39	(77)
Southeast 0.9x	0.77	x	0.48	X	62.67	X	0.63	x	0.7	=	9.19	(77)
Southeast 0.9x	0.77	X	1.99	X	62.67	x	0.63	x	0.7	=	38.12	(77)
Southeast 0.9x	0.77	x	0.96	X	85.75	x	0.63	x	0.7	=	25.16	(77)
Southeast 0.9x	0.77	x	0.48	X	85.75	x	0.63	x	0.7	=	12.58	(77)
Southeast 0.9x	0.77	X	1.99	X	85.75	x	0.63	x	0.7	=	52.15	(77)
Southeast 0.9x	0.77	x	0.96	X	106.25	x	0.63	x	0.7	=	31.17	(77)
Southeast 0.9x	0.77	X	0.48	X	106.25	x	0.63	x	0.7	=	15.59	(77)
Southeast 0.9x	0.77	x	1.99	X	106.25	x	0.63	x	0.7	=	64.62	(77)
Southeast 0.9x	0.77	X	0.96	X	119.01	x	0.63	x	0.7	=	34.92	(77)
Southeast 0.9x	0.77	X	0.48	X	119.01	x	0.63	x	0.7	=	17.46	(77)
Southeast 0.9x	0.77	x	1.99	X	119.01	x	0.63	x	0.7	=	72.38	(77)
Southeast 0.9x	0.77	x	0.96	X	118.15	X	0.63	x	0.7	=	34.66	(77)
Southeast 0.9x	0.77	X	0.48	X	118.15	x	0.63	x	0.7	=	17.33	(77)
Southeast 0.9x	0.77	x	1.99	X	118.15	x	0.63	x	0.7	=	71.86	(77)
Southeast 0.9x	0.77	X	0.96	X	113.91	x	0.63	x	0.7	=	33.42	(77)
Southeast 0.9x	0.77	x	0.48	X	113.91	X	0.63	x	0.7	=	16.71	(77)
Southeast 0.9x	0.77	x	1.99	X	113.91	x	0.63	x	0.7	=	69.28	(77)
Southeast 0.9x	0.77	X	0.96	X	104.39	X	0.63	X	0.7	=	30.63	(77)
Southeast 0.9x	0.77	X	0.48	X	104.39	X	0.63	X	0.7	=	15.31	(77)
Southeast 0.9x	0.77	X	1.99	X	104.39	X	0.63	x	0.7	=	63.49	(77)
Southeast 0.9x	0.77	X	0.96	X	92.85	X	0.63	X	0.7	=	27.24	(77)
Southeast 0.9x	0.77	X	0.48	X	92.85	X	0.63	X	0.7	=	13.62	(77)
Southeast 0.9x	0.77	X	1.99	X	92.85	X	0.63	X	0.7	=	56.47	(77)
Southeast 0.9x	0.77	X	0.96	X	69.27	X	0.63	X	0.7	=	20.32	(77)
Southeast 0.9x	0.77	X	0.48	X	69.27	X	0.63	x	0.7	=	10.16	(77)
Southeast 0.9x	0.77	X	1.99	X	69.27	X	0.63	X	0.7	=	42.13	(77)
Southeast 0.9x	0.77	X	0.96	X	44.07	X	0.63	X	0.7	=	12.93	(77)
Southeast 0.9x	0.77	X	0.48	X	44.07	X	0.63	x	0.7	=	6.46	(77)
Southeast 0.9x	0.77	X	1.99	X	44.07	X	0.63	X	0.7	=	26.8	(77)
Southeast 0.9x	0.77	X	0.96	X	31.49	X	0.63	X	0.7	=	9.24	(77)
Southeast 0.9x	0.77	X	0.48	X	31.49	X	0.63	x	0.7	=	4.62	(77)
Southeast 0.9x	0.77	X	1.99	X	31.49	x	0.63	x	0.7] =	19.15	(77)
Northwest 0.9x	0.77	X	3.17	X	11.28	X	0.63	x	0.7	=	10.93	(81)
Northwest 0.9x		X	0.92	X	11.28	x	0.63	x	0.7] =	3.17	(81)
Northwest 0.9x	0.77	X	1.99	×	11.28	x	0.63	X	0.7	=	6.86	(81)

Northwest 0, sk	Northwest 0.9x		– "	0.47	—		~~	1 ., 1	2.00	¬ ., г		_	00.05	(04)
Northwest 0.9*	<u> </u>	0.77	×	3.17	X			X	0.63	X	0.7	=	22.25	(81)
Northwest 0.9	<u> </u>		=		=] 		╡		=		= ` ′
Northwest 0.08	<u> </u>		=		=] 		╡		=		= ` ′
Northwest 0.se	<u> </u>		=		=] 		╡		╡ -		= `
Northwest 0.9x	<u> </u>	0.77	=	0.92	×	41	.38] 	0.63	_ × [0.7	_ =	11.63	== ```
Northwest 0.9x	<u> </u>	0.77	X	1.99	×	41	.38	X	0.63			_ =	25.17	== ``
Northwest 0.9x	_	0.77	X	3.17	×	67	.96	X	0.63	_ ×	0.7	_ =	65.84	(81)
Northwest 0, sk	<u> </u>	0.77	X	0.92	X	67	.96	X	0.63	x [0.7	=	19.11	(81)
Northwest 0.9x	<u> </u>	0.77	X	1.99	X	67	.96	X	0.63	X	0.7	=	41.33	(81)
Northwest 0, 9x	<u> </u>	0.77	X	3.17	X	91	.35	X	0.63	X	0.7	=	88.5	(81)
Northwest 0.9x	Northwest 0.9x	0.77	X	0.92	X	91	.35	X	0.63	X	0.7	=	25.68	(81)
Northwest 0.9x	Northwest 0.9x	0.77	X	1.99	X	91	.35	X	0.63	x	0.7	=	55.55	(81)
Northwest 0.9x	Northwest _{0.9x}	0.77	X	3.17	X	97	.38	X	0.63	X	0.7	=	94.35	(81)
Northwest 0.9x	Northwest 0.9x	0.77	X	0.92	X	97	.38	X	0.63	x	0.7	=	27.38	(81)
Northwest 0.9x	Northwest _{0.9x}	0.77	X	1.99	X	97	.38	x	0.63	x	0.7	=	59.23	(81)
Northwest 0.9x	Northwest _{0.9x}	0.77	X	3.17	X	91	.1	X	0.63	x [0.7	=	88.26	(81)
Northwest 0.9x	Northwest _{0.9x}	0.77	х	0.92	x	91	.1	X	0.63	x	0.7	=	25.61	(81)
Northwest 0.9x	Northwest _{0.9x}	0.77	X	1.99	x	91	.1	X	0.63	x	0.7	=	55.4	(81)
Northwest 0,9 x 0,77 x 1,99 x 72,63 x 0,63 x 0,7 = 44,17 (81) Northwest 0,9 x 0,77 x 0,92 x 50,42 x 0,63 x 0,7 = 14,18 (81) Northwest 0,9 x 0,77 x 1,99 x 50,42 x 0,63 x 0,7 = 14,18 (81) Northwest 0,9 x 0,77 x 1,99 x 50,42 x 0,63 x 0,7 = 30,66 (81) Northwest 0,9 x 0,77 x 3,17 x 28,07 x 0,63 x 0,7 = 27,19 (81) Northwest 0,9 x 0,77 x 0,92 x 28,07 x 0,63 x 0,7 = 7,89 (81) Northwest 0,9 x 0,77 x 1,99 x 28,07 x 0,63 x 0,7 = 7,89 (81) Northwest 0,9 x 0,77 x 1,99 x 28,07 x 0,63 x 0,7 = 17,07 (81) Northwest 0,9 x 0,77 x 1,99 x 28,07 x 0,63 x 0,7 = 17,07 (81) Northwest 0,9 x 0,77 x 1,99 x 14,2 x 0,63 x 0,7 = 13,75 (81) Northwest 0,9 x 0,77 x 1,99 x 14,2 x 0,63 x 0,7 = 3,99 (81) Northwest 0,9 x 0,77 x 1,99 x 14,2 x 0,63 x 0,7 = 8,63 (81) Northwest 0,9 x 0,77 x 1,99 x 14,2 x 0,63 x 0,7 = 8,63 (81) Northwest 0,9 x 0,77 x 1,99 x 14,2 x 0,63 x 0,7 = 8,83 (81) Northwest 0,9 x 0,77 x 1,99 x 14,2 x 0,63 x 0,7 = 8,83 (81) Northwest 0,9 x 0,77 x 1,99 x 14,2 x 0,63 x 0,7 = 8,83 (81) Northwest 0,9 x 0,77 x 1,99 x 9,21 x 0,63 x 0,7 = 8,93 (81) Northwest 0,9 x 0,77 x 1,99 x 9,21 x 0,63 x 0,7 = 5,6 (81) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 59,53 108,37 166,78 237,65 294,49 304,8 288,68 244,38 191,02 124,76 72,58 50.13 (83) Total gains — internal and solar (84)m = (73)m + (83)m , watts (84)m = 406,56 452,77 498,43 549,26 585,92 576,73 548,32 510,25 467,49 421,47 392,38 387,25 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)	Northwest 0.9x	0.77	x	3.17	x	72	.63	x	0.63	×	0.7	=	70.36	(81)
Northwest 0.9x	Northwest 0.9x	0.77	x	0.92	x	72	.63	X	0.63	x	0.7	=	20.42	(81)
Northwest 0.9x	Northwest _{0.9x}	0.77	х	1.99	x	72	.63	X	0.63	×	0.7	=	44.17	(81)
Northwest 0.9x	Northwest 0.9x	0.77	×	3.17	x	50	.42	х	0.63	= x	0.7	=	48.85	(81)
Northwest 0.9x	Northwest _{0.9x}	0.77	×	0.92	x	50	.42	х	0.63	_ x [0.7	_ =	14.18	(81)
Northwest 0.9x	Northwest 0.9x	0.77	x	1.99	x	50	.42	х	0.63	×	0.7	=	30.66	(81)
Northwest 0.9x	Northwest 0.9x	0.77	x	3.17	x	28	.07	х	0.63	×	0.7	-	27.19	(81)
Northwest 0.9x	Northwest 0.9x	0.77	x	0.92	x	28	.07	х	0.63	×	0.7	=	7.89	(81)
Northwest 0.9x	Northwest 0.9x	0.77	×	1.99	x	28	.07	х	0.63	T x	0.7		17.07	(81)
Northwest 0.9x	Northwest 0.9x	0.77	x	3.17	×	14	.2	X	0.63	- x	0.7	=	13.75	(81)
Northwest $0.9x$	Northwest _{0.9x}	0.77	×	0.92	x	14	.2	Х	0.63	_ x	0.7	= =	3.99	(81)
Northwest 0.9x	Northwest 0.9x		x	1.99	x	14	.2	X	0.63	_ x [0.7		8.63	(81)
Northwest 0.9x	Northwest 0.9x		= x		×			X		x		= =		(81)
Northwest 0.9x 0.77 x 1.99 x 9.21 x 0.63 x 0.7 = 5.6 (81) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 59.53 108.37 166.78 237.65 294.49 304.8 288.68 244.38 191.02 124.76 72.58 50.13 Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 406.56 452.77 498.43 549.26 585.92 576.73 548.32 510.25 467.49 421.47 392.38 387.25 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a)	Northwest 0.9x		×		x			X			0.7	╡ -		= '
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 59.53 108.37 166.78 237.65 294.49 304.8 288.68 244.38 191.02 124.76 72.58 50.13 Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 406.56 452.77 498.43 549.26 585.92 576.73 548.32 510.25 467.49 421.47 392.38 387.25 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a)	Northwest 0.9x		=		=] 		╡		= =		==
(83)m= 59.53 108.37 166.78 237.65 294.49 304.8 288.68 244.38 191.02 124.76 72.58 50.13 Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 406.56 452.77 498.43 549.26 585.92 576.73 548.32 510.25 467.49 421.47 392.38 387.25 Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a)		0.77		1.00		<u>_</u>	- 1] " [0.00	[0.7		0.0	(0.7)
(83)m= 59.53 108.37 166.78 237.65 294.49 304.8 288.68 244.38 191.02 124.76 72.58 50.13 Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 406.56 452.77 498.43 549.26 585.92 576.73 548.32 510.25 467.49 421.47 392.38 387.25 Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a)	Solar gains in v	vatts calc	ulated	for each m	onth			(83)m	= Sum(74)m	(82)m				
(84)m= 406.56 452.77 498.43 549.26 585.92 576.73 548.32 510.25 467.49 421.47 392.38 387.25 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1,m (see Table 9a)	ĭ			- 1		304.8		r i			72.58	50.13]	(83)
7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a)	Total gains – in	iternal and	solar	(84)m = $(7$	3)m + (83)m ,	watts	!				<u>I</u>	J	
Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a)	(84)m= 406.56	452.77 4	98.43	549.26 58	5.92 5	76.73	548.32	510.	25 467.49	421.47	392.38	387.25]	(84)
Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a)	7. Mean intern	nal temper	ature (heating se	ason)_								• 	
Utilisation factor for gains for living area, h1,m (see Table 9a)		•	`		,	area fr	om Tal	ole 9	Th1 (°C)				21	(85)
	•	_	• .		_			,	(•)					
, , , , , , , , ,		<u>_</u>			<u></u>			Aı	ua Sen	Oct	Nov	Dec]	
				- 1 ^e 1 1	·-· <i>y</i>			<u> </u>	9 500		1.01		J	

Mean internal temperature (for the whole develling) = fLA x T1 + (1 - fLA) x T2 18.79 18.79 19.31 19.31 19.79 19.31 19.31 19.79 19.32 19.35 19.31 19.79 19.32 19.35 19.31 19.79 19.32 19.35 19.31 19.79 19.32 19.35 19.31 19.79 19.32 19.35 19.31 19.79 19.32 19.35 19.31 19.79 19.32 19.35 19.33 19.72 19.73 19.33 19.72 19.73 19.33 19.72 19.73 19.33 19.72 19.73 19.33 19.73 19.73 19.73 19.33 19.73 19.73 19.73 19.73 19.33 19.73 19															
(87) 19.84 19.97 20.19 20.51 20.79 20.55 20.98 20.89 20.87 20.52 20.12 19.81 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (*C) (80)ms 20 20.01 20.01 20.01 20.01 20.02 20.02 20.02 20.03 20.03 20.03 20.03 20.02 20.02 20.01 (88) Wellisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)ms 20 20 20 20 20 20 20 2	(86)m=	1	1	0.99	0.97	0.89	0.73	0.56	0.62	0.87	0.98	1	1		(86)
19.64 19.97 20.19 20.51 20.79 20.55 20.98 20.88 20.87 20.52 20.12 19.81 19.8	Mean	interna	l temper	ature in	living are	ea T1 (fo	ollow ste	ps 3 to 7	' in Table	e 9c)					
Column C						<u> </u>					20.52	20.12	19.81		(87)
Column C	Temn	erature	during h	eating n	erinds in	rest of	dwelling	from Ta	hle 0 Ti	h2 (°C)				l	
Utilisation factor for gains for rest of dwelling, h.2,m (see Table 9a)	•									- ` 	20.02	20.02	20.01		(88)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (89)m R.45 R.64 R.97 R.64 R.97 R.64 R.97 R.64 R.97 R.64 R.97 R.64 R.97 R.64 R.64 R.97 R.64 R.64 R.97 R.64 R															, ,
Man internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m 18.45 18.64 18.97 19.43 19.81 19.99 20.02 20.02 19.92 19.45 18.88 18.42 (90) (1.4 -							<u> </u>			0.0	0.07	0.00	1 1		(80)
Secondary Seco		·								<u> </u>	<u> </u>	0.99	'		(09)
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m 18.82 18.99 19.3 19.72 20.07 20.25 20.28 20.28 20.17 19.74 19.21 18.79 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (33)m 18.82 18.99 19.3 19.72 20.07 20.25 20.28 20.28 20.17 19.74 19.21 18.79 (93) 38. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m (95)m 40.97 449.44 489.9 52.158 501.41 385.16 261.69 273.12 380.08 406.69 389.35 386.07 (95) Monthly average external temperature from Table 8 (86)m 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Monthly average external temperature, Lm , W = ((33)m ((33)m - ((33)m - (33)m (33)m - (34)m		interna	temper	ature in	the rest		- `		ps 3 to	7 in Tabl	e 9c)		1	ı	
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m 18.82 18.99 19.3 19.72 20.07 20.25 20.28 20.28 20.17 19.74 19.21 18.79 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m 18.82 18.99 19.3 19.72 20.07 20.25 20.28 20.28 20.17 19.74 19.21 18.79 (93) ((90)m=	18.45	18.64	18.97	19.43	19.81	19.99	20.02	20.02						¬`´
(92) (92) (18.82										1	LA = Livin	g area ÷ (4	4) =	0.27	(91)
Apply adjustment to the mean internal temperature from Table 4e, where appropriate (83)m= 18.82 18.99 19.3 19.72 20.07 20.25 20.28 20.28 20.17 19.74 19.21 18.79 (83) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.98 0.95 0.86 0.67 0.48 0.54 0.81 0.96 0.99 1 Useful gains, hmGm, W = (94)m x (84)m (95)m= 40.49.77 449.44 489.9 521.55 501.41 385.16 261.69 273.12 380.08 406.69 389.35 386.07 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm, W = (39)m x ((39)m x ((39)m - (95)m) x ((41)m - (95)m) x ((41)m - (44)m - (4	Mean	interna	l temper	ature (fo	r the wh	ole dwe	lling) = fl	LA × T1	+ (1 – fL	.A) × T2					
18.82 18.99 19.3 19.72 20.07 20.25 20.28 20.17 19.74 19.21 18.79 (93)	(92)m=	18.82	18.99	19.3	19.72	20.07	20.25	20.28	20.28	20.17	19.74	19.21	18.79		(92)
8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Apply	adjustn	nent to tl	ne mean	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 1 0.99 0.98 0.95 0.86 0.67 0.48 0.54 0.81 0.96 0.99 1 (94) Useful gains, hmGm , W = (94)m x (84)m (95)m= 404.97 449.44 489.9 521.58 501.41 385.16 261.69 273.12 380.08 406.69 389.35 386.07 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) 1 (97)m 1071.95 1038.07 940.6 786.35 606.97 405.75 264.51 278.15 437.75 662.67 882.08 1067.51 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m = 496.23 395.56 335.32 190.64 78.53 0 0 0 0 0 190.45 354.76 507 Total per year (kWh/kyear) = Sum(98)a = 2548.49 (98) Space heating: Fraction of space heat from secondary/supplementary system Fraction of space heat from main system 1 (204) = (202) x [1 - (201)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 0 0 190.45 354.76 507 Efficiency of secondary/supplementary heating system, % 0 (208) Efficiency of secondary/supplementary heating system of 0 (200) 0 (200) 0 (200) 0 (200) 0 (200) 0 (200) 0 (200	(93)m=	18.82	18.99	19.3	19.72	20.07	20.25	20.28	20.28	20.17	19.74	19.21	18.79		(93)
The utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	8. Sp	ace hea	ting requ	uirement											
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec					•		ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
Utilisation factor for gains, hm: (94)me	the ut										<u> </u>	·		ı	
(94)me	L lette					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains, hmGm , W = (94)m x (84)m (95)m= 404.97						0.96	0.67	0.40	0.54	0.01	0.06	0.00	I 4		(94)
(95)me							0.67	0.46	0.54	0.01	0.96	0.99	'		(34)
Monthly average external temperature from Table 8 (96)m= 4.3				<u> </u>	<u> </u>		385 16	261 69	273 12	380.08	406 69	389 35	386.07		(95)
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m] (97)m= 1071.95 1038.07 940.6 786.35 606.97 405.75 264.51 278.15 437.75 662.67 882.08 1067.51 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 Total per year (kWh/year) = Sum(98)80.12 = 2548.49 (98) Space heating requirement in kWh/m²/year 37.81 (99) 9a. Energy requirements — Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) x [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) x [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 0 190.45 354.76 507 (211) m = {[(98)m x (204)] } x 100 ÷ (206) (211)								201.00	270.12	000.00	100.00	000.00	000.07		()
Heat loss rate for mean internal temperature, Lm , W = [(39)m × [(93)m – (96)m] (97)m = 1071.95 1038.07 940.6 786.35 606.97 405.75 264.51 278.15 437.75 662.67 882.08 1067.51 (97) Space heating requirement for each month, kWh/month = 0.024 × [(97)m – (95)m] × (41)m (98)m = 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507			_		·		I	16.6	16.4	14.1	10.6	7.1	4.2		(96)
(97)m= 1071.95 1038.07 940.6 786.35 606.97 405.75 264.51 278.15 437.75 662.67 882.08 1067.51 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 Total per year (kWh/year) = Sum(98)ssv = 2548.49 (98) Space heating requirement in kWh/m²/year 37.81 (99) 9a. Energy requirements - Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 0 190.45 354.76 507 (211) m = {[(98)m x (204)] } x 100 ÷ (206) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 0 203.91 379.83 542.82		Lloss rate	for mea	an intern	al tempe	erature.	Lm . W =	 =[(39)m :	ı x [(93)m	L – (96)m	<u> </u>	l			
(98)m= 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 Total per year (kWh/year) = Sum(98)sg12 = 2548.49 (98) Space heating requirement in kWh/m²/year 37.81 (99) 9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 (211)m = {[(98)m x (204)]} x 100 ÷ (206) (211) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 0 203.91 379.83 542.82								<u> </u>		<u> </u>	ī	882.08	1067.51		(97)
Space heating requirement in kWh/m²/year Sum(98) _{1.49-12} = 2548.49 (98) Space heating requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 (211) (211) (211) (211) (211) (211) (211) (211) (211) (211) (202) (211) (203)	Space	e heatin	g require	ement fo	r each m	nonth, k\	Nh/mont	th = 0.02	24 x [(97)	ı———)m – (95)m] x (4	1)m		l	
Space heating requirement in kWh/m²/year 37.81 (99) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) (496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 (211) m = {[(98) m x (204)] } x 100 ÷ (206) (211) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 203.91 379.83 542.82	(98)m=	496.23	395.56	335.32	190.64	78.53	0	0	0	0	190.45	354.76	507		
9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 – (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 – (203)] = 1 (204) Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 0 190.45 354.76 507 (211)m = {[(98)m x (204)] } x 100 ÷ (206) (211) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 0 203.91 379.83 542.82									Tota	l per year	(kWh/year	r) = Sum(9	8)15,912 =	2548.49	(98)
9a. Energy requirements – Individual heating systems including micro-CHP) Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 – (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 – (203)] = 1 (204) Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 (211)m = {[(98)m x (204)] } x 100 ÷ (206) (211) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 203.91 379.83 542.82	Space	e heatin	a reauire	ement in	kWh/m²	/vear								37.81] (99)
Space heating: Fraction of space heat from secondary/supplementary system 0 (201) Fraction of space heat from main system(s) (202) = 1 - (201) = 1 (202) Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 0 190.45 354.76 507 507 (211)m = {[[98)m x (204)] } x 100 ÷ (206) (211) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 0 203.91 379.83 542.82							veteme i	noludina	mioro C	יחט/					」 ` '
Fraction of space heat from secondary/supplementary system Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec KWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 (211)m = {[(98)m x (204)] } x 100 ÷ (206) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 203.91 379.83 542.82				its – iriai	vidual II	eaung s	ystems i	riciuality	micro-C	<i>,</i> пг)					
Fraction of space heat from main system(s) Fraction of total heating from main system 1 Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 (211)m = {[(98)m x (204)] } x 100 ÷ (206) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 203.91 379.83 542.82	•		_	t from s	econdar	//supple	mentarv	svstem						0	(201)
Fraction of total heating from main system 1 (204) = (202) × [1 - (203)] = 1 (204) Efficiency of main space heating system 1 93.4 (206) Efficiency of secondary/supplementary heating system, % 0 (208) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 (211)m = {[(98)m x (204)] } x 100 ÷ (206) (211) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 203.91 379.83 542.82						• • •	,	•	(202) = 1 -	- (201) =					╡
Efficiency of main space heating system 1 Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 0 190.45 354.76 507 (211)m = {[(98)m x (204)] } x 100 ÷ (206) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 203.91 379.83 542.82					•	. ,					(203)] =				╡
Efficiency of secondary/supplementary heating system, % Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year				_	•				(204) - (2	02) X [1	(200)] =				╡
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec kWh/year		•	-											93.4	╡`
Space heating requirement (calculated above) 496.23 395.56 335.32 190.64 78.53 0 0 0 190.45 354.76 507 (211)m = {[(98)m x (204)] } x 100 ÷ (206) 531.3 423.51 359.01 204.11 84.08 0 0 0 0 203.91 379.83 542.82	Efficie	ency of s	seconda	ry/suppl	ementar	y heating	g system	า, %				_		0	(208)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar
$ (211)m = \{ [(98)m \times (204)] \} \times 100 \div (206) $	Space									1	1	ı		I	
531.3 423.51 359.01 204.11 84.08 0 0 0 0 203.91 379.83 542.82		496.23	395.56	335.32	190.64	78.53	0	0	0	0	190.45	354.76	507		
	(211)m	n = {[(98)m x (20	4)] } x 1	00 ÷ (20	6)								ı	(211)
Total (kWh/year) =Sum(211) _{15,1012} = 2728.58 (211)		531.3	423.51	359.01	204.11	84.08	0	0							_
									Tota	I (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	2728.58	(211)

115)m= 0 0 0 0 0	0	0	0	0	0	0	0		
			Total	(kWh/yea	ar) =Sum(2			0	(215
later heating									
Putput from water heater (calculated above) 188.51 164.67 171.33 151.96 147.13 13	29.58 1	24.15	138.39	139.92	159.33	170.08	184.09		
fficiency of water heater	ļ							80.3	(216
117)m= 87.37 87.18 86.71 85.62 83.55	80.3	80.3	80.3	80.3	85.5	86.86	87.47		(217
uel for water heating, kWh/month									
(219) m = (64) m x $100 \div (217)$ m (19)m = (215.75) (188.89) (197.59) (177.48) (176.1) (176.1)	61.37 1	54.6	172.35	174.25	186.35	195.81	210.46		
	<u>!</u>		Total	= Sum(21	19a) ₁₁₂ =			2211	(21
nnual totals					k۱	Nh/year	. '	kWh/year	_
pace heating fuel used, main system 1							ļ	2728.58	_
/ater heating fuel used								2211	
lectricity for pumps, fans and electric keep-hot									
central heating pump:							30		(23
boiler with a fan-assisted flue							45		(23
otal electricity for the above, kWh/year			sum	of (230a).	(230g) =			75	(23
lectricity for lighting								322.33	(23
otal delivered energy for all uses (211)(221) +	(231) +	(232)	(237b)	=				5336.9	(33
12a. CO2 emissions – Individual heating system	s includi	ng mio	cro-CHP						
	Ener kWh/				Emiss kg CO2	ion fac 2/kWh	tor	Emissions kg CO2/yea	ır
pace heating (main system 1)	(211)	X			0.21	16	=	589.37	(26
pace heating (secondary)	(215)	X			0.51	19	=	0	(26
/ater heating	(219)	X			0.21	16	=	477.58	(26
pace and water heating	(261) +	(262) +	+ (263) + (2	264) =				1066.95	(26
lectricity for pumps, fans and electric keep-hot	(231)	x			0.51	19	= j	38.93	_](26
Land Color Con Park Con	(232)	x			0.51	19	= [167.29] (26
lectricity for lighting									

TER =

(273)

18.89

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 04 November 2021

Property Details: Plot 11

Dwelling type:Mid-terrace House

Located in:EnglandRegion:South England

Cross ventilation possible: Yes Number of storeys: 2

Front of dwelling faces: South East

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Medium

Night ventilation:FalseBlinds, curtains, shutters:None

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

Overheating Details:

Summer ventilation heat loss coefficient: 225.98 (P1)

Transmission heat loss coefficient: 47.4

Summer heat loss coefficient: 273.36 (P2)

Overhangs:

Orientation:	Ratio:	Z_overhangs:
South East (W1)	0	1
South East (W2)	0	1
North West (W3)	0	1
North West (W4)	0	1
South East (W5)	0	1
North West (W7)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
South East (W1)	1	0.9	1	0.9	(P8)
South East (W2)	1	0.9	1	0.9	(P8)
North West (W3)	1	0.9	1	0.9	(P8)
North West (W4)	1	0.9	1	0.9	(P8)
South East (W5)	1	0.9	1	0.9	(P8)
North West (W7)	1	0.9	1	0.9	(P8)

Solar gains

Orientation		Area	Flux	g _	FF	Shading	Gains
South East (W1)	0.9 x	0.96	127.31	0.71	0.7	0.9	78.1
South East (W2)	0.9 x	0.48	127.31	0.71	0.7	0.9	39.05
North West (W3)	0.9 x	3.17	106.05	0.71	0.7	0.9	214.82
North West (W4)	0.9 x	0.92	106.05	0.71	0.7	0.9	62.34
South East (W5)	0.9 x	1.99	127.31	0.71	0.7	0.9	161.89
North West (W7)	0.9 x	1.99	106.05	0.71	0.7	0.9	134.85
						Total	691.06 (P3/P4)

Internal gains:

	June	July	August
Internal gains	382.74	367.05	374.79
Total summer gains	1130.25	1058.11	971.73 (P5)

SAP 2012 Overheating Assessment

ikelihood of high internal temperature	Not significant	Sliaht	Sliaht	
hreshold temperature	19.78	21.42	21.1	(P7)
hermal mass temperature increment	0.25	0.25	0.25	
lean summer external temperature (South England)	15.4	17.3	17.3	
ummer gain/loss ratio	4.13	3.87	3.55	(P6)

Assessment of likelihood of high internal temperature: Slight