Regulations Compliance Report



Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.60 Printed on 02 March 2023 at 09:35:34

Project Information:

Assessed By: () Building Type: Detached House

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 178.03m²

Site Reference: Broome Farm Barn

Plot Reference: Plot 4 LPG

Address: Land West of Broome Farm Barn, Broome, Craven Arms

Client Details:

Name: Neil Homer

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: Bulk LPG

Fuel factor: 1.06 (lpg)

Target Carbon Dioxide Emission Rate (TER) 16.23 kg/m²
Dwelling Carbon Dioxide Emission Rate (DER) 16.07 kg/m²

16.07 kg/m² **OK**

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 58.1 kWh/m²
Dwelling Fabric Energy Efficiency (DFEE) 55.1 kWh/m²

OK

2 Fabric U-values

Element **Average** Highest External wall 0.16 (max. 0.30) 0.16 (max. 0.70) OK Floor 0.14 (max. 0.25) 0.14 (max. 0.70) **OK** OK Roof 0.10 (max. 0.20) 0.17 (max. 0.35) **Openings** 1.40 (max. 2.00) 1.40 (max. 3.30) OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 5.00 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

Main Heating system: Boiler systems with radiators or underfloor heating - LPG

Data from manufacturer

Efficiency 90.0 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 1.79 kWh/day

Permitted by DBSCG: 2.30 kWh/day OK

Primary pipework insulated: Yes OK

Regulations Compliance Report



Controls			
Space heating controls	TTZC by plumbing and electri	ical services	OK
Hot water controls:	Cylinderstat		OK
	Independent timer for DHW		OK
Boiler interlock:	Yes		OK
Low energy lights			
Percentage of fixed lights with I	ow-energy fittings	100.0%	
Minimum		75.0%	OK
Mechanical ventilation			
Not applicable			
Summertime temperature			
Overheating risk (Midlands):		Not significant	ок
sed on:			
Overshading:		Average or unknown	
Windows facing: North		20.43m²	
Windows facing: South		8.75m²	
Windows facing: East		2m²	
Windows facing: West		6.6m ²	
Roof windows facing: East		0.76m²	
Ventilation rate:		8.00	
Blinds/curtains:		Dark-coloured curtain or roller blind	
		Closed 100% of daylight hours	
0 Key features		2 4 10 4 10 6	
Roofs U-value		0.1 W/m²K	
Photovoltaic array			

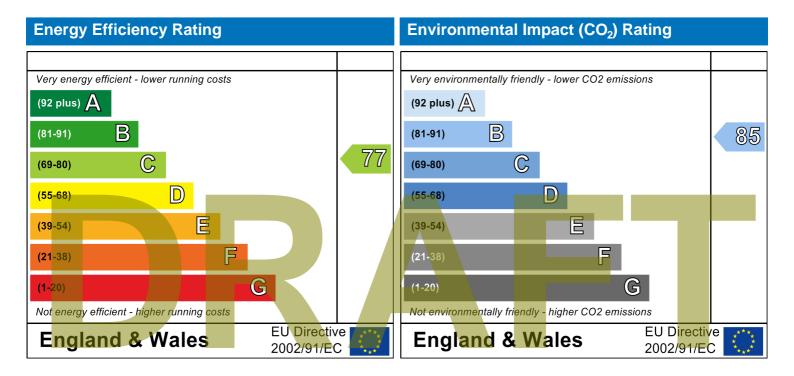
Predicted Energy Assessment



Land West of Broome Farm Barn Broome Craven Arms Dwelling type: Date of assessment: Produced by: Total floor area: Detached House 08 October 2020 Stroma Certification 178.03 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.



Property Details: Plot 4 LPG

Address: Land West of Broome Farm Barn, Broome, Craven Arms

Located in: England Region: Midlands

UPRN:

Date of assessment: 08 October 2020 Date of certificate: 02 March 2023

Assessment type: New dwelling design stage

Transaction type: Marketed sale

Thermal Mass Parameter: Indicative Value Medium

Comments:

Property description:

Dwelling type: House
Detachment: Detached
Year Completed: 2020
Front of dwelling faces: North

Comments:

Opening types:

Name:	Type:	Frame Factor:	g-value:	U-Value:	Area:
North	Windows	0.7	0.63	1.4	20.43
South	Windows	0.7	0.63	1.4	8.75
East	Windows	0.7	0.63	1.4	2
West	Windows	0.7	0.63	1.4	6.6
East	Roof Windows	0.7	0.63	1.4	0.7644

Overshading: Average or unknown

Comments:

Opaque Elements:

Type: U-Value: Kappa:

External Elements

External wall 0.16 Please provide the U-Value calculation to justify the U-Value entered into the assessment. N/A

Materials Used:

Type: Name: Thickness: Conductivity: R-Value: External wall Internal Surface Resistance 0 0.13



External wall External wall External wall External wall Comments:	Plasterboard Standard Kooltherm K12 Framing Board (150 mm) Soft Wood/Plywood/Chipboard (Softwood) (mm Ventilated Cavity Brickwork Outer Leaf - BRE (102.5 mm) External Surface Resistance	12.5 150 10 50 102.5 0	0.21 0.018 0.13 0 0.77 0	0.06 8.33 0.08 0.18 0.13 0.04
Flat ceiling Pitched	0.1 Please provide the U-Value calculation to justify the0.17 Please provide the U-Value calculation to justify the			N/A N/A
Materials Used:				
Type:	Name:	Thickness:	Conductivity:	R-Value:
Flat ceiling	Internal Surface Resistance	0	0	0.1
Flat ceiling	Plasterboard Standard	12.5	0.21	0.06
Flat ceiling	Earthwool Loft Roll 40 (Combi-cut) (100 mm)	100	0.04	2.5
Flat ceiling	Earthwool Loft Roll 40 (Combi-cut) (100 mm)	100	0.04	2.5
Flat ceiling	Earthwool Loft Roll 40 (Combi-cut) (100 mm)	100	0.04	2.5
Flat ceiling	Earthwool Loft Roll 40 (Combi-cut) (100 mm)	100	0.04	2.5
Flat ceiling	External Surface Resistance	0	0	0.04
Pitched	Internal Surface Resistance	0	0	0.1
Pitched	Plasterboard Standard	12.5	0.21	0.06
Pitched	Kooltherm K107 Pitched Roof Board	150	0.018	8.33
Pitched Comments:	External Surface Resistance	0	0	0.04
Ground floor	0.14 Please provide the U-Value calculation to justify the	· U-Value entered i	nto the assessment.	N/A
Matarials Usad				
Materials Used: Type:	Name:	Thicknoon	Conductivity:	R-Value:
1 VIII			3	
	Internal Surface Resistance	0 75	0 0.41	0.17 0.18
Ground floor		/ h	(1 / (1	11 12
Ground floor Ground floor	Screed Kastharm K3 Floorboard (130 mm)			
Ground floor Ground floor Ground floor	Kooltherm K3 Floorboard (120 mm)	120	0.018	6.67
Ground floor Ground floor				

<u>Internal Elements (Area, Kappa)</u> <u>Party Elements (Area, Kappa)</u>



Thermal bridges:

Thermal bridges:		User-defined	(individual PS	ndividual PSI-values) Y-Value = 0.0841		
J		Length	Psi-value			
	[Approved]	25.45	0.5	E1	Steel lintel with perforated steel base plate	
	[Approved]	25.45	0.04	E3	Sill	
	[Approved]	44.1	0.05	E4	Jamb	
	[Approved]	48.26	0.16	E5	Ground floor (normal)	
	[Approved]	48.26	0.07	E6	Intermediate floor within a dwelling	
	[Approved]	23.85	0.06	E10	Eaves (insulation at ceiling level)	
	[Approved]	11.22	0.24	E12	Gable (insulation at ceiling level)	
	[Approved]	31.66	0.09	E16	Corner (normal)	
	[Approved]	16.62	-0.09	E17	Corner (inverted internal area greater than external area)	
	[Approved]	6.3	0.04	E11	Eaves (insulation at rafter level)	
	[Approved]	3.6	0.04	E13	Gable (insulation at rafter level)	

Comments:

If specific construction details have been adopted then please provide the associated checklists; signed and dated.

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Pressure test: 5

Comments:

Please provide the pressure test certificate, or certificates if the result is based on an average; signed and dated.

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: bulk LPG

Info Source: Manufacturer Declaration

Manufacturer's data

Efficiency: 90.0% (SEDBUK2009)

Regular condensing with automatic ignition

Fuel Burning Type:

Underfloor heating, pipes in screed above insulation

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature<=35°C

Room-sealed Boiler interlock: Yes

Comments:



Main heating Control:	
Main heating Control: Comments:	Time and temperature zone control by suitable arrangement of plumbing and electrical services
Secondary heating system:	
Secondary heating system: Comments:	None
Water heating:	
Water heating:	Hot water cylinder Cylinder volume: 210 litres Cylinder insulation: Factory 100 mm Primary pipework insulation: True Cylinderstat: True Cylinder in heated space: True
Comments:	
	Solar panel: False
Others:	
Electricity tariff: Low energy lights: Terrain type: Wind turbine: Photovoltaics:	Standard Tariff 100% Rural No Photovoltaic 1 Installed Peak power: 1.5
Comments:	Tilt of collector: 45° Overshading: Modest Collector Orientation: South
Please provide the MCS certificat	te or data sheet equivalent confirming the size of the array on the roof. This should ort a proportioned amount included in the assessment.



Declaration

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

SAP Input



Address: Land West of Broome Farm Barn, Broome, Craven Arms

Located in: England Midlands Region:

UPRN:

08 October 2020 Date of assessment: Date of certificate: 02 March 2023

New dwelling design stage Assessment type:

Marketed sale Transaction type: Tenure type: Owner-occupied Related party disclosure: No related party Thermal Mass Parameter: Indicative Value Medium

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

512 PCDF Version:

Dwelling type: House Detached Detachment: 2020 Year Completed:

Floor Location: Floor area:

Storey height:

98.4 m² 2.7 m Floor 0 Floor 1 79.63 m² 2.41 m

24.5 m² (fraction 0.146) Living area: North

Front of dwelling faces:

Opening types:

Name:	Source:	Type:	Glazing:		Argon:	Frame:
North	Manufacturer	Windows	low-E, $En = 0.05$,	soft coat	No	Wood
South	Manufacturer	Windows	low-E, $En = 0.05$,	soft coat	No	Wood
East	Manufactur <mark>er</mark>	Windows	low-E, $En = 0.05$,	soft coat	No	Wood
West	Manufacturer	Windows	low-E, En = 0.05,	soft coat	No	Wood
East	Manufacturer	Roof Windows	low-E, $En = 0.05$,	soft coat	No	Wood

Name:	Gap:	Frame Factor	: g-value:	U-value:	Area:	No. of Openings:
North	16mm or more	0.7	0.63	1.4	20.43	1
South	16mm or more	0.7	0.63	1.4	8.75	1
East	16mm or more	0.7	0.63	1.4	2	1
West	16mm or more	0.7	0.63	1.4	6.6	1

0.63

1.4

0.7644

Name:	Type-Name:	Location:	Orient:	Width:	Height:
North	-	External wall	North	0	0
South		External wall	South	0	0
East		External wall	East	0	0
West		External wall	West	0	0
East		Pitched	East	0.78	0.98

0.7

Overshading: Average or unknown

16mm or more

East

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Карра:
External Elemer External wall	197.56	37.78	159.78	0.16	0	False	N/A
Flat ceiling	89.2	0	89.2	0.1	0		N/A
Pitched	6.32	0.76	5.56	0.17	0		N/A

SAP Input



Ground floor 98.4 0.14 N/A

Internal Elements
Party Elements

ппенна	bridges:
	2

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0841

	Length	Psi-value		
[Approved]	25.45	0.5	E1	Steel lintel with perforated steel base plate
[Approved]	25.45	0.04	E3	Sill
[Approved]	44.1	0.05	E4	Jamb
[Approved]	48.26	0.16	E5	Ground floor (normal)
[Approved]	48.26	0.07	E6	Intermediate floor within a dwelling
[Approved]	23.85	0.06	E10	Eaves (insulation at ceiling level)
[Approved]	11.22	0.24	E12	Gable (insulation at ceiling level)
[Approved]	31.66	0.09	E16	Corner (normal)
[Approved]	16.62	-0.09	E17	Corner (inverted internal area greater than external area)
[Approved]	6.3	0.04	E11	Eaves (insulation at rafter level)
[Approved]	3.6	0.04	E13	Gable (insulation at rafter level)

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

Number of chimneys: 0

Number of open flues: 1 (main: 0, secondary: 1, other: 0)

Number of fans: Number of passive stacks:

Number of passive stacks: 0
Number of sides sheltered: 0

Pressure test:

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers Fuel: bulk LPG

Info Source: Manufacturer Declaration

Manufacturer's data

Efficiency: 90.0% (SEDBUK2009)

Regular condensing with automatic ignition

Fuel Burning Type:

Underfloor heating, pipes in screed above insulation

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature<=35°C

Room-sealed Boiler interlock: Yes

Main heating Control:

Main heating Control: Time and temperature zone control by suitable arrangement of plumbing and electrical

services

Control code: 2110

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating: From main heating system

Water code: 901 Fuel :bulk LPG Hot water cylinder

Cylinder volume: 210 litres

Cylinder insulation: Factory 100 mm

SAP Input



Primary pipework insulation: True

Cylinderstat: True

Cylinder in heated space: True

Solar panel: False

Others:

Electricity tariff: Standard Tariff

In Smoke Control Area: No

Conservatory: No conservatory

Low energy lights: 100%
Terrain type: Rural
EPC language: English
Wind turbine: No

Photovoltaics: Photovoltaic 1

Installed Peak power: 1.5 Tilt of collector: 45° Overshading: Modest Collector Orientation: South

Assess Zero Carbon Home: No



User Details: **Assessor Name:** Stroma Number: Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.60 Property Address: Plot 4 LPG Land West of Broome Farm Barn, Broome, Craven Arms Address: 1. Overall dwelling dimensions: Av. Height(m) Volume(m³) Area(m²) Ground floor 98.4 (1a) x 2.7 (2a) =265.68 (3a) First floor (2b) (1b) x (3b) 79.63 2.41 191.91 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)178.03 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =(5) 457.59 2. Ventilation rate: main secondary other total m³ per hour heating heating Number of chimneys x 40 =(6a) 0 0 0 0 0 x 20 = Number of open flues 0 0 1 20 (6b) Number of intermittent fans x 10 =(7a)5 50 Number of passive vents x 10 =(7b) 0 0 Number of flueless gas fires x 40 =(7c)0 0 Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = \div (5) = 0.15 (8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) (9)0 Additional infiltration [(9)-1]x0.1 =(10)0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 (12)0 If no draught lobby, enter 0.05, else enter 0 0 (13)Percentage of windows and doors draught stripped (14)0 $0.25 - [0.2 \times (14) \div 100] =$ Window infiltration 0 (15)(8) + (10) + (11) + (12) + (13) + (15) =Infiltration rate 0 (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise (18) = (16)0.4 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 1 (20) $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor (21)0.4

Infiltrat	ion rate	modifie	d for mo	nthly wir	d speed							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthl	y avera	ge wind	speed fr	om Tabl	e 7							
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7



Wind Factor (22a)m = (2	2)m ÷ 4	ļ											
(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 infiltration rate	(allowin	a for ob	oltor on	طيينامط م		(21a) v	(22a)m	<u>.</u>	!		•		
Adjusted infiltration rate	(allowing	9 for sn 0.44	0.43	0.38	0.38	0.37	(22a)m 0.4	0.43	0.45	0.47]		
Calculate effective air ch		· .				0.57	0.4	0.40	0.40	0.47	J		
If mechanical ventilation	on:											0	(23a)
If exhaust air heat pump usi	ing Appen	ndix N, (23	3b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)				0	(23b)
If balanced with heat recove	ery: efficie	ency in %	allowing for	or in-use f	actor (fron	n Table 4h) =					0	(23c)
a) If balanced mechan				·	- ` ` 	- ^ `	ŕ	 	- 	1 – (23c)	÷ 100]		
(24a)m= 0 0	0	0	0	0	0	0	0	0	0	0			(24a)
b) If balanced mechan				i		- ^ ` ` 	í `	- ` `	<u> </u>	1	1		,
(24b)m= 0 0	0	0	0	0	0	0	0	0	0	0			(24b)
c) If whole house extra if $(22b)m < 0.5 \times ($			•	•				5 × (23h	n)				
(24c)m = 0 0	0	0	0	0	0	0	0	0	0	0]		(24c)
d) If natural ventilation	or whol	le hous	e positiv	re input	ventilatio	on from I	oft	<u> </u>	ļ.		J		
if (22b)m = 1, then								0.5]			_		
(24d)m= 0.63 0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61			(24d)
Effective air change ra	te - ente	er (24a)	or (2 <mark>4</mark> b	o) or (24	c) or (2 <mark>4</mark>	d) in box	(25)						
(25)m= 0.63 0.63	0.62	0.6	0.59	0.57	0.57	0.57	0.58	0.59	0.6	0.61			(25)
Heat losses and hear	t loss pa	aramete	er:										
ELEMENT Gross	(Openin	gs	Net Ar		U-valı		A X U	()	k-value		A X	
	(gs	Net Ar A ,r 20.43	m²	U-valı W/m2 /[1/(1.4)+	k.	A X U (W/I	<) 	k-value kJ/m²·l		A X kJ/h	
ELEMENT Gross area (r	(Openin	gs	A ,r	m ² x1	W/m2	0.04] =	(W/I	<) 				<
ELEMENT Gross area (r Windows Type 1	(Openin	gs	A ,r	m ² x1,	W/m2 /[1/(1.4)+	[0.04] = [0.04] = [0.04]	(W/l	<) 				(27)
ELEMENT Gross area (r Windows Type 1 Windows Type 2 Windows Type 3	(Openin	gs	A ,r 20.43 8.75	x10	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	[0.04] = [0.04] = [0.04] = [0.04]	27.09 11.6 2.65	<) 				(27) (27) (27)
ELEMENT Gross area (r Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	(Openin	gs	A ,r 20.43 8.75 2 6.6	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{l} (0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ \end{array} $	27.09 11.6 2.65 8.75					(27) (27) (27) (27) (27)
ELEMENT Gross area (no Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights	(Openin	gs	A ,r 20.43 8.75 2 6.6 0.764	x1. x1. x1. x1. x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	$ \begin{array}{l} (0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ \end{array} $	27.09 11.6 2.65 8.75					(27) (27) (27) (27) (27) (27b)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor	n²)	Opening m	gs 2	A ,r 20.43 8.75 2 6.6 0.764 98.4	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = =	27.09 11.6 2.65 8.75 1.07010					(27) (27) (27) (27) (27) (27b)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls 197.56	n²)	Opening m	gs 2	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14	0.04] = 0.04]	27.09 11.6 2.65 8.75 1.07010 13.776 25.56					(27) (27) (27) (27) (27) (27b) (28)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type 1 89.2	n²)	37.78 0	gs 2	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14 0.16	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = =	27.09 11.6 2.65 8.75 1.07010 13.776 25.56 8.92					(27) (27) (27) (27) (27b) (28) (29) (30)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type2 6.32	n²) (Opening m	gs 2	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14	0.04] = 0.04]	27.09 11.6 2.65 8.75 1.07010 13.776 25.56					(27) (27) (27) (27) (27) (27b) (28) (29) (30)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type2 Roof Type2 Total area of elements, r * for windows and roof windows	n²) (m²) (m²	37.78 0 0.76	gs 3 Indow U-ve	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calcul	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14 0.16 0.1	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [= = [= = [27.09 11.6 2.65 8.75 1.07010 13.776 25.56 8.92 0.94		kJ/m²-l	K		(27) (27) (27) (27) (27b) (28) (29) (30)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type1 Roof Type2 6.32 Total area of elements, r * for windows and roof window* ** include the areas on both sides.	m²) m² ms, use effectes of interesting interesting in the second interesting in the second in the	37.78 0 0.76 iective wir	gs 3 Indow U-ve	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calcul	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.14 0.16 0.1 0.17	$ \begin{array}{l} (1) & (1) $	27.09 11.6 2.65 8.75 1.07010 13.776 25.56 8.92 0.94		kJ/m²-l		kJ/r	(27) (27) (27) (27) (27b) (28) (29) (30) (31)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type1 Roof Type2 6.32 Total area of elements, r * for windows and roof window ** include the areas on both sice Fabric heat loss, W/K = \$\frac{1}{2}\$	m²) [m² rs, use effides of inte	37.78 0 0.76 iective wir	gs 3 Indow U-ve	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calcul	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14 0.16 0.1	$ \begin{array}{l} (1.5) \\ (1.5) $	27.09 11.6 2.65 8.75 1.07010 13.776 25.56 8.92 0.94	as given ir	kJ/m²-l	3.2	kJ/h	(27) (27) (27) (27) (27b) (28) (29) (30) (31)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type1 Roof Type2 G.32 Total area of elements, r * for windows and roof window ** include the areas on both side Fabric heat loss, W/K = S Heat capacity Cm = S(A	m ² S, use effectes of interest (A x U x k)	37.78 0 0.76 Sective wire ernal walls	gs 3 Indow U-va	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculatitions	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.14 0.16 0.1 0.17	$ \begin{array}{l} (1) & (1) $	(W/l) 27.09 11.6 2.65 8.75 1.07016 13.776 25.56 8.92 0.94 re)+0.04] a	as given ir	kJ/m²-l	10 131	0.31 14.82	(27) (27) (27) (27) (27b) (28) (29) (30) (31) (33) (33)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type1 Roof Type2 6.32 Total area of elements, r * for windows and roof window ** include the areas on both side Fabric heat loss, W/K = 3 Heat capacity Cm = S(A Thermal mass parameter	m² [m² [ws, use effectes of inteles of inteles (A x U x k)	37.78 0 0.76 fective wire ernal wall. J)	gs andow U-va s and part	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculatitions	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.14 0.16 0.1 0.17 q formula 1 (26)(30)	$ \begin{array}{l} (1) \\ (1) \\ (2) \\ (3) \\ (4) $	27.09 11.6 2.65 8.75 1.07010 13.776 25.56 8.92 0.94 ee)+0.04] a	as given ir 2) + (32a)	kJ/m²-l	10 131	kJ/h	(27) (27) (27) (27) (27b) (28) (29) (30) (31)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type1 Roof Type2 G.32 Total area of elements, r * for windows and roof window ** include the areas on both side Fabric heat loss, W/K = S Heat capacity Cm = S(A	m ² s, use effectes of interest (TMP) et the deta	37.78 0 0.76 iective win ernal wall. J) = Cm ÷	gs andow U-va s and part	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculatitions	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.14 0.16 0.1 0.17 q formula 1 (26)(30)	$ \begin{array}{l} (1) \\ (1) \\ (2) \\ (3) \\ (4) $	27.09 11.6 2.65 8.75 1.07010 13.776 25.56 8.92 0.94 ee)+0.04] a	as given ir 2) + (32a)	kJ/m²-l	10 131	0.31 14.82	(27) (27) (27) (27) (27b) (28) (29) (30) (31) (33) (33)



if details of thermal bridging are not known (36) = 0.05 x (31) Total fabric heat loss (33) + (36) =133.23 (37)Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)$ m x (5)Jul Sep Oct Jan Feb Mar May Jun Dec Apr Aug Nov (38)m =95.43 94.66 93.9 90.34 89.67 86.57 86.57 85.99 87.76 89.67 91.02 92.43 (38)Heat transfer coefficient, W/K (39)m = (37) + (38)m 228.66 227.89 227.13 223.56 222.9 222.9 224.25 (39)m =219.79 219.79 219.22 220.99 225.66 (39)Average = $Sum(39)_{1...12}/12=$ 223.56 Heat loss parameter (HLP), W/m2K (40)m = (39)m ÷ (4)(40)m =1.28 1 28 1.28 1.26 1.25 1 23 1 23 1.23 1 24 1.25 1.26 1 27 (40)Average = $Sum(40)_{1...12}/12=$ 1.26 Number of days in month (Table 1a) Nov Jan Feb Mar May Jul Sep Oct Apr Jun Aug Dec 31 (41)(41)m =31 28 31 30 31 30 31 31 30 30 31 4. Water heating energy requirement: kWh/year: Assumed occupancy, N (42)2.97 if TFA > 13.9, N = 1 + 1.76 x [1 - $\exp(-0.000349 \times (TFA - 13.9)2)] + 0.0013 \times (TFA - 13.9)$ if TFA £ 13.9, N = 1Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 (43)104.81 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 Jul Aug Sep Oct Nov Dec Apr Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)(44)m =115.3 111.1 106.91 102.72 98.53 94.33 94.33 98.53 102.72 106.91 111.1 115.3 Total = $Sum(44)_{1...12}$ = 1257.77 (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) 170.98 149.54 154.31 134.53 129.09 111.39 103.22 118.45 119.86 139.69 152.48 165.58 (45)m =(45)Total = $Sum(45)_{1...12}$ = 1649.13 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m =25.65 22.43 23.15 20.18 19.36 16.71 15.48 17.77 17.98 20.95 22.87 24.84 (46)Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 210 (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): 0 (48)Temperature factor from Table 2b (49)0 Energy lost from water storage, kWh/year $(48) \times (49) =$ (50)210 b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.01 (51)If community heating see section 4.3 Volume factor from Table 2a (52)0.83 Temperature factor from Table 2b (53)0.54 Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$ (54)0.97 Enter (50) or (54) in (55) (55)0.97



Water storage I	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m= 30.01	27.11	30.01	29.05	30.01	29.05	30.01	30.01	29.05	30.01	29.05	30.01		(56)
If cylinder contains	dedicate	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= 30.01	27.11	30.01	29.05	30.01	29.05	30.01	30.01	29.05	30.01	29.05	30.01		(57)
Primary circuit	loss (an	nual) fro	m Table	3							0		(58)
Primary circuit	•	•			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	factor fi	om Tabl	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss cald	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat requ	ired for	water he	eating ca	alculated	I for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 224.26	197.66	207.59	186.09	182.36	162.95	156.5	171.72	171.42	192.96	204.04	218.86		(62)
Solar DHW input ca	alculated	using App	endix G or	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= 224.26	197.66	207.59	186.09	182.36	162.95	156.5	171.72	171.42	192.96	204.04	218.86		_
							Outp	out from wa	ater heate	r (annual) ₁	12	2276.41	(64)
Hea <mark>t gains fron</mark>	n water	heating,	kWh/mo	onth 0.2	5 [0.85	× (45)m	+ (61)n] + 0.8 x	([(46)m	+ (57)m	+ (59)m	1	
(65)m= 99.47	88.22	93.93	85.98	85.54	7 <mark>8.28</mark>	76.94	82	81.1	89.07	91.95	97.68		(65)
in <mark>clude</mark> (57)n	n in calc	culation of	of (65)m	only if c	ylinder is		dwelling				munity h	eating	
include (57)n 5. Internal ga					ylinder is		dwelling				munity h	eating	
5. Internal gai	ins (see	Table 5	and 5a)		ylinder is		dwelling				munity h	eating	
	ins (see	Table 5	and 5a)		ylinder is Jun		dwelling				munity h	eating	
5. Internal gains	ins (see s (Table	Table 5	and 5a):		s in the o		or hot w	ater is fr	rom com		eating	(66)
5. Internal gains Metabolic gains Jan	ins (see S (Table Feb 178.39	5), Wat Mar 178.39	and 5a) ts Apr 178.39	May 178.39	Jun 178.39	Jul 178.39	Aug 178.39	Sep 178.39	ater is fr	om com	Dec	eating	(66)
5. Internal gains Metabolic gains Jan (66)m= 178.39	ins (see s (Table Feb 178.39 (calcula	5), Wat Mar 178.39	ts Apr 178.39 Appendix	May 178.39 L, equati	Jun 178.39 ion L9 or	Jul 178.39	Aug 178.39 Iso see	Sep 178.39	ater is fr	om com	Dec	eating	(66)
5. Internal gains Metabolic gains Jan (66)m= 178.39 Lighting gains (ins (see s (Table Feb 178.39 (calcula 69.27	Table 5 5), Wat Mar 178.39 ted in Ap	ts Apr 178.39 ppendix 42.65	May 178.39 L, equati	Jun 178.39 ion L9 or 26.92	Jul 178.39 r L9a), a 29.08	Aug 178.39 Iso see	Sep 178.39 Table 5 50.74	Oct 178.39	Nov	Dec 178.39	eating	, ,
Metabolic gains Jan (66)m= 178.39 Lighting gains (67)m= 77.99	ins (see s (Table Feb 178.39 (calcula 69.27	Table 5 5), Wat Mar 178.39 ted in Ap	ts Apr 178.39 ppendix 42.65	May 178.39 L, equati	Jun 178.39 ion L9 or 26.92	Jul 178.39 r L9a), a 29.08	Aug 178.39 Iso see	Sep 178.39 Table 5 50.74	Oct 178.39	Nov	Dec 178.39	eating	, ,
Metabolic gains Jan (66)m= 178.39 Lighting gains (67)m= 77.99 Appliances gain	ins (see Feb 178.39 (calculated) 69.27 ns (calculated) 527.29	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64	Apr 178.39 ppendix 42.65 Append 484.59	May 178.39 L, equati 31.88 dix L, eq	Jun 178.39 ion L9 of 26.92 uation L	Jul 178.39 r L9a), a 29.08 13 or L1 390.42	Aug 178.39 Iso see 37.8 3a), also 385.01	Sep 178.39 Table 5 50.74 see Tal 398.65	Oct 178.39 64.42 ble 5 427.7	Nov 178.39 75.19	Dec 178.39	eating	(67)
Metabolic gains Jan (66)m= 178.39 Lighting gains ((67)m= 77.99 Appliances gain (68)m= 521.87	ins (see Feb 178.39 (calculated) 69.27 ns (calculated) 527.29	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64	Apr 178.39 ppendix 42.65 Append 484.59	May 178.39 L, equati 31.88 dix L, eq	Jun 178.39 ion L9 of 26.92 uation L	Jul 178.39 r L9a), a 29.08 13 or L1 390.42	Aug 178.39 Iso see 37.8 3a), also 385.01	Sep 178.39 Table 5 50.74 see Tal 398.65	Oct 178.39 64.42 ble 5 427.7	Nov 178.39 75.19	Dec 178.39	eating	(67)
Metabolic gains Jan (66)m= 178.39 Lighting gains ((67)m= 77.99 Appliances gain (68)m= 521.87 Cooking gains	ins (see Feb 178.39 (calcula 69.27 ns (calc 527.29 (calcula 55.81	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64 ted in Ap 55.81	Apr 178.39 opendix 42.65 Append 484.59 opendix 55.81	May 178.39 L, equati 31.88 dix L, equat 447.91 L, equat	Jun 178.39 ion L9 or 26.92 uation L 413.45 tion L15	Jul 178.39 r L9a), a 29.08 13 or L1 390.42 or L15a)	Aug 178.39 Iso see 37.8 3a), also 385.01	Sep 178.39 Table 5 50.74 see Tal 398.65 ee Table	Oct 178.39 64.42 ble 5 427.7 5	Nov 178.39 75.19	Dec 178.39 80.16	eating	(67) (68)
Metabolic gains Jan (66)m= 178.39 Lighting gains (67)m= 77.99 Appliances gain (68)m= 521.87 Cooking gains (69)m= 55.81	ins (see Feb 178.39 (calcula 69.27 ns (calc 527.29 (calcula 55.81	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64 ted in Ap 55.81	Apr 178.39 opendix 42.65 Append 484.59 opendix 55.81	May 178.39 L, equati 31.88 dix L, equat 447.91 L, equat	Jun 178.39 ion L9 or 26.92 uation L 413.45 tion L15	Jul 178.39 r L9a), a 29.08 13 or L1 390.42 or L15a)	Aug 178.39 Iso see 37.8 3a), also 385.01	Sep 178.39 Table 5 50.74 see Tal 398.65 ee Table	Oct 178.39 64.42 ble 5 427.7 5	Nov 178.39 75.19	Dec 178.39 80.16	eating	(67) (68)
Metabolic gains Jan (66)m= 178.39 Lighting gains ((67)m= 77.99 Appliances gain (68)m= 521.87 Cooking gains (69)m= 55.81 Pumps and fan	ins (see Feb 178.39 (calcula 69.27 ns (calc 527.29 (calcula 55.81 ns gains	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64 ted in Ap 55.81 (Table 5	Apr 178.39 ppendix 42.65 Appendix 484.59 ppendix 55.81	May 178.39 L, equati 31.88 dix L, equat 447.91 L, equat 55.81	Jun 178.39 ion L9 or 26.92 uation L 413.45 ion L15 55.81	Jul 178.39 r L9a), a 29.08 13 or L1 390.42 or L15a) 55.81	Aug 178.39 Iso see 37.8 3a), also 385.01 3, also se 55.81	Sep 178.39 Table 5 50.74 see Tal 398.65 ee Table 55.81	Oct 178.39 64.42 ble 5 427.7 5 55.81	Nov 178.39 75.19 464.38	Dec 178.39 80.16 498.84	eating	(67) (68) (69)
Metabolic gains Jan (66)m= 178.39 Lighting gains ((67)m= 77.99 Appliances gain (68)m= 521.87 Cooking gains (69)m= 55.81 Pumps and fan (70)m= 3 Losses e.g. eva	ins (see Feb 178.39 (calcula 69.27 ns (calc 527.29 (calcula 55.81 ns gains	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64 ted in Ap 55.81 (Table 5	Apr 178.39 ppendix 42.65 Appendix 484.59 ppendix 55.81	May 178.39 L, equati 31.88 dix L, equat 447.91 L, equat 55.81	Jun 178.39 ion L9 or 26.92 uation L 413.45 ion L15 55.81	Jul 178.39 r L9a), a 29.08 13 or L1 390.42 or L15a) 55.81	Aug 178.39 Iso see 37.8 3a), also 385.01 3, also se 55.81	Sep 178.39 Table 5 50.74 see Tal 398.65 ee Table 55.81	Oct 178.39 64.42 ble 5 427.7 5 55.81	Nov 178.39 75.19 464.38	Dec 178.39 80.16 498.84	eating	(67) (68) (69)
Metabolic gains Jan (66)m= 178.39 Lighting gains ((67)m= 77.99 Appliances gain (68)m= 521.87 Cooking gains (69)m= 55.81 Pumps and fan (70)m= 3 Losses e.g. eva	ins (see Feb 178.39 (calcular 69.27 ns (calcular 527.29 (calcular 55.81 ns gains 3 aporation -118.93	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64 ted in Ap 55.81 (Table 5 3 on (negat	Apr 178.39 opendix 42.65 Appendix 484.59 opendix 55.81 5a) 3	May 178.39 L, equati 31.88 dix L, eq 447.91 L, equat 55.81	Jun 178.39 ion L9 of 26.92 uation L 413.45 ion L15 55.81 3	Jul 178.39 r L9a), a 29.08 13 or L1 390.42 or L15a) 55.81	Aug 178.39 Iso see 37.8 3a), also 385.01 , also se 55.81	Sep 178.39 Table 5 50.74 see Tal 398.65 ee Table 55.81	Oct 178.39 64.42 ble 5 427.7 5 55.81	Nov 178.39 75.19 464.38	Dec 178.39 80.16 498.84 55.81	eating	(67) (68) (69) (70)
Metabolic gains Jan (66)m= 178.39 Lighting gains ((67)m= 77.99 Appliances gain (68)m= 521.87 Cooking gains (69)m= 55.81 Pumps and fan (70)m= 3 Losses e.g. eva (71)m= -118.93	ins (see Feb 178.39 (calcular 69.27 ns (calcular 527.29 (calcular 55.81 ns gains 3 aporation -118.93	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64 ted in Ap 55.81 (Table 5 3 on (negat	Apr 178.39 opendix 42.65 Appendix 484.59 opendix 55.81 5a) 3	May 178.39 L, equati 31.88 dix L, eq 447.91 L, equat 55.81	Jun 178.39 ion L9 of 26.92 uation L 413.45 ion L15 55.81 3	Jul 178.39 r L9a), a 29.08 13 or L1 390.42 or L15a) 55.81	Aug 178.39 Iso see 37.8 3a), also 385.01 , also se 55.81	Sep 178.39 Table 5 50.74 see Tal 398.65 ee Table 55.81	Oct 178.39 64.42 ble 5 427.7 5 55.81	Nov 178.39 75.19 464.38	Dec 178.39 80.16 498.84 55.81	eating	(67) (68) (69) (70)
Metabolic gains Jan (66)m= 178.39 Lighting gains (67)m= 77.99 Appliances gain (68)m= 521.87 Cooking gains (69)m= 55.81 Pumps and fan (70)m= 3 Losses e.g. eva (71)m= -118.93 Water heating (9	ins (see Feb 178.39 (calcular 69.27 ns (calcular 527.29 (calcular 55.81 ns gains 3 aporation -118.93 gains (T	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64 ted in Ap 55.81 (Table 5 3 in (negat -118.93 Table 5) 126.25	Apr 178.39 opendix 42.65 Appendix 484.59 opendix 55.81 5a) 3 tive valu -118.93	May 178.39 L, equati 31.88 dix L, equati 447.91 L, equati 55.81	Jun 178.39 ion L9 or 26.92 uation L 413.45 ion L15 55.81 3 lle 5) -118.93	Jul 178.39 r L9a), a 29.08 13 or L1 390.42 or L15a) 55.81	Aug 178.39 Iso see 37.8 3a), also 385.01 3, also se 55.81 3	Sep 178.39 Table 5 50.74 see Tal 398.65 ee Table 55.81	Oct 178.39 64.42 ble 5 427.7 5 55.81 3 -118.93	Nov 178.39 75.19 464.38 55.81 3	Dec 178.39 80.16 498.84 55.81 3	eating	(67) (68) (69) (70) (71)
Metabolic gains Jan (66)m= 178.39 Lighting gains ((67)m= 77.99 Appliances gain (68)m= 521.87 Cooking gains (69)m= 55.81 Pumps and fan (70)m= 3 Losses e.g. eva (71)m= -118.93 Water heating ((72)m= 133.7	ins (see Feb 178.39 (calcular 69.27 ns (calcular 527.29 (calcular 55.81 ns gains 3 aporation -118.93 gains (T	Table 5 5), Wat Mar 178.39 ted in Ap 56.33 ulated in 513.64 ted in Ap 55.81 (Table 5 3 in (negat -118.93 Table 5) 126.25	Apr 178.39 opendix 42.65 Appendix 484.59 opendix 55.81 5a) 3 tive valu -118.93	May 178.39 L, equati 31.88 dix L, equati 447.91 L, equati 55.81	Jun 178.39 ion L9 or 26.92 uation L 413.45 ion L15 55.81 3 lle 5) -118.93	Jul 178.39 r L9a), a 29.08 13 or L1 390.42 or L15a) 55.81	Aug 178.39 Iso see 37.8 3a), also 385.01 3, also se 55.81 3	Sep 178.39 Table 5 50.74 see Tal 398.65 ee Table 55.81	Oct 178.39 64.42 ble 5 427.7 5 55.81 3 -118.93	Nov 178.39 75.19 464.38 55.81 3	Dec 178.39 80.16 498.84 55.81 3	eating	(67) (68) (69) (70) (71)

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



Orientati	on:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	20.43	x	10.63	x	0.63	x	0.7	=	66.39	(74)
North	0.9x	0.77	x	20.43	x	20.32	x	0.63	x	0.7	=	126.88	(74)
North	0.9x	0.77	x	20.43	x	34.53	x	0.63	x	0.7	=	215.6	(74)
North	0.9x	0.77	x	20.43	x	55.46	x	0.63	X	0.7	=	346.3	(74)
North	0.9x	0.77	x	20.43	x	74.72	x	0.63	x	0.7	=	466.5	(74)
North	0.9x	0.77	x	20.43	x	79.99	x	0.63	x	0.7] =	499.4	(74)
North	0.9x	0.77	x	20.43	x	74.68	x	0.63	x	0.7] =	466.26	(74)
North	0.9x	0.77	x	20.43	x	59.25	X	0.63	X	0.7	=	369.91	(74)
North	0.9x	0.77	x	20.43	x	41.52	x	0.63	x	0.7] =	259.22	(74)
North	0.9x	0.77	x	20.43	x	24.19	X	0.63	X	0.7	=	151.03	(74)
North	0.9x	0.77	x	20.43	x	13.12	x	0.63	x	0.7	=	81.9	(74)
North	0.9x	0.77	x	20.43	x	8.86	x	0.63	x	0.7	=	55.35	(74)
East	0.9x	0.77	x	2	x	19.64	x	0.63	x	0.7	=	12	(76)
East	0.9x	0.77	x	2	X	38.42	x	0.63	x	0.7	=	23.48	(76)
East	0.9x	0.77	X	2	x	63.27	X	0.63	x	0.7	=	38.67	(76)
East	0.9x	0.77	X	2	X	92.28	X	0.63	X	0.7	=	56.4	(76)
East	0.9x	0.77	x	2	х	113.09	×	0.63	x	0.7	-	69.13	(76)
East	0.9x	0.77	x	2	х	115.77	×	0.63	x	0.7	=	70.76	(76)
East	0.9x	0.77	x	2	X	110.22	X	0.63	x	0.7	=	67.37	(76)
East	0.9x	0.77	x	2	x	94.68	Х	0.63	x	0.7	=	57.87	(76)
East	0.9x	0.77	x	2	x	73.59	X	0.63	x	0.7	=	44.98	(76)
East	0.9x	0.77	X	2	х	45.59	X	0.63	X	0.7	=	27.87	(76)
East	0.9x	0.77	X	2	x	24.49	X	0.63	X	0.7	=	14.97	(76)
East	0.9x	0.77	X	2	X	16.15	X	0.63	X	0.7	=	9.87	(76)
South	0.9x	0.77	X	8.75	x	46.75	x	0.63	X	0.7	=	125.02	(78)
South	0.9x	0.77	X	8.75	X	76.57	X	0.63	X	0.7] =	204.75	(78)
South	0.9x	0.77	X	8.75	x	97.53	x	0.63	X	0.7	=	260.82	(78)
South	0.9x	0.77	X	8.75	X	110.23	X	0.63	X	0.7	=	294.78	(78)
South	0.9x	0.77	X	8.75	X	114.87	X	0.63	X	0.7	=	307.18	(78)
South	0.9x	0.77	X	8.75	X	110.55	X	0.63	X	0.7	=	295.62	(78)
South	0.9x	0.77	X	8.75	X	108.01	X	0.63	X	0.7	=	288.84	(78)
South	0.9x	0.77	X	8.75	X	104.89	X	0.63	X	0.7	=	280.5	(78)
South	0.9x		X	8.75	x	101.89	X	0.63	X	0.7	=	272.45	(78)
South	0.9x	0.77	X	8.75	X	82.59	X	0.63	X	0.7	=	220.84	(78)
South	0.9x		X	8.75	x	55.42	X	0.63	X	0.7	=	148.19	(78)
South	0.9x		X	8.75	х	40.4	X	0.63	X	0.7	=	108.03	(78)
West	0.9x	••••	X	6.6	x	19.64	X	0.63	X	0.7	=	39.62	(80)
West	0.9x		X	6.6	x	38.42	X	0.63	X	0.7	=	77.5	(80)
West	0.9x	0.77	X	6.6	X	63.27	X	0.63	X	0.7	=	127.62	(80)



_													
West 0.9x	0.77	X	6.6	X	9	2.28	X	0.63	X	0.7	=	186.13	(80)
West 0.9x	0.77	X	6.6	X	1	13.09	X	0.63	X	0.7	=	228.11	(80)
West 0.9x	0.77	X	6.6	X	11	15.77	X	0.63	X	0.7	=	233.51	(80)
West 0.9x	0.77	X	6.6	X	1	10.22	x	0.63	x	0.7	=	222.32	(80)
West 0.9x	0.77	X	6.6	X	9	4.68	x	0.63	x	0.7	=	190.97	(80)
West 0.9x	0.77	X	6.6	X	7	3.59	x	0.63	х	0.7	=	148.43	(80)
West 0.9x	0.77	x	6.6	X	4	5.59	x	0.63	х	0.7	=	91.96	(80)
West 0.9x	0.77	x	6.6	X	2	4.49	X	0.63	х	0.7	=	49.4	(80)
West 0.9x	0.77	X	6.6	X	1	6.15	x	0.63	х	0.7	=	32.58	(80)
Rooflights 0.9x	1	x	0.76	X	2	5.93	x	0.63	х	0.7	=	7.87	(82)
Rooflights 0.9x	1	X	0.76	X	5	1.88	x	0.63	x	0.7		15.74	(82)
Rooflights 0.9x	1	X	0.76	X	8	8.38	x	0.63	x	0.7		26.81	(82)
Rooflights 0.9x	1	x	0.76	X	1;	33.65	x	0.63	x	0.7	=	40.55	(82)
Rooflights 0.9x	1	×	0.76	X	1	68.1	x	0.63	x	0.7		51	(82)
Rooflights 0.9x	1	X	0.76	x		174	x	0.63	x	0.7		52.79	(82)
Rooflights 0.9x	1	X	0.76	x	10	64.87	x	0.63	x	0.7		50.02	(82)
Rooflights 0.9x	1	X	0.76	X	1;	38.72	x	0.63	x	0.7		42.09	(82)
Rooflights 0.9x	1	X	0.76	X	10	04.33	Х	0.63	X	0.7	=	31.65	(82)
Rooflights 0.9x	1	x	0.76	X	6	2.32	x	0.63	x	0.7	_	18.91	(82)
Rooflights _{0.9x}	1	X	0.76	х	3	2.54	x	0.63	Х	0.7	=	9.87	(82)
Rooflights _{0.9x}	1	x	0.76	= x	2	1.19	x	0.63	х	0.7	=	6.43	(82)
_		ΓΙ											
Sola <mark>r gains in</mark>	watts, calc	ulated	for each mo	nth			(83)m	= Sum(74)m .	(82)m				
(83)m= 250.9		69.53	924.17 112	_	1152.09		941	.34 756.73	510.6	304.33	212.26		(83)
Total gains – i	nternal and	l solar	(84)m = (73))m +	(83)m	, watts					1		
(84)m= 1102.73	1294.46 14	184.03	1689.09 183	1.96	1819.45	1735.99	1592	2.64 1437.04	1240.7	2 1089.88	1040.82		(84)
7. Mean inter	nal temper	ature ((heating sea	son)									
Temperature	during hea	iting p	eriods in the	living	g area f	from Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fac	tor for gain	s for li	iving area, h	1,m (see Ta	ble 9a)							
Jan	Feb	Mar	Apr M	ay	Jun	Jul	A	ug Sep	Oct	Nov	Dec		
(86)m= 1	0.99	0.99	0.96 0.8	37	0.71	0.54	0.0	0.85	0.97	1	1		(86)
Mean interna	l temperatu	ıre in I	iving area T	1 (fol	low ste	ps 3 to 7	7 in T	able 9c)					
(87)m= 19.89	20.02 2	20.23	20.52 20.	76	20.9	20.93	20.	93 20.82	20.51	20.15	19.88		(87)
Temperature	during hea	itina p	eriods in res	t of d	welling	from Ta	able 9). Th2 (°C)				•	
(88)m= 19.85		9.86	19.88 19.		19.89	19.89	19.		19.88	19.87	19.87		(88)
Utilisation fac	tor for goin	e for r	est of dwolli		2 m /cc	L Table	03/	·				I	
(89)m= 1		0.98	0.94 0.8	Ť	0.61	0.41	0.4	7 0.77	0.96	0.99	1		(89)
		!	<u> </u>					ļ		1	<u> </u>	I	. ,
Mean interna (90)m= 18.38		ıre ın t	19.3 19.	-	g 12 (fo 19.78	19.81	ps 3		le 9c) 19.3	18.78	18.36]	(90)
(90)m= 18.38	10.57	0.00	19.5	о I _	13.70	19.01	19.			ring area ÷ (0.14	(91)
									, . <u>_</u>	g aroa ? (., =	0.14	(31)
Mean interna	l tamparati	iro (foi	r the whole	أالصبيا	nal - fl	Δ ∨ T1	1 1	_ fl Δ\ v T2					

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$



(92)m= 18.59	18.77	19.07	19.47	19.77	19.93	19.96	19.96	19.86	19.46	18.97	18.57		(92)
Apply adjustn	nent to t	he mear	interna	l temper	ature fro	m Table	4e, whe	ere appro	priate	<u>!</u>			
(93)m= 18.59	18.77	19.07	19.47	19.77	19.93	19.96	19.96	19.86	19.46	18.97	18.57		(93)
8. Space hea	ting requ	uirement											
Set Ti to the r	mean int	ternal ter	mperatu	re obtain	ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	culate	
the utilisation	factor fo	or gains	using Ta	ble 9a								•	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:									•	
(94)m= 1	0.99	0.98	0.93	0.82	0.61	0.42	0.48	0.77	0.95	0.99	1		(94)
Useful gains,			_ `									•	
(95)m= 1097.8	1281.97	1448.62	1571.7	1497.87	1115.79	731.16	766.6	1109.56	1184.89	1079.9	1037.25		(95)
Monthly average	age exte	rnal tem	perature	from Ta	able 8							•	
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	for me	an intern	al tempo	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]			•	
(97)m= 3266.51	3160.44	2854.12	2362.01	1799.26	1171.86	738.54	780.14	1273.3	1975.65	2660.7	3243.23		(97)
Space heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	h = 0.02	24 x [(97)m – (95)m] x (4	1)m		•	
(98)m= 1613.52	1262.33	1045.69	569.02	224.23	0	0	0	0	588.33	1138.18	1641.25		
							Tota	l per year	(kWh/year	r) = Sum(9	8)15,912 =	8082.55	(98)
Space heatin	g require	ement in	kWh/m²	² /year								45.4	(99)
					votomo i	noludino	mioro C	יווט/	_				
9a. Energy rec		ils – Illu	IVIUUAI II	eaming s	/Stellis I	ncidaling	MILCIO-C) III)	_			_	
Space heatir Fraction of sp	_	at from s	econdar	v/supple	mentary	system						0	(201)
					y		(202) = 1	- (201) -					= '
Fraction of sp									(0.00)			1	(202)
Fraction of to							(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficiency of r	main spa	ace heat	ing syste	em 1								90.9	(206)
Efficiency of	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	 ear
Space heatin												,	
1613.52	1262.33	1045.69	569.02	224.23	0	0	0	0	588.33	1138.18	1641.25		
(211)m = {[(98)m x (20	1 <u> </u>	00 ÷ (20)6)								•	(211)
1775.05	<u> </u>	1150.37	625.99	246.68	0	0	0	0	647.23	1252.12	1805.56		(=)
								l (kWh/yea				8891.7	(211)
Space bootin	a fuel (e	ooondor	v) k///b/	month						715,1012		0001.7	(,
Space heatin $= \{[(98)m \times (200)]\}$	•		• •	monun									
$= \{[(90) \text{III X } (20)] $ (215)m= 0	0	00 + (20	0	0	0	0	0	0	0	0	0		
(210)				ı			_	l (kWh/yea		_		0	(215)
Water beating	_							(***********************************	,	715,1012	2	0	(210)
Water heating		tor (colo	ulotod o	hovo)									
Output from w	197.66	207.59	186.09	182.36	162.95	156.5	171.72	171.42	192.96	204.04	218.86		
Efficiency of w		ļ	100.00	.02.00	.02.00	.00.0	I		.02.00			80.8	(216)
			90 40	86.07	90.0	90.0	90.0	90.0	90 10	90.0	90.50	00.0	(217)
(217)m= 89.53	89.39	89.06	88.18	00.07	80.8	80.8	80.8	80.8	88.18	89.2	89.58		(217)
Fuel for water $(219)m = (64)$	•												
(219)m= $(04)(219)$ m= 250.47	221.13	233.1	211.03	211.87	201.67	193.68	212.53	212.15	218.84	228.73	244.31		
. ,		<u>I</u>						I = Sum(2		<u> </u>		2639.5	(219)
								ν=	r112			2003.0	(213)



Annual totals		kWh/year	kWh/year
Space heating fuel used, main system 1			8891.7
Water heating fuel used	and the d		2639.5
Electricity for pumps, fans and electric kee	ep-not	F	7 (000.)
central heating pump:		30	(230c)
boiler with a fan-assisted flue		45	(230e)
Total electricity for the above, kWh/year	sum of (230	0a)(230g) =	75 (231)
Electricity for lighting			550.94 (232)
Electricity generated by PVs			-1025.35 (233)
Total delivered energy for all uses (211)(. , , , , , , , ,		11131.79 (338)
10a. Fuel costs - individual heating system	ms:		
	Fuel kWh/year	Fuel Price (Table 12)	Fuel Cost £/year
Space heating - main system 1	(211) x	7.6 x 0.01 =	675.77 (240)
Space heating - main system 2	(213) x	0 x 0.01 =	0 (241)
Space heating - secondary	(215) x	13.19 × 0.01 =	0 (242)
Water heating cost (other fuel)	(219)	7.6 x 0.01 =	200.6 (247)
Pumps, fans and electric keep-hot	(231)	13.19 × 0.01 =	9.89 (249)
(if off-peak tariff, list each of (230a) to (230 Energy for lighting	Og) separately as applicable and ap	pply fuel price according to $\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Table 12a (250)
Additional standing charges (Table 12)			70 (251)
	one of (233) to (235) x)	13.19 × 0.01 =	-135.24 (252)
Appendix Q items: repeat lines (253) and ((254) as needed		
Total energy cost (2	245)(247) + (250)(254) =		893.69 (255)
11a. SAP rating - individual heating syste	ems		
Energy cost deflator (Table 12)			0.42 (256)
Energy cost factor (ECF)	255) x (256)] ÷ [(4) + 45.0] =		1.68 (257)
SAP rating (Section 12)			76.52 (258)
12a. CO2 emissions – Individual heating	systems including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.241	2142.9 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.241 =	636.12 (264)
Space and water heating	(261) + (262) + (263) + (264) =		2779.02 (265)
Electricity for pumps, fans and electric kee	ep-hot (231) x	0.519	38.93 (267)



63.71

(273)

Electricity for lighting	(232) x	0.519	=	285.94	(268)
Energy saving/generation technologies Item 1		0.519	=	-532.16	(269)
Total CO2, kg/year	sum	of (265)(271) =		2571.73	(272)
CO2 emissions per m²	(272	2) ÷ (4) =		14.45	(273)
EI rating (section 14)				85	(274)
13a. Primary Energy					
	Energy kWh/year	Primary factor		P. Energy kWh/year	
Space heating (main system 1)	(211) x	1.09	=	9691.95	(261)
Space heating (secondary)	(215) x	3.07	=	0	(263)
Energy for water heating	(219) x	1.09	=	2877.06	(264)
Space and water heating	(261) + (262) + (263) + (264) =			12569.01	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	3.07	=	230.25	(267)
Electricity for lighting	(232) x	0	=	1691.38	(268)
Energy saving/generation technologies Item 1 'Total Primary Energy	sum	3.07 of (265)(271) =	=	-3147.82 11342.82	(269) (272)

Primary energy kWh/m²/year



User Details: **Assessor Name:** Stroma Number: Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.60 Property Address: Plot 4 LPG Land West of Broome Farm Barn, Broome, Craven Arms Address: 1. Overall dwelling dimensions: Av. Height(m) Volume(m³) Area(m²) Ground floor 98.4 (1a) x 2.7 (2a) =265.68 (3a) First floor (2b) (1b) x (3b) 79.63 2.41 191.91 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)178.03 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =(5) 457.59 2. Ventilation rate: main secondary other total m³ per hour heating heating Number of chimneys x 40 =(6a) 0 0 0 0 0 x 20 = Number of open flues 0 0 0 0 (6b) Number of intermittent fans x 10 =(7a)40 4 Number of passive vents x 10 =(7b) 0 0 Number of flueless gas fires x 40 =(7c) 0 0 Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = \div (5) = 0.09 (8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) (9)0 Additional infiltration [(9)-1]x0.1 =(10)0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 (12)0 If no draught lobby, enter 0.05, else enter 0 0 (13)Percentage of windows and doors draught stripped (14)0 $0.25 - [0.2 \times (14) \div 100] =$ Window infiltration 0 (15)(8) + (10) + (11) + (12) + (13) + (15) =Infiltration rate 0 (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise (18) = (16)0.34 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)0 $(20) = 1 - [0.075 \times (19)] =$ Shelter factor 1 (20)

Infiltration rate incorporating shelter factor (21) = (18) x (20) =													0.34
Infiltration rate modified for monthly wind speed													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Monthl	y avera	ge wind	speed fr	om Tabl	e 7								

3.8

3.7

4.3

4.5

4.7

3.8

4.9

4.4

4.3

(22)m =

5.1

(21)



Wind Factor (22a)m = (22)	m ÷ 4										
	23 1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
A diverse of infiltration rate (a		+	ما د داند ما م		(04 =)	(00-)	!	!	!		
Adjusted infiltration rate (a	110Wing for S 41 0.37	0.36	0.32	0.32	(21a) x 0.31	(22a)m 0.34	0.36	0.38	0.4]	
Calculate effective air chai		1	ı	1	0.51	0.54	0.50	0.30	0.4		
If mechanical ventilation	:									((23a)
If exhaust air heat pump using	Appendix N, (2	23b) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			((23b)
If balanced with heat recovery	efficiency in %	allowing f	or in-use f	factor (from	n Table 4h) =				((23c)
a) If balanced mechanic	al ventilatior	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 balanced mechanic	al ventilatior	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)	r	1	
(24b)m = 0 0	0 0	0	0	0	0	0	0	0	0		(24b)
c) If whole house extractif (22b)m < 0.5 × (23		-	-				.5 × (23k	o)			
	0 0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation o	r whole hou	se positiv	ve input	ventilation	on from	oft				ı	
if $(22b)m = 1$, then (2)	24d)m = (22	b)m othe	erwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]				
(24d)m= 0.59 0.59 0.	59 0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(24d)
Effective air change rate	- e <mark>nter (</mark> 24a	a) or (24b	o) or (24	c) or (24	d) in bo	(25)					
(25)m= 0.59 0.59 0.	59 0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58		(25)
2 Heat leases and beat le	noc poromot								_		
3. Heat losses and heat lo	uss parainei	er:									
ELEMENT Gross	Openir	ngs	Net Ar		U-val		AXU		k-value		AXk
ELEMENT Gross area (m²	Openir		A ,r	m²	W/m2	k.	(W/		k-value kJ/m²-l		kJ/K
ELEMENT Gross area (m²) Windows Type 1	Openir	ngs	A ,r	m ² x1	W/m2 /[1/(1.4)+	0.04] =	(W/ 27.09				kJ/K (27)
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2	Openir	ngs	A ,r 20.43	m ² x1	W/m2 /[1/(1.4)+ /[1/(1.4)+	0.04 = 0.04 = 0.04 = 0.04	27.09 11.6				kJ/K (27) (27)
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2 Windows Type 3	Openir	ngs	A ,r	m ² x10 x10 x10	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	[0.04] = [0.04] = [0.04] = [0.04]	(W/ 27.09				kJ/K (27) (27) (27)
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Openir	ngs	A ,r 20.43	m ² x1. x1. x1. x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{l} (0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ \end{array} $	27.09 11.6				kJ/K (27) (27)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights	Openir	ngs	A ,r 20.43 8.75	m ² x1. x1. x1. x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{l} (0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ \end{array} $	27.09 11.6 2.65	k)			kJ/K (27) (27) (27)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor	Openir	ngs	A ,r 20.43 8.75 2 6.6	m ² x1. x1. x1. x1. x1. x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{l} (0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ \end{array} $	(W/ 27.09 11.6 2.65 8.75	K) 			kJ/K (27) (27) (27) (27)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights	Openir	ngs n²	A ,r 20.43 8.75 2 6.6 0.764	m ² x1. x1. x1. x1. x1. x x1. x1. x1. x1. x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{c} (0.04) = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ 0.04] = \\ \end{array} $	27.09 11.6 2.65 8.75 1.2994	K) 			kJ/K (27) (27) (27) (27) (27b)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor	Openir n	ngs n²	A ,r 20.43 8.75 2 6.6 0.764	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = =	(W/ 27.09 11.6 2.65 8.75 1.2994 12.792	K) 			kJ/K (27) (27) (27) (27) (27b)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls 197.56	Openir n	ngs n²	A ,r 20.43 8.75 2 6.6 0.764 98.4	m ² x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	0.04] = 0.04]	(W/ 27.09 11.6 2.65 8.75 1.2994 12.792 28.76	K) 			(27) (27) (27) (27) (27) (27b) (28) (29)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type 1 89.2	37.7 0	ngs n²	A ,r 20.4; 8.75 2 6.6 0.764 98.4 159.7 89.2	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.18	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = =	27.09 11.6 2.65 8.75 1.2994 12.792 28.76	K) 			kJ/K (27) (27) (27) (27) (27b) (28) (29)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type2 6.32	Openir n 37.7 0 0.70 use effective w	ngs n ² 6	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculus	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.18 0.13	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [= = [= = [27.09 11.6 2.65 8.75 1.2994 12.792 28.76 11.6 0.72	K) 	kJ/m²-l	× [kJ/K (27) (27) (27) (27b) (28) (29) (30)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type2 Roof Type2 Total area of elements, m² * for windows and roof windows,	Openir n 37.7 0 0.7 use effective we so of internal wa	ngs n ² 6	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculus	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.18 0.13	$ \begin{array}{l} (1) & (1) $	27.09 11.6 2.65 8.75 1.2994 12.792 28.76 11.6 0.72	K) 	kJ/m²-l	× [kJ/K (27) (27) (27) (27) (27b) (28) (29) (30) (31)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls 197.56 Roof Type1 89.2 Roof Type2 6.32 Total area of elements, m² * for windows and roof windows, ** include the areas on both sides	Openir n 37.7 0 0.70 use effective was of internal was (A x U)	ngs n ² 6	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculus	x1.	W/m ² /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+	$ \begin{array}{l} (1.5) \\ (1.5) $	27.09 11.6 2.65 8.75 1.2994 12.792 28.76 11.6 0.72	K) 	kJ/m²-l	X [kJ/K (27) (27) (27) (27) (27b) (28) (29) (30) (31)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type2 6.32 Total area of elements, m² * for windows and roof windows, ** include the areas on both sides Fabric heat loss, W/K = S	Openir n 37.7 0 0.7 use effective was of internal was (A x U) k)	ngs n ² 6 indow U-va	A ,r 20.4; 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculatitions	x1.	W/m ² /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7)+	$ \begin{array}{l} (1) & (1) $	27.09 11.6 2.65 8.75 1.2994 12.792 28.76 11.6 0.72	8 [[] [] [] [] [] [] [] [] []	kJ/m²-l	1 3.2 105	(27) (27) (27) (27) (27) (28) (28) (29) (30) (30) (31) (31)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type2 Roof Type2 Total area of elements, m² * for windows and roof windows, ** include the areas on both sides Fabric heat loss, W/K = S Heat capacity Cm = S(A x	Opening 37.7 0 0.7 use effective was of internal was (A x U) k) TMP = Cm the details of the	ngs n ² indow U-va ills and part	A ,r 20.4; 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculatitions	x1.	W/m ² /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.13 0.13 0.13 (26)(30	$ \begin{array}{l} (1) \\ (1) \\ (2) \\ (3) \\ (4) $	27.09 11.6 2.65 8.75 1.2994 12.792 28.76 11.6 0.72 11.6 0.72 11.6 0.72 11.6 0.72	8	kJ/m²-l	1311	kJ/K (27) (27) (27) (27) (27b) (28) (29) (30) (31) (31)



if details of thermal bridging are not known (36) = 0.05 x (31) Total fabric heat loss (33) + (36) =121.64 (37)Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)$ m x (5)Jul Sep Oct Jan Feb Mar May Jun Dec Apr Aug Nov (38)m =89.48 88.93 88.4 85.9 85.44 83.26 83.26 82.86 84.1 85.44 86.38 87.37 (38)Heat transfer coefficient, W/K (39)m = (37) + (38)m 211.12 210.58 210.05 207.55 207.08 204.9 207.08 208.03 (39)m =204.9 204.5 205.74 209.01 207.54 (39)Average = $Sum(39)_{1...12}/12=$ Heat loss parameter (HLP), W/m2K (40)m = (39)m ÷ (4)(40)m =1.19 1.18 1.18 1.16 1.15 1.15 1.15 1 16 1.16 1.17 1 17 (40)Average = $Sum(40)_{1...12}/12=$ 1.17 Number of days in month (Table 1a) Dec Jan Feb Mar May Jul Sep Oct Nov Apr Jun Aug 31 31 (41)(41)m =31 28 30 31 30 31 31 30 30 31 4. Water heating energy requirement: kWh/year: Assumed occupancy, N (42)2.97 if TFA > 13.9, N = 1 + 1.76 x [1 - $\exp(-0.000349 \times (TFA - 13.9)2)] + 0.0013 \times (TFA - 13.9)$ if TFA £ 13.9, N = 1Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 (43)104.81 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 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 =115.3 111.1 106.91 102.72 98.53 94.33 94.33 98.53 102.72 106.91 111.1 115.3 Total = $Sum(44)_{1...12}$ = 1257.77 (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) 170.98 149.54 154.31 134.53 129.09 111.39 103.22 118.45 119.86 139.69 152.48 165.58 (45)m =Total = $Sum(45)_{1...12}$ = (45)1649.13 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m =0 0 0 (46)Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 150 (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): 0 (48)Temperature factor from Table 2b (49)0 Energy lost from water storage, kWh/year $(48) \times (49) =$ (50)n b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)If community heating see section 4.3 Volume factor from Table 2a (52)0 Temperature factor from Table 2b (53)0 Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$ (54)0 Enter (50) or (54) in (55) 0 (55)



Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)ı	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	d solar sto	rage, (57)r	n = (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 (ar	nual) fro	m Table	3							0		(58)
Primary circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	55 × (41)	m					
(modified by	/ factor fi	rom Tab	le H5 if t	here is s	solar wat	er heatir	ng and a	cylinde	r thermo	stat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	lculated	for each	month (61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	for eacl	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 145.33	127.11	131.17	114.35	109.72	94.68	87.74	100.68	101.88	118.74	129.61	140.75		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add additiona	I lines if	FGHRS	and/or V	VWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	ter											
(64)m= 145.33	127.11	131.17	114.35	109.72	94.68	87.74	100.68	101.88	118.74	129.61	140.75		_
							Outp	out from wa	ater heate	r (annual) ₁	12	1401.76	(64)
Hea <mark>t gains fro</mark>	m water	heating,	kWh/mo	onth 0.2	5 [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m	1	
(65)m= 36.33	31.78	32.79	28.59	27.43	23.67	21.93	25.17	25.47	29.68	32.4	35.19		(65)
(3.1)	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \					-	7-0-1		_0.00	J ~			
include (57)	m in calc	culation of	of (65)m		ylinder is							eating	
				only if c	ylinder is							eating	
include (57) 5. Internal ga	ains (see	Table 5	and 5a)	only if c	ylinder is							leating	
include (57)	ains (see	Table 5	and 5a)	only if c	ylinder is							eating	
include (57) 5. Internal gain	ains (see	Table 5	and 5a)	only if o		s in the d	dwelling	or hot w	ater is fr	rom com	munity h	eating	(66)
include (57) 5. Internal games Metabolic gain Jan	reb 148.66	Table 5 5), Wat Mar 148.66	and 5a) ts Apr 148.66	only if control is May	Jun 148.66	Jul 148.66	Aug 148.66	Sep 148.66	ater is fr	om com	munity h	eating	(66)
include (57) 5. Internal games Metabolic gain Jan (66)m= 148.66	reb 148.66	Table 5 5), Wat Mar 148.66	and 5a) ts Apr 148.66	only if control is May	Jun 148.66	Jul 148.66	Aug 148.66	Sep 148.66	ater is fr	om com	munity h	eating	(66) (67)
include (57) 5. Internal gain Metabolic gain Jan (66)m= 148.66 Lighting gains	reb 148.66 (calcula 27.71	Table 5 5), Wat Mar 148.66 ted in Ap 22.53	ts Apr 148.66 ppendix	May 148.66 L, equat	Jun 148.66 ion L9 or 10.77	Jul 148.66 r L9a), a 11.63	Aug 148.66 Iso see	Sep 148.66 Table 5	Oct 148.66	Nov	Dec	neating	, ,
include (57) 5. Internal games Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2	ns (Table Feb 148.66 (calcula 27.71 ins (calc	Table 5 5), Wat Mar 148.66 ted in Ap 22.53	ts Apr 148.66 ppendix	May 148.66 L, equat	Jun 148.66 ion L9 or 10.77	Jul 148.66 r L9a), a 11.63	Aug 148.66 Iso see	Sep 148.66 Table 5	Oct 148.66	Nov	Dec	neating	, ,
include (57) 5. Internal games Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances games	res (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28	Table 5 9 5), Wat Mar 148.66 ted in Ap 22.53 ulated in 344.14	148.66 ppendix 1 17.06 Appendix 1 324.67	May 148.66 L, equat 12.75 dix L, eq	Jun 148.66 ion L9 or 10.77 uation L	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Tal 267.1	Oct 148.66 25.77 ble 5 286.56	Nov 148.66	Dec 148.66	eating	(67)
include (57) 5. Internal graph of the second of the secon	res (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28	Table 5 9 5), Wat Mar 148.66 ted in Ap 22.53 ulated in 344.14	148.66 ppendix 1 17.06 Appendix 1 324.67	May 148.66 L, equat 12.75 dix L, eq	Jun 148.66 ion L9 or 10.77 uation L	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Tal 267.1	Oct 148.66 25.77 ble 5 286.56	Nov 148.66	Dec 148.66	eating	(67)
include (57) 5. Internal games Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances games (68)m= 349.65 Cooking gains	res (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28 (calcula 37.87)	Table 5 Mar 148.66 ted in Ap 22.53 ullated in 344.14 atted in Ap	148.66 ppendix 17.06 Appendix 24.67 ppendix 324.67	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58 or L15a)	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Tal 267.1	Oct 148.66 25.77 ble 5 286.56 5	Nov 148.66 30.08	Dec 148.66 32.06 334.23	neating	(67) (68)
include (57) 5. Internal games Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances games (68)m= 349.65 Cooking gains (69)m= 37.87	res (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28 (calcula 37.87)	Table 5 Mar 148.66 ted in Ap 22.53 ullated in 344.14 atted in Ap	148.66 ppendix 17.06 Appendix 24.67 ppendix 324.67	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58 or L15a)	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Tal 267.1	Oct 148.66 25.77 ble 5 286.56 5	Nov 148.66 30.08	Dec 148.66 32.06 334.23	eating	(67) (68)
include (57) 5. Internal graph of the second of the secon	res (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28 (calcula 37.87 ins gains 0	Table 5 5), Wat Mar 148.66 ted in Ap 22.53 ulated in Ap 344.14 tted in Ap 37.87 (Table 5	148.66 ppendix I 17.06 Appendix I 324.67 ppendix 37.87 5a) 0	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95 , also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23	eating	(67) (68) (69)
include (57) 5. Internal games Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances games (68)m= 349.65 Cooking gains (69)m= 37.87 Pumps and fames (70)m= 0	ns (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28 (calcula 37.87 ns gains 0 vaporatio	Table 5 5), Wat Mar 148.66 ted in Ap 22.53 culated in 344.14 tted in Ap 37.87 (Table 5)	ts Apr 148.66 ppendix I 17.06 Appendix 324.67 ppendix 37.87 5a) 0 tive value	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95 , also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 37.87	neating	(67) (68) (69)
include (57) 5. Internal graph of the second of the secon	res (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28 (calcula 37.87 ins gains 0 raporatio -118.93	Table 5 5), Wat Mar 148.66 ted in Ap 22.53 ulated in 344.14 tted in Ap 37.87 (Table 5 on (negation)	ts Apr 148.66 ppendix I 17.06 Appendix 324.67 ppendix 37.87 5a) 0 tive value	only if control of the control of th	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95 o, also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 37.87	neating	(67) (68) (69) (70)
include (57) 5. Internal graph of the state	res (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28 (calcula 37.87 ins gains 0 raporatio -118.93	Table 5 5), Wat Mar 148.66 ted in Ap 22.53 ulated in 344.14 tted in Ap 37.87 (Table 5 on (negation)	ts Apr 148.66 ppendix I 17.06 Appendix 324.67 ppendix 37.87 5a) 0 tive value	only if control of the control of th	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95 o, also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 37.87	eating	(67) (68) (69) (70)
include (57) 5. Internal games Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances games (68)m= 349.65 Cooking gains (69)m= 37.87 Pumps and fames (70)m= 0 Losses e.g. even (71)m= -118.93 Water heating	res (Table Feb 148.66 (calcula 27.71 ins (calcula 353.28 calcula 37.87 ins gains 0 vaporatio -118.93 gains (Table 47.29	Table 5 9 5), Wat Mar 148.66 ted in Ap 22.53 rulated in 344.14 ted in Ap 37.87 (Table 5 0 on (negat -118.93 Table 5) 44.07	148.66 ppendix 17.06 n Appendix 37.87 ppendix 37.87 tive value -118.93	only if control of the control of th	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87 0 ole 5) -118.93	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95 o, also se 37.87 0	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87 0	Oct 148.66 25.77 ble 5 286.56 5 37.87 0 -118.93	Nov 148.66 30.08 311.13 37.87 0	Dec 148.66 32.06 334.23 37.87 0	neating	(67) (68) (69) (70) (71)
include (57) 5. Internal graph of the state	ains (see Feb 148.66 (calcula 27.71 ins (calcula 353.28 (calcula 37.87 ins gains 0 (aporatio -118.93 gains (Table 47.29 gains =	Table 5 9 5), Wat Mar 148.66 ted in Ap 22.53 rulated in 344.14 ted in Ap 37.87 (Table 5 0 on (negat -118.93 Table 5) 44.07	148.66 ppendix 17.06 n Appendix 37.87 ppendix 37.87 tive value -118.93	only if control of the control of th	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87 0 ole 5) -118.93	Jul 148.66 r L9a), a 11.63 13 or L1: 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95 o, also se 37.87 0	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87 0	Oct 148.66 25.77 ble 5 286.56 5 37.87 0 -118.93	Nov 148.66 30.08 311.13 37.87 0	Dec 148.66 32.06 334.23 37.87 0	eating	(67) (68) (69) (70) (71)

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



Orientat		Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	20.43	x	10.63	x	0.63	x	0.7	=	66.39	(74)
North	0.9x	0.77	x	20.43	x	20.32	x	0.63	x	0.7	=	126.88	(74)
North	0.9x	0.77	x	20.43	x	34.53	x	0.63	x	0.7	=	215.6	(74)
North	0.9x	0.77	x	20.43	x	55.46	x	0.63	x	0.7	=	346.3	(74)
North	0.9x	0.77	x	20.43	x	74.72	x	0.63	x	0.7	=	466.5	(74)
North	0.9x	0.77	x	20.43	x	79.99	x	0.63	x	0.7	=	499.4	(74)
North	0.9x	0.77	x	20.43	x	74.68	X	0.63	x	0.7] =	466.26	(74)
North	0.9x	0.77	x	20.43	X	59.25	X	0.63	x	0.7	=	369.91	(74)
North	0.9x	0.77	x	20.43	X	41.52	X	0.63	x	0.7	=	259.22	(74)
North	0.9x	0.77	x	20.43	x	24.19	x	0.63	x	0.7	=	151.03	(74)
North	0.9x	0.77	x	20.43	x	13.12	x	0.63	X	0.7	=	81.9	(74)
North	0.9x	0.77	x	20.43	x	8.86	x	0.63	X	0.7	=	55.35	(74)
East	0.9x	0.77	x	2	x	19.64	x	0.63	x	0.7	=	12	(76)
East	0.9x	0.77	x	2	x	38.42	x	0.63	X	0.7	=	23.48	(76)
East	0.9x	0.77	x	2	X	63.27	X	0.63	X	0.7	=	38.67	(76)
East	0.9x	0.77	X	2	X	92.28	X	0.63	X	0.7	=	56.4	(76)
East	0.9x	0.77	x	2	х	113.09	X	0.63	X	0.7	-	69.13	(76)
East	0.9x	0.77	x	2	х	115.77	×	0.63	x	0.7	=	70.76	(76)
East	0.9x	0.77	x	2	X	110.22	X	0.63	x	0.7	=	67.37	(76)
East	0.9x	0.77	x	2	x	94.68	х	0.63	x	0.7	=	57.87	(76)
East	0.9x	0.77	x	2	x	73.59	X	0.63	x	0.7	=	44.98	(76)
East	0.9x	0.77	x	2	х	45.59	X	0.63	X	0.7	=	27.87	(76)
East	0.9x	0.77	x	2	X	24.49	X	0.63	X	0.7	=	14.97	(76)
East	0.9x	0.77	X	2	X	16.15	X	0.63	X	0.7	=	9.87	(76)
South	0.9x	0.77	x	8.75	X	46.75	x	0.63	X	0.7	=	125.02	(78)
South	0.9x	0.77	X	8.75	X	76.57	X	0.63	X	0.7	=	204.75	(78)
South	0.9x	0.77	X	8.75	X	97.53	x	0.63	X	0.7	=	260.82	(78)
South	0.9x	0.77	X	8.75	X	110.23	X	0.63	X	0.7	=	294.78	(78)
South	0.9x	0.77	X	8.75	X	114.87	X	0.63	X	0.7	=	307.18	(78)
South	0.9x	0.77	X	8.75	X	110.55	X	0.63	X	0.7	=	295.62	(78)
South	0.9x	0.77	X	8.75	X	108.01	X	0.63	X	0.7	=	288.84	(78)
South	0.9x	0.77	X	8.75	X	104.89	X	0.63	X	0.7	=	280.5	(78)
South	0.9x	0.77	X	8.75	X	101.89	X	0.63	X	0.7	=	272.45	(78)
South	0.9x	0.77	X	8.75	X	82.59	X	0.63	X	0.7	=	220.84	(78)
South	0.9x	0.77	X	8.75	X	55.42	X	0.63	X	0.7	=	148.19	(78)
South	0.9x	0.77	X	8.75	X	40.4	X	0.63	X	0.7	=	108.03	(78)
West	0.9x	0.77	X	6.6	X	19.64	X	0.63	X	0.7	=	39.62	(80)
West	0.9x	0.77	X	6.6	X	38.42	X	0.63	X	0.7	=	77.5	(80)
West	0.9x	0.77	X	6.6	X	63.27	X	0.63	X	0.7	=	127.62	(80)



_												
West 0.9x	0.77	X	6.6	X	92.28	X	0.63	X	0.7	=	186.13	(80)
West 0.9x	0.77	X	6.6	X	113.09	X	0.63	X	0.7	=	228.11	(80)
West 0.9x	0.77	X	6.6	X	115.77	X	0.63	X	0.7	=	233.51	(80)
West 0.9x	0.77	X	6.6	X	110.22	x	0.63	X	0.7	=	222.32	(80)
West 0.9x	0.77	x	6.6	x	94.68	x	0.63	x	0.7	=	190.97	(80)
West 0.9x	0.77	x	6.6	x	73.59	x	0.63	х	0.7	=	148.43	(80)
West 0.9x	0.77	x	6.6	x	45.59	х	0.63	х	0.7	=	91.96	(80)
West 0.9x	0.77	x	6.6	x	24.49	x	0.63	х	0.7	=	49.4	(80)
West 0.9x	0.77	x	6.6	x	16.15	x	0.63	х	0.7	=	32.58	(80)
Rooflights 0.9x	1	х	0.76	x	25.93	х	0.63	х	0.7	=	7.87	(82)
Rooflights 0.9x	1	X	0.76	x	51.88	X	0.63	X	0.7	=	15.74	(82)
Rooflights 0.9x	1	X	0.76	x	88.38	x	0.63	X	0.7	=	26.81	(82)
Rooflights 0.9x	1	x	0.76	x	133.65	×	0.63	x	0.7	=	40.55	(82)
Rooflights 0.9x	1	×	0.76	X	168.1	X	0.63	x	0.7	=	51	(82)
Rooflights 0.9x	1	X	0.76	x	174	X	0.63	x	0.7	=	52.79	(82)
Rooflights 0.9x	1	X	0.76	x	164.87	x	0.63	X	0.7	=	50.02	(82)
Rooflights 0.9x	1	X	0.76	x	138.72	x	0.63	X	0.7	=	42.09	(82)
Rooflights 0.9x	1	X	0.76	X	104.33	×	0.63	X	0.7	=	31.65	(82)
Rooflights 0.9x	1	X	0.76	x	62.32	x	0.63	х	0.7	=	18.91	(82)
Rooflights 0.9x	1	X	0.76	х	32.54		0.63	Х	0.7	=	9.87	(82)
Rooflights 0.9x	1	x	0.76	X	21.19	X	0.63	x	0.7	=	6.43	(82)
		ΠΙ										
Solar gains in	watts, calc	ulated	for each mo	nth		(83)m	ı = Sum(74)m	(82)m				
(83)m= 250.9	448.35 6	69.53	924 <mark>.17 1121</mark>	.92 1	152.09 1094.79	9 941	.34 756.73	510.6	304.33	212.26		(83)
Total gains – ir	nternal and	l solar	(84)m = (73)	m +	(83)m , watts							
(84)m= 748.18	944.22 11	47.87	1373.2 1539	.24 1	540.34 1465.09	9 131	5.84 1147.1	930.43	758.14	693.44		(84)
7. Mean inter	nal temper	ature ((heating seas	on)								
Temperature	during hea	iting p	eriods in the	living	area from Ta	able 9	Th1 (°C)				21	(85)
Utilisation fac	tor for gain	s for li	iving area, h	,m (see Table 9a))						
Jan	Feb	Mar	Apr Ma	ау	Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 1	1 (0.99	0.98 0.9	1	0.76 0.59	0.6	0.91	0.99	1	1		(86)
Mean internal	l temperatu	ıre in I	iving area T1	(foll	ow steps 3 to	7 in T	able 9c)					
(87)m= 19.54	19.72	20	20.38 20.7	2	20.93 20.98	20.	97 20.8	20.35	19.88	19.52		(87)
Temperature	during hea	itina p	eriods in rest	of d	welling from T	able 9	Th2 (°C)		•	•	•	
(88)m= 19.93		9.94	19.95 19.9		19.96 19.96	19.	` 	19.95	19.95	19.94		(88)
Utilisation fac	tor for goin	s for r	est of dwallin	a b	m (see Tabl	0 00)			·	I	I	
(89)m= 1		0.99	0.97 0.8	- -	0.67 0.46	e 9a) 0.5	0.85	0.99	1	1		(89)
		!	<u> </u>			<u> </u>	ļ		1 .	<u> </u>		V - 7
Mean internal					- ` 	-i			10.04	10 50		(90)
(90)m= 18.59	18.77 1	9.05	19.44 19.7	٥	19.92 19.96	19.		19.41	18.94 ing area ÷ (4	18.58	0.44	(90)
								LA – LIV	iy aiea → (4	- // -	0.14	(81)
Mean internal	Ltamparati	iro (foi	r tha whala d	الاصيما	$\alpha = f \wedge \nabla T$	1 1 / 1	_ fl Λ\ √ Τ2					

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$



18.72 18.9 19.18 19.77 19.89 20.06 20.1 20.09 19.97 19.54 19.07 18.71 (82)	(02)~	10.70	10.0	10.10	10.57	10.00	20.06	20.1	20.00	10.07	10.54	10.07	10.71	1	(92)
Same 18.72 18.8 19.18 19.15 19.87 19.89 20.06 20.1 20.09 19.97 19.64 19.07 18.71 18.71 18.71 18.71 18.71 18.72 18.82 19.18	. ,											19.07	10.71		(92)
Set 1 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, hm:									1			19.07	18 71		(93)
Set 1 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:	. ,					10.00	20.00	20.1	20.00	10.07	10.01	10.01	10.11		(3.2)
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec						re obtain	ed at ste	ep 11 of	Table 9b	o, so tha	t Ti.m=(76)m an	d re-calc	ulate	
Utilisation factor for gains, hm: (94)ms 1					•										
Case March		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains, hmGm, W = (94)m x (84)m	Utilisa	ation fac	tor for g	ains, hm	:									•	
(95)me	(94)m=	1	1	0.99	0.96	0.87	0.68	0.48	0.56	0.85	0.98	1	1		(94)
Monthly average external temperature from Table 8 (86)m	Usefu	ıl gains,		<u> </u>	_									ı	
Gelima	(95)m=	747.6	941.83	1137.46	1321.75	1339.84	1047.19	706.24	734.67	979.8	915.16	756.69	693.07		(95)
Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) (97)m (95)m (97)m (97)						i i								ı	
Space						l l			ļ			7.1	4.2		(96)
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m 1709.47 1347.98 1135.88 642.79 265.08 0 0 0 696.91 1247.88 1740.23 1347.98 1136.88 642.79 265.08 0 0 0 696.91 1247.88 1740.23 1347.98															(07)
Space heating requirement in kWh/m²/year	. ,												3032.09		(97)
Space heating requirement in kWh/m²/year	•		•						- ` 	`	<u> </u>		4740.00	1	
Space heating requirement in kWh/m²/year	(98)m=	1709.47	1347.98	1135.88	642.79	265.08	0	0							7(00)
Calculated for June, July and August. See Table 10b									Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	8786.02	(98)
Calculated for June, July and August. See Table 10b Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100)	Spac	e heatin	g require	ement in	kWh/m²	/year								49.35	(99)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	8c. S	pace co	oling red	uiremen	nt										
Heat loss rate Lm (calculated using 25°C internal temperature and external temperature from Table 10) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (100) (101) (101) (102) (102) (102) (102) (102) (102) (103) (103) (103) (104) (104) (104) (104) (104) (104) (104) (104) (104) (104) (105) (106) (106) (107) (106) (107) (107) (107) (108) (109) (109) (109) (109) (109) (109) (109) (101) (101) (102) (103) (104) (105) (105) (106) (107) (107) (108) (109)	Calcu	ulated fo	r June, J	luly and	August.	See Tab	ole 10b								
(100) Color Color		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor for loss hm (101)m= 0	Heat	loss rate	Lm (ca	lculated	using 25	5°C inter	nal temp	perature	and exte	ernal ten	npe <mark>ratur</mark>	e from T	able 10)		
Useful loss, hmLm (Watts) = (100)m x (101)m	(400)														
Useful loss, hmLm (Watts) = (100)m x (101)m (102)m=	(100)111=	0	0	0	0	0	1926.09	1516.29	1554.21	0	0	0	0		(100)
Gains (solar gains calculated for applicable weather region, see Table 10) (103)m= 0 0 0 0 0 1926.2 1835.45 1665.07 0 0 0 0 0 (103) Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 x [(103)m - (102)m] x (41)m set (104)m to zero if (104)m < 3 × (98)m (104)m= 0 0 0 0 0 0 230.31 347.41 242.6 0 0 0 0 0 0 Total = Sum(1.04) = 820.33 (104) Cooled fraction	Utilis	ation fac	tor for Ic			0				0					` ,
Gains (solar gains calculated for applicable weather region, see Table 10) (103)m= 0 0 0 0 0 1926.2 1835.45 1665.07 0 0 0 0 0 0	Utilisa (101)m=	ation fac	tor for lo	ss hm 0	0	0									` ,
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Utilisa (101)m= Usefu	ation fac	tor for lo	ss hm 0 /atts) = (0 (100)m x	0 (101)m	0.83	0.9	0.86	0	0	0	0		(101)
$Space \ cooling \ requirement \ for \ month, \ whole \ dwelling, \ continuous \ (kWh) = 0.024 \ x \ [(103)m - (102)m] \ x \ (41)m$ set $(104)m$ to zero if $(104)m < 3 \times (98)m$ $(104)m = 0 0 0 0 0 230.31 347.41 242.6 0 0 0 0$ $Total = Sum(10.4) = 820.33 (104)$ Cooled fraction $f \ C = cooled \ area \div (4) = 1 (105)$ Intermittency factor (Table 10b) $(106)m = 0 0 0 0 0 0 25 0.25 0.25 0 0 0 0$ $Total = Sum(10.4) = 0 0 (106)$ Space cooling requirement for month = $(104)m \times (105) \times (106)m$ $(107)m = 0 0 0 0 0 57.58 86.85 60.65 0 0 0 0$ Total = $Sum(10.7) = 205.08 (107)$ Space cooling requirement in kWh/m²/year $(107) \div (4) = 1.15 (108)$ 8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11) Fabric Energy Efficiency $(99) + (108) = 50.5 (109)$	Utilisa (101)m= Usefu (102)m=	ation fac 0 ul loss, h	tor for lo	ss hm 0 /atts) = (0 (100)m x	0 x (101)m 0	0.83	0.9	0.86	0	0	0	0		(101)
set (104)m to zero if (104)m < $3 \times (98)m$ (104)m= 0 0 0 0 0 230.31 347.41 242.6 0 0 0 0 0 Total = Sum(104) = 820.33 (104) Cooled fraction f C = cooled area ÷ (4) = 1 (105) Intermittency factor (Table 10b) (106)m= 0 0 0 0 0 0 0.25 0.25 0.25 0 0 0 0 0 Total = Sum(104) = 0 (106) Space cooling requirement for month = (104)m × (105) × (106)m (107)m= 0 0 0 0 0 57.58 86.85 60.65 0 0 0 0 0 Total = Sum(107) = 205.08 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 1.15 (108) 8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11) Fabric Energy Efficiency (99) + (108) = 50.5 (109)	Utilisa (101)m= Usefu (102)m= Gains	ation fac 0 ul loss, h 0 s (solar g	tor for lo	ss hm 0 /atts) = (0 culated	0 (100)m x 0 for appli	0 (101)m 0 cable we	0.83 1606.32 eather re	0.9 1368.5 egion, se	0.86 1338.99 e Table	0 0 10)	0	0	0		(101)
(104)m= 0 0 0 0 0 230.31 347.41 242.6 0 0 0 0 0 Total = Sum(1,04) = 820.33 (104) Cooled fraction	Utilisa (101)m= Usefu (102)m= Gains (103)m=	olion fac	tor for lo	ss hm 0 /atts) = (0 culated 0	0 (100)m x 0 for appli	0 (101)m 0 cable we	0.83 1606.32 eather re	0.9 1368.5 egion, se 1835.45	0.86 1338.99 e Table 1665.07	0 10) 0	0 0	0 0	0 0	(44)	(101)
Cooled fraction	Utilisa (101)m= Usefu (102)m= Gains (103)m=	olion fac	mLm (W 0 gains ca 0	ss hm 0 /atts) = (0 culated 0 ement fo	100)m x 0 for appli 0 r month,	0 (101)m 0 cable we 0 whole d	0.83 1606.32 eather re	0.9 1368.5 egion, se 1835.45	0.86 1338.99 e Table 1665.07	0 10) 0	0 0	0 0	0 0	x (41)m	(101)
Cooled fraction	Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1	ation fac 0 ul loss, h 0 s (solar of e coolino 04)m to	mLm (W 0 gains ca 0 g require zero if (ss hm 0 /atts) = (0 culated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 (101)m 0 cable we 0 whole down	0.83 1606.32 eather re 1926.2	0.9 1368.5 egion, se 1835.45 continuo	0.86 1338.99 ee Table 1665.07 ous (kW	0 $10)$ 0 0 $(h) = 0.00$	0 0 0 24 x [(10	0 0 0 03)m – (0 0 0 102)m];	x (41)m	(101)
	Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1	ation fac 0 ul loss, h 0 s (solar of e coolino 04)m to	mLm (W 0 gains ca 0 g require zero if (ss hm 0 /atts) = (0 culated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 (101)m 0 cable we 0 whole down	0.83 1606.32 eather re 1926.2	0.9 1368.5 egion, se 1835.45 continuo	0.86 1338.99 ee Table 1665.07 ous (kW	0 10) 0 (h) = 0.00	0 0 0 24 x [(10	0 0 03)m – (0 0 0 102)m] 2		(101) (102) (103)
Space cooling requirement for month = (104) m × (105) × (106) m (107)m = 0 0 0 0 0 57.58 86.85 60.65 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Utilisa (101)m= Usefu (102)m= Gains (103)m= Spac set (1 (104)m=	ation fac 0 ul loss, h 0 s (solar of 0 e coolino 04)m to	tor for lo	ss hm 0 /atts) = (0 culated 0 ement fo 104)m <	0 (100)m x 0 for appli 0 r month,	0 (101)m 0 cable we 0 whole down	0.83 1606.32 eather re 1926.2	0.9 1368.5 egion, se 1835.45 continuo	0.86 1338.99 ee Table 1665.07 ous (kW	0 $10)$ 0 $(h) = 0.00$ 0 $Total$	0 0 24 x [(10 0 = Sum(0 0 03)m - (0 1,04)	0 0 0 102)m] x	820.33	(101) (102) (103)
Space cooling requirement for month = $(104)m \times (105) \times (106)m$ (107)m = 0 0 0 0 0 57.58 86.85 60.65 0 0 0 0 Total = Sum(1,0,7) = 205.08 (107) Space cooling requirement in kWh/m²/year (107) ÷ (4) = 1.15 (108) 8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11) Fabric Energy Efficiency (99) + (108) = 50.5 (109)	Utilisa (101)m= Usefu (102)m= Gains (103)m= Spac set (1 (104)m=	ation fac	tor for lo	ss hm 0 /atts) = (0 culated 0 ement for 104)m <	0 100)m x 0 for appli 0 r month, 3 x (98)	0 (101)m 0 cable we 0 whole down	0.83 1606.32 eather re 1926.2	0.9 1368.5 egion, se 1835.45 continuo	0.86 1338.99 ee Table 1665.07 ous (kW	0 $10)$ 0 $(h) = 0.00$ 0 $Total$	0 0 24 x [(10 0 = Sum(0 0 03)m - (0 1,04)	0 0 0 102)m] x	820.33	(101) (102) (103)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Utilisa (101)m= Usefu (102)m= Gains (103)m= Spac set (1 (104)m=	ation fac	mLm (W 0 gains ca 0 g require zero if (0	ss hm 0 /atts) = (0 culated 0 ement fo 104)m < 0	0 (100)m x 0 for appli 0 r month, : 3 x (98	o (101)m o cable we o whole d	0.83 1606.32 eather re 1926.2 lwelling, 230.31	0.9 1368.5 egion, se 1835.45 continuo 347.41	0.86 1338.99 ee Table 1665.07 ous (kW	0 10) 0 (h) = 0.00 Total f C =	0 0 24 x [(10 0 = Sum(cooled a	0 0 03)m - (0 1,04) area ÷ (4	0 0 102)m]; 0 = 4) =	820.33	(101) (102) (103)
Total = Sum(107) = 205.08 (107) Space cooling requirement in kWh/m²/year (107) \div (4) = 1.15 (108) 8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11) Fabric Energy Efficiency (99) + (108) = 50.5 (109)	Utilisa (101)m= Usefu (102)m= Gains (103)m= Spac set (1 (104)m= Cooled Interm (106)m=	ation fac	mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	ss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 able 10b 0	0 (100)m x 0 for appli 0 r month, 3 x (98) 0	o (101)m o cable we o whole do)m o	0.83 1606.32 eather re 1926.2 //welling, 230.31	0.9 1368.5 egion, se 1835.45 continuo 347.41	0.86 1338.99 ee Table 1665.07 ous (kW 242.6	0 10) 0 (h) = 0.00 Total f C =	0 0 24 x [(10 0 = Sum(cooled :	0 0 03)m - (0 1,0,4) area ÷ (4	0 0 102)m] x 0 = 4) =	820.33 1	(101) (102) (103) (104) (105)
Space cooling requirement in kWh/m²/year $(107) \div (4) = 1.15$ (108) 8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11) Fabric Energy Efficiency $(99) + (108) = 50.5$ (109)	Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Interm (106)m=	ation fac	tor for lo	ss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 ment for	0 100)m x 0 for appli 0 r month, 3 x (98) 0	0 (101)m 0 cable we 0 whole down 0	0.83 1606.32 eather re 1926.2 //welling, 230.31 0.25 × (105)	0.9 1368.5 egion, se 1835.45 continuo 347.41 0.25 × (106)r	0.86 1338.99 ee Table 1665.07 ous (kW 242.6	0 10) 0 Total f C =	0 0 24 x [(10 0 = Sum(cooled :	0 0 03)m - (0 1,0,4) area ÷ (4	0 0 102)m]2 0 = 4) =	820.33 1	(101) (102) (103) (104) (105)
8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11) Fabric Energy Efficiency (99) + (108) = 50.5 (109)	Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Interm (106)m=	ation fac	tor for lo	ss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 ment for	0 100)m x 0 for appli 0 r month, 3 x (98) 0	0 (101)m 0 cable we 0 whole down 0	0.83 1606.32 eather re 1926.2 //welling, 230.31 0.25 × (105)	0.9 1368.5 egion, se 1835.45 continuo 347.41 0.25 × (106)r	0.86 1338.99 ee Table 1665.07 ous (kW 242.6	0 10) 0 7h) = 0.0h 0 Total f C = 0 Total	0 0 24 x [(10 0 = Sum(cooled a	0 0 03)m - (0 1,04) area ÷ (4 0 1,04)	0 0 102)m]2 0 = 4) =	820.33 1	(101) (102) (103) (104) (105) (106)
Fabric Energy Efficiency (99) + (108) = 50.5 (109)	Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Interm (106)m=	ation fac	tor for lo	ss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 ment for	0 100)m x 0 for appli 0 r month, 3 x (98) 0	0 (101)m 0 cable we 0 whole down 0	0.83 1606.32 eather re 1926.2 //welling, 230.31 0.25 × (105)	0.9 1368.5 egion, se 1835.45 continuo 347.41 0.25 × (106)r	0.86 1338.99 ee Table 1665.07 ous (kW 242.6	0 10) 0 7h) = 0.0h 0 Total f C = 0 Total	0 0 24 x [(10 0 = Sum(cooled a	0 0 03)m - (0 1,04) area ÷ (4 0 1,04)	0 0 102)m] 2 0 = 4) = 0	820.33 1	(101) (102) (103) (104) (105) (106)
	Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Interm (106)m= Space (107)m=	e cooling cooling	mLm (W 0 gains ca 0 grequire zero if (0 n actor (Ta 0	ss hm 0 /atts) = (0 culated 0 ement for 0 able 10b 0 ment for	0 100)m x 0 for appli 0 r month, 3 x (98) 0	0 (101)m 0 cable we 0 m 0 0 cable we 10 m cable we 10	0.83 1606.32 eather re 1926.2 //welling, 230.31 0.25 × (105)	0.9 1368.5 egion, se 1835.45 continuo 347.41 0.25 × (106)r	0.86 1338.99 ee Table 1665.07 ous (kW 242.6	0 10) 0 Total f C = 0 Total 0 Total	0 0 24 x [(10) 0 = Sum(cooled a 0 = Sum(0 = Sum(0 0 03)m - (0 1,04) area ÷ (4 0 1,04)	0 0 102)m] 2 0 = 4) = 0	820.33 1 0	(101) (102) (103) (104) (105) (106)
Target Fabric Energy Efficiency (TFEE) 58.08 (109)	Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Interm (106)m= Space (107)m=	ation fac o ul loss, h o s (solar g e cooling 04)m to d fractior ittency factor cooling cooling	tor for lo	ss hm 0 /atts) = (0 culated 0 ement for 0 able 10b 0 ment for 0	0 100)m x 0 for appli 0 r month, 3 x (98) 0	0 (101)m 0 cable we 0 whole down 0 0 (104)m 0 //ear	0.83 1606.32 eather re 1926.2 welling, 230.31 0.25 × (105) 57.58	0.9 1368.5 egion, se 1835.45 continuo 347.41 0.25 × (106)r 86.85	0.86 1338.99 ee Table 1665.07 ous (kW 242.6 0.25 m 60.65	0 10) 0 Total f C = 0 Total (107)	0 0 24 x [(10 0 = Sum(cooled : 0 = Sum(0 = Sum(0 : (4) =	0 0 03)m - (0 1,04) area ÷ (4 0 1,04)	0 0 102)m] 2 0 = 4) = 0	820.33 1 0	(101) (102) (103) (104) (105) (106)
L	Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Interm (106)m= Space (107)m= Space	ation fac oul loss, h os (solar g e cooling 04)m to d fraction ittency face output cooling cooling pric Ener	mLm (W 0 gains ca 0 grequire zero if (0 requirer 0	ss hm 0 /atts) = (0 culated 0 ement for 0 nent for 0 nent in k ency (ca	0 100)m x 0 for appli 0 r month, 3 x (98) 0	0 (101)m 0 cable we 0 whole down 0 0 (104)m 0 //ear	0.83 1606.32 eather re 1926.2 welling, 230.31 0.25 × (105) 57.58	0.9 1368.5 egion, se 1835.45 continuo 347.41 0.25 × (106)r 86.85	0.86 1338.99 ee Table 1665.07 ous (kW 242.6 0.25 m 60.65	0 10) 0 Total f C = 0 Total (107)	0 0 24 x [(10) 0 = Sum(cooled a 0 = Sum(0 = Sum(0 + Sum(0 + (4) = 0 11)	0 0 0 03)m - (0 1,0,4) area ÷ (4 0 1,0,4) 0 1,0,7)	0 0 102)m] 2 0 = 4) = 0	820.33 1 0 205.08 1.15	(101) (102) (103) (104) (105) (106) (107) (108)





User Details: **Assessor Name:** Stroma Number: Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.60 Property Address: Plot 4 LPG Land West of Broome Farm Barn, Broome, Craven Arms Address: 1. Overall dwelling dimensions: Av. Height(m) Volume(m³) Area(m²) Ground floor 98.4 (1a) x 2.7 (2a) =265.68 (3a) First floor (2b) (1b) x (3b) 79.63 2.41 191.91 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)178.03 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =(5) 457.59 2. Ventilation rate: main secondary other total m³ per hour heating heating Number of chimneys x 40 =(6a) 0 0 0 0 0 x 20 = Number of open flues 0 0 1 20 (6b) Number of intermittent fans x 10 =(7a)40 4 Number of passive vents x 10 =(7b) 0 0 Number of flueless gas fires x 40 =(7c)0 0 Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =÷ (5) = 0.13 (8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) (9)0 Additional infiltration [(9)-1]x0.1 =(10)0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 (12)0 If no draught lobby, enter 0.05, else enter 0 0 (13)Percentage of windows and doors draught stripped (14)0 $0.25 - [0.2 \times (14) \div 100] =$ Window infiltration 0 (15)(8) + (10) + (11) + (12) + (13) + (15) =Infiltration rate 0 (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise (18) = (16)0.38 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 1 (20) $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor (21)0.38

inflitrat	ion rate	modified	a for mo	ntniy wir	ia speed							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthl	y avera	ge wind	speed fr	om Tabl	e 7							
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7



Wind Factor (22	2a)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]		
A di sata di affica		. /-!!- '	(11			(04 -)	(00 -)	!	!	!	•		
Adjusted infiltrat	0.48	e (allowi 0.47	ng for sr 0.42	0.41	a wina s	o.36	(21a) x 0.35	(22a)m 0.38	0.41	0.43	0.45	1		
Calculate effect		-	-	I			0.33	0.36	0.41	0.43	0.45	J		
If mechanical	ventila	tion:										((23	a)
If exhaust air hea	at pump (using Appe	endix N, (2	(23a) = (23a	a) × Fmv (e	equation (N	N5)) , othe	rwise (23b) = (23a)			((23	b)
If balanced with h	neat reco	very: effici	iency in %	allowing f	or in-use f	actor (fron	n Table 4h	n) =				((23	c)
a) If balanced	mecha	anical ve	ntilation	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		(24	a)
b) If balanced	mecha	anical ve	ntilation	without	heat red	covery (N	ЛV) (24b	m = (22)	2b)m + (23b)	•	1		
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24)	b)
c) If whole ho				•	•				E (00k	. \				
if (22b)m	< 0.5 x	(23b), t	nen (24)	(230) = (230)	o); otner	wise (24)	C) = (221)	b) m + 0.	$5 \times (230)$	í –	Ι ,	1	(24	c)
(' ' '		·							U	0	0]	(24)	C)
d) If natural ve if (22b)m				•					0.5]					
$(24d)_{m} = 0.62$	0.61	0.61	0.59	0.58	0.57	0.57	0.56	0.57	0.58	0.59	0.6		(24	d)
Effective air c	hange	rate - en	iter (24a) or (24b	o) or (24	c) or (24	d) in box	x (25)				•		
(25)m= 0.62	0.61	0.61	0.59	0.58	0.57	0.57	0.56	0.57	0.58	0.59	0.6		(25))
2 Heat leases					7							•		
	and he	at loce r	narameti											
3. Heat losses					Net Ar	rea	U-val	ue	AXU		k-value	9	ΑΧk	
ELEMENT	Gros area	ss	oaramet 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 area	ss	Openin	gs		m²		2K .)
ELEMENT	Gros area	ss	Openin	gs	A ,r	m ² x1	W/m2	2K - 0.04] =	(W/				kJ/K	
ELEMENT Windows Type	Gros area 1	ss	Openin	gs	A ,r	m ² x10	W/m2 /[1/(1.4)+	$2K$ $-0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix} 0.04 \end{bmatrix}$	(W/ 27.09				kJ/K (27))
ELEMENT Windows Type 2	Gros area 1 2	ss	Openin	gs	A ,r 20.43 8.75	m ² x10 x10 x10	W/m2 /[1/(1.4)+ /[1/(1.4)+	$2K$ $-0.04] = \begin{bmatrix} -0.04 \end{bmatrix} = \begin{bmatrix} -0.04 \end{bmatrix} = \begin{bmatrix} -0.04 \end{bmatrix} = \begin{bmatrix} -0.04 \end{bmatrix} = \begin{bmatrix} -0.04 \end{bmatrix}$	27.09 11.6				kJ/K (27) (27))
Windows Type 2 Windows Type 2 Windows Type 3	Gros area 1 2	ss	Openin	gs	A ,r 20.43 8.75	m ² x1. x1. x1. x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{l} 2K \\ -0.04] = \\ -0.04] = \\ -0.04] = \\ -0.04] = \\ \end{array} $	(W/ 27.09 11.6 2.65	k)			kJ/K (27) (27) (27))))
Windows Type 2 Windows Type 2 Windows Type 3 Windows Type 4	Gros area 1 2	ss	Openin	gs	A ,r 20.43 8.75 2 6.6	x1. x1. x1. 4 x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{l} 2K \\ -0.04] = \\ -0.04] = \\ -0.04] = \\ -0.04] = \\ 0.04] = \\ \end{array} $	(W/ 27.09 11.6 2.65 8.75	k) 			kJ/K (27) (27) (27) (27)))) (b)
Windows Type 2 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights	Gros area 1 2	es (m²)	Openin	gs ₁₂	A ,r 20.43 8.75 2 6.6 0.764	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	$ \begin{array}{l} 2K \\ -0.04] = \\ -0.04] = \\ -0.04] = \\ -0.04] = \\ 0.04] = \\ \end{array} $	27.09 11.6 2.65 8.75	k) 			kJ/K (27) (27) (27) (27)	b)
Windows Type 2 Windows Type 2 Windows Type 2 Windows Type 2 Rooflights Floor	Gros area 1 2 3 4	ss (m²)	Openin m	gs ₁₂	A ,r 20.43 8.75 2 6.6 0.764 98.4	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) +	2K - 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [27.09 11.6 2.65 8.75 1.07010	k) 			kJ/K (27) (27) (27) (27) (27))))) b)))
Windows Type 2 Windows Type 2 Windows Type 3 Windows Type 3 Windows Type 4 Rooflights Floor Walls	Gros area 1 2 3 4 4	56 <u>2</u>	Openin m	gs ₁ ²	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7	x1.	W/m ² /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14	2K - 0.04] = - 0.04] = - 0.04] = - 0.04] = 0.04] = =	27.09 11.6 2.65 8.75 1.0701 13.776 25.56	k) 			kJ/K (27) (27) (27) (27) (27) (28))))) b)))
Windows Type 2 Windows Type 2 Windows Type 2 Windows Type 2 Rooflights Floor Walls Roof Type1	Gros area 1 2 3 4 4 197.5 89.2 6.32	58 (m²)	37.75 0	gs ₁ ²	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14 0.16	2K - 0.04] = [- 0.04] = [- 0.04] = [0.04] = [0.04] = [= = [= = [27.09 11.6 2.65 8.75 1.0701 13.776 25.56 8.92	k) 			kJ/K (27) (27) (27) (27) (27) (28) (29))) b)))))
Windows Type 2 Windows Type 2 Windows Type 2 Windows Type 2 Rooflights Floor Walls Roof Type1 Roof Type2	Gros area 1 2 3 4 197.8 89.2 6.32 ements	56 (m²)	37.76 0 0.76	gs ₁ ²	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14 0.16 0.1	2K - 0.04] = [- 0.04] = [- 0.04] = [0.04] = [= = [= = [27.09 11.6 2.65 8.75 1.0701 13.776 25.56 8.92 0.94	K)	kJ/m²-l	K [(27) (27) (27) (27) (28) (29) (30))) b)))))
Windows Type 2 Rooflights Floor Walls Roof Type1 Roof Type2 Total area of electors include the areas	Gros area 1 2 3 4 197.8 89.2 6.32 ements con both	(m²) 66 2 2 y m² ows, use e sides of in	37.76 0 0.76 ffective witernal wal	gs 8 3 indow U-ve	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculus	x1.	W/m ² /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.14 0.16 0.1 0.17	$ 2K \\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ 0.04] = [\\ = [\\ = [\\ = [\\ -1/[(1/U-valc)]] $	27.09 11.6 2.65 8.75 1.0701 13.776 25.56 8.92 0.94	K)	kJ/m²-l	K [(27) (27) (27) (27) (28) (29) (30) (31)	b) b) c) c) c) d) c) d)
Windows Type 2 Windows Type 2 Windows Type 2 Windows Type 2 Rooflights Floor Walls Roof Type1 Roof Type2 Total area of elector windows and roots include the areas Fabric heat loss	Gros area 1 2 3 4 197.5 89.2 6.32 ements oo f windo on both s, W/K =	56 2 2 , m ² ows, use e sides of in = S (A x	37.76 0 0.76 ffective witernal wal	gs 8 3 indow U-ve	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculus	x1.	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.14 0.16 0.1	2K -0.04] = [-0.04] = [-0.04] = [0.04] = [0.04] = [= [= [-0.04] = [-0.	27.09 11.6 2.65 8.75 1.0701 13.776 25.56 8.92 0.94	K) 6 Compared to the compare	kJ/m²-l	K [(27) (27) (27) (27) (28) (29) (30) (31)	b) b) c) c) c) d)
Windows Type 2 Rooflights Floor Walls Roof Type1 Roof Type2 Total area of ele * for windows and ro ** include the areas Fabric heat loss Heat capacity C	Gros area 1 2 3 4 197.5 89.2 6.32 ements oof winde on both s, W/K =	56 2 2 , m ² ows, use e sides of in = S (A x A x k)	37.76 0 0.76 ffective with ternal wall	gs 8 3 3 3 3 4 5 5 6 7 7 8 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculatitions	x1.	W/m ² /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.14 0.16 0.1 0.17	2K -0.04] = [-0.04] = [-0.04] = [-0.04] = [0.04] = [= [= [-0.04] = [-0	27.09 11.6 2.65 8.75 1.0701 13.776 25.56 8.92 0.94 (e)+0.04] &	(K) 6 6 [] [] [] as given in	kJ/m²-l	K [(27) (27) (27) (27) (28) (29) (30) (31) (31) (33) (33) (34)	b)))))))))
Windows Type 2 Windows Type 2 Windows Type 2 Windows Type 2 Rooflights Floor Walls Roof Type1 Roof Type2 Total area of ele * for windows and ro ** include the areas Fabric heat loss Heat capacity C Thermal mass p	Gros area 1 2 3 4 197.5 89.2 6.32 ements con both s, W/K = cm = S(coarame	566 2 2 2 3 5 5 6 6 7 7 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	37.76 0 0.76 ffective winternal wall U) P = Cm -	gs 8 Indow U-va Is and part	A ,r 20.4; 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculatitions	x1.	W/m ² /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.14 0.16 0.1 0.17	$ 2K \\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ 0.04] = [\\ -0.04] = [\\$	(VV/ 27.09 11.6 2.65 8.75 1.0701 13.776 25.56 8.92 0.94 ue)+0.04] a tive Value	(A)	kJ/m²-l paragraph (32e) =	13.2 100	(27) (27) (27) (27) (28) (29) (30) (31) (31) (33) 4.82 (34)	b)))))))))
Windows Type 2 Rooflights Floor Walls Roof Type1 Roof Type2 Total area of ele * for windows and ro ** include the areas Fabric heat loss Heat capacity C	Gros area 1 2 3 4 197.8 89.2 6.32 ements oof winder on both on both s, W/K = S(coarame ments when enerts enerth enerts enerth enert	56 2 2 3 3 56 2 2 3 4 5 5 6 6 6 7 9 9 9 9 9 9 9 9 9 9 9 9 9	37.76 0 0.76 ffective with ternal walk U) P = Cm + tails of the	gs 8 Indow U-va Is and part	A ,r 20.4; 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculatitions	x1.	W/m ² /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.14 0.16 0.1 0.17	$ 2K \\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ -0.04] = [\\ 0.04] = [\\ -0.04] = [\\$	(VV/ 27.09 11.6 2.65 8.75 1.0701 13.776 25.56 8.92 0.94 ue)+0.04] a tive Value	(A)	kJ/m²-l paragraph (32e) =	3.2 100	(27) (27) (27) (27) (28) (29) (30) (31) (31) (33) (33) (34)	b)))))))))



if details of thermal bridging are not known (36) = $0.05 \times (31)$ Total fabric heat loss (33) + (36) =133.23 (37)Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)$ m x (5)Jul Sep Oct Jan Feb Mar May Jun Dec Apr Aug Nov (38)m =93.33 92.64 91.96 88.77 88.18 85.4 85.4 84.89 86.47 88.18 89.38 90.64 (38)Heat transfer coefficient, W/K (39)m = (37) + (38)m 226.56 218.11 225.86 225.19 222 221.4 218.63 218.63 221.4 222.61 (39)m =219.7 223.87 (39)Average = $Sum(39)_{1...12}/12=$ 222 Heat loss parameter (HLP), W/m2K (40)m = (39)m ÷ (4)(40)m =1.27 1 27 1.26 1.24 1 23 1.23 1.23 1 23 1.24 1.25 1 26 (40)Average = $Sum(40)_{1...12}/12=$ 1.25 Number of days in month (Table 1a) Jan Feb Mar May Jul Sep Oct Nov Apr Jun Aug Dec 31 31 (41)(41)m =31 28 30 31 30 31 31 30 30 31 4. Water heating energy requirement: kWh/year: Assumed occupancy, N (42)2.97 if TFA > 13.9, N = 1 + 1.76 x [1 - $\exp(-0.000349 \times (TFA - 13.9)2)] + 0.0013 \times (TFA - 13.9)$ if TFA £ 13.9, N = 1Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 (43)104.81 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 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 =115.3 111.1 106.91 102.72 98.53 94.33 94.33 98.53 102.72 106.91 111.1 115.3 Total = $Sum(44)_{1...12}$ = 1257.77 (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) 170.98 149.54 154.31 134.53 129.09 111.39 103.22 118.45 119.86 139.69 152.48 165.58 (45)m =Total = $Sum(45)_{1...12}$ = (45)1649.13 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m =0 0 0 (46)Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 210 (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): 0 (48)Temperature factor from Table 2b (49)0 Energy lost from water storage, kWh/year $(48) \times (49) =$ (50)n b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)If community heating see section 4.3 Volume factor from Table 2a (52)0 Temperature factor from Table 2b (53)0 Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$ (54)0 Enter (50) or (54) in (55) 0 (55)



Water storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m= 0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contain	s dedicate	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 circui	t loss (ar	nnual) fro	om Table	e 3							0		(58)
Primary circui	t loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(modified by	y factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)		•	
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss ca	alculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m					_	
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat req	uired for	water he	eating ca	alculated	for eacl	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 145.33	127.11	131.17	114.35	109.72	94.68	87.74	100.68	101.88	118.74	129.61	140.75		(62)
Solar DHW input	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	1	
(add additiona	al lines if	FGHRS	and/or V	WWHRS	applies	, see Ap	pendix (€)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from w	ater hea	iter				-	-		-	-	-	•	
(64)m= 145.33	127.11	131.17	114.35	109.72	94.68	87.74	100.68	101.88	118.74	129.61	140.75		
							Outp	out from wa	ater heate	r (annual) ₁	12	1401.76	(64)
Heat gains fro	m water	heating,	kWh/mo	onth 0.2	5 [0.85	× (45)m	+ (61)m	n] + 0.8 x	c [(46)m	+ (57)m	+ (59)m	1	
(65)m= 36.33	31.78	32.79	28.59	27.43	23.67	21.93	25.17	25.47	29.68	32.4	35.19		(65)
(00)11-		00				21.59	20.17	20.77	23.00	JZ.7	000	1	` '
include (57)	-						_				<u> </u>	l eating	` ,
include (57)	m in cal	culation of	of (65)m	only if c			_				<u> </u>	l leating	
include (57) 5. Internal g	m in calc	culation of Table 5	of (65)m	only if c			_				<u> </u>	leating	
include (57)	m in calc	culation of Table 5	of (65)m and 5a	only if c	ylinder is		dwelling	or hot w			<u> </u>	l leating	
include (57) 5. Internal g Metabolic gain	im in cald ains (see ns (Table	culation of Table 5	of (65)m	only if c		s in the o	_		ater is fr	rom com	munity h	I leating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66	ains (see ns (Table Feb	Table 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 148.66	only if constant of the consta	Jun 148.66	Jul 148.66	Aug 148.66	Sep 148.66	ater is fr	om com	munity h	l neating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains	ains (see ns (Table Feb	Table 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 148.66	only if constant of the consta	Jun 148.66 ion L9 or	Jul 148.66	Aug 148.66	Sep 148.66	ater is fr	om com	munity h	l neating	
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2	m in calcular in c	Table 5 Table 5 Table 5 Table 5 Mar 148.66 ted in Ap 22.53	of (65)m 5 and 5a tts Apr 148.66 opendix 17.06	only if constant in the consta	Jun 148.66 ion L9 or	Jul 148.66 r L9a), a	Aug 148.66 Iso see	Sep 148.66 Table 5	Oct 148.66	Nov	Dec	l neating	(66)
include (57) 5. Internal g Metabolic gain (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga	m in calcular in c	Table 5 Table 5 Table 5 Table 5 Mar 148.66 ted in Ap 22.53	of (65)m 5 and 5a ts Apr 148.66 Dependix 17.06 Append	May 148.66 L, equati 12.75 dix L, eq	Jun 148.66 ion L9 or	Jul 148.66 r L9a), a 11.63	Aug 148.66 Iso see 15.12 3a), also	Sep 148.66 Table 5	Oct 148.66 25.77 ble 5	Nov 148.66	Dec 148.66	l neating	(66)
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65	m in calcular in calcular ins (calcular ins	Table 5 Table	of (65)m and 5a ts Apr 148.66 ppendix 17.06 Appendix 324.67	only if control of the control of th	Jun 148.66 ion L9 or 10.77 uation L	Jul 148.66 r L9a), a 11.63 13 or L1 261.58	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Ta 267.1	Oct 148.66 25.77 ble 5 286.56	Nov	Dec	l neating	(66) (67)
include (57) 5. Internal g Metabolic gain (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga	m in calcular in calcular ins (calcular ins	Table 5 Table	of (65)m and 5a ts Apr 148.66 ppendix 17.06 Appendix 324.67	only if control of the control of th	Jun 148.66 ion L9 or 10.77 uation L	Jul 148.66 r L9a), a 11.63 13 or L1 261.58	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Ta 267.1	Oct 148.66 25.77 ble 5 286.56	Nov 148.66	Dec 148.66	l neating	(66) (67)
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65 Cooking gains (69)m= 37.87	m in calcular services of the calcular service	Table 5 25), Wat Mar 148.66 ted in Ap 22.53 culated in 344.14 ated in A 37.87	of (65)m 5 and 5a ts Apr 148.66 ppendix 17.06 Append 324.67 ppendix 37.87	May 148.66 L, equati 12.75 dix L, equat 300.1 L, equat	Jun 148.66 ion L9 or 10.77 uation L 277.01	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a)	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Ta 267.1	Oct 148.66 25.77 ble 5 286.56 5	Nov 148.66 30.08	Dec 148.66 32.06 334.23	leating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65 Cooking gains	m in calcular services of the calcular service	Table 5 25), Wat Mar 148.66 ted in Ap 22.53 culated in 344.14 ated in A 37.87	of (65)m 5 and 5a ts Apr 148.66 ppendix 17.06 Append 324.67 ppendix 37.87	May 148.66 L, equati 12.75 dix L, equat 300.1 L, equat	Jun 148.66 ion L9 or 10.77 uation L 277.01	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a)	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Ta 267.1	Oct 148.66 25.77 ble 5 286.56 5	Nov 148.66 30.08	Dec 148.66 32.06 334.23	leating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65 Cooking gains (69)m= 37.87 Pumps and fa (70)m= 0	m in calculations (Table Feb 148.66 c (calculations (calcu	ted in Ap 22.53 culated in Ap 37.87 (Table 5	of (65)m 5 and 5a ts Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 0	only if control of the control of th	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 37.87	leating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65 Cooking gains (69)m= 37.87 Pumps and fa	m in calcular services of the calcular service	Mar 148.66 ted in Ap 22.53 culated in 344.14 ated in Ap (Table 5)	of (65)m 5 and 5a tts Apr 148.66 Dependix 17.06 Appendix 324.67 Dependix 37.87 5a) 0 tive valu	May 148.66 L, equati 12.75 dix L, equati 300.1 L, equati 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23 0	leating	(66) (67) (68)
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65 Cooking gains (69)m= 37.87 Pumps and fa (70)m= 0 Losses e.g. e	m in calcular services of the calcular service	ted in Apart and a second control of the sec	of (65)m 5 and 5a tts Apr 148.66 Dependix 17.06 Appendix 324.67 Dependix 37.87 5a) 0 tive valu	May 148.66 L, equati 12.75 dix L, equati 300.1 L, equati 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23 0	leating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65 Cooking gains (69)m= 37.87 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -118.93	m in calcular services of the calcular service	ted in Apart and a second control of the sec	of (65)m 5 and 5a tts Apr 148.66 Dependix 17.06 Appendix 324.67 Dependix 37.87 5a) 0 tive valu	May 148.66 L, equati 12.75 dix L, equati 300.1 L, equati 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23 0	leating	(66) (67) (68) (69)
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65 Cooking gains (69)m= 37.87 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -118.93 Water heating	m in calcular services of the calcular service	ted in Ap 22.53 culated in Ap 37.87 (Table 5 0 on (negation) 44.07	of (65)m 5 and 5a ts Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 0 tive valu -118.93	only if construction in the construction is constructed in the construction in the con	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87 0 ole 5) -118.93	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Ta 267.1 ee Table 37.87 0	Oct 148.66 25.77 ble 5 286.56 5 37.87 0 -118.93	Nov 148.66 30.08 311.13 37.87 0	Dec 148.66 32.06 334.23 0 -118.93	leating	(66) (67) (68) (69) (70)
include (57) 5. Internal g Metabolic gain Jan (66)m= 148.66 Lighting gains (67)m= 31.2 Appliances ga (68)m= 349.65 Cooking gains (69)m= 37.87 Pumps and fa (70)m= 0 Losses e.g. e (71)m= -118.93 Water heating (72)m= 48.83	m in calculations (Feb 148.66 calculations (Calculations (ted in Ap 22.53 culated in Ap 37.87 (Table 5 0 on (negation) 44.07	of (65)m 5 and 5a ts Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 0 tive valu -118.93	only if construction in the construction is constructed in the construction in the con	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87 0 ole 5) -118.93	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Ta 267.1 ee Table 37.87 0	Oct 148.66 25.77 ble 5 286.56 5 37.87 0 -118.93	Nov 148.66 30.08 311.13 37.87 0	Dec 148.66 32.06 334.23 0 -118.93	leating	(66) (67) (68) (69) (70)

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



Orientat	tion:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	20.43	x	10.63	x	0.63	x	0.7	=	66.39	(74)
North	0.9x	0.77	x	20.43	х	20.32	х	0.63	x	0.7	=	126.88	(74)
North	0.9x	0.77	x	20.43	х	34.53	х	0.63	x	0.7	=	215.6	(74)
North	0.9x	0.77	x	20.43	x	55.46	x	0.63	x	0.7	=	346.3	(74)
North	0.9x	0.77	x	20.43	х	74.72	х	0.63	x	0.7	=	466.5	(74)
North	0.9x	0.77	x	20.43	x	79.99	x	0.63	x	0.7	=	499.4	(74)
North	0.9x	0.77	x	20.43	x	74.68	x	0.63	x	0.7	=	466.26	(74)
North	0.9x	0.77	x	20.43	x	59.25	x	0.63	x	0.7	=	369.91	(74)
North	0.9x	0.77	x	20.43	x	41.52	x	0.63	x	0.7	=	259.22	(74)
North	0.9x	0.77	x	20.43	x	24.19	x	0.63	x	0.7	=	151.03	(74)
North	0.9x	0.77	x	20.43	x	13.12	x	0.63	x	0.7	=	81.9	(74)
North	0.9x	0.77	x	20.43	x	8.86	x	0.63	x	0.7	=	55.35	(74)
East	0.9x	0.77	x	2	x	19.64	x	0.63	x	0.7	=	12	(76)
East	0.9x	0.77	x	2	x	38.42	x	0.63	x	0.7	=	23.48	(76)
East	0.9x	0.77	x	2	x	63.27	x	0.63	x	0.7	=	38.67	(76)
East	0.9x	0.77	X	2	X	92.28	X	0.63	X	0.7	=	56.4	(76)
East	0.9x	0.77	x	2	x	113.09	x	0.63	x	0.7		69.13	(76)
East	0.9x	0.77	x	2	х	115.77	x	0.63	x	0.7	=	70.76	(76)
East	0.9x	0.77	x	2	x	110.22	x	0.63	x	0.7	=	67.37	(76)
East	0.9x	0.77	x	2	x	94.68	х	0.63	x	0.7	=	57.87	(76)
East	0.9x	0.77	x	2	x	73.59	x	0.63	x	0.7	=	44.98	(76)
East	0.9x	0.77	x	2	х	45.59	x	0.63	x	0.7	=	27.87	(76)
East	0.9x	0.77	X	2	X	24.49	X	0.63	X	0.7	=	14.97	(76)
East	0.9x	0.77	X	2	X	16.15	X	0.63	X	0.7	=	9.87	(76)
South	0.9x	0.77	X	8.75	x	46.75	X	0.63	X	0.7	=	125.02	(78)
South	0.9x	0.77	X	8.75	x	76.57	x	0.63	x	0.7	=	204.75	(78)
South	0.9x	0.77	X	8.75	x	97.53	x	0.63	X	0.7	=	260.82	(78)
South	0.9x	0.77	X	8.75	X	110.23	x	0.63	x	0.7	=	294.78	(78)
South	0.9x	0.77	X	8.75	X	114.87	X	0.63	x	0.7	=	307.18	(78)
South	0.9x	0.77	X	8.75	x	110.55	x	0.63	X	0.7	=	295.62	(78)
South	0.9x	0.77	X	8.75	x	108.01	x	0.63	x	0.7	=	288.84	(78)
South	0.9x	0.77	X	8.75	x	104.89	x	0.63	x	0.7	=	280.5	(78)
South	0.9x	0.77	X	8.75	x	101.89	x	0.63	x	0.7	=	272.45	(78)
South	0.9x	0.77	X	8.75	x	82.59	x	0.63	X	0.7	=	220.84	(78)
South	0.9x	0.77	X	8.75	x	55.42	X	0.63	x	0.7	=	148.19	(78)
South	0.9x	0.77	X	8.75	x	40.4	x	0.63	x	0.7	=	108.03	(78)
West	0.9x	0.77	x	6.6	x	19.64	x	0.63	x	0.7	=	39.62	(80)
West	0.9x	0.77	x	6.6	x	38.42	x	0.63	x	0.7	=	77.5	(80)
West	0.9x	0.77	X	6.6	X	63.27	×	0.63	X	0.7	=	127.62	(80)



West			_											
West	West 0.9x	0.77	X	6.6)	(9	2.28	X	0.63	X	0.7	=	186.13	(80)
West 0.9x 0.77 x 6.6 x 94.68 x 0.63 x 0.7 = 222.22 (30) West 0.9x 0.77 x 6.6 x 94.68 x 0.63 x 0.7 = 190.97 (30) West 0.9x 0.77 x 6.6 x 94.68 x 0.63 x 0.7 = 148.43 (30) West 0.9x 0.77 x 6.6 x 45.59 x 0.63 x 0.7 = 148.43 (30) West 0.9x 0.77 x 6.6 x 45.59 x 0.63 x 0.7 = 148.43 (30) West 0.9x 0.77 x 6.6 x 45.59 x 0.63 x 0.7 = 491.96 (30) West 0.9x 0.77 x 6.6 x 44.59 x 0.63 x 0.7 = 494.4 (30) West 0.9x 0.77 x 6.6 x 24.44 x 0.63 x 0.7 = 494.4 (30) West 0.9x 0.77 x 6.6 x 24.44 x 0.63 x 0.7 = 22.58 (30) Rooflights 0.9x 1 x 0.76 x 25.93 x 0.63 x 0.7 = 32.58 (30) Rooflights 0.9x 1 x 0.76 x 51.88 x 0.63 x 0.7 = 52.81 (32) Rooflights 0.9x 1 x 0.76 x 51.88 x 0.63 x 0.7 = 52.81 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 52.81 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 52.81 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 52.81 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 52.79 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 52.79 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 52.79 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 52.79 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 133.72 x 0.63 x 0.7 = 52.79 (32) Rooflights 0.9x 1 x 0.76 x 133.72 x 0.63 x 0.7 = 52.79 (32) Rooflights 0.9x 1 x 0.76 x 133.72 x 0.63 x 0.7 = 52.79 (32) Rooflights 0.9x 1 x 0.76 x 133.72 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 133.72 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 133.72 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 133.72 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 133.72 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 0.77 x 0.77 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 0.77 x 0.77 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 0.77 x 0.77 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 0.77 x 0.77 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 0.77 x 0.77 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1 x 0.76 x 0.77 x 0.77 x 0.63 x 0.7 = 50.02 (32) Rooflights 0.9x 1	West 0.9x	0.77	×	6.6)	(1	13.09	X	0.63	X	0.7	=	228.11	(80)
West 0.9% 0.77 × 6.6.6 × 73.59 × 0.63 × 0.7 = 190.97 (90) West 0.9% 0.77 × 6.6.6 × 73.59 × 0.63 × 0.7 = 190.97 (90) West 0.9% 0.77 × 6.6.6 × 45.59 × 0.63 × 0.7 = 191.98 (90) West 0.9% 0.77 × 6.6.6 × 45.99 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.77 × 6.6.6 × 161.55 × 0.63 × 0.7 = 148.43 (90) West 0.9% 0.9 1 × 0.76 × 168.83 × 0.63 × 0.7 = 148.43 (92) Rooflights 0.9% 1 × 0.76 × 168.11 × 0.63 × 0.63 × 0.7 = 148.43 (92) Rooflights 0.9% 1 × 0.76 × 168.11 × 0.63 × 0.7 = 140.55 (92) Rooflights 0.9% 1 × 0.76 × 168.11 × 0.63 × 0.7 = 140.55 (92) Rooflights 0.9% 1 × 0.76 × 168.11 × 0.63 × 0.7 = 140.55 (92) Rooflights 0.9% 1 × 0.76 × 168.11 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 168.11 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 140.433 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 140.433 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 140.433 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 140.433 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 140.433 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 140.433 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 0.78 × 140.433 × 0.63 × 0.7 = 142.09 (92) Rooflights 0.9% 1 × 0.76 × 0.78 ×	West 0.9x	0.77	X	6.6)	1	15.77	X	0.63	X	0.7	=	233.51	(80)
West 0.9x 0.77	West 0.9x	0.77	X	6.6		1	10.22	X	0.63	x	0.7	=	222.32	(80)
West 0.9x 0.77 x 8.6.6 x 4.559 x 0.63 x 0.77 = 91.96 (30) West 0.9x 0.77 x 6.6.6 x 24.49 x 0.63 x 0.7 = 49.4 (40) West 0.9x 0.77 x 6.6.6 x 16.15 x 0.63 x 0.7 = 49.4 (40) West 0.9x 0.77 x 6.6.6 x 16.15 x 0.63 x 0.7 = 49.4 (40) West 0.9x 0.77 x 6.6.6 x 16.15 x 0.63 x 0.7 = 49.4 (40) West 0.9x 0.77 x 6.6.6 x 16.15 x 0.63 x 0.7 = 7.87 (82) Rooflights 0.9x 1 x 0.76 x 15.18 x 0.63 x 0.7 = 15.74 (82) Rooflights 0.9x 1 x 0.76 x 15.18 x 0.63 x 0.7 = 15.74 (82) Rooflights 0.9x 1 x 0.76 x 15.18 x 0.63 x 0.7 = 40.55 (82) Rooflights 0.9x 1 x 0.76 x 153.65 x 0.63 x 0.7 = 40.55 (82) Rooflights 0.9x 1 x 0.76 x 153.65 x 0.63 x 0.7 = 51 (82) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 51 (82) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 51 (82) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 154.4 x 0.63 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 0.76 x 0.76 x 0.83 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 0.76 x 0.83 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 0.76 x 0.76 x 0.83 x 0.7 = 42.09 (92) Rooflights 0.9x 1 x 0.76 x 0.76 x 0.83 x 0.7 = 42.09	West 0.9x	0.77	X	6.6		(9	94.68	x	0.63	x	0.7	=	190.97	(80)
West 0.9x 0.77 x 6.6 x 22.449 x 0.63 x 0.7 = 49.4 (30) West 0.9x 0.77 x 6.6 x 22.449 x 0.63 x 0.7 = 32.58 (20) Rooflights 0.9x 1 x 0.76 x 25.93 x 0.63 x 0.7 = 7.87 (32) Rooflights 0.9x 1 x 0.76 x 51.88 x 0.63 x 0.7 = 15.74 (82) Rooflights 0.9x 1 x 0.76 x 68.38 x 0.63 x 0.7 = 26.81 (32) Rooflights 0.9x 1 x 0.76 x 133.65 x 0.63 x 0.7 = 40.55 (32) Rooflights 0.9x 1 x 0.76 x 168.1 x 0.63 x 0.7 = 40.55 (32) Rooflights 0.9x 1 x 0.76 x 168.1 x 0.63 x 0.7 = 51 (32) Rooflights 0.9x 1 x 0.76 x 168.1 x 0.63 x 0.7 = 51 (32) Rooflights 0.9x 1 x 0.76 x 168.1 x 0.63 x 0.7 = 51 (32) Rooflights 0.9x 1 x 0.76 x 168.1 x 0.63 x 0.7 = 51 (32) Rooflights 0.9x 1 x 0.76 x 168.1 x 0.63 x 0.7 = 52.79 (32) Rooflights 0.9x 1 x 0.76 x 164.37 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 50.02 (82) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 31.65 (82) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 31.65 (82) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 31.65 (82) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 164.33 x 0.63 x 0.7 = 39.87 (32) Rooflights 0.9x 1 x 0.76 x 0.77	West 0.9x	0.77	X	6.6)	7	'3.59	x	0.63	x	0.7	=	148.43	(80)
West 0.9x 0.77	West 0.9x	0.77	X	6.6		4	15.59	x	0.63	x	0.7	=	91.96	(80)
Rooflights 0.9x	West 0.9x	0.77	X	6.6		(2	24.49	x	0.63	x	0.7	=	49.4	(80)
Rooflights 0.9x	West 0.9x	0.77	X	6.6)	(1	6.15	x	0.63	x	0.7	=	32.58	(80)
Rooflights 0.9x	Rooflights 0.9x	1	X	0.76		(2	25.93	x	0.63	x	0.7	=	7.87	(82)
Rooflights 0.9x	Rooflights _{0.9x}	1	X	0.76	<u> </u>	ζ 5	51.88	x	0.63	x	0.7	=	15.74	(82)
Rooflights 0.9x	Rooflights _{0.9x}	1	X	0.76	<u> </u>	ع ع	88.38	x	0.63	x	0.7	=	26.81	(82)
Rooflights 0.9x	Rooflights _{0.9x}	1	×	0.76	<u> </u>	1	33.65	x	0.63	x	0.7	=	40.55	(82)
Rooflights 0.9x	Rooflights 0.9x	1	X	0.76		۲1	68.1	x	0.63	x	0.7	=	51	(82)
Rooflights 0.9x	Rooflights _{0.9x}	1	X	0.76	<u> </u>	(174	X	0.63	x	0.7	=	52.79	(82)
Rooflights 0.9x	Rooflights 0.9x	1	X	0.76	<u> </u>	1	64.87	x	0.63	x	0.7	=	50.02	(82)
Rooflights 0.9x 1	Rooflights 0.9x	1	X	0.76	<u> </u>	1	38.72	x	0.63	x	0.7	=	42.09	(82)
Rooflights 0.9x	Rooflights 0.9x	1	X	0.76)	1	04.33	Х	0.63	X	0.7	=	31.65	(82)
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m	Rooflights 0.9x	1	x	0.76	<u> </u>	(6	52.32	x	0.63	x	0.7	_	18.91	(82)
Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 250.9	Rooflights _{0.9x}	1	x	0.76	,	3	32.54	x	0.63	х	0.7	=	9.87	(82)
(83) 250.9 448.35 669.53 924.17 1121.92 1152.09 1094.79 941.34 756.73 5 10.6 304.33 212.26 Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 748.18 944.22 1147.87 1373.2 1539.24 1540.34 1465.09 1315.84 1147.1 930.43 758.14 693.44 (84) 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) 3n Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m = 1 1 1 0.98 0.92 0.78 0.62 0.7 0.92 0.99 1 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 19.43 19.61 19.9 20.3 20.67 20.9 20.97 20.96 20.76 20.28 19.79 19.41 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m = 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.99 19.89 19.89 19.88 19.87 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m = 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) (89)m = 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) (90)m = 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.89 19.75 19.3 18.8 18.42 (90) (1.48 ELiving area + (4) = 0.14 (91) (1.48 ELiving area + (4) = 0.14 (1.48 ELiving area + (4) =	Rooflights _{0.9x}	1	×	0.76	=,	2	21.19	X	0.63	x	0.7	=	6.43	(82)
(83) 250.9 448.35 669.53 924.17 1121.92 1152.09 1094.79 941.34 756.73 5 10.6 304.33 212.26 Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 748.18 944.22 1147.87 1373.2 1539.24 1540.34 1465.09 1315.84 1147.1 930.43 758.14 693.44 (84) 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) 3n Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m = 1 1 1 0.98 0.92 0.78 0.62 0.7 0.92 0.99 1 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 19.43 19.61 19.9 20.3 20.67 20.9 20.97 20.96 20.76 20.28 19.79 19.41 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m = 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.99 19.89 19.89 19.88 19.87 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m = 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) (89)m = 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) (90)m = 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.89 19.75 19.3 18.8 18.42 (90) (1.48 ELiving area + (4) = 0.14 (91) (1.48 ELiving area + (4) = 0.14 (1.48 ELiving area + (4) =										_				_
Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m= 748.18 944.22 1147.87 1373.2 1539.24 1540.34 1465.09 1315.84 1147.1 930.43 758.14 693.44 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) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m= 1 1 1 0.98 0.92 0.78 0.62 0.7 0.92 0.99 1 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.43 19.61 19.9 20.3 20.67 20.9 20.97 20.96 20.76 20.28 19.79 19.41 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.9 19.9 19	Sola <mark>r gains in v</mark>	vatts, calcu	lated	for each mo	nth			(83)m	ı = Sum(74)m .	(82)m				
(84)m=	` '							941	.34 756.73	510.6	304.33	212.26		(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) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m= 1 1 1 0.98 0.92 0.78 0.62 0.7 0.92 0.99 1 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.43 19.61 19.9 20.3 20.67 20.9 20.97 20.96 20.76 20.28 19.79 19.41 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.9 19.89 19.89 19.88 19.87 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.89 19.75 19.3 18.8 18.42 (90) FLA = Living area ÷ (4) = 0.14 (91)	Total gains – in	iternal and	solar	(84)m = (73))m +	(83)m	, watts							
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) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m= 1 1 1 0.98 0.92 0.78 0.62 0.7 0.92 0.99 1 1 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.43 19.61 19.9 20.3 20.67 20.9 20.97 20.96 20.76 20.28 19.79 19.41 Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.9 19.89 19.89 19.88 19.87 Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.89 19.75 19.3 18.8 18.42 (90) ItA = Living area ÷ (4) = 0.14	(84)m= 748.18	944.22 114	47.87	1373.2 153	9.24	1540.34	1465.09	1315	5.84 1147.1	930.4	3 758.14	693.44		(84)
Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	7. Mean intern	nal tempera	iture ((heating sea	son)									
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Temperature of	during heat	ing p	eriods in the	livin	g area	from Tab	ole 9,	Th1 (°C)				21	(85)
(86)m= 1 1 1 0.98 0.92 0.78 0.62 0.7 0.92 0.99 1 1 Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.43 19.61 19.9 20.3 20.67 20.9 20.97 20.96 20.76 20.28 19.79 19.41 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.86 19.87 19.88 19.89 19.9 19.9 19.89 19.89 19.89 19.89 19.89 19.89 19.89 19.89 19.89 19.89 19.89 19.89 19.89 19.3 18.8 18.42 (90) (89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) 19.3 18.8 18.42 (90) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89	Utilisation fact	tor for gains	for li	iving area, h	1,m	(see Ta	ble 9a)						1	
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.43 19.61 19.9 20.3 20.67 20.9 20.97 20.96 20.76 20.28 19.79 19.41 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.9 19.89 19.89 19.88 19.87 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.75 19.3 18.8 18.42 (90) fLA = Living area ÷ (4) = 0.14	Jan	Feb N	Mar	Apr N	lay	Jun	Jul	A	ug Sep	Oct	Nov	Dec		
(87)m=	(86)m= 1	1	1	0.98 0.9	92	0.78	0.62	0.	7 0.92	0.99	1	1		(86)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.9 19.89 19.89 19.88 19.87 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.75 19.3 18.8 18.42 (90) fLA = Living area ÷ (4) = 0.14 (91)	Mean internal	temperatui	re in I	iving area T	1 (fol	low ste	ps 3 to 7	7 in T	able 9c)				_	
(88)m= 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.89 19.89 19.88 19.87 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.75 19.3 18.8 18.42 (90) fLA = Living area ÷ (4) = 0.14 (91)	(87)m= 19.43	19.61 1	9.9	20.3 20	67	20.9	20.97	20.	96 20.76	20.28	19.79	19.41		(87)
(88)m= 19.86 19.87 19.87 19.88 19.89 19.9 19.9 19.9 19.89 19.89 19.88 19.87 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.75 19.3 18.8 18.42 (90) fLA = Living area ÷ (4) = 0.14 (91)	Temperature of	during heat	ing p	eriods in res	t of c	lwelling	from Ta	able 9), Th2 (°C)			-		
(89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.75 19.3 18.8 18.42 (90) fLA = Living area ÷ (4) = 0.14 (91)	· -				$\overline{}$		r			19.89	19.88	19.87		(88)
(89)m= 1 1 0.99 0.97 0.89 0.69 0.48 0.56 0.87 0.99 1 1 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.75 19.3 18.8 18.42 (90) fLA = Living area ÷ (4) = 0.14 (91)	Utilisation fact	or for gains	for r	est of dwelli	na h	2 m (se	e Tahle	921				•		
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.43		<u>`</u>			-	<u> </u>	r	T	6 0.87	0.99	1	1]	(89)
(90)m= 18.43 18.61 18.9 19.31 19.65 19.85 19.89 19.89 19.75 19.3 18.8 18.42 (90) fLA = Living area ÷ (4) = 0.14 (91)		ļ					<u>l</u>		!			<u>I</u>	J	
$fLA = Living area \div (4) = 0.14 $ (91)					-	<u> </u>	r	i 			18.8	18 42	1	(90)
	10.70	10.01	J.J	10.01	<u>~~ </u>	. 5.55	I .0.00	L ''				ļ	0 14	
Mean internal temperature (for the whole dwelling) – fl $\Delta \times T1 + (1 - fl \Delta) \times T2$											J (•		``

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$



(92)m=	18.57	18.74	19.04	19.45	19.79	19.99	20.04	20.03	19.89	19.43	18.93	18.55		(92)
, ,	∟—— ⁄ adiustn	nent to t	ı he mear	ı ı interna	Lemper	ı ature fro	m Table	4e, whe	re appro	poriate				
(93)m=	18.57	18.74	19.04	19.45	19.79	19.99	20.04	20.03	19.89	19.43	18.93	18.55		(93)
8. Sp	ace hea	ting requ	uirement											
Set T	i to the r	mean int	ernal ter	mperatu	re obtain	ed at ste	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the ut	tilisation	factor fo	or gains	using Ta	ble 9a								ı	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ation fac	tor for g	ains, hm	1:									ı	
(94)m=	1	1	0.99	0.96	0.88	0.7	0.5	0.58	0.87	0.98	1	1		(94)
Usefu	ıl gains,	hmGm	W = (94)	4)m x (8	4)m								ı	
(95)m=	747.53	941.7	1137.54	1324.97	1356.9	1081	736.57	763.13	993.1	915.6	756.6	693.02		(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)
Heat	loss rate	for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m·	– (96)m]			i	
(97)m=	3232.33	3127.02	2823.77	2341.19	1791.54	1179.43	752.12	792.68	1271.41	1955.28	2634.5	3213.51		(97)
Space	e heatin	g require	ement fo	r each n	nonth, k\	/Vh/mont	th = 0.02	24 x [(97)	m – (95)m] x (4 ²	1)m			
(98)m=	1848.69	1468.53	1254.55	731.68	323.38	0	0	0	0	773.53	1352.09	1875.24		
					-			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	9627.69	(98)
Space	e heatin	a requir	ement in	kWh/m²	2/vear								54.08	(99)
					, y oa.								0 1.00	
			uiremer							_		_	_	_
Calcu			July and					A	0	0.1	NI.	D		
114	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
								and exte						(100)
(100)m=		0	0	0	0	2055.09	1617.84	1657.66	0	0	0	0		(100)
	ation fac					00	0.07	0.00		0		0		(101)
(101)m=		0	0	0	0	0.8	0.87	0.83	0	0	0	0		(101)
		<u> </u>	Vatts) = (` 	`			4070.00						(400)
(102)m=		. 0	0	0	0		1414.7	1373.86	0	0	0	0		(102)
	<u> </u>		i e		i			e Table						(400)
(103)m=		0	0	0	0	1926.2	ļ	1665.07	0	0	0	0	(44)	(103)
•			<i>ement to</i> (104)m <			iwelling,	continuo	ous (kW	(n) = 0.02	24 X [(1C)3)m – (102)m J	K (41)M	
(104)m=		0	0	0	0	204.8	313.03	216.66	0	0	0	0		
(104)111=						204.0	010.00	210.00					734.49	(104)
									Total	- Sum/	10 <i>1</i> 1		734.49	(104)
Cooled	d fraction	า								= Sum(,	= 1) =		(105)
	d fraction		able 10b)						= Sum(cooled a	,		1	(105)
Interm	ittency f		able 10b) o	0	0.25	0.25	0.25		,	,			(105)
	ittency f	actor (Ta	1	i –	0	0.25	0.25	0.25	f C =	cooled a	area ÷ (4	1) =	1	_
Interm (106)m=	ittency f	actor (Ta	0	0			<u> </u>	<u> </u>	f C =	cooled	area ÷ (4	1) =		(105)
Interm (106)m=	o cooling	actor (Ta	0	0			0.25 × (106)r 78.26	<u> </u>	f C =	cooled a	area ÷ (4	1) =	1	_
Interm (106)m=	o cooling	actor (Ta	nent for	0 month =	: (104)m	× (105)	× (106)r	n	f C = 0 Total	0 0 0 = Sum(o (1,0,4)	1) = 0 =	0	(106)
Interm (106)m= Space (107)m=	cooling	o requirer	o ment for 0	0 month = 0	: (104)m	× (105)	× (106)r	n	f C = 0 Total 0 Total	0	o (1,0,4)	1) = 0 = 0	0 183.62	(106)
Interm (106)m= Space (107)m=	cooling	o requirer	0 ment for 0 ment in k	0 month = 0 xWh/m²/y	(104)m 0 /ear	× (105)	× (106)r	n 54.17	f C = 0 Total 0 Total (107)	cooled a 0 $T = Sum(0)$ 0 0 0 0 0 0 0 0 0 0	o (1,0,4)	1) = 0 = 0	0	(106)
Interm (106)m= Space (107)m= Space 8f. Fab	cooling	requirer requirer gy Effic	nent for 0 ment in kiency (ca	0 month = 0 xWh/m²/y	(104)m 0 /ear	× (105)	× (106)r	n	f C = 0 Total 0 Total (107)	cooled a 0 $T = Sum(0)$ 0 0 0 0 0 0 0 0 0 0	o (1,0,4) 0 1,0,7)	1) = 0 = 0	0 183.62	(106)



User Details: **Assessor Name:** Stroma Number: Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.60 Property Address: Plot 4 LPG Land West of Broome Farm Barn, Broome, Craven Arms Address: 1. Overall dwelling dimensions: Av. Height(m) Volume(m³) Area(m²) Ground floor 98.4 (1a) x 2.7 (2a) =265.68 (3a) First floor (2b) (1b) x (3b) 79.63 2.41 191.91 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)178.03 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =(5) 457.59 2. Ventilation rate: main secondary other total m³ per hour heating heating x 40 =Number of chimneys (6a) 0 0 0 0 0 x 20 = Number of open flues 0 0 1 20 (6b) Number of intermittent fans x 10 =(7a)5 50 Number of passive vents x 10 =(7b) 0 0 Number of flueless gas fires x 40 =(7c)0 0 Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) =÷ (5) = 0.15 (8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) (9)0 Additional infiltration [(9)-1]x0.1 =(10)0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 (12)0 If no draught lobby, enter 0.05, else enter 0 0 (13)Percentage of windows and doors draught stripped (14)0 $0.25 - [0.2 \times (14) \div 100] =$ Window infiltration 0 (15)(8) + (10) + (11) + (12) + (13) + (15) =Infiltration rate 0 (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise (18) = (16)0.4 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 1 (20) $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor (21)0.4

Inflitrat	ion rate	modified	a for mo	ntniy wir	ia speed							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthl	y avera	ge wind	speed fr	om Tabl	e 7							
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7



Adjusted infiltration rate (allowing for shelter and wind speed) = (21a) x (22a)m
0.51 0.5 0.49 0.44 0.43 0.38 0.38 0.37 0.4 0.43 0.45 0.47
0.51 0.5 0.49 0.44 0.43 0.38 0.38 0.37 0.4 0.43 0.45 0.47
If mechanical ventilation: 1
If exhaust air heat pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)) , otherwise (23b) = (23a) If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 - (23c) ÷ 100] (24a)m= 0
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =
a) If balanced mechanical ventilation with heat recovery (MVHR) (24a)m = (22b)m + (23b) × [1 – (23c) ÷ 100] (24a)m = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
(24a)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
b) If balanced mechanical ventilation without heat recovery (MV) (24b)m = (22b)m + (23b) (24b)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
(24b)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
c) If whole house extract ventilation or positive input ventilation from outside if (22b)m < 0.5 × (23b), then (24c) = (23b); otherwise (24c) = (22b) m + 0.5 × (23b) (24c)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
if $(22b)m < 0.5 \times (23b)$, then $(24c) = (23b)$; otherwise $(24c) = (22b) m + 0.5 \times (23b)$ (24c)m = 0
(24c)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m ² x 0.5] (24d)m = 0.63
if (22b)m = 1, then (24d)m = (22b)m otherwise (24d)m = 0.5 + [(22b)m ² x 0.5] (24d)m = 0.63
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) (25)m= 0.63 0.63 0.62 0.6 0.59 0.57 0.57 0.57 0.58 0.59 0.6 0.61 3. Heat losses and heat loss parameter:
(25)m= 0.63 0.63 0.62 0.6 0.59 0.57 0.57 0.58 0.59 0.6 0.61 (25) 3. Heat losses and heat loss parameter:
3. Heat losses and heat loss parameter:
ELEMENT Gross Openings Net Area U-value A X U k-value A X k area (m²) m² A ,m² W/m2K (W/K) kJ/m²·K kJ/K
Windows Type 1 20.43 $\times 1/[1/(1.4) + 0.04] = 27.09$ (27)
Windows Type 2 $8.75 \times 1/[1/(1.4) + 0.04] = 11.6$ (27)
Windows Type 3 $2 \times 1/[1/(1.4) + 0.04] = 2.65$ (27)
Windows Type 4
Rooflights
Floor $98.4 \times 0.14 = 13.776$ (28)
Walls 197.56 37.78 159.78 × 0.16 = 25.56 (29)
ROO[VDe] = 1 892 + 1 0 + 1 892 + x + 01 + 1 + 1 892 + 1 + 1 + 1 (30)
Roof Type1 89.2 0 89.2 x 0.1 = 8.92 (30)
Roof Type2 6.32 0.76 5.56 x 0.17 = 0.94 (30)
Roof Type2 6.32 0.76 5.56 x 0.17 = 0.94 (30) Total area of elements, m ² 391.48 (31) * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2
Roof Type2 6.32 0.76 5.56 x 0.17 = 0.94 (30) Total area of elements, m ² 391.48 (31) * for windows and roof windows, use effective window U-value calculated using formula 1/[(1/U-value)+0.04] as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions
Roof Type2 6.32 0.76 5.56 \times 0.17 = 0.94 (30) Total area of elements, m ² 391.48 (31) * for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 100.31 (33)
Roof Type2 6.32 0.76 5.56 \times 0.17 = 0.94 (30) Total area of elements, m ² 391.48 (31) * for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 *** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 100.31 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 13114.82 (34)
Roof Type2 6.32 0.76 5.56 \times 0.17 = 0.94 (30) Total area of elements, m ² 391.48 (31) * for windows and roof windows, use effective window U-value calculated using formula $1/[(1/U-value)+0.04]$ as given in paragraph 3.2 ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 100.31 (33) Heat capacity Cm = S(A x K) ((28)(30) + (32) + (32a)(32e) = 13114.82 (34)



if details of thermal bridging are not known (36) = 0.05 x (31) Total fabric heat loss (33) + (36) =133.23 (37)Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)$ m x (5)Jul Sep Oct Jan Feb Mar May Jun Dec Apr Aug Nov (38)m =95.43 94.66 93.9 90.34 89.67 86.57 86.57 85.99 87.76 89.67 91.02 92.43 (38)Heat transfer coefficient, W/K (39)m = (37) + (38)m 228.66 227.89 227.13 223.56 222.9 222.9 224.25 (39)m =219.79 219.79 219.22 220.99 225.66 (39)Average = $Sum(39)_{1...12}/12=$ 223.56 Heat loss parameter (HLP), W/m2K (40)m = (39)m ÷ (4)(40)m =1.28 1 28 1.28 1.26 1.25 1 23 1 23 1.23 1 24 1.25 1.26 1 27 (40)Average = $Sum(40)_{1...12}/12=$ 1.26 Number of days in month (Table 1a) Jan Feb Mar May Jul Sep Oct Nov Apr Jun Aug Dec 31 (41)(41)m =31 28 31 30 31 30 31 31 30 30 31 4. Water heating energy requirement: kWh/year: Assumed occupancy, N (42)2.97 if TFA > 13.9, N = 1 + 1.76 x [1 - $\exp(-0.000349 \times (TFA - 13.9)2)] + 0.0013 \times (TFA - 13.9)$ if TFA £ 13.9, N = 1Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 (43)104.81 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 Jul Aug Sep Oct Nov Dec Apr Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43)(44)m =115.3 111.1 106.91 102.72 98.53 94.33 94.33 98.53 102.72 106.91 111.1 115.3 Total = $Sum(44)_{1...12}$ = 1257.77 (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) 170.98 149.54 154.31 134.53 129.09 111.39 103.22 118.45 119.86 139.69 152.48 165.58 (45)m =(45)Total = $Sum(45)_{1...12}$ = 1649.13 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m =25.65 22.43 23.15 20.18 19.36 16.71 15.48 17.77 17.98 20.95 22.87 24.84 (46)Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 210 (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): 0 (48)Temperature factor from Table 2b (49)0 Energy lost from water storage, kWh/year $(48) \times (49) =$ (50)210 b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.01 (51)If community heating see section 4.3 Volume factor from Table 2a (52)0.83 Temperature factor from Table 2b (53)0.54 Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$ (54)0.97 Enter (50) or (54) in (55) (55)0.97



vvater sto	orage loss o	alculated	for each	month			((56)m = (55) × (41)r	m				
(56)m= 3	30.01 27.1	30.01	29.05	30.01	29.05	30.01	30.01	29.05	30.01	29.05	30.01		(56)
If cylinder c	ontains dedic	ated solar sto	orage, (57)	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 3	30.01 27.1	30.01	29.05	30.01	29.05	30.01	30.01	29.05	30.01	29.05	30.01		(57)
Primary of	circuit loss (annual) fro	om Table	e 3							0		(58)
Primary of	circuit loss	alculated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(modifi	ed by facto	r from Tab	le H5 if t	here is s	solar wat	er heatii	ng and a	cylinde	r thermo	stat)			
(59)m= 2	23.26 21.0	1 23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi los	ss calculate	ed for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total hea	at required f	or water h	eating ca	alculated	for eacl	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 22	24.26 197.6	6 207.59	186.09	182.36	162.95	156.5	171.72	171.42	192.96	204.04	218.86		(62)
Solar DHW	input calculat	ed using App	endix G o	r Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add addi	itional 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 fro	om water h	eater		-	_	-	-			-	-		
(64)m= 22	24.26 197.6	6 207.59	186.09	182.36	162.95	156.5	171.72	171.42	192.96	204.04	218.86		
			-				Outp	out from wa	ater heate	r (annual)₁	12	2276.41	(64)
Hea <mark>t gai</mark> r	ns from wat	er heating	, kWh/m	onth 0.2	5 [0.85	× (45)m	+ (61)m	ı] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
(65)m= 9	9.47 88.2	93.93	85.98	85.54	78.28	76.94	82	81.1	89.07	91.95	97.68		(65)
_													
in <mark>clude</mark>	(57)m in c	alculation	of (65)m	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	<mark>mu</mark> nity h	eating	
					ylinder is	s in the o	dwelling	or hot w	ate <mark>r is fr</mark>	om com	munity h	eating	
5. Intern	nal gains (s	ee Table 5	and 5a		ylinder is	s in the d	dwelling	or hot w	ater is fr	om com	<mark>mu</mark> nity h	eating	
5. Intern		ee Table s	and 5a		ylinder is	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Intern	nal gains (s gains (Tal	ee Table sole 5), Was	and 5a):								eating	(66)
5. Intern Metabolic (66)m= 14	nal gains (s gains (Tal Jan Fe	ee Table 5 ble 5), War 6 148.66	and 5a tts Apr 148.66	May 148.66	Jun 148.66	Jul 148.66	Aug 148.66	Sep 148.66	Oct	Nov	Dec	eating	(66)
5. Intern Metabolic (66)m= 14	gains (Tal Jan Fe 48.66 148.6 gains (calcu	ce Table (color), War Mar 6 148.66	and 5a tts Apr 148.66	May 148.66	Jun 148.66 ion L9 or	Jul 148.66	Aug 148.66	Sep 148.66	Oct	Nov	Dec	eating	(66)
Metabolic (66)m= 14 Lighting (67)m= 3	gains (Tal Jan Fe 48.66 148.6 gains (calcu	ee Table 8 ole 5), War o Mar 6 148.66 ulated in A 1 22.53	148.66 ppendix	May 148.66 L, equat	Jun 148.66 ion L9 or 10.77	Jul 148.66 r L9a), a 11.63	Aug 148.66 Iso see	Sep 148.66 Table 5 20.3	Oct 148.66	Nov 148.66	Dec 148.66	eating	, ,
5. Intern Metabolic (66)m= 14 Lighting (67)m= 3 Appliance	gains (Tal Jan Fe 48.66 148.6 gains (calcu	ple 5), War Mar 6 148.66 Ilated in A 1 22.53	148.66 ppendix	May 148.66 L, equat	Jun 148.66 ion L9 or 10.77	Jul 148.66 r L9a), a 11.63	Aug 148.66 Iso see	Sep 148.66 Table 5 20.3	Oct 148.66	Nov 148.66	Dec 148.66	eating	, ,
Metabolic (66)m= 14 Lighting c (67)m= 34 Appliance (68)m= 34	gains (Tal Jan Fe 48.66 148.6 gains (calcumos) 31.2 27.7 es gains (calcumos) 49.65 353.2	me Table (color), War Mar Mar Mar Mar Mar Mar Mar Mar Mar M	Apr 148.66 ppendix 17.06 Appendix 324.67	May 148.66 L, equat 12.75 dix L, eq 300.1	Jun 148.66 ion L9 or 10.77 uation L	Jul 148.66 r L9a), a 11.63 13 or L1 261.58	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Tal 267.1	Oct 148.66 25.77 ole 5 286.56	Nov 148.66 30.08	Dec 148.66	eating	(67)
Metabolic (66)m= 14 Lighting (67)m= 34 Cooking (gains (Tal Jan Fe 48.66 148.6 gains (calcu 31.2 27.7 es gains (ca	ple 5), War Mar 6 148.66 Hated in A 1 22.53 Alculated in 8 344.14	Apr 148.66 ppendix 17.06 Appendix 324.67	May 148.66 L, equat 12.75 dix L, eq 300.1	Jun 148.66 ion L9 or 10.77 uation L	Jul 148.66 r L9a), a 11.63 13 or L1 261.58	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Tal 267.1	Oct 148.66 25.77 ole 5 286.56	Nov 148.66 30.08	Dec 148.66	eating	(67)
Metabolic (66)m= 14 Lighting (67)m= 3 Appliance (68)m= 34 Cooking (69)m= 3	gains (calculate) gains (calcu	Mar 6 148.66 llated in A 1 22.53 alculated in A 3 344.14 ulated in A 7 37.87	148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a)	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Tal 267.1	Oct 148.66 25.77 ole 5 286.56 5	Nov 148.66 30.08	Dec 148.66 32.06 334.23	eating	(67) (68)
Metabolic (66)m= 14 Lighting (67)m= 3 Appliance (68)m= 34 Cooking (69)m= 3	gains (Tal Jan Fe 48.66 148.6 gains (calcust) 31.2 27.7 es gains (calcust) 49.65 353.2 gains (calcust) 37.87 37.8	Mar 6 148.66 llated in A 1 22.53 alculated in A 3 344.14 ulated in A 7 37.87	148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a)	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 see Tal 267.1	Oct 148.66 25.77 ole 5 286.56 5	Nov 148.66 30.08	Dec 148.66 32.06 334.23	eating	(67) (68)
Metabolic (66)m= 14 Lighting Q (67)m= 3 Appliance (68)m= 34 Cooking Q (69)m= 3 Pumps ar (70)m=	gains (Tal Jan Fe 48.66 148.6 gains (calcumos) 31.2 27.7 es gains (calcumos) 49.65 353.2 gains (calcumos) 37.87 37.87	pole 5), War o Mar 6 148.66 dated in A 1 22.53 alculated in 8 344.14 dated in A 7 37.87 ns (Table s	Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a)	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87	Oct 148.66 25.77 ole 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23	eating	(67) (68) (69)
Metabolic (66)m= 14 Lighting ((67)m= 3 Appliance (68)m= 3 Cooking ((69)m= 3 Pumps ar (70)m= 1 Losses e	gains (Tal Jan Fe 48.66 148.6 gains (calcu 31.2 27.7 es gains (calcu 49.65 353.2 gains (calcu 37.87 37.8 nd fans gai	mee Table (color), War Mar Mar Mar Mar Mar Mar Mar Mar Mar M	Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 3	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87	Oct 148.66 25.77 ole 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23 37.87	eating	(67) (68) (69)
Metabolic (66)m= 14 Lighting (67)m= 3 Appliance (68)m= 3 Cooking (69)m= 3 Pumps at (70)m= 1 Losses e (71)m= -1	gains (Tal Jan Fe 48.66 148.6 gains (calcumants) 31.2 27.7 es gains (calcumants) 49.65 353.2 gains (calcumants) 37.87 37.8 and fans gains 3 3 .g. evapora	Mar 6 148.66 llated in A 1 22.53 alculated in A 3 344.14 ulated in A 7 37.87 ns (Table s 3 tion (nega	Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 3	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87	Oct 148.66 25.77 cole 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23 37.87	eating	(67) (68) (69) (70)
Metabolic (66)m= 14 Lighting (67)m= 3 Appliance (68)m= 34 Cooking (69)m= 3 Pumps at (70)m= 1 Losses e (71)m= -1 Water he	gains (Tal Jan Fe 48.66 148.6 gains (calcumants) 31.2 27.7 es gains (calcumants) 49.65 353.2 gains (calcumants) 37.87 37.8 and fans gains 3 3 .g. evapora	ee Table (ble 5), War Mar 6 148.66 related in A 1 22.53 relaculated in A 2 37.87 res (Table 5) related in A 3 -118.93 (Table 5)	Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 3	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 or 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87	Oct 148.66 25.77 cole 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23 37.87	eating	(67) (68) (69) (70)
Metabolic (66)m= 14 Lighting (67)m= 3 Appliance (68)m= 3 Cooking (69)m= 3 Pumps ar (70)m= 1 Losses e (71)m= -1 Water he (72)m= 1	gains (Tal Jan Fe 48.66 148.6 gains (calcumants) 31.2 27.7 es gains (calcumants) 49.65 353.2 gains (calcumants) 37.87 37.8 and fans gains 3 3 .g. evapora 18.93 -118.9 ating gains 33.7 131.2	ee Table (ble 5), War Mar 6	148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 3 tive valu -118.93	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 of 10.77 uation L 277.01 tion L15 37.87 3 ole 5) -118.93	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87 3	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87 3	Oct 148.66 25.77 ole 5 286.56 5 37.87 3 -118.93	Nov 148.66 30.08 311.13 37.87 3	Dec 148.66 32.06 334.23 37.87 3	eating	(67) (68) (69) (70) (71)
Metabolic (66)m= 14 Lighting Q (67)m= 3 Appliance (68)m= 3 Cooking Q (69)m= 3 Pumps at (70)m= 1 Losses e (71)m= -1 Water he (72)m= 1 Total inter	gains (Tal Jan Fe 48.66 148.6 gains (calcumos) 31.2 27.7 es gains (calcumos) 49.65 353.2 gains (calcumos) 37.87 37.8 nd fans gain 3 3 .g. evapora 18.93 -118.9 ating gains	ee Table (ble 5), War Mar 6	148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 3 tive valu -118.93	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 of 10.77 uation L 277.01 tion L15 37.87 3 ole 5) -118.93	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87 3	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87 3	Sep 148.66 Table 5 20.3 see Tal 267.1 ee Table 37.87 3	Oct 148.66 25.77 ole 5 286.56 5 37.87 3 -118.93	Nov 148.66 30.08 311.13 37.87 3	Dec 148.66 32.06 334.23 37.87 3	eating	(67) (68) (69) (70) (71)

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



Orientat	tion:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	20.43	x	10.63	x	0.63	x	0.7	=	66.39	(74)
North	0.9x	0.77	x	20.43	x	20.32	x	0.63	x	0.7] =	126.88	(74)
North	0.9x	0.77	x	20.43	x	34.53	×	0.63	x	0.7] =	215.6	(74)
North	0.9x	0.77	x	20.43	x	55.46	x	0.63	x	0.7] =	346.3	(74)
North	0.9x	0.77	х	20.43	x	74.72	x	0.63	x	0.7] =	466.5	(74)
North	0.9x	0.77	x	20.43	x	79.99	x	0.63	x	0.7	=	499.4	(74)
North	0.9x	0.77	x	20.43	x	74.68	x	0.63	x	0.7	=	466.26	(74)
North	0.9x	0.77	x	20.43	x	59.25	x	0.63	x	0.7	=	369.91	(74)
North	0.9x	0.77	x	20.43	x	41.52	x	0.63	x	0.7	=	259.22	(74)
North	0.9x	0.77	x	20.43	x	24.19	x	0.63	x	0.7	=	151.03	(74)
North	0.9x	0.77	x	20.43	X	13.12	X	0.63	x	0.7	=	81.9	(74)
North	0.9x	0.77	x	20.43	x	8.86	x	0.63	x	0.7] =	55.35	(74)
East	0.9x	0.77	x	2	X	19.64	X	0.63	x	0.7	=	12	(76)
East	0.9x	0.77	x	2	X	38.42	X	0.63	x	0.7	=	23.48	(76)
East	0.9x	0.77	x	2	x	63.27	X	0.63	x	0.7	=	38.67	(76)
East	0.9x	0.77	x	2	X	92.28	Х	0.63	X	0.7	=	56.4	(76)
East	0.9x	0.77	x	2	х	113.09	×	0.63	x	0.7	=	69.13	(76)
East	0.9x	0.77	x	2	х	115.77	x	0.63	x	0.7	=	70.76	(76)
East	0.9x	0.77	x	2	x	110.22	x	0.63	x	0.7	=	67.37	(76)
East	0.9x	0.77	x	2	x	94.68	х	0.63	x	0.7	=	57.87	(76)
East	0.9x	0.77	x	2	x	73.59	х	0.63	x	0.7	=	44.98	(76)
East	0.9x	0.77	x	2	х	45.59	X	0.63	x	0.7	=	27.87	(76)
East	0.9x	0.77	x	2	X	24.49	X	0.63	x	0.7	=	14.97	(76)
East	0.9x	0.77	x	2	X	16.15	x	0.63	x	0.7	=	9.87	(76)
South	0.9x	0.77	x	8.75	X	46.75	x	0.63	x	0.7	=	125.02	(78)
South	0.9x	0.77	x	8.75	X	76.57	X	0.63	x	0.7] =	204.75	(78)
South	0.9x	0.77	x	8.75	X	97.53	X	0.63	x	0.7	=	260.82	(78)
South	0.9x	0.77	X	8.75	X	110.23	X	0.63	X	0.7	=	294.78	(78)
South	0.9x	0.77	x	8.75	X	114.87	X	0.63	X	0.7	=	307.18	(78)
South	0.9x	0.77	x	8.75	X	110.55	X	0.63	X	0.7	=	295.62	(78)
South	0.9x	0.77	x	8.75	X	108.01	x	0.63	X	0.7	=	288.84	(78)
South	0.9x	0.77	x	8.75	X	104.89	X	0.63	X	0.7	=	280.5	(78)
South	0.9x	0.77	X	8.75	X	101.89	X	0.63	X	0.7	=	272.45	(78)
South	0.9x	0.77	X	8.75	X	82.59	X	0.63	X	0.7	=	220.84	(78)
South	0.9x	0.77	x	8.75	x	55.42	X	0.63	x	0.7	=	148.19	(78)
South	0.9x	0.77	X	8.75	x	40.4	x	0.63	x	0.7	=	108.03	(78)
West	0.9x	0.77	x	6.6	x	19.64	x	0.63	x	0.7	=	39.62	(80)
West	0.9x	0.77	x	6.6	x	38.42	x	0.63	x	0.7	=	77.5	(80)
West	0.9x	0.77	x	6.6	X	63.27	X	0.63	X	0.7	=	127.62	(80)



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West 0.9x	0.77	X	6.6	X	92.28	3	X	0.63	X	0.7		186.13	(80)
West 0.9x	0.77	X	6.6	X	113.0	9	x	0.63	x	0.7	=	228.11	(80)
West 0.9x	0.77	X	6.6	X	115.7	7	x	0.63	x	0.7	=	233.51	(80)
West 0.9x	0.77	X	6.6	X	110.2	2	x	0.63	x	0.7		222.32	(80)
West 0.9x	0.77	X	6.6	X	94.68	3	x	0.63	x	0.7	=	190.97	(80)
West 0.9x	0.77	X	6.6	X	73.59	9	x	0.63	x	0.7	_	148.43	(80)
West 0.9x	0.77	×	6.6	X	45.59	9	x	0.63	x	0.7	=	91.96	(80)
West 0.9x	0.77	x	6.6	X	24.49	9	x	0.63	x	0.7	_	49.4	(80)
West 0.9x	0.77	X	6.6	X	16.15	5	x	0.63	x	0.7	_	32.58	(80)
Rooflights 0.9x	1	×	0.76	X	25.93	3	x	0.63	×	0.7	=	7.87	(82)
Rooflights 0.9x	1	×	0.76	X	51.88	3	x	0.63	x	0.7		15.74	(82)
Rooflights 0.9x	1	x	0.76	x	88.38	3	х	0.63	x	0.7	-	26.81	(82)
Rooflights 0.9x	1	×	0.76	X	133.6	5	x	0.63	T x	0.7	=	40.55	(82)
Rooflights 0.9x	1	×	0.76	X	168.1	l	х	0.63	x	0.7		51	(82)
Rooflights 0.9x	1	x	0.76	x	174		х	0.63	x	0.7	-	52.79	(82)
Rooflights 0.9x	1	×	0.76	X	164.8	7	x	0.63	T x	0.7	=	50.02	(82)
Rooflights 0.9x	1	x	0.76	x	138.7	2	х	0.63	x	0.7		42.09	(82)
Rooflights 0.9x	1	x	0.76	X	104.3	3	Х	0.63	Х	0.7	=	31.65	(82)
Rooflights 0.9x	1	×	0.76	X	62.32	2	х	0.63	x	0.7		18.91	(82)
Rooflights 0.9x	1	X	0.76	x	32.54	1 /	x	0.63	x	0.7	=	9.87	(82)
Rooflights 0.9x	1	x	0.76	j x	21.19		x	0.63	х	0.7	=	6.43	(82)
_		T I							_				_
Solar gains in	watts, calcu	ulated	for each mo	nth		(83	3)m	= Sum(74)m	(82)m				
(83)m= 250.9		69.53	924.17 112	$\overline{}$	152.09 10	94.79	941.	34 756.73	510.6	304.33	212.26		(83)
Total gains – ir	nternal and	solar	(84)m = (73))m +	(83)m , wa	atts					•		
(84)m= 836.04	1031.21 12	33.04	1455.91 1620	0.35 1	619.19 15	42.02 1	395	.23 1227.36	1013.2	5 843.84	780.43		(84)
7. Mean inter	nal tempera	ature ((heating sea	son)									
Temperature	during hea	ting p	eriods in the	living	area fron	n Table	9,	Th1 (°C)				21	(85)
Utilisation fac	tor for gain	s for li	iving area, h	1,m (see Table	9a)							
Jan	Feb	Mar	Apr M	ay	Jun 、	Jul	Αι	ıg Sep	Oct	Nov	Dec		
(86)m= 1	1 (0.99	0.97 0.9	1	0.76	0.6	0.6	7 0.9	0.99	1	1		(86)
Mean internal	temperatu	ıre in I	iving area T	l (fall	ow stens :	3 to 7 ir	n Ta	able 9c)		-	-	•	
(87)m= 19.79		0.14	20.44 20.	$\overline{}$			20.9	 	20.43	20.06	19.78		(87)
Temperature	during hoo	ting n	oriode in roc	of d	volling fro	m Tabl	ام ۱۵	Th2 (°C)		Į.		I	
(88)m= 19.85		9.86	19.88 19.				19.8		19.88	19.87	19.87		(88)
` ′		!		!_		ļ.		1 .0.00	. 5.50	1 . 5.5.	L	I	(/
Utilisation fac				Ť				2 004 1	0.00	1 4	4		(89)
(89)m= 1		0.99	0.96 0.8		<u>i</u>	ļ.	0.5		0.98	1	1		(09)
Mean internal					` ` ` 					_		1	
(90)m= 18.23	18.42 1	8.75	19.19 19.	56	19.76 1	9.8	19.		19.18		18.22		(90)
								fl	LA = Liv	ring area ÷ (4	4) =	0.14	(91)
Mean internal	temperatu	ıra (foi	r the whole o	االصيدا	$\alpha = f \Delta$	v T1 ⊥	(1 -	- fl Δ) ~ T2					

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$



(92)m= 18.44	18.63	18.94	19.36	19.72	19.92	19.96	19.95	19.82	19.36	18.83	18.43		(92)
Apply adjustn	nent to t	he mear	interna	temper	ature fro	m Table	4e, whe	ere appro	priate	<u> </u>			
(93)m= 18.44	18.63	18.94	19.36	19.72	19.92	19.96	19.95	19.82	19.36	18.83	18.43		(93)
8. Space hea	ting requ	uirement											
Set Ti to the r	mean int	ernal ter	mperatu	re obtain	ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisation	factor fo	or gains	using Ta	ble 9a									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	:										
(94)m= 1	1	0.99	0.96	0.86	0.67	0.47	0.54	0.84	0.98	1	1		(94)
Useful gains,	hmGm	W = (94)	4)m x (8	4)m								1	
(95)m= 834.82	1027.09	1217.93	1392.07	1397.16	1086.93	726.14	756.72	1027.53	990.29	841.02	779.61		(95)
Monthly average	age exte	rnal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	for me	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 3233.84	3128.73	2825.25	2339.57	1786.9	1168.5	737.93	778.96	1263.38	1951.49	2631.37	3211.58		(97)
Space heatin	g require	ement fo	r each n	nonth, k\	Wh/mont	h = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 1784.87	1412.3	1195.84	682.2	289.97	0	0	0	0	715.14	1289.05	1809.39		
		-	-				Tota	l per year	(kWh/yeaı	r) = Sum(9	8)15,912 =	9178.75	(98)
Space heatin	a require	ement in	kWh/m²	/vear								51.56	(99)
						a almelia e		NID)	_				
9a. Energy rec		its – Indi	ividuai n	eating sy	/stems II	ncluding	micro-C	HP)	-			_	
Space heating Fraction of sp	_	et from s	econdar	v/supple	montary	evetem						0	(201)
· ·					illeritar y			(204)				0	╡ `
Fraction of sp				7.1			(202) = 1					1	(202)
Fraction of to	tal heati	ng from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficiency of r	main spa	ace heat	ing s <mark>yste</mark>	em 1								90.9	(206)
Efficiency of	seconda	ry/suppl	ementar	y heating	g system	ո, %						0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	⊒ ar
Space heatin						- Gai	1 7.09	Сор		1.00	200	1	-Gi
1784.87	1412.3	1195.84	682.2	289.97	0	0	0	0	715.14	1289.05	1809.39		
(211)m = {[(98)m v (20		00 : (20)6)			l	ļ		<u> </u>		l	(211)
` /	<u>``</u>	1315.56	`	319	0	0	0	0	786.73	1418.09	1990.52		(211)
1000.00	1000.00	1010.00	700.40	010	Ü	Ů		l (kWh/yea				10097.63	(211)
	- (-1/-) 13A/L					(, ••••••••	- 1 15,1012	2	10097.03	(211)
Space heatin	•		• /	montn									
$= \{[(98)m \times (200)] $ (215)m= 0	0 0 0 1	00 ÷ (20	0	0	0	0	0	0	0	0	0		
(213)111= 0	0			U	U	0	_	l (kWh/yea	-	_			7(245)
							Tota	ii (KVVII) y Ce	ar) =0arri(2	= 1 3) _{15,1012}	2	0	(215)
Water heating		4/		h									
Output from w	197.66	207.59	186.09	182.36	162.95	156.5	171.72	171.42	192.96	204.04	218.86		
Efficiency of w			100.00	102.00	102.00	100.0	171.72	171.72	102.00	204.04	210.00	90.9	(216)
			00.50	00.74	00.0	00.0	00.0	00.0	00.55	00.07	90.00	80.8	┙゛
(217)m= 89.65	89.53	89.25	88.53	86.71	80.8	80.8	80.8	80.8	88.55	89.37	89.69		(217)
Fuel for water	•												
(219)m = (64) (219)m = 250.15	220.78	232.59	210.2	210.3	201.67	193.68	212.53	212.15	217.92	228.3	244.02		
200.10		I			_51.07	. 30.00		I = Sum(2:		I	1 - 1 1.02	2624.24	(240)
							1018	– Juni(2	. 54,112			2634.31	(219)



Annual totals		kWh/year	kWh/year	_
Space heating fuel used, main system 1			10097.63	
Water heating fuel used			2634.31]
Electricity for pumps, fans and electric keep-hot				
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			550.94	(232)
Electricity generated by PVs			-1025.35	(233)
Total delivered energy for all uses (211)(221) + (231) + (232)(237b) =		12332.53	(338)
12a. CO2 emissions – Individual heating systems	including micro-CHP			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/yea	ır
Space heating (main system 1)	-			ır](261)
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh	kg CO2/yea	_
	kWh/year	kg CO2/kWh	kg CO2/yea	(261)
Space heating (secondary)	kWh/year (211) x (215) x	kg CO2/kWh 0.241 = 0.519 =	kg CO2/yea	(261) (263)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	kg CO2/kWh 0.241 = 0.519 =	kg CO2/yea	(261) (263) (264)
Space heating (secondary) Water heating Space and water heating	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	kg CO2/kWh 0.241 = 0.519 = 0.241 =	kg CO2/yea 2433.53 0 634.87 3068.4	(261) (263) (264) (265)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x	kg CO2/kWh 0.241 = 0.519 = 0.519 =	kg CO2/yea 2433.53 0 634.87 3068.4 38.93	(261) (263) (264) (265) (267)
Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot Electricity for lighting Energy saving/generation technologies	kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x (232) x	kg CO2/kWh 0.241 = 0.519 = 0.519 = 0.519 =	kg CO2/yea 2433.53 0 634.87 3068.4 38.93 285.94	(261) (263) (264) (265) (267) (268)

El rating (section 14)

(274)



User Details: **Assessor Name:** Stroma Number: Stroma FSAP 2012 **Software Version: Software Name:** Version: 1.0.5.60 Property Address: Plot 4 LPG Land West of Broome Farm Barn, Broome, Craven Arms Address: 1. Overall dwelling dimensions Av. Height(m) Volume(m³) Area(m²) Ground floor 98.4 (1a) x 2.7 (2a) =265.68 (3a) First floor (2b) (1b) x (3b) 79.63 2.41 191.91 Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+....(1n)178.03 Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+....(3n) =(5) 457.59 2. Ventilation rate: main secondary other total m³ per hour heating heating Number of chimneys x 40 =(6a) 0 0 0 0 0 x 20 =Number of open flues 0 0 0 0 (6b) Number of intermittent fans x 10 =(7a)40 4 Number of passive vents x 10 =(7b) 0 0 Number of flueless gas fires x 40 =(7c)0 0 Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = \div (5) = 0.09 (8)If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) Number of storeys in the dwelling (ns) (9)0 Additional infiltration [(9)-1]x0.1 =(10)0 Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction (11)if both types of wall are present, use the value corresponding to the greater wall area (after deducting areas of openings); if equal user 0.35 If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 (12)0 If no draught lobby, enter 0.05, else enter 0 0 (13)Percentage of windows and doors draught stripped (14)0 $0.25 - [0.2 \times (14) \div 100] =$ Window infiltration 0 (15)(8) + (10) + (11) + (12) + (13) + (15) =Infiltration rate 0 (16)Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)5 If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise (18) = (16)0.34 (18)Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered (19)Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 1 (20) $(21) = (18) \times (20) =$ Infiltration rate incorporating shelter factor (21)0.34 Infiltration rate modified for monthly wind speed

minuat	ioniale	mounic	3 101 1110	illing win	ia spece							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthl	y avera	ge wind	speed fr	om Tabl	e 7							
(22)m=	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7



Wind Factor (22a)m = (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 infiltration rate (allo	wing for sh	elter an	d wind s	:need) –	(21a) v	(22a)m		•		-		
0.43 0.42 0.41	0.37	0.36	0.32	0.32	0.31	0.34	0.36	0.38	0.4]		
Calculate effective air change				l]		_
If mechanical ventilation:											0	(23a)
If exhaust air heat pump using Ap) = (23a)				0	(23b)
If balanced with heat recovery: ef	-	_									0	(23c)
a) If balanced mechanical				, 	- 	í `	 	- 	``) ÷ 100] 1		(0.4.)
(24a)m= 0 0 0	0	0	0	0	0	0	0	0	0]		(24a)
b) If balanced mechanical				- 	- 	í `	- ` `	r í	Ι .	1		(24b)
(24b)m= 0 0 0	0	0	0	0	0	0	0	0	0]		(24b)
c) If whole house extract v if (22b)m < 0.5 x (23b)		-	-				5 x (23h	<i>)</i>				
(24c)m =	0	0	0	0	0) = (22)	0	0	0	0]		(24c)
d) If natural ventilation or v	hole house	e nositiv	e input	ventilatio	on from I	loft				J		, ,
if (22b)m = 1, then (24		•	•				0.5]					
(24d)m= 0.59 0.59 0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58			(24d)
Effective air change rate -	enter (24a)	or (24b	o) or (24	c) or (24	d) in bo	x (25)						
(25)m= 0.59 0.59 0.59	0.57	0.57	0.55	0.55	0.55	0.56	0.57	0.57	0.58			(25)
3. Heat losses and heat los	s paramete											
3. Heat losses and heat loss ELEMENT Gross	Opening	gs	Net Ar	ea	U-val		AXU		k-value		A X	
ELEMENT Gross area (m²)		gs	A ,r	m²	W/m2	2K	(W/I	K)	k-value kJ/m²-		A X kJ/ł	<
ELEMENT Gross area (m²) Windows Type 1	Opening	gs		m ² x1	W/m2 /[1/(1.4)+	2K · 0.04] =		K)				
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2	Opening	gs	A ,r	m ² x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+	$2K$ $0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix} 0.04 \end{bmatrix}$	(W/I	K)				<
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2 Windows Type 3	Opening	gs	A ,r	m ² x1 x1	W/m2 /[1/(1.4)+	$2K$ $0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix} 0.04 \end{bmatrix}$	(W/l	<) 				(27)
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2	Opening	gs	A ,r 20.43 8.75	m ² x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+	$2K$ $0.04] = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix} 0.04 \end{bmatrix} = \begin{bmatrix} 0.04 \end{bmatrix}$	27.09 11.6	K)				(27)
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2 Windows Type 3	Opening	gs	A ,r 20.43 8.75	m ² x1 x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{l} (0.04) = \\ (0.$	27.09 11.6 2.65					(27) (27) (27)
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4	Opening	gs	A ,r 20.43 8.75 2 6.6	m ² x1 x1 x1 x1 x1	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{l} (0.04) = \\ (0.$	27.09 11.6 2.65 8.75	 				(27) (27) (27) (27) (27)
ELEMENT Gross area (m²) Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights	Opening	gs	A ,r 20.43 8.75 2 6.6 0.764	m ² x1 x1 x1 4 x1 x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{l} (0.04) = \\ (0.$	27.09 11.6 2.65 8.75					(27) (27) (27) (27) (27) (27b)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor	Opening m ²	gs	A ,r 20.43 8.75 2 6.6 0.764 98.4	m ² x1 x1 x1 4 x1 x 8 x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	$ \begin{array}{l} (0.04) = \\ (0.$	(W/l 27.09 11.6 2.65 8.75 1.29948 12.792					(27) (27) (27) (27) (27) (27b)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls 197.56	Opening m ²	gs	A ,r 20.43 8.75 2 6.6 0.764 98.4	m² x1 x1 x1 x1 x1 x1 x1 xx xx xx xx xx xx	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13	2K 0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [(W/l 27.09 11.6 2.65 8.75 1.29944 12.792 28.76					(27) (27) (27) (27) (27) (27b) (28) (29)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type 1 89.2	Opening m ² 37.78	gs	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2	m ²	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.18	2K 0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [= [27.09 11.6 2.65 8.75 1.29944 12.792 28.76 11.6					(27) (27) (27) (27) (27) (27b) (28) (29) (30)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type2 6.32	Opening m ² 37.78 0 0.76	gs 2	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calcul	x1 x1 x1 x1 x1 x1 x x x x x x x x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.18 0.13	2K 0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [= [27.09 11.6 2.65 8.75 1.29948 12.792 28.76 11.6 0.72	B [kJ/m²-	K		(27) (27) (27) (27) (27) (27b) (28) (29) (30) (30)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls 197.56 Roof Type1 89.2 Roof Type2 6.32 Total area of elements, m² * for windows and roof windows, use	Opening m ² 37.78 0 0.76 e effective wint internal walls	gs 2	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calcul	x1 x1 x1 x1 x1 x1 x x x x x x x x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.18 0.13	$ \begin{array}{l} 2K \\ 0.04] = \begin{bmatrix} \\ 0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix} $	27.09 11.6 2.65 8.75 1.29948 12.792 28.76 11.6 0.72	B [kJ/m²-	n 3.2		(27) (27) (27) (27) (27) (27b) (28) (29) (30) (30)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls 197.56 Roof Type1 89.2 Roof Type2 6.32 Total area of elements, m² * for windows and roof windows, use ** include the areas on both sides of	37.78 0 0.76 e effective wint internal walls x U)	gs 2	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calcul	x1 x1 x1 x1 x1 x1 x x x x x x x x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.18 0.13	$ \begin{array}{l} 2K \\ 0.04] = \begin{bmatrix} \\ 0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix} + (32) = \begin{bmatrix} \\ \\ \end{bmatrix} + (32) = \begin{bmatrix} \\ \\ \\ \end{bmatrix}$	27.09 11.6 2.65 8.75 1.29948 12.792 28.76 11.6 0.72	B [kJ/m²-	n 3.2	kJ/f	(27) (27) (27) (27) (27b) (28) (29) (30) (31)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls 197.56 Roof Type1 89.2 Roof Type2 6.32 Total area of elements, m² * for windows and roof windows, use ** include the areas on both sides of Fabric heat loss, W/K = S (A	Opening m ² 37.78 0 0.76 e effective wint internal walls x U)	gs adow U-va s and part	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculations	x1 x1 x1 x1 x1 x1 xx xx xx xx xx xx xx x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.18 0.13	$ \begin{array}{l} 2K \\ 0.04] = \begin{bmatrix} \\ 0.04 \end{bmatrix} = \begin{bmatrix} \\ \\ \end{bmatrix} + (32) = ((28) $	27.09 11.6 2.65 8.75 1.29944 12.792 28.76 11.6 0.72	as given in	kJ/m²-	n 3.2	kJ/f	(27) (27) (27) (27) (27b) (28) (29) (30) (31) (33)
Windows Type 1 Windows Type 2 Windows Type 3 Windows Type 4 Rooflights Floor Walls Roof Type1 Roof Type2 6.32 Total area of elements, m² * for windows and roof windows, use ** include the areas on both sides of Fabric heat loss, W/K = S (A Heat capacity Cm = S(A x k)	Opening max 37.78 0 0.76 e effective wint f internal walls x U) MP = Cm ÷ details of the effective of t	ndow U-vas and part	A ,r 20.43 8.75 2 6.6 0.764 98.4 159.7 89.2 5.56 391.4 alue calculations	x1 x1 x1 x1 x1 x1 xx xx xx xx xx xx xx x	W/m2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.13 0.13 0.13 0.13 q formula 1 (26)(30)	$ \begin{array}{l} 2K \\ 0.04] = \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} \\ $	(W/l 27.09 11.6 2.65 8.75 1.2994t 12.792 28.76 11.6 0.72 (30) + (32) tive Value	8	kJ/m²-l	n 3.2	kJ/l 05.17 14.82	(27) (27) (27) (27) (27b) (28) (29) (30) (31) (33) (34)



if details of thermal bridging are not known (36) = 0.05 x (31) Total fabric heat loss (33) + (36) =121.64 (37)Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)$ m x (5)Jul Sep Oct Jan Feb Mar May Jun Dec Apr Aug Nov (38)m =89.48 88.93 88.4 85.9 85.44 83.26 83.26 82.86 84.1 85.44 86.38 87.37 (38)Heat transfer coefficient, W/K (39)m = (37) + (38)m 211.12 210.58 210.05 207.55 207.08 204.9 207.08 (39)m =204.9 204.5 205.74 208.03 209.01 207.54 (39)Average = $Sum(39)_{1...12}/12=$ Heat loss parameter (HLP), W/m2K (40)m = (39)m ÷ (4)(40)m =1.19 1.18 1.18 1.16 1.15 1.15 1.15 1.16 1.16 1.17 1 17 (40)Average = $Sum(40)_{1...12}/12=$ 1.17 Number of days in month (Table 1a) Jan Feb Mar May Jul Sep Oct Nov Apr Jun Aug Dec 31 31 (41)(41)m =31 28 30 31 30 31 31 30 30 31 4. Water heating energy requirement: kWh/year: Assumed occupancy, N (42)2.97 if TFA > 13.9, N = 1 + 1.76 x [1 - $\exp(-0.000349 \times (TFA - 13.9)2)] + 0.0013 \times (TFA - 13.9)$ if TFA £ 13.9, N = 1Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 (43)104.81 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 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 =115.3 111.1 106.91 102.72 98.53 94.33 94.33 98.53 102.72 106.91 111.1 115.3 Total = $Sum(44)_{1...12}$ = 1257.77 (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) 170.98 149.54 154.31 134.53 129.09 111.39 103.22 118.45 119.86 139.69 152.48 165.58 (45)m =(45)Total = $Sum(45)_{1...12}$ = 1649.13 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m =25.65 22.43 23.15 20.18 19.36 16.71 15.48 17.77 17.98 20.95 22.87 24.84 (46)Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 150 (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): 1.7 (48)Temperature factor from Table 2b (49)0.54 Energy lost from water storage, kWh/year $(48) \times (49) =$ (50)0.92 b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51)If community heating see section 4.3 Volume factor from Table 2a (52)0 Temperature factor from Table 2b (53)0 Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) =$ (54)0 Enter (50) or (54) in (55) (55)0.92



Water storage loss ca	alculated t	for each	month			((56)m = ((55) × (41)	m				
(56)m= 28.48 25.73	28.48	27.57	28.48	27.57	28.48	28.48	27.57	28.48	27.57	28.48		(56)
If cylinder contains dedica	ed 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= 28.48 25.73	28.48	27.57	28.48	27.57	28.48	28.48	27.57	28.48	27.57	28.48		(57)
Primary circuit loss (a	nnual) fro	om Table	e 3							0		(58)
Primary circuit loss c	alculated	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by factor	from Tab	le H5 if t	here is s	solar wat	ter heatii	ng and a	cylinde	r thermo	stat)		•	
(59)m= 23.26 21.01	23.26	22.51	23.26	22.51	23.26	23.26	22.51	23.26	22.51	23.26		(59)
Combi loss calculate	d for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 0 0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat required for	r 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= 222.73 196.28	206.06	184.61	180.83	161.47	154.97	170.2	169.94	191.44	202.56	217.33		(62)
Solar DHW input calculate	d using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)		
(add additional lines	f FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (G)					
(63)m= 0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output from water he	ater											
(64)m= 222.73 196.28	206.06	184.61	180.83	161.47	154.97	170.2	169.94	191.44	202.56	217.33		_
						Outp	out from wa	ater heate	r (annual)₁	12	2258.41	(64)
Heat gains from water	r heating,	kWh/mo	onth 0.2	5 ^[0.85	× (45)m	+ (61)n	า] + 0.8 x	((46)m	+ (57)m	+ (59)m	1	
(CE) 00 0E 07 11	92.71	84.79	84.32	7 7.1	75.72	80.78	79.92	87.84	90.76	96.45		(65)
(65)m= 98.25 87.11	32.71	04.75	01.02	,,,,,	10.72	00.70	10.02	07.01	000			` '
include (57)m in ca				_						<u> </u>	l leating	,
` '	lculation	of (65)m	only if c	_						<u> </u>	l leating	
include (57)m in ca	lculation ee Table 5	of (65)m	only if c	_						<u> </u>	neating	
include (57)m in ca	lculation ee Table 5	of (65)m	only if c	_						<u> </u>	eating	
include (57)m in ca 5. Internal gains (so Metabolic gains (Tab	lculation ee Table 5 le 5), Wat Mar	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	rom com	munity h	neating	(66)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb	lculation ee Table 5 le 5), Wat Mar 148.66	of (65)m 5 and 5a ts Apr 148.66	only if co: : : : : : : : : : : : : : : : : : :	Jun 148.66	Jul 148.66	Aug 148.66	Sep	ater is fr	om com	munity h	neating	
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66	lculation ee Table 5 le 5), Wat Mar 148.66 ated in Ap	of (65)m 5 and 5a ts Apr 148.66	only if co: : : : : : : : : : : : : : : : : : :	Jun 148.66	Jul 148.66	Aug 148.66	Sep	ater is fr	om com	munity h	neating	
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calculate)	lculation ee Table 5 le 5), Wat Mar 148.66 ated in Ap 22.53	of (65)m 6 and 5a tts Apr 148.66 ppendix 17.06	only if constant of the consta	Jun 148.66 ion L9 of	Jul 148.66 r L9a), a	Aug 148.66 Iso see	Sep 148.66 Table 5	Oct 148.66	Nov	Dec	eating	(66)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71	lculation le Table 5 le 5), Wat Mar 148.66 le 22.53 le 22.53	of (65)m 6 and 5a tts Apr 148.66 ppendix 17.06	only if constant of the consta	Jun 148.66 ion L9 of	Jul 148.66 r L9a), a	Aug 148.66 Iso see	Sep 148.66 Table 5	Oct 148.66	Nov	Dec	neating	(66)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (calcul	lculation Re Table 5 Re 5), Wat Mar 148.66 Rated in Ap 22.53 Rculated ir 344.14	of (65)m 5 and 5a tts Apr 148.66 ppendix 17.06 Appendix 324.67	May 148.66 L, equat 12.75 dix L, eq	Jun 148.66 ion L9 o 10.77 uation L 277.01	Jul 148.66 r L9a), a 11.63 13 or L1 261.58	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 See Ta 267.1	Oct 148.66 25.77 ble 5 286.56	Nov 148.66	Dec 148.66	neating	(66) (67)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.28	lculation Re Table 5 Re 5), Wat Mar 148.66 Rated in Ap 22.53 Rculated ir 344.14	of (65)m 5 and 5a tts Apr 148.66 ppendix 17.06 Appendix 324.67	May 148.66 L, equat 12.75 dix L, eq	Jun 148.66 ion L9 o 10.77 uation L 277.01	Jul 148.66 r L9a), a 11.63 13 or L1 261.58	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 See Ta 267.1	Oct 148.66 25.77 ble 5 286.56	Nov 148.66	Dec 148.66	neating	(66) (67)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.28 Cooking gains (calcul	lculation le Table 5 le 5), Wat Mar 148.66 le ated in Ap 22.53 lculated in Ap 344.14 lated in A 37.87	of (65)m 5 and 5a ts Apr 148.66 Dependix 17.06 Append 324.67 Dependix 37.87	only if construction is the second of the se	Jun 148.66 ion L9 of 10.77 uation L 277.01	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a)	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 See Ta 267.1	Oct 148.66 25.77 ble 5 286.56 5	Nov 148.66 30.08	Dec 148.66 32.06 334.23	neating	(66) (67) (68)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.28 Cooking gains (calcul (69)m= 37.87 37.87	lculation le Table 5 le 5), Wat Mar 148.66 le ated in Ap 22.53 lculated in Ap 344.14 lated in A 37.87	of (65)m 5 and 5a ts Apr 148.66 Dependix 17.06 Append 324.67 Dependix 37.87	only if construction is the second of the se	Jun 148.66 ion L9 of 10.77 uation L 277.01	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a)	Aug 148.66 Iso see 15.12 3a), also 257.95	Sep 148.66 Table 5 20.3 See Ta 267.1	Oct 148.66 25.77 ble 5 286.56 5	Nov 148.66 30.08	Dec 148.66 32.06 334.23	neating	(66) (67) (68)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.28 Cooking gains (calcul (69)m= 37.87 37.87 Pumps and fans gain	lculation Re Table 5 Re 5), Wat Mar 148.66 Rated in Ap 22.53 Rculated ir 344.14 Rated in A 37.87 S (Table 5	of (65)m 5 and 5a ts Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 3	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 of 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 2 see Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23	neating	(66) (67) (68) (69)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.28 Cooking gains (calcul (69)m= 37.87 37.87 Pumps and fans gain (70)m= 3 3	lculation Re Table 5 Re 5), Wat Mar 148.66 Rated in Ap 22.53 Rculated ir 344.14 Rated in A 37.87 S (Table 5	of (65)m 5 and 5a tts Apr 148.66 Dependix 17.06 Appendix 324.67 Dependix 37.87 5a) 3 tive valu	May 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 of 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 2 see Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23	neating	(66) (67) (68) (69)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.28 Cooking gains (calcul (69)m= 37.87 37.87 Pumps and fans gain (70)m= 3 3 Losses e.g. evaporate	lculation Table 5 Mar 148.66 Ated in Ap 22.53 Culated ir 344.14 Ated in A 37.87 s (Table 5 3 ion (nega 3 -118.93	of (65)m 5 and 5a tts Apr 148.66 Dependix 17.06 Appendix 324.67 Dependix 37.87 5a) 3 tive valu	only if construction is seen and seen a	Jun 148.66 ion L9 o 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 See Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23 37.87	neating	(66) (67) (68) (69) (70)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.26 Cooking gains (calcul (69)m= 37.87 37.87 Pumps and fans gain (70)m= 3 3 Losses e.g. evaporat (71)m= -118.93 -118.93	lculation Table 5 Mar 148.66 ated in Ap 22.53 culated in A 37.87 s (Table 5 3 ion (nega 18.93 Table 5)	of (65)m 5 and 5a tts Apr 148.66 Dependix 17.06 Appendix 324.67 Dependix 37.87 5a) 3 tive valu	only if construction is seen and seen a	Jun 148.66 ion L9 o 10.77 uation L 277.01 tion L15 37.87	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 See Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87	Nov 148.66 30.08 311.13	Dec 148.66 32.06 334.23 37.87	neating	(66) (67) (68) (69) (70)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.28 Cooking gains (calcul (69)m= 37.87 37.87 Pumps and fans gain (70)m= 3 3 Losses e.g. evaporat (71)m= -118.93 -118.93 Water heating gains	lculation Table 5 Mar 148.66 Ated in Ap 22.53 Culated ir 344.14 Ated in A 37.87 s (Table 5 3 ion (nega 3 -118.93 (Table 5) 124.6	of (65)m 5 and 5a ts Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 3 tive valu -118.93	only if co 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 of 10.77 uation L 277.01 tion L15 37.87 3 ble 5) -118.93	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 See Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87 3 -118.93	Nov 148.66 30.08 311.13 37.87 3	Dec 148.66 32.06 334.23 37.87 3	neating	(66) (67) (68) (69) (70)
include (57)m in ca 5. Internal gains (56) Metabolic gains (Tab Jan Feb (66)m= 148.66 148.66 Lighting gains (calcul (67)m= 31.2 27.71 Appliances gains (ca (68)m= 349.65 353.28 Cooking gains (calcul (69)m= 37.87 37.87 Pumps and fans gain (70)m= 3 3 Losses e.g. evaporat (71)m= -118.93 -118.93 Water heating gains (72)m= 132.05 129.63	Culation Culation Culation Culation Culation Culated in April Culated in Ap	of (65)m 5 and 5a ts Apr 148.66 ppendix 17.06 Appendix 324.67 ppendix 37.87 5a) 3 tive valu -118.93	only if co 148.66 L, equat 12.75 dix L, eq 300.1 L, equat 37.87	Jun 148.66 ion L9 of 10.77 uation L 277.01 tion L15 37.87 3 ble 5) -118.93	Jul 148.66 r L9a), a 11.63 13 or L1 261.58 or L15a) 37.87	Aug 148.66 Iso see 15.12 3a), also 257.95), also se 37.87	Sep 148.66 Table 5 20.3 See Ta 267.1 ee Table 37.87	Oct 148.66 25.77 ble 5 286.56 5 37.87 3 -118.93	Nov 148.66 30.08 311.13 37.87 3	Dec 148.66 32.06 334.23 37.87 3	neating	(66) (67) (68) (69) (70)

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



Orientat	tion:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
North	0.9x	0.77	x	20.43	x	10.63	x	0.63	x	0.7	=	66.39	(74)
North	0.9x	0.77	x	20.43	x	20.32	x	0.63	x	0.7] =	126.88	(74)
North	0.9x	0.77	x	20.43	x	34.53	×	0.63	x	0.7] =	215.6	(74)
North	0.9x	0.77	x	20.43	x	55.46	x	0.63	x	0.7] =	346.3	(74)
North	0.9x	0.77	х	20.43	x	74.72	x	0.63	x	0.7] =	466.5	(74)
North	0.9x	0.77	x	20.43	x	79.99	x	0.63	x	0.7	=	499.4	(74)
North	0.9x	0.77	x	20.43	x	74.68	x	0.63	x	0.7	=	466.26	(74)
North	0.9x	0.77	x	20.43	x	59.25	x	0.63	x	0.7	=	369.91	(74)
North	0.9x	0.77	x	20.43	x	41.52	x	0.63	x	0.7	=	259.22	(74)
North	0.9x	0.77	x	20.43	x	24.19	x	0.63	x	0.7	=	151.03	(74)
North	0.9x	0.77	x	20.43	X	13.12	X	0.63	x	0.7	=	81.9	(74)
North	0.9x	0.77	x	20.43	x	8.86	x	0.63	x	0.7] =	55.35	(74)
East	0.9x	0.77	x	2	X	19.64	X	0.63	x	0.7	=	12	(76)
East	0.9x	0.77	x	2	X	38.42	X	0.63	x	0.7	=	23.48	(76)
East	0.9x	0.77	x	2	x	63.27	X	0.63	x	0.7	=	38.67	(76)
East	0.9x	0.77	x	2	X	92.28	Х	0.63	X	0.7	=	56.4	(76)
East	0.9x	0.77	x	2	х	113.09	x	0.63	x	0.7	=	69.13	(76)
East	0.9x	0.77	x	2	х	115.77	x	0.63	x	0.7	=	70.76	(76)
East	0.9x	0.77	x	2	x	110.22	x	0.63	x	0.7	=	67.37	(76)
East	0.9x	0.77	x	2	x	94.68	х	0.63	x	0.7	=	57.87	(76)
East	0.9x	0.77	x	2	x	73.59	х	0.63	x	0.7	=	44.98	(76)
East	0.9x	0.77	x	2	х	45.59	X	0.63	x	0.7	=	27.87	(76)
East	0.9x	0.77	x	2	X	24.49	X	0.63	x	0.7	=	14.97	(76)
East	0.9x	0.77	x	2	X	16.15	x	0.63	x	0.7	=	9.87	(76)
South	0.9x	0.77	x	8.75	X	46.75	x	0.63	x	0.7	=	125.02	(78)
South	0.9x	0.77	x	8.75	X	76.57	X	0.63	x	0.7] =	204.75	(78)
South	0.9x	0.77	x	8.75	X	97.53	X	0.63	x	0.7	=	260.82	(78)
South	0.9x	0.77	X	8.75	X	110.23	X	0.63	X	0.7	=	294.78	(78)
South	0.9x	0.77	x	8.75	X	114.87	X	0.63	X	0.7	=	307.18	(78)
South	0.9x	0.77	x	8.75	X	110.55	X	0.63	X	0.7	=	295.62	(78)
South	0.9x	0.77	x	8.75	X	108.01	x	0.63	X	0.7	=	288.84	(78)
South	0.9x	0.77	x	8.75	X	104.89	X	0.63	X	0.7	=	280.5	(78)
South	0.9x	0.77	X	8.75	X	101.89	X	0.63	X	0.7	=	272.45	(78)
South	0.9x	0.77	X	8.75	X	82.59	X	0.63	X	0.7	=	220.84	(78)
South	0.9x	0.77	x	8.75	x	55.42	X	0.63	x	0.7	=	148.19	(78)
South	0.9x	0.77	X	8.75	x	40.4	x	0.63	x	0.7	=	108.03	(78)
West	0.9x	0.77	x	6.6	x	19.64	x	0.63	x	0.7	=	39.62	(80)
West	0.9x	0.77	x	6.6	x	38.42	x	0.63	x	0.7	=	77.5	(80)
West	0.9x	0.77	x	6.6	X	63.27	X	0.63	X	0.7	=	127.62	(80)



_				_									
West 0.9x	0.77	X	6.6	X	9	2.28	X	0.63	X	0.7	=	186.13	(80)
West 0.9x	0.77	X	6.6	X	1′	13.09	X	0.63	X	0.7	=	228.11	(80)
West 0.9x	0.77	X	6.6	X	11	15.77	X	0.63	X	0.7	=	233.51	(80)
West 0.9x	0.77	X	6.6	X	1′	10.22	X	0.63	X	0.7	=	222.32	(80)
West 0.9x	0.77	X	6.6	X	9	4.68	x	0.63	X	0.7	=	190.97	(80)
West 0.9x	0.77	x	6.6	x	7	3.59	x	0.63	X	0.7	=	148.43	(80)
West 0.9x	0.77	x	6.6	X	4	5.59	x	0.63	x	0.7	=	91.96	(80)
West 0.9x	0.77	x	6.6	x	2	4.49	x	0.63	X	0.7	=	49.4	(80)
West 0.9x	0.77	x	6.6	x	1	6.15	x	0.63	X	0.7	=	32.58	(80)
Rooflights 0.9x	1	x	0.76	x	2	5.93	x	0.63	x	0.7	=	7.87	(82)
Rooflights 0.9x	1	×	0.76	Ī×	5	1.88	x	0.63	×	0.7		15.74	(82)
Rooflights 0.9x	1	x	0.76	= x	8	8.38	x	0.63	×	0.7		26.81	(82)
Rooflights 0.9x	1	x	0.76	= x	13	33.65	x	0.63	X	0.7		40.55	(82)
Rooflights 0.9x	1	x	0.76	= x	1	68.1	X	0.63	×	0.7	=	51	(82)
Rooflights 0.9x	1	x	0.76	= x		174	x	0.63	×	0.7	=	52.79	(82)
Rooflights 0.9x	1	x	0.76	Ī×	16	64.87	x	0.63	×	0.7	=	50.02	(82)
Rooflights 0.9x	1	x	0.76	= x	13	38.72	X	0.63	×	0.7	=	42.09	(82)
Rooflights 0.9x	1	x	0.76	×	10	04.33	Х	0.63	Х	0.7	=	31.65	(82)
Rooflights 0.9x	1	×	0.76	= x	6	2.32	х	0.63	х	0.7	=	18.91	(82)
Rooflights 0.9x	1	X	0.76	x	3	2.54	x	0.63	х	0.7	=	9.87	(82)
Rooflights 0.9x	1	x	0.76	j×	2	1.19	x	0.63	X	0.7	=	6.43	(82)
_		Π											
Solar gains in	watts, calcu	ulated	for each mo	nth			(83)m	= Sum(74)m .	(82)m				
(83)m= 250.9	448.35 66	69.53	924.17 1121	.92	1152.09	1094.79	941	.34 756.73	510.6	304.33	212.26		(83)
Total gains – ir	nternal and	solar	(84)m = (73)	m +	(83)m	, watts	-						
(84)m= 834.4	1029.57 12	231.4	1454.27 161	3.7	1617.54	1540.38	1393	3.59 1225.72	1011.6	842.2	778.79		(84)
7. Mean inter	nal temper	ature ((heating sea	son)									
Temperature	during hea	iting p	eriods in the	livin	g area f	rom Tab	ole 9,	Th1 (°C)				21	(85)
Utilisation fac	tor for gain	s for l	iving area, h	1,m (see Ta	ble 9a)							
Jan	Feb	Mar	Apr M	ay	Jun	Jul	A	ug Sep	Oct	Nov	Dec		
(86)m= 1	1 (0.99	0.97 0.9)	0.74	0.57	0.6	0.89	0.99	1	1		(86)
Mean internal	temperatu	ıre in I	iving area T	(fol	low ste	ps 3 to 7	in T	able 9c)				-	
(87)m= 19.59	· ·	20.04	20.42 20.	Ť	20.94	20.99	20.		20.39	19.92	19.56		(87)
Temperature	during hea	itina n	eriods in res	of d	welling	from Ta	hle (Th2 (°C)		<u>'</u>		1	
(88)m= 19.93		9.94	19.95 19.9	$\overline{}$	19.96	19.96	19.		19.95	19.95	19.94		(88)
` '			ļ .							1	<u> </u>	I	. ,
Utilisation fac		0.99	0.96 0.8	- -	2,m (se _{0.64}	e Table 0.44	9a) 0.5	1 0.83	0.98	1	1]	(89)
			ļ.					<u> </u>		1 '		1	(55)
Mean internal				-	<u> </u>		i 			140.50	1,000	1	(00)
(90)m= 18.04	18.29	18.7	19.26 19.	/	19.92	19.95	19.		19.22		18.01		(90)
								T	LA = LI\	ving area ÷ (4) =	0.14	(91)
Mean internal	temperati	ıra (fa	r the whole o	اامس	ina) – fl	Δ ∨ T1	⊥ /1	_ fl Δ\ v T2					

Mean internal temperature (for the whole dwelling) = $fLA \times T1 + (1 - fLA) \times T2$



(92)m= 18.25	18.49	18.89	19.42	19.84	20.06	20.1	20.09	19.95	19.38	18.73	18.22		(92)
Apply adjustn	nent to t	he mean	interna	tempera	ature fro	m Table	4e, whe	ere appro	priate	<u>!</u>			
(93)m= 18.25	18.49	18.89	19.42	19.84	20.06	20.1	20.09	19.95	19.38	18.73	18.22		(93)
8. Space hea	ting requ	uirement											
Set Ti to the i	mean int	ernal ter	mperatu	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	culate	
the utilisation	factor fo	or gains	using Ta	ble 9a								•	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	tor for g	ains, hm	1:										
(94)m= 1	1	0.99	0.95	0.85	0.65	0.46	0.53	0.83	0.98	1	1		(94)
Useful gains,	hmGm	W = (94)	4)m x (8	4)m									
(95)m= 833.17	1025.22	1214.91	1383.53	1374.85	1057.51	708.12	738.72	1012	986.68	839.26	777.97		(95)
Monthly average	age exte	rnal tem	perature	from Ta	able 8								
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate	for me	an intern	al tempe	erature, l	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 2945.43	2862.42	2602.23	2182.61	1686.34	1118.09	716.39	754.97	1203.08	1818.79	2418.41	2930.94		(97)
Space heatin	g require	ement fo	r each n	nonth, k\	Wh/mon	th = 0.02	24 x [(97))m – (95)m] x (4	1)m			
(98)m= 1571.53	1234.59	1032.16	575.34	231.75	0	0	0	0	619.09	1136.99	1601.81		
		-	-			-	Tota	l per year	(kWh/yeaı) = Sum(9	8) _{15,912} =	8003.27	(98)
Space heatin	a require	ement in	kWh/m²	/vear								44.95	(99)
								YUD)	_				
9a. Energy rec		its – Indi	ividuai n	eating sy	/stems I	ncluding	micro-C	HP)	-			_	
Space heating Fraction of sp	_	et from s	econdar	v/supple	montary	evetem						0	(201)
					mentary		(202)	(204)				0	╡゛
Fraction of sp				7.1			(202) = 1 -					1	(202)
Fraction of to	tal heati	ng from	main sys	stem 1			(204) = (204)	02) × [1 –	(203)] =			1	(204)
Efficiency of I	main spa	ace heat	ing s <mark>yste</mark>	em 1								93.5	(206)
Efficiency of	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	— ear
Space heatin						<u> </u>	7.09	ООР		1101		1	, ca.
		1032.16		231.75	0	0	0	0	619.09	1136.99	1601.81		
			<u> </u>							<u> </u>			(211)
(211) m = {[(98) 78]	<u>`</u>	1103.92	<u>`</u>	247.86	0	0	0	0	662.13	1216.03	1713.17	1	(211)
1000.70	1320.42	1103.92	013.54	247.00	0			l (kWh/yea				0550.04	(211)
							7010	ii (ikwiii) you	ar) =0arri(2	- ' '/15,1012	2	8559.64	(211)
Space heatin	•		• /	month									
$=\{[(98)m \times (200)](215)m=0\}$	0 0 0 1	00 ÷ (20	0	0	0	0	0	0	0	0	0	I	
(215)m= 0	0	0	0	U	0		-	l (kWh/yea	-	_			7(045)
							Tota	ii (KVVII/yea	ar) =3urri(2	213) _{15,1012}	<u>-</u>	0	(215)
Water heating													
Output from w	ater hea 196.28	206.06	ulated a 184.61	180.83	161.47	154.97	170.2	169.94	191.44	202.56	217.33	1	
			104.01	100.03	101.47	154.97	170.2	109.94	191.44	202.30	217.55	70.0	7(246)
Efficiency of w			0= :=	0.5 /-							00.7=	79.8	(216)
(217)m= 89.02	88.87	88.52	87.65	85.48	79.8	79.8	79.8	79.8	87.72	88.7	89.07		(217)
Fuel for water	•												
(219)m = (64) (219)m = 250.2	M X 100 220.87	232.77	m 210.63	211.56	202.34	194.2	213.28	212.96	218.23	228.36	243.99		
200.2	220.01	202.11	210.00	211.00	202.07	107.2	l	I = Sum(2		220.00	2-0.00	2620.20	7(240)
							i ola	. – Guiii(2	10a) ₁₁₂ =			2639.39	(219)



Annual totals		kWh/year		kWh/year	,
Space heating fuel used, main system 1				8559.64	
Water heating fuel used				2639.39	
Electricity for pumps, fans and electric keep-hot					
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				550.94	(232)
Total delivered energy for all uses (211)(221) + (231) + (232)(237b) =				11824.98	(338)
12a. CO2 emissions – Individual heating systems including micro-CHP					
	Energy kWh/year	Emission factor kg CO2/kWh		Emissions kg CO2/year	
Space heating (main system 1)	(211) x	0.216	=	1848.88	(261)
Space heating (secondary)	(215) x	0.519	=	0	(263)
Water heating	(219) x	0.216	=	570.11	(264)
Space and water heating	(261) + (262) + (263) + (264) =			2418.99	(265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519	=	38.93	(267)
Electricity for lighting	(232) x	0.519	-	285.94	(268)
Total CO2, kg/year TER =	sum	n of (265)(271) =		2743.85	(272)