Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.58 Printed on 29 November 2022 at 15:09:44

Proiect Information:

Assessed By: Liam Mason (STRO033679) Building Type: Semi-detached House

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 72.5m²

Site Reference: Bell Road, Bottisham

Plot Reference: Plot 18

Address: Plot 18

Client Details:

Name: Address :

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 18.2 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 8.71 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 47.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 43.4 kWh/m²

OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.19 (max. 0.30)	0.19 (max. 0.70)	OK
Party wall	0.00 (max. 0.20)	-	OK
Floor	0.11 (max. 0.25)	0.11 (max. 0.70)	OK
Roof	0.11 (max. 0.20)	0.11 (max. 0.35)	OK
Openings	1.36 (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: Database: (rev 508, product index 016841):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Vaillant Model: ecoTEC plus 824

Model qualifier: VUW GB 246/5-5

(Combi)

Efficiency 89.1 % SEDBUK2009

Minimum 88.0 % OK

Secondary heating system: None

Regulations Compliance Report

Hot water Storage:	No cylinder		
ontrols	140 cylinaci		
Space heating controls	Programmer, room therm	ostat and TRVs	OŁ
Hot water controls:	No cylinder thermostat No cylinder	ootat ana 11770	0.
Boiler interlock:	Yes		OF
ow energy lights			
Percentage of fixed lights with lo	ow-energy fittings	100.0%	
Minimum		75.0%	Ok
echanical ventilation			
Not applicable			
ummertime temperature			
Overheating risk (East Anglia):		Slight	OŁ
ed on:			
Overshading:		Average or unknown	
Windows facing: North		1.17m²	
Windows facing: North		1.12m²	
Windows facing: West		0.39m²	
Windows facing: South		2.98m²	
Windows facing: West		0.39m²	
Windows facing: South		1.14m²	
Windows facing: South		1.25m²	
Ventilation rate:		3.00	
Blinds/curtains:		Dark-coloured curtain or roller blind	
		Closed 100% of daylight hours	
			_
Key features			
Roofs U-value		0.11 W/m²K	
Party Walls U-value		0 W/m²K	

0.11 W/m²K

Floors U-value

Photovoltaic array

Predicted Energy Assessment



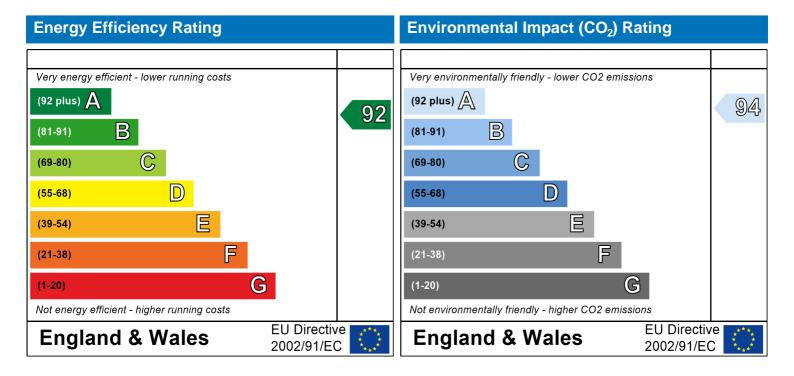
Plot 18

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

Semi-detached House 03 November 2022 Liam Mason 72.5 m²

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

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



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

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

SAP Input

Address: Plot 18 Located in: **England** Region: East Anglia

UPRN:

03 November 2022 Date of assessment: 29 November 2022 Date of certificate: New dwelling design stage Assessment type:

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

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

508 PCDF Version:

Dwelling type: House

Semi-detached Detachment: 2022 Year Completed:

Floor Location: Floor area:

36.25 m² 2.4 m Floor 0 Floor 1 36.25 m² 2.4 m

12.61 m² (fraction 0.174) Living area:

Front of dwelling faces: North

W_7

- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1					
Name:	Source:	Type:	Glazing:	Argon:	Frame:
D_1	Manufacturer	Solid			
W_1	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	
W_2	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	
W_3	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	
W_4	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	
W_5	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	
W_6	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	
W_7	Manufacturer	Windows	low-E, $En = 0.05$, soft coat	Yes	

Storey height:

1.4

1.25

1

Name:	Gap:	Frame F	actor: g-value:	U-value:	Area:	No. of Openings:
D_1	mm	0	0	1.2	1.83	1
W_1	16mm or more	0.7	0.63	1.4	1.17	1
W_2	16mm or more	0.7	0.63	1.4	1.12	1
W_3	16mm or more	0.7	0.63	1.4	0.39	1
W_4	16mm or more	0.7	0.63	1.4	2.98	1
W_5	16mm or more	0.7	0.63	1.4	0.39	1
W_6	16mm or more	0.7	0.63	1.4	1.14	1

0.63

0.7

Name:	Type-Name:	Location:	Orient:	Width:	Height:
D_1	Doors	Wall 1	North	1.83	1
W_1	Windows	Wall 1	North	1.17	1
W_2	Windows	Wall 1	North	1.12	1
W_3	Windows	Wall 1	West	0.39	1
W_4	Windows	Wall 1	South	2.98	1
W_5	Windows	Wall 1	West	0.39	1
W_6	Windows	Wall 1	South	1.14	1
W_7	Windows	Wall 1	South	1.25	1

16mm or more

SAP Input

Overshading: Average or unknown

Opaque Liement	5.						
Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Карра:
External Elemen		10.07	70.75	0.40	•	- I	21/2
Wall 1	84.02	10.27	73.75	0.19	0	False	N/A
Roof 1	36.25	0	36.25	0.11	0		N/A
Floor 1	36.25			0.11			N/A
Internal Element	<u>ts</u>						
INT FLOOR	36.25						N/A
Party Elements							
Party Wall	39.42						N/A

Thermal bridges:

Thermal bridges: User-defined (individual PSI-values) Y-Value = 0.0885

Lanath	Doi volue	• • • • • • • • • • • • • • • • • • • •	
Length	Psi-value		0 16 ()
17.06	0.16	E5	Ground floor (normal)
17.06	0.07	E6	Intermediate floor within a dwelling
9.85	0.09	E16	Corner (normal)
8	0.3	E2	Other lintels (including other steel lintels)
7.07	0.04	E3	Sill
17.4	0.05	E4	Jamb
9.06	0.06	E10	Eaves (insulation at ceiling level)
11.29	0.24	E12	Gable (insulation at ceiling level)
9.85	0.06	E18	Party wall between dwellings
0	0.3	E2	
0	0.04	E3	
0	0.05	E4	
0	0.16	E5	
0	0.07	E6	
0	0.06	E10	
0	0.24	E12	
0	0.09	E16	
0	-0.09	E17	
0	0.06	E18	
8	0.16	P1	Ground floor
8	0	P2	Intermediate floor within a dwelling
0	0.16	P1	
0	0	P2	
4.53	0.08	R4	Ridge (vaulted ceiling)
0	0.08	R4	

Ventilation:

Pressure test: Yes (As designed)

Ventilation: Natural ventilation (extract fans)

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

Main heating system:

Main heating system: Boiler systems with radiators or underfloor heating

Gas boilers and oil boilers

Fuel: mains gas

Info Source: Boiler Database

SAP Input

Database: (rev 508, product index 016841) Efficiency: Winter 87.0 % Summer: 90.0

Brand name: Vaillant Model: ecoTEC plus 824

Model qualifier: VUW GB 246/5-5

(Combi boiler)

Systems with radiators

Central heating pump: 2013 or later

Design flow temperature: Design flow temperature<=45°C

Unknown

Boiler interlock: Yes Delayed start

Main heating Control:

Main heating Control: Programmer, room thermostat and TRVs

Control code: 2106

Secondary heating system:

Secondary heating system: None

Water heating

Water heating: From main heating system

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

Others:

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

Low energy lights: 100%

Terrain type: Low rise urban / suburban

EPC language: English Wind turbine: No

Photovoltaics: Photovoltaic 1

Installed Peak power: 1.5 Tilt of collector: 45°

Overshading: None or very little Collector Orientation: South

Assess Zero Carbon Home: No

		Į	Jser Deta	ls:				
Assessor Name:	Liam Mason		St	oma Nui	mber:	STRO	033679	
Software Name:	Stroma FSAP 201	12	So	ftware V	ersion:	Versio	n: 1.0.5.58	
		Pro	perty Ado	ress: Plot 1	8			
Address :	Plot 18							
1. Overall dwelling dimen	sions:							
			Area(m	·)	Av. Heig	ht(m)	Volume(m	³)
Ground floor			36.25	(1a) x	2.4	(2a) =	87	(3a)
First floor			36.25	(1b) x	2.4	(2b) =	87	(3b)
Total floor area TFA = (1a)	+(1b)+(1c)+(1d)+(1e	e)+(1n)	72.5	(4)				
Dwelling volume				(3a)+(3	3b)+(3c)+(3d)+	(3e)+(3n) =	174	(5)
2. Ventilation rate:								
		econdary neating	oth	er	total		m³ per hou	ır
Number of chimneys	0 +	0	+	=	0	x 40 =	0	(6a)
Number of open flues	0 +	0	+	=	0	x 20 =	0	(6b)
Number of intermittent fans	s			<u></u>	2	x 10 =	20	(7a)
Number of passive vents					0	x 10 =	0	(7b)
Number of flueless gas fire	es				0	x 40 =	0	(7c)
							anges per h	_
Infiltration due to chimneys If a pressurisation test has been	•				20 from (9) to (16	÷ (5) =	0.11	(8)
Number of storeys in the		eu, proceeu i	O (17), Oli 16	wise continue	110111 (9) 10 (10) 	0	(9)
Additional infiltration	arronning (110)					[(9)-1]x0.1 =	0	(10)
Structural infiltration: 0.2	5 for steel or timber	frame or 0	35 for ma	sonry cons	struction	[(0) :]	0	(11)
if both types of wall are pre-	sent, use the value corres			,	a de la constant		0	(/
If suspended wooden flo		led) or 0.1	(sealed),	else enter)		0	(12)
If no draught lobby, ente	r 0.05, else enter 0						0	(13)
Percentage of windows		tripped					0	(14)
Window infiltration			0.25	- [0.2 x (14) -	- 100] =		0	(15)
Infiltration rate			(8)	(10) + (11) +	(12) + (13) + (15) =	0	(16)
Air permeability value, q	50. expressed in cub	oic metres	per hour	er square	metre of env	elope area	5	(17)
If based on air permeability	•		•				0.36	(18)
Air permeability value applies	if a pressurisation test ha	s been done (or a degree	air permeabili	ty is being used	d		
Number of sides sheltered							2	(19)
Shelter factor			(20)	= 1 - [0.075 x	(19)] =		0.85	(20)
Infiltration rate incorporating	g shelter factor		(21)	= (18) x (20)	=		0.31	(21)
Infiltration rate modified for	monthly wind speed	d .					•	
Jan Feb N	Mar Apr May	Jun	Jul	ug Ser	Oct	Nov Dec		
Monthly average wind spe-	ed from Table 7							

4.3

3.8

3.8

3.7

4.3

4.5

4.7

Wind Factor (2	22a)m =	(22)m ∸	4										
(22a)m= 1.27	1.25	1.23	1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18]	
Adjusted infiltr	ation rate	e (allowi	na for sh	nelter an	d wind s	:need) -	(21a) y	(22a)m	!		!	•	
0.4	0.39	0.38	0.34	0.33	0.29	0.29	0.29	0.31	0.33	0.35	0.36]	
Calculate effe		_	rate for t	he appli	cable ca	se	<u> </u>	<u> </u>	<u> </u>		<u> </u>	J	
If mechanica			andis N. (O	2h) (22a	.) (accetion (N	\ F\\	muiaa (22h	·) (22a)			0	(23a)
If exhaust air h)) = (23a)			0	(23b)
		-	-	_					Oh)m ı ((22h) [1 (22a)	0	(23c)
a) If balance (24a)m= 0	o mecha	o o	ntilation	with nea	at recove		$\frac{HR}{0}$ (248	$\frac{a)m = (2a)}{a}$	26)m + (0	$\frac{(230) \times [}{0}$	$\frac{1 - (230)}{0}$	1 ÷ 100]	(24a)
b) If balance		_										J	(244)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole h		,	,	,	<u> </u>							J	(= :)
,	n < 0.5 x			•	•				.5 × (23k	o)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural if (22b)n	ventilation								0.5]	•	•	•	
(24d)m= 0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(24d)
Effective air	change	rate - er	iter (24a	or (24b	o) or (24	c) or (24	d) in bo	x (25)				•	
(25)m= 0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(25)
3. Heat losse	s and he	at loss p	paramete	er:									
ELEMENT	Gros	·	Openin		NIat A.								
	area	_	m	-	Net Ar A ,r		U-val W/m2		A X U (W/		k-value kJ/m²·l		A X k kJ/K
Doors		_	•	-		m²				K)			
Doors Windows Type	area	_	•	-	A ,r	m² x	W/m2	2K =	(W/	K)			kJ/K
	area	_	•	-	A ,r	m ² x x 10	W/m2	2K = - 0.04] =	(W/ 2.196	K)			kJ/K (26)
Windows Type	area e 1 e 2	_	•	-	A ,r	m ² x x10 x10	W/m2 1.2 /[1/(1.4)+	2K = 0.04 = 0.04 =	(W/ 2.196 1.55	K)			kJ/K (26) (27)
Windows Type	area	_	•	-	A ,r 1.83 1.17	x1. x1. x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+	$ \begin{array}{ccc} 2K & = & \\ -0.04] & = & \\ -0.04] & = & \\ -0.04] & = & \\ \end{array} $	(W/ 2.196 1.55 1.48	K)			kJ/K (26) (27) (27)
Windows Type Windows Type Windows Type	area	_	•	-	A ,r 1.83 1.17 1.12 0.39	x1. x1. x1. x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	$\begin{array}{ccc} 2K & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$	(W/ 2.196 1.55 1.48 0.52	K)			kJ/K (26) (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type	area	_	•	-	A ,r 1.83 1.17 1.12 0.39 2.98	x1. x1. x1. x1. x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = - 0.04] =	(W/ 2.196 1.55 1.48 0.52 3.95	K)			kJ/K (26) (27) (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type	area 1 2 3 4 4 5 6 6	_	•	-	A ,r 1.83 1.17 1.12 0.39 2.98 0.39	x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04 =	(W/ 2.196 1.55 1.48 0.52 3.95 0.52	K)			kJ/K (26) (27) (27) (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type Windows Type Windows Type	area 1 2 3 4 4 5 6 6	_	•	-	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14	x1. x1. x1. x1. x1. x1. x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04 =	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51	K) 			kJ/K (26) (27) (27) (27) (27) (27)
Windows Type	area 1 2 3 4 4 5 6 6	(m²)	•	2	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14 1.25	x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04] = 0	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51 1.66	K) 			kJ/K (26) (27) (27) (27) (27) (27) (27) (27)
Windows Type Windows Type Windows Type Windows Type Windows Type Windows Type Windows Type Floor	area 1 2 2 3 4 4 5 5 6 6 7	(m²)	m	2	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14 1.25 36.28	x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+	EK = 0.04 =	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51 1.66 3.9875	K) 			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28)
Windows Type	area area 1 2 3 4 5 6 7 84.0 36.2	(m²) 2 5	10.22	2	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14 1.25 36.25 73.75 36.25	x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.11 0.19	EK = 0.04 =	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51 1.66 3.9875	K) 			kJ/K (26) (27) (27) (27) (27) (27) (27) (27) (28) (29)
Windows Type Roof	area area 1 2 3 4 5 6 7 84.0 36.2	(m²) 2 5	10.22	2	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14 1.25 36.25 73.75 156.5	x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.11 0.19 0.11	EK = 0.04 =	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51 1.66 3.9875 14.01 3.99	K) 			kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (30) (31)
Windows Type Floor Walls Roof Total area of e	area area 1 2 3 4 5 6 7 84.0 36.2	(m²) 2 5	10.22	2	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14 1.25 36.25 73.75 36.25 156.5	x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.11 0.19	2K = 0.04 =	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51 1.66 3.9875	K) 			kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
Windows Type Tloor Walls Roof Total area of e Party wall	area 2 1 2 2 3 3 4 4 5 5 6 6 7 84.0 36.2 elements	(m²) 2 5 , m²	10.22	7 7 ndow U-ve	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14 1.25 36.25 73.75 36.25 39.42 36.25 alue calcul	x1. x1. x1. x1. x1. x1. x2. x2. x x2. x x2. x x3. x x3	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.11 0.19 0.11	EK =	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51 1.66 3.9875 14.01 3.99	K)	kJ/m²-l	k 	kJ/K (26) (27) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
Windows Type Tloor Walls Roof Total area of e Party wall Internal floor * for windows and	area area	(m²) 2 5 , m² ows, use e sides of in	10.23 0	7 7 ndow U-ve	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14 1.25 36.25 73.75 36.25 39.42 36.25 alue calcul	x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.11 0.19 0.11	2K = 0.04 =	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51 1.66 3.9875 14.01 3.99	K)	kJ/m²-l	k 	kJ/K (26) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32)
Windows Type Tloor Walls Roof Total area of e Party wall Internal floor * for windows and ** include the area	area area	(m²) 2 5 , m² ows, use e sides of in = S (A x	10.23 0	7 7 ndow U-ve	A ,r 1.83 1.17 1.12 0.39 2.98 0.39 1.14 1.25 36.25 73.75 36.25 39.42 36.25 alue calcul	x1.	W/m2 1.2 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.11 0.19 0 formula 1	2K = 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04] = 0.04[= 0.04[= 0.04] = 0.04[= 0.04[= 0.04] = 0.04[= 0.04[= 0.04] = 0.04[= 0.04[= 0.04[= 0.04] = 0.04[= 0	(W/ 2.196 1.55 1.48 0.52 3.95 0.52 1.51 1.66 3.9875 14.01 3.99	K)	kJ/m²•l	K	kJ/K (26) (27) (27) (27) (27) (27) (28) (29) (30) (31) (32) (32d)
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Г	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
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∟ eat trai	nsfer c	oefficier	nt. W/K		ļ.	ļ.	ļ.		(39)m	= (37) + (3	38)m			
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umber	of day	s in mor	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.12	(4
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if TFA nnual a educe the at more to	£ 13.9 average e annua hat 125 Jan usage ir	e hot wa I average litres per p Feb	hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month	es per da 5% if the d vater use, l May Vd,m = fa	ay Vd,av Iwelling is thot and co Jun ctor from	erage = designed ld) Jul Table 1c x	(25 x N) to achieve Aug	+ 36 a water us Sep	ce target o	Nov	Dec		(
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Energy lost from water s	storage, kWh	/year			(47) x (51) x (52) x (53) =		0		(54)
Enter (50) or (54) in (55	5)								0		(55)
Water storage loss calc	ulated for ea	ch month			((56)m = ($(55) \times (41)$ r	m				
(56)m= 0 0	0 0	0	0	0	0	0	0	0	0		(56)
If cylinder contains dedicated	solar storage, (57)m = (56)m	x [(50) – ((H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0 0	0 0	0	0	0	0	0	0	0	0		(57)
Primary circuit loss (ann	nual) from Ta	ble 3							0		(58)
Primary circuit loss calc	ulated for ea	ch month ((59)m =	(58) ÷ 36	65 × (41)	m					
(modified by factor fro	om Table H5	if there is	solar wa	ter heati	ng and a	cylinde	r thermo	stat)	_		
(59)m= 0 0	0 0	0	0	0	0	0	0	0	0		(59)
Combi loss calculated for	or each mon	h (61)m =	(60) ÷ 3	65 × (41)m						
(61)m= 25.82 23.29	25.75 24.8	7 25.67	24.8	25.6	25.64	24.84	25.72	24.94	25.8		(61)
Total heat required for v	water heating	calculated	d for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 170.92 150.2	156.7 139.0	4 135.22	119.33	113.2	126.17	126.56	144.26	154.34	166.33		(62)
Solar DHW input calculated u	sing Appendix (or Appendix	к Н (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additional lines if F	GHRS and/o	r WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0 0	0 0	0	0	0	0	0	0	0	0		(63)
Output from water heate	er	-	-	-	-	-		-	-	•	
(64)m= 170.92 150.2	156.7 139.0	4 135.22	119.33	113.2	126.17	126.56	144.26	154.34	166.33		
	•	•		•	Outp	out from wa	ater heate	r (annual)₁	12	1702.27	(64)
Heat gains from water h	neating, kWh	month 0.2	5 ′ [0.85	× (45)m	+ (61)m	n]	r [(46)m	+ (57)m	+ (59)m	1	
				~ (10)11	(<i>0 i j</i> ii	1] 1 0.0 /	· [(+0)111	· (01)	1 (00)111]	
(65)m= 54.7 48.02	49.98 44.1		37.63	35.53	39.83	40.03	45.85	49.26	53.17] 	(65)
(65)m= 54.7 48.02 include (57)m in calcu	ļ ļ	3 42.84	37.63	35.53	39.83	40.03	45.85	49.26	53.17		(65)
	ulation of (65	42.84 m only if o	37.63	35.53	39.83	40.03	45.85	49.26	53.17		(65)
include (57)m in calcu 5. Internal gains (see	ulation of (65 Table 5 and	42.84 m only if o	37.63	35.53	39.83	40.03	45.85	49.26	53.17		(65)
include (57)m in calcu	ulation of (65 Table 5 and	42.84 Im only if o	37.63	35.53	39.83	40.03	45.85	49.26	53.17		(65)
include (57)m in calcute. 5. Internal gains (see Metabolic gains (Table)	ulation of (65 Table 5 and 5), Watts	42.84 mm only if contains the second of the	37.63 cylinder i	35.53 s in the o	39.83 dwelling	40.03 or hot w	45.85 ater is fr	49.26 om com	53.17 munity h		(65)
include (57)m in calcutations. 5. Internal gains (see Metabolic gains (Table of Samuel Samu	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3	42.84 m only if co. 5a): May 138.32	37.63 cylinder i Jun 138.32	35.53 s in the (39.83 dwelling Aug 138.32	40.03 or hot w Sep 138.32	45.85 ater is fr	49.26 om com	53.17 munity h		
include (57)m in calcu 5. Internal gains (see Metabolic gains (Table Jan Feb	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3	42.84 am only if containing the second secon	37.63 cylinder i Jun 138.32	35.53 s in the (39.83 dwelling Aug 138.32	40.03 or hot w Sep 138.32	45.85 ater is fr	49.26 om com	53.17 munity h		
include (57)m in calculate 5. Internal gains (see Metabolic gains (Table : Jan Feb (66)m= 138.32 138.32 Lighting gains (calculate (67)m= 50.57 44.92	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6	42.84 am only if of 5a): T May 138.32 ax L, equat 6 20.67	37.63 cylinder i Jun 138.32 tion L9 o	35.53 s in the o Jul 138.32 r L9a), a	39.83 dwelling Aug 138.32 lso see 24.51	40.03 or hot w Sep 138.32 Table 5	45.85 ater is fr Oct 138.32 41.78	49.26 om com Nov 138.32	53.17 munity h		(66)
include (57)m in calculate 5. Internal gains (see Metabolic gains (Table : Jan Feb (66)m= 138.32 138.32 Lighting gains (calculate (67)m= 50.57 44.92 Appliances gains (calculate gains gains (calculate gains (calculate gains (calculate gains gains (calculate gains gains (calculate gains gains (calculate gains gain	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append	42.84 m only if contains a second of the conta	Jun 138.32 tion L9 o 17.45 uation L	Jul 138.32 r L9a), a 18.86	39.83 dwelling Aug 138.32 lso see 24.51 3a), also	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal	45.85 ater is fr Oct 138.32 41.78 ble 5	49.26 om com Nov 138.32	53.17 munity h		(66)
include (57)m in calculate 5. Internal gains (see Metabolic gains (Table of Samuel S	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4	42.84 am only if of 5a): T May 138.32 ix L, equal 6 20.67 endix L, equal 2 260.13	Jun 138.32 tion L9 o 17.45 uation L 240.11	35.53 s in the o Jul 138.32 r L9a), a 18.86 13 or L1 226.74	39.83 dwelling Aug 138.32 lso see 24.51 3a), also 223.59	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal 231.52	45.85 ater is fr Oct 138.32 41.78 ble 5 248.39	49.26 om com Nov 138.32	53.17 munity h		(66) (67)
include (57)m in calculate 5. Internal gains (see Metabolic gains (Table of Same of	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append	42.84 m only if one	Jun 138.32 tion L9 o 17.45 uation L 240.11 tion L15	35.53 s in the of Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a	39.83 dwelling 138.32 lso see 24.51 3a), also 223.59	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal 231.52 ee Table	45.85 ater is fr Oct 138.32 41.78 ole 5 248.39 5	49.26 om com Nov 138.32 48.76	53.17 munity h		(66) (67) (68)
include (57)m in calculate 5. Internal gains (see Metabolic gains (Table : Jan Feb (66)m= 138.32 138.32 Lighting gains (calculate (67)m= 50.57 44.92 Appliances gains (calculate (68)m= 303.07 306.22 Cooking gains (calculate (69)m= 51.14 51.14	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1	42.84 m only if one	Jun 138.32 tion L9 o 17.45 uation L 240.11	35.53 s in the o Jul 138.32 r L9a), a 18.86 13 or L1 226.74	39.83 dwelling Aug 138.32 lso see 24.51 3a), also 223.59	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal 231.52	45.85 ater is fr Oct 138.32 41.78 ble 5 248.39	49.26 om com Nov 138.32	53.17 munity h		(66) (67)
include (57)m in calculate 5. Internal gains (see Metabolic gains (Table of Samuel S	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1 (Table 5a)	42.84 am only if one	Jun 138.32 tion L9 o 17.45 uation L 240.11 tion L15 51.14	Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a 51.14	39.83 dwelling 138.32 lso see 24.51 3a), also 223.59), also se 51.14	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal 231.52 ee Table 51.14	45.85 ater is fr Oct 138.32 41.78 ble 5 248.39 5 51.14	49.26 om com Nov 138.32 48.76 269.69	53.17 munity h Dec 138.32 51.98		(66) (67) (68) (69)
include (57)m in calculate 5. Internal gains (see Metabolic gains (Table of Samuel 1988) Jan Feb (66)m= 138.32 138.32 Lighting gains (calculate (67)m= 50.57 44.92 Appliances gains (calculate (68)m= 303.07 306.22 Cooking gains (calculate (69)m= 51.14 51.14 Pumps and fans gains (70)m= 3 3	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1 (Table 5a) 3 3	42.84 am only if of 5a): T May 138.32 ax L, equate 5 20.67 ax L, equate 2 260.13 ax L, equate 4 51.14	Jun 138.32 tion L9 o 17.45 tuation L 240.11 tion L15 51.14	35.53 s in the of Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a	39.83 dwelling 138.32 lso see 24.51 3a), also 223.59	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal 231.52 ee Table	45.85 ater is fr Oct 138.32 41.78 ole 5 248.39 5	49.26 om com Nov 138.32 48.76	53.17 munity h		(66) (67) (68)
include (57)m in calculate (57)m in calculate (57)m in calculate (58)m Metabolic gains (Table 19) Jan Feb (66)m 138.32 138.32 Lighting gains (calculate (67)m 50.57 44.92 Appliances gains (calculate (68)m 303.07 306.22 Cooking gains (calculate (69)m 51.14 51.14 Pumps and fans gains (70)m 3 Losses e.g. evaporation	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1 (Table 5a) 3 3 n (negative value)	42.84 Im only if (5a): T May 138.32 Iix L, equal 20.67 Endix L, equal 21.14 31 Salues) (Tab	Jun 138.32 tion L9 o 17.45 uation L 240.11 tion L15 51.14	35.53 s in the of Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a 51.14	39.83 dwelling 138.32 lso see 24.51 3a), also 223.59), also se 51.14	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal 231.52 ee Table 51.14	45.85 ater is fr Oct 138.32 41.78 ble 5 248.39 5 51.14	49.26 om com Nov 138.32 48.76 269.69	53.17 munity h Dec 138.32 51.98 289.7		(66) (67) (68) (69)
include (57)m in calculate 5. Internal gains (see Metabolic gains (Table and Internal gains) [66)m= 138.32	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1 (Table 5a) 3 3 n (negative value) -92.21 -92.2	42.84 Im only if (5a): T May 138.32 Ix L, equal 20.67 Endix L, equal 21.14 31 Salues) (Tak	Jun 138.32 tion L9 o 17.45 tuation L 240.11 tion L15 51.14	Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a 51.14	39.83 dwelling 138.32 lso see 24.51 3a), also 223.59), also se 51.14	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal 231.52 ee Table 51.14	45.85 ater is fr Oct 138.32 41.78 ble 5 248.39 5 51.14	49.26 om com Nov 138.32 48.76 269.69	53.17 munity h Dec 138.32 51.98		(66) (67) (68) (69)
include (57)m in calculate (58)m= 303.07 306.22 Cooking gains (calculate (69)m= 51.14 51.14 Pumps and fans gains (70)m= 3 3 Losses e.g. evaporation (71)m= -92.21 -92.21 Water heating gains (calculate (57)m= -92.21 -92.21	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1 (Table 5a) 3 3 n (negative value) -92.21 -92.2 able 5)	42.84 m only if of only if only i	Jun 138.32 tion L9 o 17.45 tuation L 240.11 tion L15 51.14 3 ole 5) -92.21	35.53 s in the of Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a) 51.14 3	39.83 dwelling 138.32 lso see 24.51 3a), also 223.59), also se 51.14	40.03 or hot w Sep 138.32 Table 5 32.9 o see Talle 231.52 ee Table 51.14	45.85 ater is fr Oct 138.32 41.78 ole 5 248.39 5 51.14 3	49.26 om com Nov 138.32 48.76 269.69 51.14 3	53.17 munity h Dec 138.32 51.98 289.7 51.14 3		(66) (67) (68) (69) (70) (71)
include (57)m in calculate (58)m= 303.07 306.22 Cooking gains (calculate (69)m= 51.14 51.14 Pumps and fans gains (70)m= 3 3 Losses e.g. evaporation (71)m= -92.21 -92.21 Water heating gains (Talculate (72)m= 73.52 71.46	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1 (Table 5a) 3 3 n (negative value) -92.21 -92.2	42.84 m only if of only if only i	Jun 138.32 tion L9 o 17.45 uation L 240.11 tion L15 51.14 3 ble 5) -92.21	35.53 s in the of Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a 51.14 3 -92.21	39.83 dwelling 138.32 lso see 24.51 3a), also 223.59), also se 51.14 3	40.03 or hot w Sep 138.32 Table 5 32.9 see Tal 231.52 ee Table 51.14 3 -92.21	45.85 ater is fr Oct 138.32 41.78 ble 5 248.39 5 51.14 3 -92.21	49.26 om com Nov 138.32 48.76 269.69 51.14 3 -92.21	53.17 munity h Dec 138.32 51.98 289.7 51.14 3 -92.21		(66) (67) (68) (69)
include (57)m in calculate (58)m= 303.07 306.22 Cooking gains (calculate (69)m= 51.14 51.14 Pumps and fans gains (70)m= 3 3 Losses e.g. evaporation (71)m= -92.21 -92.21 Water heating gains (Talculate (72)m= 73.52 71.46 Total internal gains =	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1 (Table 5a) 3 3 n (negative value) -92.21 -92.2 able 5) 67.18 61.3	42.84 Im only if of the control of	Jun 138.32 tion L9 o 17.45 uation L 240.11 tion L15 51.14 3 ole 5) -92.21	35.53 s in the of Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a) 51.14 3 -92.21 47.75)m + (67)m	39.83 dwelling Aug 138.32 lso see 24.51 3a), also 223.59), also se 51.14 3 -92.21 53.54 1+ (68)m	40.03 or hot w Sep 138.32 Table 5 32.9 o see Tal 231.52 ee Table 51.14 3 -92.21 55.6 + (69)m + (45.85 ater is fr Oct 138.32 41.78 ole 5 248.39 5 51.14 3 -92.21 61.62 70)m + (7	49.26 om com Nov 138.32 48.76 269.69 51.14 3 -92.21 68.42 1)m + (72)	53.17 munity h Dec 138.32 51.98 289.7 51.14 3 -92.21 71.47		(66) (67) (68) (69) (70) (71)
include (57)m in calculate (58)m= 303.07 306.22 Cooking gains (calculate (69)m= 51.14 51.14 Pumps and fans gains (70)m= 3 3 Losses e.g. evaporation (71)m= -92.21 -92.21 Water heating gains (Talculate (72)m= 73.52 71.46 Total internal gains =	ulation of (65 Table 5 and 5), Watts Mar Ap 138.32 138.3 ed in Append 36.53 27.6 ulated in Append 298.29 281.4 ed in Append 51.14 51.1 (Table 5a) 3 3 n (negative value) -92.21 -92.2 able 5)	42.84 Im only if of the control of	Jun 138.32 tion L9 o 17.45 uation L 240.11 tion L15 51.14 3 ble 5) -92.21	35.53 s in the of Jul 138.32 r L9a), a 18.86 13 or L1 226.74 or L15a 51.14 3 -92.21	39.83 dwelling 138.32 lso see 24.51 3a), also 223.59), also se 51.14 3	40.03 or hot w Sep 138.32 Table 5 32.9 see Tal 231.52 ee Table 51.14 3 -92.21	45.85 ater is fr Oct 138.32 41.78 ble 5 248.39 5 51.14 3 -92.21	49.26 om com Nov 138.32 48.76 269.69 51.14 3 -92.21	53.17 munity h Dec 138.32 51.98 289.7 51.14 3 -92.21		(66) (67) (68) (69) (70) (71)

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

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	1.17	x	10.63	x	0.63	x	0.7] =	3.8	(74)
North	0.9x	0.77	x	1.12	x	10.63	x	0.63	x	0.7	=	3.64	(74)
North	0.9x	0.77	x	1.17	x	20.32	x	0.63	x	0.7	=	7.27	(74)
North	0.9x	0.77	x	1.12	x	20.32	х	0.63	x	0.7] =	6.96	(74)
North	0.9x	0.77	x	1.17	x	34.53	x	0.63	x	0.7	=	12.35	(74)
North	0.9x	0.77	X	1.12	x	34.53	X	0.63	x	0.7	=	11.82	(74)
North	0.9x	0.77	x	1.17	x	55.46	x	0.63	x	0.7	=	19.83	(74)
North	0.9x	0.77	X	1.12	x	55.46	X	0.63	x	0.7	=	18.98	(74)
North	0.9x	0.77	x	1.17	x	74.72	x	0.63	x	0.7	=	26.72	(74)
North	0.9x	0.77	x	1.12	x	74.72	x	0.63	x	0.7	=	25.57	(74)
North	0.9x	0.77	x	1.17	x	79.99	x	0.63	x	0.7	=	28.6	(74)
North	0.9x	0.77	x	1.12	x	79.99	x	0.63	x	0.7	=	27.38	(74)
North	0.9x	0.77	x	1.17	x	74.68	x	0.63	x	0.7	=	26.7	(74)
North	0.9x	0.77	x	1.12	x	74.68	x	0.63	x	0.7	=	25.56	(74)
North	0.9x	0.77	x	1.17	x	59.25	x	0.63	x	0.7	=	21.18	(74)
North	0.9x	0.77	x	1.12	x	59.25	x	0.63	x	0.7	=	20.28	(74)
North	0.9x	0.77	x	1.17	x	41.52	x	0.63	x	0.7	=	14.84	(74)
North	0.9x	0.77	x	1.12	x	41.52	x	0.63	x	0.7	=	14.21	(74)
North	0.9x	0.77	x	1.17	x	24.19	x	0.63	x	0.7	=	8.65	(74)
North	0.9x	0.77	x	1.12	x	24.19	x	0.63	x	0.7	=	8.28	(74)
North	0.9x	0.77	x	1.17	x	13.12	x	0.63	x	0.7	=	4.69	(74)
North	0.9x	0.77	x	1.12	x	13.12	x	0.63	x	0.7	=	4.49	(74)
North	0.9x	0.77	x	1.17	x	8.86	x	0.63	x	0.7	=	3.17	(74)
North	0.9x	0.77	x	1.12	x	8.86	x	0.63	x	0.7	=	3.03	(74)
South	0.9x	0.77	x	2.98	x	46.75	X	0.63	X	0.7	=	42.58	(78)
South	0.9x	0.77	x	1.14	x	46.75	X	0.63	X	0.7	=	16.29	(78)
South	0.9x	0.77	X	1.25	x	46.75	X	0.63	X	0.7	=	17.86	(78)
South	0.9x	0.77	X	2.98	x	76.57	X	0.63	X	0.7	=	69.73	(78)
South	0.9x	0.77	x	1.14	X	76.57	x	0.63	x	0.7	=	26.68	(78)
South	0.9x	0.77	X	1.25	x	76.57	X	0.63	X	0.7	=	29.25	(78)
South	0.9x	0.77	x	2.98	x	97.53	X	0.63	X	0.7	=	88.83	(78)
South	0.9x	0.77	x	1.14	x	97.53	X	0.63	x	0.7	=	33.98	(78)
South	0.9x	0.77	X	1.25	x	97.53	X	0.63	X	0.7	=	37.26	(78)
South	0.9x	0.77	X	2.98	X	110.23	X	0.63	X	0.7	=	100.39	(78)
South	0.9x	0.77	X	1.14	x	110.23	x	0.63	x	0.7	=	38.41	(78)
South	0.9x	0.77	X	1.25	x	110.23	x	0.63	x	0.7	=	42.11	(78)
South	0.9x	0.77	X	2.98	x	114.87	x	0.63	x	0.7	=	104.62	(78)
South	0.9x	0.77	X	1.14	x	114.87	x	0.63	x	0.7	=	40.02	(78)
South	0.9x	0.77	X	1.25	X	114.87	X	0.63	X	0.7] =	43.88	(78)

South	0.9x	0.77	1 🗸	2.00	l 🗸	140.55	1 🗸	0.63	l 🗸	0.7	1 =	100.69	(78)
South	0.9x	0.77] X] v	2.98	X I v	110.55] X] v	0.63	X	0.7]]	100.68	(78)
South	0.9x	0.77	x x	1.14	x	110.55] x] x	0.63	x	0.7] =] =	38.51	(78)
South	0.9x	0.77] ^] x	2.98	^ x	110.55] ^] x	0.63	X	0.7] - =	98.37	(78)
South	0.9x	0.77] ^] x	1.14	^ x	108.01] ^] x	0.63	X	0.7]	37.63	(78)
South	0.9x	0.77] ^] x	1.14	^ x	108.01] ^] x	0.63	X	0.7] -] =	41.26	(78)
South	0.9x	0.77] ^] x	2.98	^ x	104.89] ^] x	0.63	X	0.7] -] =	95.53	(78)
South	0.9x	0.77	」^]x	1.14	x	104.89] ^] _x	0.63	x	0.7]	36.55	(78)
South	0.9x	0.77)	1.25	l x	104.89] ^] _X	0.63	x	0.7]] =	40.07	(78)
South	0.9x	0.77]]	2.98	l X	101.89]]	0.63	X	0.7] =	92.79	(78)
South	0.9x	0.77]]	1.14	X	101.89]]	0.63	X	0.7]] =	35.5	(78)
South	0.9x	0.77	X	1.25	X	101.89	X	0.63	x	0.7	=	38.92	(78)
South	0.9x	0.77	X	2.98	X	82.59	X	0.63	x	0.7	, =	75.21	(78)
South	0.9x	0.77	X	1.14	x	82.59	x	0.63	x	0.7	=	28.77	(78)
South	0.9x	0.77	x	1.25	x	82.59	x	0.63	x	0.7	j =	31.55	(78)
South	0.9x	0.77	x	2.98	х	55.42	x	0.63	x	0.7	=	50.47	(78)
South	0.9x	0.77	x	1.14	x	55.42	x	0.63	x	0.7	=	19.31	(78)
South	0.9x	0.77	X	1.25	x	55.42	x	0.63	x	0.7	j =	21.17	(78)
South	0.9x	0.77	X	2.98	х	40.4	x	0.63	x	0.7	=	36.79	(78)
South	0.9x	0.77	X	1.14	x	40.4	X	0.63	x	0.7	=	14.07	(78)
South	0.9x	0.77	X	1.25	x	40.4	X	0.63	x	0.7	=	15.43	(78)
West	0.9x	0.77	X	0.39	x	19.64	X	0.63	x	0.7	=	2.34	(80)
West	0.9x	0.77	X	0.39	X	19.64	X	0.63	X	0.7	=	2.34	(80)
West	0.9x	0.77	X	0.39	x	38.42	x	0.63	x	0.7	=	4.58	(80)
West	0.9x	0.77	X	0.39	X	38.42	X	0.63	X	0.7	=	4.58	(80)
West	0.9x	0.77	X	0.39	x	63.27	X	0.63	X	0.7	=	7.54	(80)
West	0.9x	0.77	X	0.39	x	63.27	X	0.63	X	0.7	=	7.54	(80)
West	0.9x	0.77	X	0.39	x	92.28	X	0.63	x	0.7	=	11	(80)
West	0.9x	0.77	X	0.39	х	92.28	X	0.63	X	0.7	=	11	(80)
West	0.9x	0.77	X	0.39	X	113.09	X	0.63	X	0.7	=	13.48	(80)
West	0.9x	0.77	X	0.39	X	113.09	X	0.63	X	0.7	=	13.48	(80)
West	0.9x	0.77	X	0.39	X	115.77	X	0.63	X	0.7	=	13.8	(80)
West	0.9x	0.77	X	0.39	X	115.77	X	0.63	X	0.7	=	13.8	(80)
West	0.9x	0.77	X	0.39	X	110.22	X	0.63	X	0.7] = 1	13.14	(80)
West	0.9x	0.77	X	0.39	X	110.22	X	0.63	X	0.7] = 1	13.14	(80)
West	0.9x	0.77	X	0.39	X	94.68	X	0.63	Х	0.7	= 	11.28	(80)
West West	0.9x	0.77	X	0.39	X	94.68	X 1	0.63	X	0.7] = 1	11.28	(80)
West	0.9x	0.77] X	0.39	X	73.59	X	0.63	X	0.7] =]	8.77	(80)
West	0.9x	0.77] X	0.39	X	73.59	X	0.63	X	0.7] =] _	8.77	(80)
West	0.9x	0.77	X	0.39	X	45.59] X] v	0.63	X	0.7] = _	5.43	(80)
VVGSL	0.9x	0.77	X	0.39	X	45.59	X	0.63	X	0.7] =	5.43	(80)

West															
Vest	West	0.9x	0.77	X	0.3	39	x	24.49	X	0.63	x	0.7	=	2.92	(80)
Solar gains in watts, calculated for each month	West	0.9x	0.77	x	0.3	39	x	24.49	X	0.63	х	0.7	=	2.92	(80)
Solar gains in watts, calculated for each month (83)m = Sum/74)m(82)m	West	0.9x	0.77	x	0.3	39	x	16.15	X	0.63	х	0.7	=	1.93	(80)
(63)me 8.85 48.04 199.32 241.72 267.77 265 256.8 236.18 213.81 163.33 105.97 76.35 (83) Total gains - internal and solar (64)m = (73)m (83)m watts (84)m 616.28 671.88 701.56 712.41 706.39 675.07 649.39 638.07 634.07 615.36 593.07 589.75 (84) 7. Mean internal temperature (treating 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) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9c) (68)me 9.93 0.91 0.92 19.58 20.02 20.44 20.76 20.91 20.9 20.68 20.17 19.52 18.96 (87) Temperature during heating periods in rest of dwelling, from Table 9, Th2 (°C) (68)me 19.97 19.97 19.97 19.98 19.99 19.99 19.99 19.99 19.99 19.99 19.98 19.98 19.98 (89) Helisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)me 0.92 0.9 0.86 0.8 0.71 0.55 0.4 0.42 0.62 0.8 0.89 0.93 0.93 (89) Mean internal temperature in the rest of dwelling, h2,m (see Table 9a) (89)me 0.92 0.9 0.93 0.91	West	0.9x	0.77	×	0.3	39	x	16.15	х	0.63	_ x [0.7		1.93	(80)
(63)me 8.85 48.04 199.32 241.72 267.77 265 256.8 236.18 213.81 163.33 105.97 76.35 (83) Total gains - internal and solar (64)m = (73)m (83)m watts (84)m 616.28 671.88 701.56 712.41 706.39 675.07 649.39 638.07 634.07 615.36 593.07 589.75 (84) 7. Mean internal temperature (treating 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) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9c) (68)me 9.93 0.91 0.92 19.58 20.02 20.44 20.76 20.91 20.9 20.68 20.17 19.52 18.96 (87) Temperature during heating periods in rest of dwelling, from Table 9, Th2 (°C) (68)me 19.97 19.97 19.97 19.98 19.99 19.99 19.99 19.99 19.99 19.99 19.98 19.98 19.98 (89) Helisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)me 0.92 0.9 0.86 0.8 0.71 0.55 0.4 0.42 0.62 0.8 0.89 0.93 0.93 (89) Mean internal temperature in the rest of dwelling, h2,m (see Table 9a) (89)me 0.92 0.9 0.93 0.91															
(63)me 8.85 48.04 199.32 241.72 267.77 265 256.8 236.18 213.81 163.33 105.97 76.35 (83) Total gains - internal and solar (64)m = (73)m (83)m watts (84)m 616.28 671.88 701.56 712.41 706.39 675.07 649.39 638.07 634.07 615.36 593.07 589.75 (84) 7. Mean internal temperature (treating 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) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9c) (68)me 9.93 0.91 0.92 19.58 20.02 20.44 20.76 20.91 20.9 20.68 20.17 19.52 18.96 (87) Temperature during heating periods in rest of dwelling, from Table 9, Th2 (°C) (68)me 19.97 19.97 19.97 19.98 19.99 19.99 19.99 19.99 19.99 19.99 19.98 19.98 19.98 (89) Helisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)me 0.92 0.9 0.86 0.8 0.71 0.55 0.4 0.42 0.62 0.8 0.89 0.93 0.93 (89) Mean internal temperature in the rest of dwelling, h2,m (see Table 9a) (89)me 0.92 0.9 0.93 0.91	Solar gains in watts, calculated for each month (83)m = Sum(74)m (82)m														
(84) (84)	Ť						265	255.8	236.18	213.81	163.33	105.97	76.35		(83)
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)me 0.93 0.91 0.88 0.83 0.75 0.62 0.49 0.51 0.68 0.83 0.91 0.94 0.686) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)me 19.01 19.23 19.58 20.02 20.44 20.76 20.91 20.9 20.68 20.17 19.52 18.96 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)me 19.97 19.97 19.97 19.98 19.99 19	Total ga	ains – ir	nternal a	nd solar	(84)m =	= (73)m -	+ (83)r	n , watts	1					1	
Temperature during heating periods in the living area from Table 9, Th1 (°C)	(84)m=	616.26	671.88	701.56	712.41	706.39	675.0	7 649.39	638.07	634.07	615.36	593.07	589.75		(84)
Temperature during heating periods in the living area from Table 9, Th1 (°C)	7. Mean internal temperature (heating season)														
Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec															(85)
Second S	•		ŭ	٠.			•		DIC 5, 11	11 (0)				21	
(86)me	Ullisat						<u> </u>		Λα	Con	Oct	Nov	Doo	1	
Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 19.01 19.23 19.58 20.02 20.44 20.76 20.91 20.9 20.88 20.17 19.52 18.96 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.97 19.97 19.97 19.98 19.99 19.99 19.99 19.99 19.99 19.99 19.99 19.99 19.99 19.98 19.99 19.98 19.99 19.98 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)m= 0.92 0.9 0.86 0.8 0.71 0.55 0.4 0.42 0.62 0.8 0.8 0.89 0.93 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m= 18.18 18.4 18.73 19.17 19.56 19.84 19.95 19.94 19.78 19.31 18.69 18.13 (90) (E2)m= 18.32 18.54 18.88 19.32 19.71 20 20.12 20.11 19.94 19.46 18.83 18.28 (92) Apply adjustment to the mean internal temperature from Table 4e, where appropriate (33)m= 18.17 18.39 18.73 19.17 19.56 19.85 19.95 19.97 19.96 19.79 19.31 18.68 18.13 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains, hm: (94)m= 0.9 0.87 0.84 0.78 0.69 0.54 0.39 0.42 0.6 0.77 0.87 0.91 (94) Useful gains, hmGm, W = (94)m x (84)m (95)m= 55.366 587.48 588.75 556.26 486.2 367.47 255 266.37 381.68 476.63 514.1 534.75 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm, w = (39)m x (93)m - (96)m (97)m x (41)m (98)m x (98)m	(00)							+	Ť	† 	 	 	 		(06)
(87) (8	(86)m=	0.93	0.91	0.88	0.83	0.75	0.62	0.49	0.51	0.68	0.83	0.91	0.94		(00)
Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)me 19.97 19.97 19.97 19.98 19.99 19.99 19.99 19.99 19.99 19.99 19.98 19.98 19.98 19.98 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)me 0.92 0.9 0.86 0.8 0.71 0.55 0.4 0.42 0.62 0.8 0.8 0.89 0.93 (89) Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)me 18.18 18.4 18.73 19.17 19.56 19.84 19.95 19.94 19.78 19.31 18.69 18.13 (90) (1.4 E-Living area + (4) = 0.17 (91) (92)me 18.22 18.54 18.88 19.32 19.71 20 20.12 20.11 19.94 19.46 18.83 18.28 (92) (42)me 18.32 18.54 18.88 19.32 19.71 20 20.12 20.11 19.94 19.46 18.83 18.28 (93)me 18.17 18.39 18.73 19.17 19.56 19.85 19.97 19.96 19.79 19.31 18.68 18.13 (93) (93)me 18.17 18.39 18.73 19.17 19.56 19.85 19.97 19.96 19.79 19.31 18.68 18.13 (93) (93)me 18.17 18.39 18.73 19.17 19.56 19.85 19.97 19.96 19.79 19.31 18.68 18.13 (93) (93)me 18.17 18.39 18.73 19.17 19.56 19.85 19.97 19.96 19.79 19.31 18.68 18.13 (93) (93) (93) (93) (93) (93) (93) (93	Mean i	internal	temper	ature in I	iving are	ea T1 (fo	ollow s	teps 3 to 7	7 in Tab	le 9c)				_	
(88)me	(87)m=	19.01	19.23	19.58	20.02	20.44	20.76	20.91	20.9	20.68	20.17	19.52	18.96		(87)
(88)me	Tempe	erature	durina h	eating p	eriods ir	rest of	dwellir	na from Ta	able 9. T	h2 (°C)					
Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (89)me	· -							-	1		19.99	19.98	19.98]	(88)
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)								!	ļ	1	1	1	1	I	, ,
Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c) (90)m=			Ť	r			`		T					1	(00)
(90)me	(89)m=	0.92	0.9	0.86	0.8	0.71	0.55	0.4	0.42	0.62	0.8	0.89	0.93		(89)
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2	Mean internal temperature in the rest of dwelling T2 (follow steps 3 to 7 in Table 9c)														
Mean internal temperature (for the whole dwelling) = fLA x T1 + (1 - fLA) x T2 (92)m= 18.32	(90)m=	18.18	18.4	18.73	19.17	19.56	19.84	19.95	19.94	19.78	19.31	18.69	18.13		(90)
(92)m= 18.32	_							•		f	fLA = Livir	ng area ÷ (4) =	0.17	(91)
(92)m= 18.32	Moan i	intornal	tompor	atura (fo	r the wh	olo dwo	lina) –	. fl Λ ∨ T1	⊥ (1 _ fl	۸) ی T2					
Apply adjustment to the mean internal temperature from Table 4e, where appropriate (93)m= 18.17 18.39 18.73 19.17 19.56 19.85 19.97 19.96 19.79 19.31 18.68 18.13 (93) 8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.9 0.87 0.84 0.78 0.69 0.54 0.39 0.42 0.6 0.77 0.87 0.91 (94) Useful gains, hmGm , W = (94)m x (84)m (95)m= 553.66 587.48 588.75 556.26 486.2 367.47 255 266.37 381.68 476.63 514.1 534.75 (95) Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98)								\neg				18.83	18 28	1	(92)
8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.9 0.87 0.84 0.78 0.69 0.54 0.39 0.42 0.6 0.77 0.87 0.91 Useful gains, hmGm , W = (94)m x (84)m (95)m= 553.66 587.48 588.75 556.26 486.2 367.47 255 266.37 381.68 476.63 514.1 534.75 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m)] (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98)ssz = 2340.82 (98)				ļ. l					<u> </u>	Į	ļ	10.00	10.20	I	(02)
8. Space heating requirement Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.9 0.87 0.84 0.78 0.69 0.54 0.39 0.42 0.6 0.77 0.87 0.91 Useful gains, hmGm, W = (94)m x (84)m (95)m= 553.66 587.48 588.75 556.26 486.2 367.47 255 266.37 381.68 476.63 514.1 534.75 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W = ((39)m x ((93)m - (96)m) (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) _{h-8.9-12} = 2340.82 (98)	· · · · -			T T		· ·		T T	1	1	·	18 68	18 13	1	(93)
Set Ti to the mean internal temperature obtained at step 11 of Table 9b, so that Ti,m=(76)m and re-calculate the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.9 0.87 0.84 0.78 0.69 0.54 0.39 0.42 0.6 0.77 0.87 0.91 Useful gains, hmGm, W = (94)m x (84)m (95)m= 553.66 587.48 588.75 556.26 486.2 367.47 255 266.37 381.68 476.63 514.1 534.75 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm, W = ((39)m x ((93)m - (96)m) (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98)sa12 = 2340.82 (98)					19.17	19.50	19.00	19.97	19.90	19.79	19.51	10.00	10.13		(00)
the utilisation factor for gains using Table 9a Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.9 0.87 0.84 0.78 0.69 0.54 0.39 0.42 0.6 0.77 0.87 0.91 Useful gains, hmGm , W = (94)m x (84)m (95)m= 553.66 587.48 588.75 556.26 486.2 367.47 255 266.37 381.68 476.63 514.1 534.75 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature, Lm , W = ((39)m x [(93)m - (96)m] (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98)se.12 2340.82 (98)	•		•		nn a rati u	ro obtoin	ad at a	oton 11 of	Toble 0	h aa tha	t Time (76\m on	d ro cold	vuloto	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec							eu ai s	steb 11 of	rable 9	D, SO IIIa	at 11,111=(70)III ali	u re-car	Julate	
Utilisation factor for gains, hm: (94)m= 0.9	Γ						Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m= 0.9	∟ Utilisat				•	,		1	13	1	1	1	1]	
Useful gains, hmGm , W = (94)m x (84)m (95)m= 553.66 587.48 588.75 556.26 486.2 367.47 255 266.37 381.68 476.63 514.1 534.75 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m] (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) _{159.12} = 2340.82 (98)						0.69	0.54	0.39	0.42	0.6	0.77	0.87	0.91		(94)
(95)m= 553.66 587.48 588.75 556.26 486.2 367.47 255 266.37 381.68 476.63 514.1 534.75 Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m] (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) _{159.12} = 2340.82 (98)	_	gains.	hmGm .	. W = (94	I)m x (84	4)m		!	!		!	!	<u>!</u>		
Monthly average external temperature from Table 8 (96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W = [(39)m x [(93)m - (96)m] (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ = 2340.82 (98)		~		<u> </u>	, ,		367.4	7 255	266.37	381.68	476.63	514.1	534.75		(95)
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 (96) Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m] (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ = 2340.82 (98)	_		age exte	rnal tem	perature		able 8		<u> </u>					I	
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m – (96)m] (97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ = 2340.82 (98)				T I				16.6	16.4	14.1	10.6	7.1	4.2		(96)
(97)m= 1143.35 1109.64 1003.99 834.51 637.7 422.64 270.96 285.85 458.85 706.73 943.05 1138.47 (97) Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ = 2340.82 (98)									1		1			I	, ,
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ = 2340.82 (98)									 	1 ' '	ī .	943.05	1138.47]	(97)
(98)m= 438.73 350.9 308.94 200.34 112.72 0 0 0 0 171.19 308.84 449.17 Total per year (kWh/year) = Sum(98) ₁₅₉₁₂ = 2340.82 (98)	· · · L								<u> </u>	<u> </u>			L	l	` '
Total per year (kWh/year) = Sum(98) _{15,912} = 2340.82 (98)	· -									i `	í 		449.17		
	(55)	.55.76	550.0	550.04	_55.54	L				1	ļ	ļ	L	23/10.82	(98)
Space heating requirement in kWh/m²/year 32.29 (99)			-	_		.,			1018	ai pei yedi	(KVVII/YEd)	i, – Suiii(8	10 <i>j</i> 15,912 =		╡
	Space	neating	g require	ement in	kVVh/m²	/year								32.29	(99)

9a. Energy requiremer	nts – Ind	ividual h	eating s	vstems i	ncluding	mi <u>cro-</u> C	CHP)					
Space heating:		- radai II		, storno i	<u> </u>							_
Fraction of space heat from secondary/supplementary system											0	(201)
Fraction of space heat from main system(s) $(202) = 1 - (201) =$										1	(202)	
Fraction of total heating	ng from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficiency of main spa	ace heat	ing syste	em 1								92.4	(206)
Efficiency of secondary/supplementary heating system, %											0	(208)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec										kWh/ye	ar	
Space heating require	- `	1	·	1				474.40	200.04	440.47	1	
438.73 350.9	308.94	200.34	112.72	0	0	0	0	171.19	308.84	449.17		(5.4.4)
(211)m = {[(98)m x (20 474.81 379.76	(4)] } x 1	100 ÷ (20 216.82	121.99	0	0	0	0	185.28	334.24	486.12		(211)
474.81 379.70	334.33	210.02	121.99	0					211),,,,5,10,,,,12		2533.36	(211)
Space heating fuel (s	econdar	v) kWh/	month				()	(715,1012		2000.00	
$= \{[(98) \text{m x } (201)] \} \text{ x } 1$		• •	monar									
(215)m= 0 0	0	0	0	0	0	0	0	0	0	0		
						Tota	l (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water heating												
Output from water hea	ter (calc	ulated a 139.04	bove) 135.22	119.33	113.2	126.17	126.56	144.26	154.34	166.33		
Efficiency of water hea		100.04	100.22	110.00	110.2	120.17	120.00	144.20	104.04	100.55	87	(216)
(217)m= 89.14 89.08	88.97	88.75	88.34	87	87	87	87	88.6	88.98	89.17	<u> </u>	」` (217)
Fuel for water heating,	kWh/m	onth	l		l							
$(219)m = (64)m \times 100$	T	T									İ	
(219)m= 191.75 168.61	176.14	156.67	153.07	137.16	130.12	145.02	145.47 I = Sum(2	162.82	173.46	186.53	4000.00	7(040)
Annual totals						rota	r – Garri(2		Wh/year	•	1926.82 kWh/year	(219)
Space heating fuel use	ed, main	system	1					K	viii y cai		2533.36	7
Water heating fuel use	ed										1926.82	Ī
Electricity for pumps, fa		electric	keep-ho	t								_
central heating pump		0.000		•						30		(230c
boiler with a fan-assis							-1 (000-)	(000-)		45		(230e
Total electricity for the	above, I	kWh/yea	ır			sum	or (230a).	(230g) =			75	(231)
Electricity for lighting											357.25	(232)
Electricity generated by PVs								-1281.68	(233)			
Total delivered energy	for all u	ses (211)(221)	+ (231)	+ (232).	(237b)	=				3610.74	(338)
10a. Fuel costs - indiv	vidual he	eating sy	stems:									
				Fu	el			Fuel P	rice		Fuel Cost	
					/h/year			(Table			£/year	
Space heating - main s	system 1	1		(21	1) x			3.4	.8	x 0.01 =	88.16	(240)
Space heating - main s	system 2	2		(21	3) x			0		x 0.01 =	0	(241)
-												_ ′

Space heating - secondary	(215) x	13.19 x 0.01 =	0 (242)
Water heating cost (other fuel)	(219)	3.48 x 0.01 =	67.05 (247)
Pumps, fans and electric keep-hot	(231)	13.19 x 0.01 =	9.89 (249)
(if off-peak tariff, list each of (230a) to (230g) s			
Energy for lighting	(232)	13.19 X 0.01 =	47.12 (200)
Additional standing charges (Table 12)			120 (251)
	one of (233) to (235) x)	13.19 x 0.01 =	-169.05 (252)
Appendix Q items: repeat lines (253) and (254	,		
	(247) + (250)(254) =		163.17 (255)
11a. SAP rating - individual heating systems			
Energy cost deflator (Table 12)			0.42 (256)
Energy cost factor (ECF) [(255)	$x (256)] \div [(4) + 45.0] =$		0.58 (257)
SAP rating (Section 12)			91.86 (258)
12a. CO2 emissions – Individual heating sys	tems including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	547.2 (261)
Space heating (secondary)	(215) x	0.519	0 (263)
Water heating	(219) x	0.216	416.19 (264)
Space and water heating	(261) + (262) + (263) + (2	264) =	963.4 (265)
Electricity for pumps, fans and electric keep-he	ot (231) x	0.519	38.93 (267)
Electricity for lighting	(232) x	0.519	185.41 (268)
Energy saving/generation technologies Item 1		0.519 =	-665.19 (269)
Total CO2, kg/year		sum of (265)(271) =	522.54 (272)
CO2 emissions per m²		(272) ÷ (4) =	7.21 (273)
EI rating (section 14)			94 (274)
13a. Primary Energy			
	Energy kWh/year	Primary factor	P. Energy kWh/year
Space heating (main system 1)	(211) x	1.22	3090.69 (261)
Space heating (secondary)	(215) x	3.07	0 (263)
Energy for water heating	(219) x	1.22 =	2350.72 (264)
Space and water heating	(261) + (262) + (263) + (2	264) =	5441.41 (265)
Electricity for pumps, fans and electric keep-he	ot (231) x	3.07	230.25 (267)
Electricity for lighting	(232) x	0 =	1096.75 (268)

SAP 2012 Overheating Assessment

Calculated by Stroma FSAP 2012 program, produced and printed on 29 November 2022

Property Details: Plot 18

Dwelling type: Semi-detached House

Located in:EnglandRegion:East Anglia

Cross ventilation possible:YesNumber of storeys:2Front of dwelling faces:North

Overshading: Average or unknown

Overhangs: None

Thermal mass parameter: Indicative Value Low

Night ventilation: False

Blinds, curtains, shutters:

Ventilation rate during hot weather (ach):

Dark-coloured curtain or roller blind
3 (Windows open half the time)

Overheating Details:

Summer ventilation heat loss coefficient: 172.26 (P1)

Transmission heat loss coefficient: 49.2

Summer heat loss coefficient: 221.48 (P2)

Overhangs:

Orientation:	Ratio:	Z _overhangs:
North (W_1)	0	1
North (W_2)	0	1
West (W_3)	0	1
South (W_4)	0	1
West (W_5)	0	1
South (W_6)	0	1
South (W_7)	0	1

Solar shading:

Orientation:	Z blinds:	Solar access:	Overhangs:	Z summer:	
North (W_1)	0.85	0.9	1	0.76	(P8)
North (W_2)	0.85	0.9	1	0.76	(P8)
West (W_3)	0.85	0.9	1	0.76	(P8)
South (W_4)	0.85	0.9	1	0.76	(P8)
West (W_5)	0.85	0.9	1	0.76	(P8)
South (W_6)	0.85	0.9	1	0.76	(P8)
South (W_7)	0.85	0.9	1	0.76	(P8)

Solar gains:

Orientation		Area	Flux	g_	FF	Shading	Gains
North (W_1)	0.9 x	1.17	82.12	0.63	0.7	0.76	29.17
North (W_2)	0.9 x	1.12	82.12	0.63	0.7	0.76	27.93
West (W_3)	0.9 x	0.39	119.47	0.63	0.7	0.76	14.15
South (W_4)	0.9 x	2.98	114.84	0.63	0.7	0.76	103.91
West (W_5)	0.9 x	0.39	119.47	0.63	0.7	0.76	14.15
South (W_6)	0.9 x	1.14	114.84	0.63	0.7	0.76	39.75
South (W_7)	0.9 x	1.25	114.84	0.63	0.7	0.76	43.59
						Total	272.64 (P3/F

Internal gains:

	June	July	August
Internal gains	407.07	390.59	398.89
Total summer gains	692.57	663.23	651.71 (P5)

SAP 2012 Overheating Assessment

Likelihood of high internal temperature	Not significant	Slight	Slight	
Threshold temperature	19.83	21.89	21.84	(P7)
Thermal mass temperature increment	1.3	1.3	1.3	
Mean summer external temperature (East Anglia)	15.4	17.6	17.6	
Summer gain/loss ratio	3.13	2.99	2.94	(P6)

Assessment of likelihood of high internal temperature: Slight