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Energy Statement 34A-36 Kilburn High Road

Document information	Prepared for: Robert Winkley Rolfe Judd,	Date of current issue: 31/05/2019
	Old Church Court, Claylands Road, London, SW8 1NZ	Issue number: 1
		Our reference: 3006-Kilburn High Road- Energy Statement- 1905-31RS.docx
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Disclaimer		Eight Associates. By receiving the report and acting on it, the on it - accepts that no individual is personally liable in contract, including negligence).
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Executive Summary

Energy Statement 34A-36 Kilburn High Road

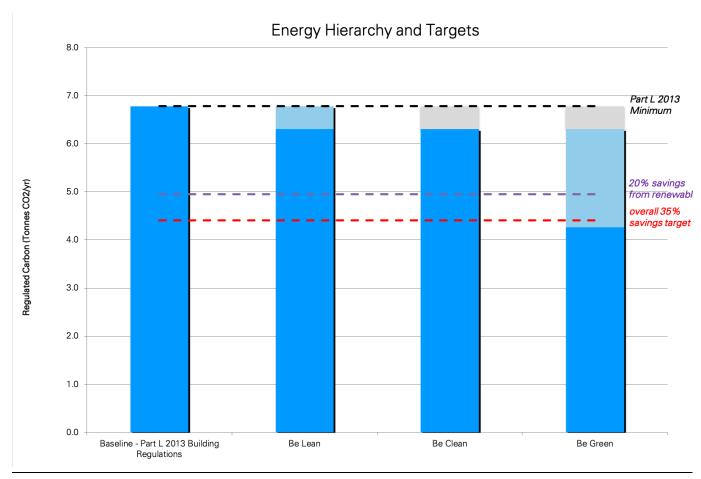
About the scheme:	The project consists of the construct to create 5 new residential units. The Camden area and it has a total net in	e development is loc	ated in in the Lond						
Planning policy	In accordance with the Appeal Decision, the scheme is required to achieve a 35% overall improvement over Part L Building Regulations 2013 with regards to carbon dioxide emissions reduction targets and 20% carbon reduction from renewable sources. An energy assessment was produced by Eight Associates on 30/04/2018.								
	The strategy included the use of gas emission heating system and thereforeport.								
Aim of this study:	The purpose of an energy statement measures comply with London Plan part of the development's design an	energy policies. It al							
	The Energy Statement is a revision t Associates dated May 2018.	o the Energy Assess	sment carried out p	reviously by Eight					
Carbon dioxide emissions		Baseline	Lean	Green					
reduction	CO ₂ emissions (Tonnes CO ₂ /yr)	6.78	6.31	4.26					
	CO ₂ emissions saving (Tonnes CO ₂ /yr)	-	0.47	2.05					
	Saving from each stage (%)	-	7.00	30.20					
	Total CO ₂ emissions saving (Tonnes CO ₂ /yr)		2.52						
	Total CO ₂ emissions saving (%)		37.10						
	As demonstrated above, the scheme L1A 2013 building regulations. The conspecified superior building fabric projection of renewable energy to regulations.	levelopment has app perties, followed by echnologies, to achie	olied the 'fabric first energy efficient sys eve the required sav	' approach and stems and					
	The design parameters have been e	laborated on in the n	ext section.						

Executive Summary Energy Statement 34A-36 Kilburn High Road

GLA's Energy Hierarchy – Regulated Carbon Emissions:

A graphical illustration of how the scheme performs in relation to Building Regulations and the Energy Hierarchy is shown below.

Figure



Summary:

As demonstrated above the development will reduce carbon emissions by 7.0% from the fabric energy efficiency measures described in the 'Be Lean' section, and will reduce total carbon emissions by 37.1% over Building Regulations with the further inclusion of low and zero carbon technologies (communal ASHP and photovoltaic panels).

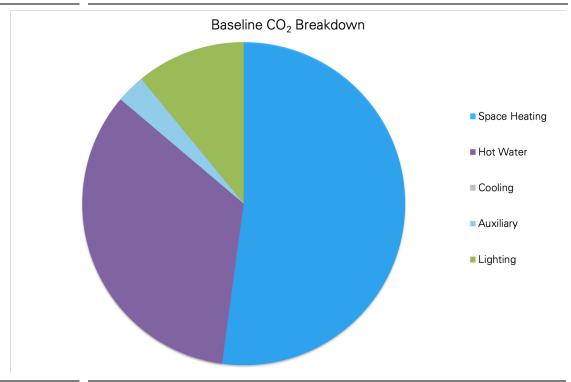
Establishing Emissions Energy Statement 34A-36 Kilburn High Road

Building Regulations Part L 2013 Minimum Compliance:

The 'baseline' carbon dioxide emissions for the development are 6.78 Tonnes CO₂/yr.

The pie chart below provides a breakdown of the scheme's baseline carbon emissions by system over the course of one year.

Carbon Emissions in Tonnes CO ₂ /yr	Heating	Hot Water	Cooling	Auxiliary	Lighting
	3.54	2.31	0.00	0.19	0.74



Overview:

The chart above shows that space heating is the primary source of carbon emissions, and hot water is the second largest. Therefore, emphasis must be placed on reducing the heating demand for the dwellings.

SAP Inputs

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Building fabric	D.11.	Minimum Building Regulations U value	Proposed U-Value,		
	Building element	W/m²K	W/m²K		
	External Walls	0.30	0.15		
	Corridor Walls	0.30	0.15		
	Party Walls	0.20	0.00		
	Roofs	0.20	0.10		
	Windows (g-value 0.55)	2.00	1.30		
	Rooflights (g-value 0.55)	2.00	1.60		
	Doors	2.00	1.30		

Air tightness

The target air permeability for the scheme has been modelled as 3 m³/(hr.m²) @ 50 pa.

This will require careful attention to two key areas:

- Structural leakage
- Services leakage

Structural leakage occurs at joints in the building fabric and around window and door openings, loft hatches and access openings. There will also be some diffusion through materials such and cracks in masonry walls typically caused by poor perpends in blockwork inner leafs. Structural leakage is hard to remedy retrospectively therefore good detailing at the design stage is essential.

Services leakage occurs at penetrations from pipes and cables entering the building. These can be sewerage pipes, water pipes and heating pipes. As well as electricity cables there may also be telecommunication cables. Attention therefore, needs to be paid to sealing all penetrations during construction.

Thermal bridging

The scheme will be designed in line with the accredited construction details (ACD) and therefore it has been indicatively modelled with the accredited thermal bridge Psi-values for the following junctions:

- Lintels (E2)
- Sill (E3)
- Jambs (E4)
- Corners (E16)
- Inverted corners (E17)
- Party walls between dwellings (E18)

In addition, a bespoke calculation should be performed for the following junction:

• Inverted eave (E24) to target a psi-value of 0.15 W/mK

The default psi-value has been used for the remaining junctions.

Thermal mass

Thermal mass of the scheme has been indicatively modelled as 250 kJ/m²K (medium).

SAP Inputs

Energy Statement 34A-36 Kilburn High Road

Energy efficient services

Fresh air in extract air Cooled air Warmed exhaust fresh air

Graphic illustration of a heat recovery unit, which exploits the extract hot air of the room to heat the cold supply air.

Heating:

For the Be Lean scenario, heating is provided by individual gas boilers with 89.5% efficiency and transmitted via radiators featuring time and temperature zone control by suitable arrangement of plumbing and electrical services and delayed thermostat.

For the Be Green scenario, a communal air source heat pump system with a COP of more than 3.0 has been specified where the charging system is linked to the use of a community heating programmer and at least two room thermostats. The heat will be distributed via underfloor heating.

Ventilation:

Balanced mechanical ventilation with heat recovery will be provided to dwellings and wet rooms. Apartments 1-4 with 1 wet room have a specific fan power of 0.53W/l/s and a heat recovery of 89%. Apartment 5 with 2 wet rooms has a specific fan power of 0.60W/l/s and a heat recovery of 88%.

Hot water:

For the Be Lean scenario, hot water will be provided by the gas boiler with an efficiency of 89.5%.

For the Be Green scenario, 70% of the hot water will be provided by the communal ASHP with a supplementary immersion heater for the remaining 30% of hot water demand.

Air conditioning:

No cooling system has been specified for the dwellings. Natural ventilation through openable windows will be used as a passive cooling measure.

Lighting

High efficiency lighting has been specified for the development with a luminaire efficacy of more than 70 lumens/watt.

Overheating



Possible air leakage points in a building

Renewable energy technology

Natural ventilation:

Openable windows are specified on all facades of the building. Cross ventilation will be achieved by opening windows on two facades and ensuring there is a clear path for airflow. Internal heat gains have been minimised where possible. Energy efficient appliances will help reduce internal heat gain and reduce overheating risk. Energy efficient lighting will also be specified to achieve low power densities.

Heat transfer and infiltration has been controlled in the following ways:

- Insulation levels have been maximised and the resulting u-values are lower than required by Building Regulations. The build-ups therefore prevent the penetration of heat as much as practically possible.
- A reduced air permeability rate of 3 m³/(hr.m²) @ 50 pa has been targeted to minimise uncontrolled air infiltration. This will require attention to detailing and sealing.

A photovoltaic panel system of 4.5 kWp (approximately 15PV panels of 300W each in total) has been specified for the development. PV panels will be oriented Southeast, with 10° tilt covering approximately 30m² of the roof.

SAP Worksheets Energy Statement 34A-36 Kilburn High Road

SAP Worksheets

Be Lean Block Compliance Be Green Block Compliance

Block Compliance WorkSheet: 34A-36 Kilburn High Road

User Details

Assessor Name:Chris HocknellStroma Number:STRO016363Software Name:Stroma FSAPSoftware Version:Version: 1.0.4.16

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
Apartment 1	23.14	23.63	67.3	68.4	50.17
Apartment 2	21.06	22.53	60.7	66.7	59.25
Apartment 3	17.56	19.57	49.6	56.6	72.85
Apartment 4	20.66	21.91	59.8	64.3	61.4
Apartment 5	17.9	19.75	49.9	58.5	75.4

Calculation Summary

Total Floor Area	319.07
Average TER	21.25
Average DER	19.76
Average DFEE	56.48
Average TFEE	62.26
Compliance	Pass
% Improvement DER TER	7.01
% Improvement DFEE TFEE	9.28

Block Compliance WorkSheet: 34A-36 Kilburn High Road

User Details

Assessor Name:Chris HocknellStroma Number:STRO016363Software Name:Stroma FSAPSoftware Version:Version: 1.0.4.16

Calculation Details

Dwelling	DER	TER	DFEE	TFEE	TFA
Apartment 1	15.15	34.66	67.3	68.4	50.17
Apartment 2	14.09	32.84	60.7	66.7	59.25
Apartment 3	12.02	28.26	49.6	56.6	72.85
Apartment 4	13.96	31.89	59.8	64.3	61.4
Apartment 5	12.39	28.51	49.9	58.5	75.4

Calculation Summary

Total Floor Area	319.07
Average TER	30.87
Average DER	13.36
Average DFEE	56.48
Average TFEE	62.26
Compliance	Pass
% Improvement DER TER	56.72
% Improvement DFEE TFEE	9.28

SAP Worksheets Energy Statement 34A-36 Kilburn High Road

SAP Worksheets

TFEE and DFEE Worksheets

Stroma Name: Chris Hocknell Stroma FSAP 2012 Stroma Number: StR0016363 Version: 1.0.4.16			User [Details:						
Action Control Contr										
Area(m²)		F	roperty	Address	: Apartm	nent 1				
Strough Floor Fl		ancione:								
Ground floor Ground floor Ground floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Ground floor area TFA = (1a)+(1b)+(1c)+(1d)+(1d)+(1d)+(1d)+(1d)+(1d)+(1d)+(1d	1. Overall dwelling diffle	HISIOHS.	Δre	a(m²)		Δν Ηρ	iaht(m)	`	Volume(m ³	3)
Dwelling volume	Ground floor				(1a) x			_	·	<u>^</u>
Dwelling volume	Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	50 17	l [(4)					
2. Ventilation rate: main heating heati		o, (, (, (, (,(.		30.17	J	n)+(3c)+(3c	d)+(3e)+	(3n) =	405.40	7(5)
Number of chimneys					(00) (00	,, (00) (00	a) · (OC) ·	(011)	135.46	(5)
Number of chimneys	2. Ventilation rate:	main seconda	rv	other		total			m³ per hou	ır
Number of open flues	Number of chimneys	heating heating			л <u>-</u> г		x	40 =		_
Number of intermittent fans 2	•		╛╘		╛╘					╡``
Number of passive vents	·		╛╵┖	0	」	0			0	=
Number of flueless gas fires	Number of intermittent fa	ns				2	×	(10 =	20	(7a)
Air changes per hour	Number of passive vents					0	X	(10 =	0	(7b)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20	Number of flueless gas fi	res				0	×	(40 =	0	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20								Air ch	nangee ner he	NII.
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)	Infiltration due to objects	fl and fano - (60)±(6b)±(7a)+/7b)+	(70) =	Г					_
Number of storeys in the dwelling (ns)		<u>-</u>			continue fu		(16)	÷ (5) =	0.15	(8)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 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						(0) 10	(. 0)		0	(9)
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 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) + 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) (17) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.92 (20) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	Additional infiltration						[(9	9)-1]x0.1 =	0	(10)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12)					•	ruction			0	(11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration O.25 - [0.2 x (14) + 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) + 20] + (8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0.92 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.37 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m + 4			o the grea	ter wall are	ea (after					
Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 x (14) + 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0.92 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.37 (21) Infiltration rate modified for monthly wind speed Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	=		.1 (seal	ed), else	enter 0				0	(12)
Window infiltration $0.25 - [0.2 \times (14) + 100] = 0.25 - [$	If no draught lobby, en	ter 0.05, else enter 0							0	(13)
Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = $[(17) \div 20] + (8)$, otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - $[0.075 \times (19)] =$ Infiltration rate incorporating shelter factor (21) = $(18) \times (20) =$ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= $[0.075 \times (19)] =$ Wind Factor (22a)m = (22)m ÷ 4	-	s and doors draught stripped							0	(14)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) ÷ 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] =				-	• •	-			0	=
If based on air permeability value, then $(18) = [(17) \div 20] \div (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] =$ $(20) = 1 - [0.075 \times (19)] =$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ $(21) = (18) \times (20) =$ Monthly average wind speed from Table 7 $(22) = 5.1 \times 4.9 \times 4.4 \times 4.3 \times 3.8 \times 3.8 \times 3.7 \times 4 \times 4.3 \times 4.5 \times 4.7$ Wind Factor $(22a) = (22) + 4$										= ' '
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.92 (20)$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.37 (21)$ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$	•	·	•	-	•	etre ot e	envelop	e area		=
Number of sides sheltered $ (20) = 1 - [0.075 \times (19)] = 0.92 $ (20) Infiltration rate incorporating shelter factor $ (21) = (18) \times (20) = 0.37 $ (21) Infiltration rate modified for monthly wind speed	·	- -				is being u	sed		0.4	(10)
Infiltration rate incorporating shelter factor					•				1	(19)
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Shelter factor			(20) = 1 -	[0.075 x (19)] =			0.92	(20)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	•	•		(21) = (18	s) x (20) =				0.37	(21)
Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4			1	1 .	T _	T -	1	<u> </u>	7	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	L	1 1 1	Jul	Aug	Sep	Oct	Nov	Dec]	
Wind Factor (22a)m = (22)m ÷ 4		 	T	T	1 .	1	1	1	1	
	(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
(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	Wind Factor (22a)m = (2	2)m ÷ 4								
	(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	

Adjusted infiltr	ation rat	e (allowi	ing for sh	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.47	0.46	0.45	0.4	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43]	
Calculate effe		_	rate for t	he appli	cable ca	ise	•		•		•		
If mechanic			anadis NI (O	10h) - (00a	-) - (NIT\\ a4ba		-) - (22-)			0	(23a
If exhaust air h		0		, ,	,	. `	,, .	`	o) = (23a)			0	(23b
If balanced wit			-	_								0	(230
a) If balance	1		·	i	1	- 	- 	ŕ	- 		- ` ` ') ÷ 100] 1	(24-
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(248
b) If balance		ı		1	1	, , `	, 	í `	, 	- ´-		1	(0.4)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24)
c) If whole h				•	•				.5 × (23b))			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24)
d) If natural	ventilatio	n or wh	ole hous	L se positiv	ve input	ventilati	on from	I Ioft		<u> </u>	ļ	J	
,	n = 1, the			•	•				0.5]				
(24d)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(240
Effective air	change	rate - er	nter (24a) or (24l	b) or (24	c) or (24	ld) in bo	x (25)	-	-	-	_	
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(25)
3. Heat losse	es and he	eat loss i	paramet	er:								_	
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,ı		U-val W/m2		A X U (W/I	K)	k-value kJ/m²·		A X k kJ/K
Doors					2	x	1	=	2				(26)
Windows Type	e 1				3.97	x1	/[1/(1.4)+	0.04] =	5.26	一			(27)
Windows Type	e 2				1.92	x1	/[1/(1.4)+	0.04] =	2.55				(27)
Windows Type	e 3				1.73	x1	/[1/(1.4)+	0.04] =	2.29				(27)
Rooflights Typ	ne 1				0.43649	994 x1	/[1/(1.7) +	0.04] =	0.742048	39			(27)
Rooflights Typ					0.74412	_	/[1/(1.7) +		1.26501	=			` (27t
Walls Type1	35.4	IR	9.35		26.13	=	0.18		4.7	<u>'</u>		\neg	(29)
Walls Type2	30.4		2		28.48	_	0.18	= =	5.13	-		- -	(29)
Roof						=		= -				- -	
	50.1		1.18		48.99	=	0.13		6.37				(30)
Total area of	elements	, 111			116.1	=							(31)
Party wall					26.97	7 ×	0	=	0			4	(32)
Party floor	, ,				50.17								(32
* for windows and ** include the are						lated using	g formula 1	1/[(1/U-valt	ue)+0.04] a	as given in	n paragrapi	h 3.2	
Fabric heat lo	ss, W/K :	= S (A x	U)				(26)(30) + (32) =				32.47	(33)
Heat capacity	Cm = S((Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	13363	
Thermal mass	parame	ter (TMF	⊃ = Cm ÷	÷ TFA) ir	า kJ/m²K	,		Indica	ative Value	: Medium		250	(35)
	sments wh	ere the de	tails of the	construct	ion are no	t known p	recisely the	e indicative	e values of	TMP in T	able 1f		
For design asses can be used inste				oononaoi			,						
-	ead of a de	tailed calc	ulation.			K	,					11.14	(36)

Total fabric he	at loss							(33) +	(36) =			43.61	(37)
Ventilation hea	at loss ca	alculated	l monthl	V				. ,	` '	25)m x (5)		40.01	(5.7)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 27.27	27.08	26.89	26.01	25.85	25.08	25.08	24.94	25.37	25.85	26.18	26.53		(38)
Heat transfer of	coefficier	nt, W/K		•	•			(39)m	= (37) + (38)m		•	
(39)m= 70.88	70.68	70.5	69.62	69.45	68.69	68.69	68.55	68.98	69.45	69.79	70.13		
						•	•		_	Sum(39) ₁	12 /12=	69.62	(39)
Heat loss para	· `	<u> </u>						` ′	= (39)m ÷	`		I	
(40)m= 1.41	1.41	1.41	1.39	1.38	1.37	1.37	1.37	1.37	1.38	1.39	1.4	4.20	— (40)
Number of day	/s in moi	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.39	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
												•	
4. Water heat	ting ene	rgy requi	rement:								kWh/ye	ear:	
A												1	
Assumed occur if TFA > 13.9			[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)1 + 0.0	0013 x (⁻	ΓFA -13.		.7		(42)
if TFA £ 13.9		•	[. exp	(0.000	• (· ·		/_/]	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		,			
Annual averag											.46		(43)
Reduce the annua not more that 125	_				_	_	to acnieve	a water us	se target o	Ī			
	Feb	Mar		<u> </u>		Jul	Δυα	Sep	Oct	Nov	Dec		
Jan Hot water usage ii			Apr ach month	May Vd,m = fa	Jun ctor from		Aug (43)	Sep	Oct	INOV	Dec		
(44)m= 81.9	78.93	75.95	72.97	69.99	67.01	67.01	69.99	72.97	75.95	78.93	81.9		
(1.1)				00.00	0		00.00			m(44) _{1 12} =		893.51	(44)
Energy content of	hot water	used - cal	culated me	onthly $= 4$.	190 x Vd,ı	m x nm x E	OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 121.46	106.23	109.62	95.57	91.7	79.13	73.33	84.14	85.15	99.23	108.32	117.63		
							•		Total = Su	m(45) ₁₁₂ =		1171.53	(45)
If instantaneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46,) to (61)				•	
(46)m= 0	0	0	0	0	0	0	0	0	0	0	0		(46)
Water storage Storage volum) includin	na anv si	olar or M	WHDS	etorana	within sa	ma vas	امء		0	1	(47)
If community h	, ,					•		arric ves	301		0		(47)
Otherwise if no	-			-				ers) ente	er 'O' in <i>(</i>	47)			
Water storage			(4					,		,			
a) If manufact	urer's de	eclared l	oss facto	or is kno	wn (kWl	n/day):					0		(48)
Temperature fa	actor fro	m Table	2b								0		(49)
Energy lost fro	m water	storage	, kWh/ye	ear			(48) x (49)) =			0		(50)
b) If manufact			-									İ	
Hot water stora	-			ie 2 (KVV	n/litre/da	ay)					0		(51)
Volume factor	_		JII 4.3								0	1	(52)
Temperature fa			2b							-	0		(53)
Energy lost fro				ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (_	, "J				. , , , ,	. , (•	-	0		(55)
, ,	. `	•										1	•

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 cylinde	r 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=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary	y circuit	loss (ar	nual) fro	m Table	3							0		(58)
Primary	y circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(mod	dified 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 cal	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 h	eat requ	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	103.24	90.3	93.18	81.24	77.95	67.26	62.33	71.52	72.38	84.35	92.07	99.99		(62)
Solar DH	IW input o	alculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	'	
(add ac	dditiona	lines if	FGHRS	and/or V	WHRS	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=	103.24	90.3	93.18	81.24	77.95	67.26	62.33	71.52	72.38	84.35	92.07	99.99		
								Outp	out from wa	ater heate	r (annual) ₁	12	995.8	(64)
Heat ga	ains froi	n water	heating,	kWh/mo	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	_
(65)m=	25.81	22.57	23.29	20.31	19.49	16.82	45.50	47.00	40.00	04.00		<u> </u>	i -	(CE)
()			25.25	20.31	19.49	10.02	15.58	17.88	18.09	21.09	23.02	25		(65)
L			<u> </u>			<u> </u>	<u> </u>				<u> </u>		eating	(65)
inclu	de (57)ı	m in cald	culation o	of (65)m	only if c	<u> </u>	<u> </u>				<u> </u>	munity h	eating	(00)
includes	de (57)ı ernal ga	m in cald	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(65)
includes	de (57)ı ernal ga	m in cald	culation o	of (65)m and 5a	only if c	<u> </u>	<u> </u>		or hot w		<u> </u>		eating	(65)
includes	de (57)i ernal ga olic gain	m in cald ins (see s (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the d	dwelling		ater is fr	om com	munity h	eating	(66)
include 5. Inter Metabo (66)m=	de (57)r ernal ga blic gain Jan 84.76	n in cald ins (see s (Table Feb 84.76	culation of Table 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 84.76	only if constant of the consta	ylinder is Jun 84.76	Jul 84.76	Aug 84.76	or hot w Sep 84.76	ater is fr	om com	munity h	eating	
include 5. Inter Metabo (66)m=	de (57)r ernal ga blic gain Jan 84.76	n in cald ins (see s (Table Feb 84.76	E Table 5 2 5), Wat Mar 84.76	of (65)m 5 and 5a ts Apr 84.76	only if constant of the consta	ylinder is Jun 84.76	Jul 84.76	Aug 84.76	or hot w Sep 84.76	ater is fr	om com	munity h	eating	
include 5. Interest of the second of the se	de (57)i ernal ga blic gain Jan 84.76 g gains	m in calc lins (see s (Table Feb 84.76 (calcula	ETable 5 E 5), Wat Mar 84.76 ted in Ap	of (65)m and 5a ts Apr 84.76 ppendix 7.21	May 84.76 L, equat	Jun 84.76 ion L9 o	Jul 84.76 r L9a), a	Aug 84.76 Iso see	Sep 84.76 Table 5 8.58	Oct 84.76	Nov 84.76	Dec	eating	(66)
include 5. Interest of the second of the se	de (57)i ernal ga blic gain Jan 84.76 g gains	m in calc lins (see s (Table Feb 84.76 (calcula	ETable 5 E Table 5 E 5), Wat Mar 84.76 ted in Ap	of (65)m and 5a ts Apr 84.76 ppendix 7.21	May 84.76 L, equat	Jun 84.76 ion L9 o	Jul 84.76 r L9a), a	Aug 84.76 Iso see	Sep 84.76 Table 5 8.58	Oct 84.76	Nov 84.76	Dec	eating	(66)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m=	de (57)i ernal ga blic gain Jan 84.76 g gains 13.18 nces gai	m in calconins (see s (Table Feb 84.76 (calcular 11.71 ns (calcular 149.21	ETable 5 E Table 5 E 5), Wat Mar 84.76 ted in Ap 9.52 ulated in	of (65)m and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13	only if controls: May 84.76 L, equat 5.39 dix L, eq 126.75	Jun 84.76 ion L9 of 4.55 uation L	Jul 84.76 r L9a), a 4.92 13 or L1	Aug 84.76 Iso see 6.39 3a), also	Sep 84.76 Table 5 8.58 see Ta 112.81	Oct 84.76 10.89 ble 5 121.03	Nov 84.76	Dec 84.76	eating	(66) (67)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m=	de (57)i ernal ga blic gain Jan 84.76 g gains 13.18 nces gai	m in calconins (see s (Table Feb 84.76 (calcular 11.71 ns (calcular 149.21	Example 5 ted in Apple 5 ted in Appl	of (65)m and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13	only if controls: May 84.76 L, equat 5.39 dix L, eq 126.75	Jun 84.76 ion L9 of 4.55 uation L	Jul 84.76 r L9a), a 4.92 13 or L1	Aug 84.76 Iso see 6.39 3a), also	Sep 84.76 Table 5 8.58 see Ta 112.81	Oct 84.76 10.89 ble 5 121.03	Nov 84.76	Dec 84.76	eating	(66) (67)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m= Cooking (69)m=	de (57)i ernal ga blic gain Jan 84.76 g gains 13.18 nces gai 147.68 g gains 31.48	m in calcular (calcular 31.48	Example 5 Exampl	of (65)m s and 5a ts Apr 84.76 ppendix 7.21 Append 137.13 ppendix 31.48	May 84.76 L, equat 5.39 dix L, eq 126.75 L, equat	Jun 84.76 ion L9 of 4.55 uation L 116.99 ion L15	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a)	Aug 84.76 Iso see 6.39 3a), also 108.95	Sep 84.76 Table 5 8.58 see Tal 112.81 ee Table	Oct 84.76 10.89 ble 5 121.03	Nov 84.76 12.71	Dec 84.76	eating	(66) (67) (68)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m= Cooking (69)m=	de (57)i ernal ga blic gain Jan 84.76 g gains 13.18 nces gai 147.68 g gains 31.48	m in calcular (calcular 31.48	ETable 5 E 5), Wat Mar 84.76 ted in Ap 9.52 ulated in 145.35	of (65)m s and 5a ts Apr 84.76 ppendix 7.21 Append 137.13 ppendix 31.48	May 84.76 L, equat 5.39 dix L, eq 126.75 L, equat	Jun 84.76 ion L9 of 4.55 uation L 116.99 ion L15	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a)	Aug 84.76 Iso see 6.39 3a), also 108.95	Sep 84.76 Table 5 8.58 see Tal 112.81 ee Table	Oct 84.76 10.89 ble 5 121.03	Nov 84.76 12.71	Dec 84.76	eating	(66) (67) (68)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m= Cooking (69)m= Pumps (70)m=	de (57)i ernal ga blic gain Jan 84.76 g gains 13.18 nces gai 147.68 g gains 31.48 and far 0	m in calc sins (see s (Table Feb 84.76 (calcula 11.71 ns (calc 149.21 (calcula 31.48 ns gains 0	Evaluation of the collection o	of (65)m s and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13 ppendix 31.48 5a) 0	only if constructions only if constructions only if constructions on the construction of the construction	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.58 see Ta 112.81 ee Table 31.48	Oct 84.76 10.89 ble 5 121.03 5 31.48	Nov 84.76 12.71 131.41 31.48	Dec 84.76 13.55 141.16 31.48	eating	(66) (67) (68) (69)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m= Cooking (69)m= Pumps (70)m=	de (57)i ernal ga blic gain Jan 84.76 g gains 13.18 nces gai 147.68 g gains 31.48 and far 0	m in calc sins (see s (Table Feb 84.76 (calcula 11.71 ns (calc 149.21 (calcula 31.48 ns gains 0	ETable 5 E Table 5 E 5), Wat Mar 84.76 ted in Ap 9.52 ulated in 145.35 uted in A 31.48 (Table 5	of (65)m s and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13 ppendix 31.48 5a) 0	only if constructions only if constructions only if constructions on the construction of the construction	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.58 see Ta 112.81 ee Table 31.48	Oct 84.76 10.89 ble 5 121.03 5 31.48	Nov 84.76 12.71 131.41 31.48	Dec 84.76 13.55 141.16 31.48	eating	(66) (67) (68) (69)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga blic gain Jan 84.76 g gains 13.18 nces gai 147.68 g gains 31.48 and far 0 e.e.g. ev	m in calconins (see s (Table Feb 84.76 (calcula 11.71 ns (calcula 31.48 ns gains 0 aporatio -67.8	culation of the ted in April 145.35 and the ted in April 145.35 and ted in Apr	of (65)m s and 5a ts Apr 84.76 ppendix 7.21 Append 137.13 ppendix 31.48 5a) 0 tive value	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 ion L15 31.48 0	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95 0, also se 31.48	Sep 84.76 Table 5 8.58 see Tal 112.81 ee Table 31.48	Oct 84.76 10.89 ble 5 121.03 5 31.48	Nov 84.76 12.71 131.41 31.48	Dec 84.76 13.55 141.16 31.48	eating	(66) (67) (68) (69) (70)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m=	de (57)i ernal ga blic gain Jan 84.76 g gains 13.18 nces gai 147.68 g gains 31.48 and far 0 e.e.g. ev	m in calconins (see s (Table Feb 84.76 (calcula 11.71 ns (calcula 149.21 (calcula 31.48 ns gains 0 aporatio	culation of the ted in April 145.35 and the ted in April 145.35 and ted in Apr	of (65)m s and 5a ts Apr 84.76 ppendix 7.21 Append 137.13 ppendix 31.48 5a) 0 tive value	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 ion L15 31.48 0	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95 0, also se 31.48	Sep 84.76 Table 5 8.58 see Tal 112.81 ee Table 31.48	Oct 84.76 10.89 ble 5 121.03 5 31.48	Nov 84.76 12.71 131.41 31.48	Dec 84.76 13.55 141.16 31.48	eating	(66) (67) (68) (69) (70)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water h (72)m=	de (57)i ernal ga blic gain 34.76 g gains 13.18 nces gai 147.68 g gains 31.48 and far 0 s e.g. ev -67.8 heating 34.69	m in calc lins (see s (Table Feb 84.76 (calcula 11.71 ns (calcula 31.48 ns gains 0 aporatic -67.8 gains (T	culation of the Table 5 2 5), Wat Mar 84.76 ted in Ap 9.52 ulated in 145.35 ated in Ap 31.48 (Table 5 0 on (negation of the Table 5) 31.31	of (65)m s and 5a ts Apr 84.76 ppendix 7.21 Appendix 31.48 5a) 0 tive value -67.8	only if constructions only if constructions only if constructions on the construction of the construction	Jun 84.76 ion L9 of 4.55 uation L 116.99 ion L15 31.48 0 le 5) -67.8	Jul 84.76 r L9a), a 4.92 13 or L1: 110.48 or L15a; 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95 0, also se 31.48	Sep 84.76 Table 5 8.58 see Ta 112.81 ee Table 31.48 0 -67.8	Oct 84.76 10.89 ble 5 121.03 5 31.48 0 -67.8	Nov 84.76 12.71 131.41 31.48 0	Dec 84.76 13.55 141.16 31.48 0	eating	(66) (67) (68) (69) (70) (71)
include 5. Interest Metabor (66)m= Lighting (67)m= Applian (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water h (72)m=	de (57)i ernal ga blic gain 34.76 g gains 13.18 nces gai 147.68 g gains 31.48 and far 0 s e.g. ev -67.8 heating 34.69	m in calcular section (calcular section 149.21 (calcular section 31.48 experience of the color o	culation of the Table 5 2 5), Wat Mar 84.76 ted in Ap 9.52 ulated in 145.35 ated in Ap 31.48 (Table 5 0 on (negation of the Table 5) 31.31	of (65)m s and 5a ts Apr 84.76 ppendix 7.21 Appendix 31.48 5a) 0 tive value -67.8	only if constructions only if constructions only if constructions on the construction of the construction	Jun 84.76 ion L9 of 4.55 uation L 116.99 ion L15 31.48 0 le 5) -67.8	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95 0, also se 31.48	Sep 84.76 Table 5 8.58 see Ta 112.81 ee Table 31.48 0 -67.8	Oct 84.76 10.89 ble 5 121.03 5 31.48 0 -67.8	Nov 84.76 12.71 131.41 31.48 0	Dec 84.76 13.55 141.16 31.48 0	eating	(66) (67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	3.97	x	11.28	x	0.63	x	0.7	=	13.69	(75)
Northeast 0.9x	0.77	x	1.92	x	11.28	x	0.63	x	0.7	=	6.62	(75)
Northeast 0.9x	0.77	X	3.97	x	22.97	x	0.63	x	0.7	=	27.87	(75)
Northeast 0.9x	0.77	x	1.92	x	22.97	x	0.63	x	0.7	=	13.48	(75)
Northeast 0.9x	0.77	x	3.97	x	41.38	x	0.63	x	0.7	=	50.2	(75)
Northeast 0.9x	0.77	x	1.92	x	41.38	x	0.63	x	0.7	=	24.28	(75)
Northeast 0.9x	0.77	x	3.97	x	67.96	x	0.63	x	0.7] =	82.45	(75)
Northeast 0.9x	0.77	x	1.92	x	67.96	x	0.63	x	0.7	=	39.87	(75)
Northeast 0.9x	0.77	x	3.97	x	91.35	x	0.63	x	0.7	=	110.83	(75)
Northeast 0.9x	0.77	x	1.92	x	91.35	x	0.63	x	0.7	=	53.6	(75)
Northeast 0.9x	0.77	x	3.97	x	97.38	x	0.63	x	0.7	=	118.15	(75)
Northeast 0.9x	0.77	x	1.92	x	97.38	x	0.63	x	0.7	=	57.14	(75)
Northeast 0.9x	0.77	x	3.97	x	91.1	x	0.63	x	0.7	=	110.53	(75)
Northeast 0.9x	0.77	x	1.92	x	91.1	x	0.63	x	0.7	=	53.46	(75)
Northeast 0.9x	0.77	x	3.97	x	72.63	x	0.63	X	0.7	=	88.12	(75)
Northeast 0.9x	0.77	X	1.92	x	72.63	X	0.63	X	0.7	=	42.62	(75)
Northeast 0.9x	0.77	X	3.97	x	50.42	x	0.63	X	0.7	=	61.17	(75)
Northeast 0.9x	0.77	x	1.92	x	50.42	x	0.63	x	0.7	=	29.59	(75)
Northeast 0.9x	0.77	x	3.97	x	28.07	x	0.63	x	0.7	=	34.05	(75)
Northeast 0.9x	0.77	X	1.92	x	28.07	x	0.63	X	0.7	=	16.47	(75)
Northeast 0.9x	0.77	x	3.97	x	14.2	x	0.63	x	0.7	=	17.22	(75)
Northeast 0.9x	0.77	x	1.92	x	14.2	x	0.63	x	0.7	=	8.33	(75)
Northeast 0.9x	0.77	x	3.97	x	9.21	x	0.63	x	0.7	=	11.18	(75)
Northeast 0.9x	0.77	x	1.92	x	9.21	x	0.63	x	0.7	=	5.41	(75)
Northwest 0.9x	0.77	X	1.73	x	11.28	X	0.63	X	0.7	=	11.93	(81)
Northwest 0.9x	0.77	x	1.73	x	22.97	x	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	1.73	x	41.38	X	0.63	X	0.7	=	43.75	(81)
Northwest 0.9x	0.77	x	1.73	x	67.96	X	0.63	X	0.7	=	71.86	(81)
Northwest 0.9x	0.77	x	1.73	x	91.35	x	0.63	X	0.7	=	96.59	(81)
Northwest 0.9x	0.77	x	1.73	x	97.38	x	0.63	X	0.7	=	102.98	(81)
Northwest 0.9x	0.77	x	1.73	x	91.1	X	0.63	X	0.7	=	96.33	(81)
Northwest 0.9x	0.77	x	1.73	x	72.63	x	0.63	x	0.7	=	76.8	(81)
Northwest 0.9x	0.77	X	1.73	x	50.42	x	0.63	x	0.7	=	53.32	(81)
Northwest 0.9x	0.77	X	1.73	x	28.07	x	0.63	x	0.7	=	29.68	(81)
Northwest 0.9x	0.77	x	1.73	x	14.2	x	0.63	x	0.7	=	15.01	(81)
Northwest 0.9x	0.77	X	1.73	x	9.21	x	0.63	x	0.7] =	9.74	(81)
Rooflights 0.9x	1	X	0.44	x	26	x	0.63	x	0.7] =	4.5	(82)
Rooflights 0.9x	1	X	0.74	x	26	×	0.63	x	0.7] =	7.68	(82)
Rooflights 0.9x	1	X	0.44	x	54	×	0.63	x	0.7] =	9.36	(82)
				-		•		•		-		_

Rooflights 0.9x	1	x	0.74	4	X	54] _x	0.63	×	0.7		15.95	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.44	==	x	96] x	0.63	×	0.7	╡ .	16.63	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.74		x	96] ^] x	0.63	-	0.7	╡ .	28.35	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.44	=	x	150] ^] _x	0.63	d °	0.7	╡ .	25.99	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.74	=	x	150] ^] _X	0.63	d ×	0.7	╡ .	44.3	(82)
Rooflights _{0.9x}	<u>'</u> 1	×	0.44		x	192] ^] x	0.63	_ ^ x	0.7	╡ .	33.26	(82)
Rooflights 0.9x	1	×	0.74	=	x	192] ^] x	0.63	┤ ^ ×	0.7	╡ .	56.71	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.44		x	200] ^] _x	0.63	d ×	0.7	╡ .	34.65	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.74	=	x	200] ^] x	0.63	d ×	0.7	╡ .	59.07	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.44		x	189] x	0.63	×	0.7	╡ -	32.74	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.74	=	x	189] x	0.63	×	0.7	╡ -	55.82	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.44	==	x	157] ^] x	0.63	d ×	0.7	╡ -	27.2	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.74	=	x	157] ^] _X	0.63	d ×	0.7	╡ .	46.37	(82)
Rooflights 0.9x	<u>'</u> 1	×	0.44		x	115] ^] _X	0.63	╡ ̈́	0.7	╡ -	19.92	(82)
Rooflights 0.9x	<u>'</u> 1	X	0.74		x	115] x	0.63	×	0.7	╡ .	33.96	(82)
Rooflights _{0.9x}	<u>'</u> 1	×	0.44		x	66] x	0.63	X	0.7	╡ .	11.43	(82)
Rooflights 0.9x	<u>·</u> 1	X	0.74	=	x	66] x	0.63	×	0.7	╡ .	19.49	(82)
Rooflights _{0.9x}	1	X	0.4	_	X	33]]	0.63	ا ×	0.7	= =	5.72	(82)
Rooflights 0.9x	1	x	0.74	==	X	33] x	0.63	╡ ×	0.7	= =	9.75	(82)
Rooflights 0.9x	1	×	0.4		X	21) x	0.63	ا ×	0.7	= =	3.64	(82)
Rooflights 0.9x	1	×	0.74		X	21] x	0.63	ا ×	0.7	= =	6.2	(82)
- L			<u> </u>				J	0.00		<u> </u>		<u> </u>	` ′
Solar gains in	watts, cal	culated	for each	n month	1		(83)m	n = Sum(74)m .	(82)m				
(83)m= 44.42	90.93	163.22	264.47	350.99		71.99 348.88	281		111.13	3 56.03	36.17		(83)
Total gains – i	nternal ar	nd solar	(84)m =	(73)m	+ (8	33)m , watts	•	•		•	•	•	
(84)m= 288.4	333.87	397.83	485.44	557.74	5	55.32 533.65	468	.89 392.91	319.82	2 280.54	272.9		(84)
7. Mean inter	nal tempe	erature (heating	seasor	ו)								
Temperature	during he	eating pe	eriods in	the liv	ing	area from Tal	ole 9	, Th1 (°C)				21	(85)
Utilisation fac	tor for ga	ins for li	ving are	a, h1,n	า (ร	ee Table 9a)							
Jan	Feb	Mar	Apr	May		Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 1	1	0.99	0.96	0.87		0.7 0.55	0.6	0.88	0.98	1	1		(86)
Mean interna	I tempera	ture in I	iving are	ea T1 (f	ollo	w steps 3 to 7	in T	able 9c)					
(87)m= 19.4	19.56	19.88	20.32	20.71	2	0.92 20.98	20.	96 20.77	20.27	19.76	19.38		(87)
Temperature	durina he	eating pe	eriods in	rest of	dw	elling from Ta	ble 9). Th2 (°C)		•	•		
(88)m= 19.75	19.76	19.76	19.77	19.78	$\overline{}$	9.79 19.79	19.		19.78	19.77	19.76		(88)
Utilisation fac	tor for a	ins for r	est of dv	velling	h2	m (see Tahle	921	1	·		!	1	
(89)m= 1	0.99	0.99	0.94	0.82	$\overline{}$	0.6 0.41	0.4	8 0.81	0.97	1	1		(89)
	<u> </u>					ļ.					I	I	•
Mean interna (90)m= 18.31	18.47	18.79	19.24	19.58	Ť	9.75 19.78	19.		e 9c) 19.19	18.69	18.3		(90)
(00)111- 10.01	1 10.77	10.19	10.27	10.00	<u> </u>	0.70	L 13.			ving area ÷ (4		0.47	(91)
				ala duv		~\ _ fl	. /1	fl A \ v TO		U (,	L 5.71	

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

(92)m= 1	8.83 18.9	9 19.3	19.75	20.12	20.31	20.35	20.34	20.18	19.7	19.19	18.81		(92)
Apply ac	djustment t	the mea	n interna	l temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 1	8.83 18.9	19.3	19.75	20.12	20.31	20.35	20.34	20.18	19.7	19.19	18.81		(93)
8. Space	e heating r	equiremen	t										
	the mean				ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	ation facto				i		ı						
	Jan Fe		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	on factor fo	<u> </u>	1			I				I			(0.4)
(94)m=	1 0.99		0.94	0.83	0.64	0.47	0.55	0.84	0.97	0.99	1		(94)
	ains, hmG	<u>`</u>	r ` ` 	·			0=0.07	222 =2			0=0.01		(05)
` ′	87.5 331.8		457.28	463.73	363.85	251.91	259.31	329.73	311.4	278.95	272.24		(95)
	average e	1	-	i		100	40.4	444	40.0				(00)
` '	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)
	s rate for r				· ·	-``	-``	<u> </u>			4004.50		(07)
` ′	29.53 995.7	ļ	755.38	584.55	391.9	257.49	270.02	419.39	632.05	844.04	1024.56		(97)
· —	eating requ		or each n	· ·	ı	r)m – (95 0	<u> </u>	ŕ	550.70		
(98)m= 55	52.07 446.	7 380.48	214.63	89.89	0	0	0		238.56	406.86	559.73		7,000
							Tota	I per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2888.38	(98)
Space h	eating requ	uirement ir	ı kWh/m²	²/year								57.57	(99)
8c. Spac	ce cooling	equireme	nt										
Calcu <u>lat</u>	ed for June	e, July and	August.	See Tal	ole 10b								
_ ,	Jan Fe	o Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat los	s rate Lm	calculated	l usina 2	5°C inter	nal temi	nerature.	and evt	arnal tan	nneratur	e from T	able 10)		
					ilai terri	·	and CAR	erriar teri	iperatui	 			
(100)m=	0 0	0	0	0	645.67	508.29	520.95	0	0	0	0		(100)
` ′	0 0 on factor fo	0	T -		· ·	i			·	i e	i i		(100)
` ′		0	T -		· ·	i			·	i e	i i		(100)
Utilisatio (101)m= Useful lo	on factor fo	loss hm	0	0	645.67 0.85	0.91	520.95 0.87	0	0	0	0		(101)
Utilisatio	on factor fo	loss hm	0	0	0.85	0.91	520.95 0.87	0	0	0	0		, ,
Utilisatio (101)m= Useful lo (102)m= Gains (s	on factor fo	0 loss hm 0 (Watts) = 0	0 (100)m >	0 0 (101)m 0	645.67 0.85 548.95 eather re	0.91 461.37 egion, se	520.95 0.87 451.53 e Table	0 0	0	0	0		(101)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m=	on factor fo 0 0 oss, hmLm 0 0 solar gains 0 0	0 loss hm 0 (Watts) = 0 calculated 0	0 (100)m > 0 for appli	0 ((101)m 0 cable we	645.67 0.85 548.95 eather re 709.09	0.91 461.37 egion, se	0.87 451.53 ee Table 599.52	0 0 10) 0	0 0	0 0 0	0 0		(101)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space c	on factor fo on	0 loss hm 0 (Watts) = 0 calculated 0 virement for	0 (100)m > 0 for applied 0 or month,	0 0 (101)m 0 cable we 0 whole co	645.67 0.85 548.95 eather re 709.09	0.91 461.37 egion, se	0.87 451.53 ee Table 599.52	0 0 10) 0	0 0	0 0	0 0		(101)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space c set (104	on factor fo on	0 loss hm 0 (Watts) = 0 calculated 0 uirement for if (104)m o	0 (100)m x 0 for appli 0 or month, < 3 × (98	0 (101)m 0 cable we 0 whole come o	0.85 548.95 eather re 709.09	0.91 461.37 egion, se 671.73	520.95 0.87 451.53 e Table 599.52 ous (kW	0 0 10) 0 (h) = 0.0	0 0 0 0 24 x [(10	0 0 0 0 03)m – (0 0 0 0 102)m];		(101)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space c	on factor fo on	0 loss hm 0 (Watts) = 0 calculated 0 virement for	0 (100)m > 0 for applied 0 or month,	0 0 (101)m 0 cable we 0 whole co	645.67 0.85 548.95 eather re 709.09	0.91 461.37 egion, se	0.87 451.53 ee Table 599.52	0 0 10) 0 (h) = 0.0	0 0 0 24 x [(10	0 0 0 0 03)m - (0 0 0 0 102)m]	x (41)m	(101) (102) (103)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space c set (104 (104)m=	on factor fo on	0 loss hm 0 (Watts) = 0 calculated 0 uirement for if (104)m o	0 (100)m x 0 for appli 0 or month, < 3 × (98	0 (101)m 0 cable we 0 whole come o	0.85 548.95 eather re 709.09	0.91 461.37 egion, se 671.73	520.95 0.87 451.53 e Table 599.52 ous (kW	0 0 10) 0 (h) = 0.0	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (0 1,0,4)	0 0 0 0 102)m]	x (41)m 381.91	(101) (102) (103)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space o set (104) (104)m= Cooled fra	on factor fo on	0 loss hm 0 (Watts) = 0 calculated 0 uirement for if (104)m 0	0 (100)m x 0 for appli 0 or month, < 3 × (98	0 (101)m 0 cable we 0 whole come o	0.85 548.95 eather re 709.09	0.91 461.37 egion, se 671.73	520.95 0.87 451.53 e Table 599.52 ous (kW	0 0 10) 0 (h) = 0.0	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (0 0 0 0 102)m]	x (41)m	(101) (102) (103)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space o set (104) (104)m= Cooled fra	on factor fo on	0 loss hm 0 (Watts) = 0 calculated 0 uirement for if (104)m 0	0 (100)m x 0 for appli 0 or month, < 3 × (98	0 (101)m 0 cable we 0 whole come o	0.85 548.95 eather re 709.09	0.91 461.37 egion, se 671.73	520.95 0.87 451.53 e Table 599.52 ous (kW	0 0 10) 0 (h) = 0.0	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (0 1,0,4)	0 0 0 0 102)m]	x (41)m 381.91	(101) (102) (103)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space c set (104 (104)m= Cooled fra Intermitte	on factor fo on	o loss hm 0 (Watts) = 0 calculated o direment for if (104)m o (Table 10t)	0 (100)m > 0 for appli 0 or month, < 3 × (98	0 0 (101)m 0 cable we 0 whole co)m 0	0.85 548.95 eather re 709.09 dwelling,	0.91 461.37 egion, se 671.73 continue	520.95 0.87 451.53 e Table 599.52 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 03)m - (0 1,0,4) area ÷ (4	0 0 0 102)m] 2	x (41)m 381.91	(101) (102) (103) (104) (105)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space c set (104 (104)m= Cooled fra Intermitte (106)m=	on factor fo on	0 loss hm 0 (Watts) = 0 calculated 0 lirement for if (104)m o (Table 10t 0 loss)	0 (100)m > 0 for appli 0 or month, < 3 × (98	0 0 (101)m 0 cable we 0 whole co)m 0	645.67 0.85 548.95 eather re 709.09 dwelling, 115.3	0.91 461.37 egion, se 671.73 continue 156.5	520.95 0.87 451.53 ee Table 599.52 ous (kW 110.1	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 03)m - (0 1,0,4) area ÷ (4	0 0 0 102)m];	x (41)m 381.91	(101) (102) (103)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space c set (104 (104)m= Cooled fra Intermitte (106)m=	on factor fo on factor gains on factor fo on factor factor on factor fo on fact	0 loss hm 0 (Watts) = 0 calculated 0 lirement for if (104)m o (Table 10t 0 loss)	0 (100)m > 0 for appli 0 or month, < 3 × (98	0 0 (101)m 0 cable we 0 whole co)m 0	645.67 0.85 548.95 eather re 709.09 dwelling, 115.3	0.91 461.37 egion, se 671.73 continue 156.5	520.95 0.87 451.53 ee Table 599.52 ous (kW 110.1	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 03)m - (0 1,0,4) area ÷ (4	0 0 0 102)m];	x (41)m 381.91	(101) (102) (103) (104) (105)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space o set (104) (104)m= Cooled fro Intermitte (106)m= Space co	on factor fo on factor fo on factor fo on factor fo on factor on factor fo on factor on factor fo on factor on f	o loss hm o (Watts) = o calculated o dif (104)m o (Table 10b) o calculated o (104)m o (Table 10b) o calculated o (Table 10b)	0 (100)m > 0 for appli 0 or month, < 3 × (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	645.67 0.85 548.95 eather re 709.09 dwelling, 115.3 0.25 × (105)	0.91 461.37 egion, se 671.73 continue 156.5 0.25 × (106)r	520.95 0.87 451.53 The Table of Sp9.52 599.52 110.1 0.25	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 (1,0,4)	0 0 0 102)m] 2 0 = 4) =	x (41)m 381.91	(101) (102) (103) (104) (105)
Utilisatio (101)m= Useful Ic (102)m= Gains (s (103)m= Space c set (104 (104)m= Cooled fra Intermitte (106)m= Space co (107)m=	on factor fo on factor gains on factor fo on factor fo on factor fo on factor fo on factor fac	o loss hm o (Watts) = o calculated o dif (104)m o calculated o o calculated	0 (100)m > 0 (100)m > 0 for applii 0 0 or month, < 3 × (98 0) 0 0 composed on the composed of	0 (101)m 0 cable we 0 whole c)m 0 (104)m 0	645.67 0.85 548.95 eather re 709.09 dwelling, 115.3 0.25 × (105)	0.91 461.37 egion, se 671.73 continue 156.5 0.25 × (106)r	520.95 0.87 451.53 The Table of Sp9.52 599.52 110.1 0.25	0 0 10) 0 Total 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 (1,0,4)	0 0 0 0 102)m]; 0 = 1) = 0	x (41)m 381.91 1 0	(101) (102) (103) (104) (105) (106)
Utilisatio (101)m= Useful Ic (102)m= Gains (s (103)m= Space c set (104 (104)m= Cooled fra Intermitte (106)m= Space co (107)m=	on factor fo on factor fo on factor fo on factor fo on factor on factor gains on factor on f	orement in	0 (100)m > 0 for appli 0 or month, < 3 × (98 0	0 (101)m 0 cable we 0 whole c)m 0 (104)m 0 year	645.67 0.85 548.95 eather re 709.09 dwelling, 115.3 0.25 × (105) 28.83	0.91 461.37 egion, se 671.73 continue 156.5 0.25 × (106)r 39.13	520.95 0.87 451.53 The Table see Table see 110.1 0.25 m 27.53	0 0 10) 0 Total 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled : 0 = Sum() 0 = Sum() (4) =	0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 (1,0,4)	0 0 0 0 102)m]; 0 = 1) = 0	x (41)m 381.91 1	(101) (102) (103) (104) (105) (106)
Utilisatio (101)m= Useful lo (102)m= Gains (s (103)m= Space c set (104 (104)m= Cooled fra Intermitte (106)m= Space co (107)m= Space co	on factor for 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	loss hm loss h	0 (100)m > 0 for appli 0 or month, < 3 × (98 0	0 (101)m 0 cable we 0 whole c)m 0 (104)m 0 year	645.67 0.85 548.95 eather re 709.09 dwelling, 115.3 0.25 × (105) 28.83	0.91 461.37 egion, se 671.73 continue 156.5 0.25 × (106)r 39.13	520.95 0.87 451.53 The Table see Table see 110.1 0.25 m 27.53	0 0 10) 0 Total 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled : 0 = Sum(0 = Sum(0 + S	0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,4) 0 1,0,7)	0 0 0 0 102)m]; 0 = 1) = 0	x (41)m 381.91 1 0 95.48 1.9	(101) (102) (103) (104) (105) (106) (107) (108)
Utilisatio (101)m= Useful Ic (102)m= Gains (s (103)m= Space c set (104 (104)m= Cooled fra Intermitte (106)m= Space co (107)m= Space co 8f. Fabric Fabric E	on factor fo on factor fo on factor fo on factor fo on factor on factor gains on factor on f	loss hm 0 (Watts) = 0 calculated 0 direment for 0 (Table 10t 0 rement for 0 rement in ficiency (ciency	0 (100)m > 0 (100)m > 0 for applii 0 0 or month, < 3 × (98 0 0) 0 cmonth = 0 0 kWh/m²/yalculatec	0 0 (101)m 0 cable we 0 whole o)m 0 (104)m 0 year lonly un	645.67 0.85 548.95 eather re 709.09 dwelling, 115.3 0.25 × (105) 28.83	0.91 461.37 egion, se 671.73 continue 156.5 0.25 × (106)r 39.13	520.95 0.87 451.53 The Table see Table see 110.1 0.25 m 27.53	0 0 10) 0 Total 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled : 0 = Sum() 0 = Sum() (4) =	0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,4) 0 1,0,7)	0 0 0 0 102)m]; 0 = 1) = 0	x (41)m 381.91 1 0	(101) (102) (103) (104) (105) (106)

Assessor Name: Chris Hocknell: Stroma Number: STRO016363 Software Version: Version: 1.0.4.16 Record Stroma Number: Stroma SAP 2012 Stroma Number: Software Version: Version: 1.0.4.16			l Isar I)etails: _						
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.16	Assessor Name:	Chris Hocknell	– - 0 361 L		a Num	ber:		STRO	016363	
## Action Control Cont										
Area(m²)		F	Property	Address	: Apartm	nent 2				
Area(m/*)		projono:								
Ground floor Ground floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Ground floor area TFA = (1a)+(1b)+(1c)+(1d)+(1c)+(1d)+(1d)+(1d)+(1d)+(1d)+(1d)+(1d)+(1d	1. Overall dwelling diffie	: IISIUIIS.	Are	a(m²)		Av. He	iaht(m)		Volume(m ³	³)
Dwelling volume	Ground floor				(1a) x			(2a) =	·	<u>^</u>
2. Ventilation rate: main heating heati	Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	59.25	(4)			_		
Number of chimneys	Dwelling volume				I (3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	159.98	(5)
Number of chimneys										
Number of chimneys	2. Ventuation rate.		ry	other		total			m³ per hou	ır
Number of intermittent fans 2	Number of chimneys		+ [0] = [0	X 4	40 =	0	(6a)
Number of passive vents	Number of open flues	0 + 0		0	Ī = Ē	0	x	20 =	0	(6b)
Number of flueless gas fires	Number of intermittent fa	ins				2	x	10 =	20	(7a)
Air changes per hour	Number of passive vents	;				0	x	10 =	0	(7b)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20	Number of flueless gas fi	ires				0	x 4	40 =	0	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 20					_					
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)					_			Air ch	nanges per ho	_
Number of storeys in the dwelling (ns) Additional infiltration (g)-1)x0.1 = 0 (10) (10)		•			continue fr			÷ (5) =	0.13	(8)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 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 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) + 100] = 0.15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0.16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) + 20] + (8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.78 (20) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4			<i>ia to (11)</i> ,	ouror wise t	oonanac n	0111 (0) 10	(10)		0	(9)
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 If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) * 100] = 0 Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 If based on air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.78 (20) Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0.29 Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	Additional infiltration						[(9)	-1]x0.1 =	0	(10)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0 0 (12)					•	ruction			0	(11)
If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 × (14) + 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) (17) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 × (19)] = 0.78 (20) Infiltration rate incorporating shelter factor (21) = (18) × (20) = 0.29 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	• • • • • • • • • • • • • • • • • • • •	•	o tne grea	ter wall are	ea (aπer					
Percentage of windows and doors draught stripped Window infiltration 0.25 - [0.2 x (14) + 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then (18) = [(17) + 20]+(8), otherwise (18) = (16) Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor (20) = 1 - [0.075 x (19)] = 0.78 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.29 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	•	,	.1 (seale	ed), else	enter 0				0	(12)
Window infiltration 0.25 - [0.2 x (14) + 100] = 0 (15) Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) = 0 (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area 5 (17) If based on air permeability value, then (18) = [(17) + 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 3 (19) Shelter factor (20) = 1 - [0.075 x (19)] = 0.78 (20) Infiltration rate incorporating shelter factor (21) = (18) x (20) = 0.29 (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 4.7 Wind Factor (22a)m = (22)m ÷ 4	•								0	=
Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16) Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) + 20] + (8)$, 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 Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78$ (20) Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.29$ (21) Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7 Wind Factor $(22a)m = (22)m \div 4$	-	s and doors draught stripped		0 25 - [0 2	9 x (14) ÷ 1	1001 =				= ' '
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = $ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = $ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$. ,	_	+ (15) =			=
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78 (20)$ Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.29 (21)$ Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Monthly average wind speed from Table 7 $(22)m = 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7$ Wind Factor $(22a)m = (22)m \div 4$		q50, expressed in cubic metro	es per ho	our per s	quare m	etre of e	envelope	area		≓` ′
Number of sides sheltered Shelter factor $ (20) = 1 - [0.075 \times (19)] = 0.78 $ (20) $ [10,075] = 0.78 $ (20) $ [21] = (18) \times (20) = 0.29 $ (21) $ [10,075] = 0.78 $ (20) $ [21] = (18) \times (20) = 0.29 $ (21) $ [10,075] = 0.78 $ (20) $ [21] = 0.78 $ (20) $ [21] = 0.78 $ (21) $ [21] = 0.78 $ (21) $ [22] = 0.29 $ (21) $ [21] = 0.78 $ (22) $ [21] = 0.78 $ (23) $ [21] = 0.78 $ (24) $ [22] = 0.78 $ (25) $ [23] = 0.78 $ (26) $ [22] = 0.78 $ (27) $ [22] = 0.78 $ (28) $ [23] = 0.78 $ (29) $ [23] = 0.78 $ (20) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (22) $ [23] = 0.78 $ (23) $ [23] = 0.78 $ (24) $ [23] = 0.78 $ (25) $ [23] = 0.78 $ (26) $ [23] = 0.78 $ (27) $ [23] = 0.78 $ (28) $ [23] = 0.78 $ (29) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (22) $ [23] = 0.78 $ (23) $ [23] = 0.78 $ (24) $ [23] = 0.78 $ (25) $ [23] = 0.78 $ (26) $ [23] = 0.78 $ (27) $ [23] = 0.78 $ (28) $ [23] = 0.78 $ (29) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (22) $ [23] = 0.78 $ (23) $ [23] = 0.78 $ (24) $ [23] = 0.78 $ (25) $ [23] = 0.78 $ (26) $ [23] = 0.78 $ (27) $ [23] = 0.78 $ (28) $ [23] = 0.78 $ (29) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (22) $ [23] = 0.78 $ (23) $ [23] = 0.78 $ (24) $ [23] = 0.78 $ (25) $ [23] = 0.78 $ (26) $ [23] = 0.78 $ (27) $ [23] = 0.78 $ (28) $ [23] = 0.78 $ (29) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (21) $ [23] = 0.78 $ (22) $ [23] = 0.78 $ (23) $ [23] = 0.78 $ (24) $ [23] = 0.78 $ (25) $ [23] = 0.78 $ (26) $ [23] = 0.78 $ (27) $ [23] = 0.78 $ (28) $ [23] = 0.$	If based on air permeabil	lity value, then $(18) = [(17) \div 20] +$	(8), otherw	vise (18) = ((16)				0.38	(18)
Shelter factor $ (20) = 1 - [0.075 \times (19)] = 0.78 $ (20) Infiltration rate incorporating shelter factor $ (21) = (18) \times (20) = 0.29 $ (21) Infiltration rate modified for monthly wind speed			ne or a de	gree air pe	rmeability	is being u	sed			
Infiltration rate incorporating shelter factor $ (21) = (18) \times (20) = $		2 0		(20) = 1 -	[0.075 x (*	19)] =				→ ' ' '
Infiltration rate modified for monthly wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		ting shelter factor		(21) = (18) x (20) =	<i>7</i> -				=
Monthly average wind speed from Table 7 (22)m= 5.1 5 4.9 4.4 4.3 3.8 3.7 4 4.3 4.5 4.7 Wind Factor (22a)m = (22)m ÷ 4	•	•							0.20	` ′
(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	Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Wind Factor (22a)m = (22)m ÷ 4	Monthly average wind sp	peed from Table 7							_	
	(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
	Wind Factor (22a)m = (2	2)m ÷ 4								
			0.95	0.92	1	1.08	1.12	1.18		

Calculate effective air change rate for the applicable cases Calculate effective air change rate for the applicable cases Calculate effective air change rate for the applicable cases Calculate effective air change rate for the applicable cases Calculate effective air change rate for the applicable cases Calculate effective air change rate Calculate effective air change rate Calculate Calculate	Adjusted infiltra	ation rate	allowi	ng for sh	ıelter an	d wind s	peed) =	(21a) x	(22a)m					
If mechanical ventilation: California Formation Formation	0.37	0.36	0.36	0.32	0.31	0.28	0.28	0.27	0.29	0.31	0.33	0.34]	
If exhaust air heat pump using Appendix N, (28b) = (23a) × Fmv (equation (NS)), otherwise (23b) = (23a) (23c) If balanced with heat recovery; efficiency in & allowing for in-use factor (from Table 4h) = 0 (24a) may 0			•	rate for t	he appli	cable ca	se	•	•			•		
The balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =				andiv N (2	3h) = (23c	a) v Emy (c	aguation (1	VEVV otho	nvico (23h	ı) = (23a)				==
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) – (23a)				
(24a) (24a) (24a) (24b) (24b			-	•	_					Ob.)	20h\ v [1 (00.0)		(23c)
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	· -		ı				- 	- ^ `	ŕ	' i	· -	```) + 100j]	(24a)
C24b m	` '												J	(210)
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				ı — ı			- 		ŕ	r ´ ` i		Ι ο	1	(24b)
The content of the						<u> </u>		<u> </u>					J	(=)
C24c)m=	,				•	•				.5 × (23b)			
The control of the			` 	<u> </u>	<u> </u>	r i	<u> </u>	ŕ	ŕ	`		0]	(24c)
The control of the	d) If natural	ventilatio	n or wh	ole hous	e positiv	ve input	ventilatio	on from I	oft				J	
Effective air change rate - enter (24a) or (24b) or (24c) or (24d) in box (25) (25) 25	,					•				0.5]			_	
Case	(24d)m= 0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(24d)
3. Heat losses and heat loss parameter: ELEMENT Gross Openings area (m²)	Effective air	change r	rate - en	iter (24a) or (24b	o) or (24	c) or (24	d) in box	x (25)				_	
ELEMENT Gross area (m²) Openings area (m²) Net Area A , m² U-value W/m2K A X U (W/K) k-value kJ/m²-K A X k kJ/K Doors 2 x 1 = 2 (26) Windows Type 1 4.89 x1/[1/(1.4) + 0.04] = 6.48 (27) Windows Type 2 2.49 x1/[1/(1.4) + 0.04] = 3.3 (27) Windows Type 3 1.9 x1/[1/(1.4) + 0.04] = 2.52 (27) Windows Type 4 2.58 x1/[1/(1.4) + 0.04] = 3.42 (27) Rooflights 0.9523603 x1/[1/(1.7) + 0.04] = 1.619012 (27) Walls Type1 38.95 11.86 27.09 x 0.18 = 4.88 (29) Walls Type2 45.47 2 43.47 x 0.18 = 7.82 (29) Roof 59.25 0.95 58.3 x 0.13 = 7.58 (30) Total area of elements, m² 143.67 Party floor 59.25 (31) ** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 1.33 (33) Heat capacity Cm = S(A x k) (26)(30) + (32) = 1.33 (33) Thermal mass parameter (TMP = Cm + TFA) in kJ/m²K Indicative value: Medium 250 (35) For design assessments where the details	(25)m= 0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56		(25)
ELEMENT Gross area (m²) Openings area (m²) Net Area A , m² U-value W/m2K A X U (W/K) k-value kJ/m²-K A X k kJ/K Doors 2 x 1 = 2 (26) Windows Type 1 4.89 x1/[1/(1.4) + 0.04] = 6.48 (27) Windows Type 2 2.49 x1/[1/(1.4) + 0.04] = 3.3 (27) Windows Type 3 1.9 x1/[1/(1.4) + 0.04] = 2.52 (27) Windows Type 4 2.58 x1/[1/(1.4) + 0.04] = 3.42 (27) Rooflights 0.9523603 x1/[1/(1.7) + 0.04] = 1.619012 (27) Walls Type1 38.95 11.86 27.09 x 0.18 = 4.88 (29) Walls Type2 45.47 2 43.47 x 0.18 = 7.82 (29) Roof 59.25 0.95 58.3 x 0.13 = 7.58 (30) Total area of elements, m² (143.67) Party wall 25.95 x 0 = 0 (32) Party floor 59.25 0.95 36.33 ** ionidows 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) = 39.52 33) 33) Thermal mass parameter (TMP = Cm + TFA) in	3. Heat losses	s and he	at loss r	paramete	er:									
Doors 2		Gros	S	Openin	gs						()			
Windows Type 1 4.89 x1/[1/(1.4) + 0.04] = 6.48 (27) Windows Type 2 2.49 x1/[1/(1.4) + 0.04] = 3.3 (27) Windows Type 3 1.9 x1/[1/(1.4) + 0.04] = 2.52 (27) Windows Type 4 2.58 x1/[1/(1.4) + 0.04] = 3.42 (27) Rooflights 0.9523603 x1/[1/(1.7) + 0.04] = 1.619012 (27b) Walls Type 1 38.95 11.86 27.09 x 0.18 = 4.88 (29) Walls Type 2 45.47 2 43.47 x 0.18 = 7.82 (29) Roof 59.25 0.95 58.3 x 0.13 = 7.58 (30) Total area of elements, m² 143.67 Party wall 25.95 x 0 = 0 (32) Party floor 59.25 39.52 30.30 * tor 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) = 39.52 (35) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 16820.08 (34) Thermal mass parameter (TMP = Cm + TFA) in kJ/m²K Indicative Values Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K	Doors		,						— ı	•	-, 			
Windows Type 3 2.49 x1/[1/(1.4) + 0.04]	Windows Type	<u>:</u> 1						<u> </u>	0.04] =		\dashv			, ,
Nindows Type 3						2 49	$=$ $_{x^1}$	/[1/(1.4)+	0.04] =		╡			, ,
Windows Type 4 Rooflights 0.9523603 x1/[1/(1.4) + 0.04] = 3.42 (27) Rooflights 0.9523603 x1/[1/(1.7) + 0.04] = 1.619012 (27b) Walls Type 1 38.95 11.86 27.09 x 0.18 = 4.88 (29) Walls Type 2 45.47 2 43.47 x 0.18 = 7.82 (29) Roof 59.25 0.95 58.3 x 0.13 = 7.58 (30) Total area of elements, m² 143.67 (31) Party wall 25.95 x 0 = 0 (32) Party floor *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) = 39.52 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 16820.08 (34) Thermal mass parameter (TMP = Cm + TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K 11.3 (36)	• •						_				╡			, ,
Rooflights	• •						= ,				\dashv			, ,
Walls Type1 38.95 11.86 27.09 x 0.18 = 4.88 (29) Walls Type2 45.47 2 43.47 x 0.18 = 7.82 (29) Roof 59.25 0.95 58.3 x 0.13 = 7.58 (30) Total area of elements, m² 143.67 (31) Party wall 25.95 x 0 = 0 (32) Party floor 59.25 (32a) * 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) = 39.52 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 16820.08 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K	• •	•					= .							
Walls Type2 45.47 2 43.47 \times 0.18 $=$ 7.82 (29) Roof 59.25 0.95 58.3 \times 0.13 $=$ 7.58 (30) Total area of elements, m² (31) Party wall 25.95 \times 0 $=$ 0 (32) Party floor 59.25 \times 0 $=$ 0 (32) \times * 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 \times U) $(26)(30) + (32) =$ (33) Heat capacity Cm = S(A \times K) $((28)(30) + (32) + (32a)(32e) =$ (33) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m²K Indicative Value: Medium (250) (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L \times Y) calculated using Appendix K	ū	28.00		11.00							-			
Roof 59.25 0.95 58.3 x 0.13 = 7.58 (30) Total area of elements, m² 143.67 (31) Party wall 25.95 x 0 = 0 (32) Party floor 59.25 (32a) * 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) = (32a)(32e) = (33a) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = (35a) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K	• •				<u>`</u>		=		=		<u> </u>		-	
Total area of elements, m² 143.67 Party wall 25.95 x 0 = 0 (32) Party floor 59.25 * 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) Heat capacity Cm = S(A x k) (26)(30) + (32) = 39.52 (33) Heat capacity Cm = S(A x k) (128)(30) + (32) + (32a)(32e) = 16820.08 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K	• •				=		=		=		- -		┥	
Party wall $ 25.95 \times 0 = 0 $ (32) Party floor $ 59.25 \times 0 = 0 $ (32a) * 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) = 39.52 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 16820.08 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K	ROOI	1 59.25	5	1 0 0 5			l X			7 5 2				(30)
Party floor * 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) Heat capacity Cm = S(A x k) (26)(30) + (32) = (128)(30) + (32) + (32a)(32e) = (16820.08) (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K	T-1-1			0.93		58.3	= ^ _	0.13	=	7.50				
* 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) = 39.52 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 16820.08 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K			m²	0.93			=	0.13	=	7.50				
** include the areas on both sides of internal walls and partitions Fabric heat loss, W/K = S (A x U) Heat capacity Cm = S(A x k) Thermal mass parameter (TMP = Cm \div TFA) in kJ/m²K Indicative Value: Medium Thermal bridges: S (L x Y) calculated using Appendix K (26)(30) + (32) = 39.52 (33) (34) (32) + (32a)(32e) = 16820.08 (34) (35) (35) (35) (35) (35) (35) (35) (35	Party wall		m²	0.90		143.6	7				_			(32)
Fabric heat loss, W/K = S (A x U) (26)(30) + (32) = 39.52 (33) Heat capacity Cm = S(A x k) ((28)(30) + (32) + (32a)(32e) = 16820.08 (34) Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges : S (L x Y) calculated using Appendix K 11.3 (36)	Party wall Party floor	lements,				143.6 25.95 59.25	7 x	0	=	0] []			(32)
Heat capacity $Cm = S(A \times K)$	Party wall Party floor * for windows and	lements,	ows, use e	effective wi	ndow U-va	143.6 25.95 59.25	7 x	0	=	0	[paragraph] []] 3.2	(32)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K Indicative Value: Medium 250 (35) For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K 11.3 (36)	Party wall Party floor * for windows and ** include the area	lements, roof windo	ows, use e sides of in	offective win	ndow U-va	143.6 25.95 59.25	7 X	0 formula 1	= /[(1/U-valu	0	[[s given in	paragraph		(32) (32a)
For design assessments where the details of the construction are not known precisely the indicative values of TMP in Table 1f can be used instead of a detailed calculation. Thermal bridges: S (L x Y) calculated using Appendix K 11.3 (36)	Party wall Party floor * for windows and ** include the area Fabric heat los	roof windo as on both s	ows, use e sides of in S (A x	offective win	ndow U-va	143.6 25.95 59.25	7 X	0 formula 1	= /[(1/U-valu) + (32) =	0 ue)+0.04] a			39.52	(32) (32a) (33)
Thermal bridges : S (L x Y) calculated using Appendix K	Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity	roof windo as on both s as, W/K = Cm = S(A	ows, use e sides of in S (A x A x k)	offective winternal wall	ndow U-va	143.6 25.95 59.25 alue calcul titions	7 X	0 formula 1	= /[(1/U-valu) + (32) = ((28).	0 ue)+0.04] a (30) + (32) + (32a).		39.52 16820.0	(32) (32a) (33) (34)
	Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity of Thermal mass For design assess	roof windo as on both s as, W/K = Cm = S(A paramet	ows, use e sides of in S (A x A x k) ter (TMF ere the det	offective winternal wall U) P = Cm ÷ tails of the	ndow U-va Is and part	143.6 25.95 59.25 alue calcul titions	7 X	0 formula 1 (26)(30)	= /[(1/U-valu) + (32) = ((28). Indica	0 ue)+0.04] a (30) + (32 tive Value:) + (32a). Medium	(32e) =	39.52 16820.0	(32) (32a) (33) (34)
if details of thermal bridging are not known (36) = 0.15 x (31)	Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess can be used instea	roof windo as on both s as, W/K = Cm = S(A paramet sments whe	ews, use e sides of in S (A x A x k) ter (TMF ere the det ailed calcu	offective winternal wall U) P = Cm ÷ tails of the culation.	ndow U-va ls and part - TFA) ir constructi	143.6 25.95 59.25 alue calcul titions n kJ/m²K	7 x 5 ated using	0 formula 1 (26)(30)	= /[(1/U-valu) + (32) = ((28). Indica	0 ue)+0.04] a (30) + (32 tive Value:) + (32a). Medium	(32e) =	39.52 16820.0 250	(32) (32a) (33) (38) (34) (35)

Total fabric heat loss					(33) +	(36) =		ĺ	50.82	(37)
Ventilation heat loss calculated month	ly				(38)m	= 0.33 × (25)m x (5)			
Jan Feb Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 30.02 29.88 29.74 29.09	28.97	28.41	28.41	28.3	28.63	28.97	29.22	29.47		(38)
Heat transfer coefficient, W/K					(39)m	= (37) + (3	38)m			
(39)m= 80.84 80.7 80.57 79.92	79.8	79.23	79.23	79.13	79.45	79.8	80.04	80.3		
Heat loss parameter (HLP), W/m²K						Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	79.92	(39)
(40)m= 1.36 1.36 1.35	1.35	1.34	1.34	1.34	1.34	1.35	1.35	1.36		
Number of days in month (Table 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.35	(40)
Jan Feb Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28 31 30	31	30	31	31	30	31	30	31		(41)
4. Water heating energy requirement	:							kWh/ye	ear:	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - ex if TFA £ 13.9, N = 1	p(-0.00034	ŀ9 x (TF	FA -13.9))2)] + 0.0	0013 x (⁻	ΓFA -13.		96		(42)
Annual average hot water usage in litted Reduce the annual average hot water usage by not more that 125 litres per person per day (all	5% if the dw	elling is o	designed t			se target o		.76		(43)
Jan Feb Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres per day for each mont	h Vd,m = facto	or from 7	Table 1c x	(43)						
(44)m= 88.83 85.6 82.37 79.14	75.91	72.68	72.68	75.91	79.14	82.37	85.6	88.83		
Energy content of hot water used - calculated r	nonthly = 4.19	90 x Vd,n	n x nm x D)Tm / 3600			m(44) ₁₁₂ = ables 1b, 1		969.1	(44)
(45)m= 131.74 115.22 118.9 103.66	99.46	85.83	79.53	91.26	92.35	107.63	117.49	127.58		
If instantaneous water heating at point of use (i	o hot water s	storage),	enter 0 in	boxes (46)		Γotal = Su	m(45) ₁₁₂ =		1270.64	(45)
(46)m= 0 0 0 0	ΙοΙ	0	0	0	0	0	0	0		(46)
Water storage loss:	1 - 1									
Storage volume (litres) including any	solar or WV	WHRS:	storage	within sa	me ves	sel		0		(47)
If community heating and no tank in d	_			` '						
Otherwise if no stored hot water (this	ncludes ins	stantan	eous co	mbi boil	ers) ente	er '0' in (47)			
Water storage loss: a) If manufacturer's declared loss fac	tor is know	ın (kWh	n/dav).					0		(48)
Temperature factor from Table 2b		(uu j /.					0		(49)
Energy lost from water storage, kWh/v	ear			(48) x (49)	=			0		(50)
b) If manufacturer's declared cylinder Hot water storage loss factor from Tal	loss factor		known:	, , , ,				0		(51)
If community heating see section 4.3	•		• /							` '
Volume factor from Table 2a								0		(52)
Temperature factor from Table 2b								0		(53)
Energy lost from water storage, kWh/y	/ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or (54) in (55)								0		(55)

Water stor	rage loss cal	culated t	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 co	ntains dedicate	d solar sto	rage, (57)ı	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 ci	rcuit loss (ar	nnual) fro	m Table	3							0		(58)
Primary ci	rcuit loss ca	lculated t	for each	month (59)m = ((58) ÷ 36	5 × (41)	m				•	
(modifie	ed by factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatir	ng and a	cylinde	r thermo	stat)			
(59)m=	0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi los	s calculated	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	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= 11	1.98 97.94	101.06	88.11	84.54	72.95	67.6	77.57	78.5	91.48	99.86	108.44		(62)
Solar DHW i	nput calculated	using App	endix G or	Appendix	H (negati	ve quantity) (enter '0	if no sola	r contribut	ion to wate	er heating)	'	
(add addit	ional 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 fro	m water hea	ıter	-		-	-				-	-		
(64)m= 11	1.98 97.94	101.06	88.11	84.54	72.95	67.6	77.57	78.5	91.48	99.86	108.44		
							Outp	out from wa	ater heate	r (annual) ₁	12	1080.05	(64)
Heat gains	s from water	heating,	kWh/mo	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	_
(65)m= 27	7.99 24.48	25.27	22.03	21.14	18.24	16.9	19.39	19.63	22.87	24.97	27.11	<u> </u>	(65)
							10.00	10.00	22.01	24.81	21.11		(55)
include	(57)m in cal	culation (of (65)m		l .					<u> </u>		l eating	(55)
	(57)m in cal		` '	only if c	l .					<u> </u>		eating	(00)
5. Intern	al gains (see	e Table 5	and 5a	only if c	l .					<u> </u>		eating	(65)
5. Intern	. ,	e Table 5	and 5a	only if c	l .			or hot w		<u> </u>		eating	
5. Intern	al gains (see	e Table 5	and 5a	only if c	ylinder i	s in the d	dwelling		ater is fr	om com	munity h	eating	(66)
5. Intern Metabolic J (66)m= 98	al gains (see gains (Table an Feb	e Table 5 e 5), Wat Mar 98.02	ts Apr 98.02	only if constant of the consta	ylinder is Jun 98.02	Jul 98.02	Aug 98.02	or hot w Sep 98.02	ater is fr Oct	om com	munity h	eating	
5. Intern Metabolic J (66)m= 98 Lighting ga	gains (Table an Feb 3.02 98.02	e Table 5 e 5), Wat Mar 98.02	ts Apr 98.02	only if constant of the consta	ylinder is Jun 98.02	Jul 98.02	Aug 98.02	or hot w Sep 98.02	ater is fr Oct	om com	munity h	eating	
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15	gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55	e Table 5 e 5), Wat Mar 98.02 tted in Ap	ts Apr 98.02 ppendix 8.34	May 98.02 L, equat	Jun 98.02 ion L9 o	Jul 98.02 r L9a), a	Aug 98.02 Iso see	Sep 98.02 Table 5	Oct 98.02	Nov 98.02	Dec 98.02	eating	(66)
5. Intern Metabolic (66)m= 98 Lighting ga (67)m= 15 Appliance	gains (Table gains (Table an Feb 3.02 98.02 ains (calcula	e Table 5 e 5), Wat Mar 98.02 tted in Ap	ts Apr 98.02 ppendix 8.34	May 98.02 L, equat	Jun 98.02 ion L9 o	Jul 98.02 r L9a), a	Aug 98.02 Iso see	Sep 98.02 Table 5	Oct 98.02	Nov 98.02	Dec 98.02	eating	(66)
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17	al gains (see gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55 s gains (calcula 1.05 172.83	Mar 98.02 ted in Ap 11.02 culated in 168.35	ts Apr 98.02 ppendix 8.34 Appendix 158.83	May 98.02 , equat 6.24 dix L, eq	Jun 98.02 ion L9 of 5.26 uation L	Jul 98.02 r L9a), a 5.69 13 or L1	Aug 98.02 lso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5 140.19	Nov 98.02	Dec 98.02	eating	(66) (67)
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g	gains (Table an Feb 98.02 98.02 ains (calcula 5.26 13.55 s gains (calcula	Mar 98.02 ted in Ap 11.02 culated in 168.35	ts Apr 98.02 ppendix 8.34 Appendix 158.83	May 98.02 , equat 6.24 dix L, eq	Jun 98.02 ion L9 of 5.26 uation L	Jul 98.02 r L9a), a 5.69 13 or L1	Aug 98.02 lso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5 140.19	Nov 98.02	Dec 98.02	eating	(66) (67)
5. Intern Metabolic (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 33	al gains (see gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55 as gains (calcula 1.05 172.83 ains (calcula 2.8 32.8	Mar 98.02 ted in Ap 11.02 culated in 168.35 ated in A 32.8	ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8	May 98.02 L, equat 6.24 dix L, eq 146.81 L, equat	Jun 98.02 ion L9 of 5.26 uation L 135.51	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a)	Aug 98.02 Iso see 7.39 3a), also 126.19	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5 140.19 5	Nov 98.02 14.71	Dec 98.02	eating	(66) (67) (68)
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 33 Pumps an	al gains (see gains (Table an Feb a.02 98.02 ains (calcula 5.26 13.55 s gains (calcula 1.05 172.83 ains (calcula	Mar 98.02 ted in Ap 11.02 culated in 168.35 ated in A 32.8	ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8	May 98.02 L, equat 6.24 dix L, eq 146.81 L, equat	Jun 98.02 ion L9 of 5.26 uation L 135.51	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a)	Aug 98.02 Iso see 7.39 3a), also 126.19	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5 140.19 5	Nov 98.02 14.71	Dec 98.02	eating	(66) (67) (68)
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 3: Pumps an (70)m=	al gains (see gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55 s gains (calcula 1.05 172.83 ains (calcula 2.8 32.8 d fans gains 0 0	Mar 98.02 ted in Ap 11.02 culated in 168.35 ated in A 32.8 c (Table \$	s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a)	only if controls: May 98.02 L, equat 6.24 dix L, equat 146.81 L, equat 32.8	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19 a, also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.71 152.21	Dec 98.02 15.68 163.5	eating	(66) (67) (68) (69)
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 32 Pumps an (70)m= Losses e.	al gains (see gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55 s gains (calcula 1.05 172.83 ains (calcula 2.8 32.8 d fans gains	Mar 98.02 ted in Ap 11.02 culated in 168.35 ated in A 32.8 c (Table \$	s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a)	only if controls: May 98.02 L, equat 6.24 dix L, equat 146.81 L, equat 32.8	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19 a, also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.71 152.21	Dec 98.02 15.68 163.5	eating	(66) (67) (68) (69)
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 33 Pumps an (70)m= Losses e.(71)m= -78	al gains (see gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55 s gains (calcula 1.05 172.83 ains (calcula 2.8 32.8 d fans gains 0 0 0 g. evaporatio	ted in Ap 11.02 culated in 168.35 ated in A 32.8 c (Table 5	ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 0 tive value	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L 135.51 iion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19 o, also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.71 152.21 32.8	Dec 98.02 15.68 163.5	eating	(66) (67) (68) (69) (70)
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 3: Pumps an (70)m= Losses e.((71)m= -78 Water hea	al gains (see gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55 s gains (calcula 1.05 172.83 ains (calcula 2.8 32.8 d fans gains 0 0 g. evaporatio 3.41 -78.41	ted in Ap 11.02 culated in 168.35 ated in A 32.8 c (Table 5	ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 0 tive value	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L 135.51 iion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19 o, also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.71 152.21 32.8	Dec 98.02 15.68 163.5	eating	(66) (67) (68) (69) (70)
5. Intern Metabolic (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 33 Pumps an (70)m= Losses e.g (71)m= -76 Water hea (72)m= 37	al gains (see gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55 s gains (calcula 2.8 32.8 d fans gains 0 0 0 g. evaporatio 3.41 -78.41 ating gains (Table 3.41 -78.41	e Table 5 e 5), Wat Mar 98.02 ted in Ap 11.02 culated in 168.35 ated in A 32.8 c (Table 5 0 on (negat -78.41 Table 5) 33.96	ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 0 tive value -78.41	only if constructions only if constructions only if constructions on the construction of the construction	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8 0 le 5) -78.41	Jul 98.02 r L9a), a 5.69 13 or L1: 127.97 or L15a; 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19 o, also se 32.8 0	Sep 98.02 Table 5 9.92 See Ta 130.66 ee Table 32.8 0 -78.41	Oct 98.02 12.6 ble 5 140.19 5 32.8 0 -78.41	Nov 98.02 14.71 152.21 32.8 0 -78.41 34.67	Dec 98.02 15.68 163.5 0 -78.41 36.44	eating	(66) (67) (68) (69) (70) (71)
5. Intern Metabolic J (66)m= 98 Lighting ga (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 33 Pumps an (70)m= Losses e. (71)m= -78 Water hea (72)m= 37 Total inte	al gains (see gains (Table an Feb 3.02 98.02 ains (calcula 5.26 13.55 s gains (calcula 1.05 172.83 ains (calcula 2.8 32.8 d fans gains 0 0 g. evaporatio 3.41 -78.41 ating gains (7.63 36.43	e Table 5 e 5), Wat Mar 98.02 ted in Ap 11.02 culated in 168.35 ated in A 32.8 c (Table 5 0 on (negat -78.41 Table 5) 33.96	ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 0 tive value -78.41	only if constructions only if constructions only if constructions on the construction of the construction	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8 0 le 5) -78.41	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19 o, also se 32.8 0	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8 0 -78.41	Oct 98.02 12.6 ble 5 140.19 5 32.8 0 -78.41	Nov 98.02 14.71 152.21 32.8 0 -78.41 34.67	Dec 98.02 15.68 163.5 0 -78.41 36.44	eating	(66) (67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	x	2.49	x	11.28	x	0.63	x	0.7	=	8.59	(75)
Northeast 0.9x	0.77	x	2.49	x	22.97	x	0.63	x	0.7	=	17.48	(75)
Northeast 0.9x	0.77	x	2.49	x	41.38	x	0.63	x	0.7	=	31.49	(75)
Northeast 0.9x	0.77	x	2.49	x	67.96	x	0.63	x	0.7	=	51.71	(75)
Northeast 0.9x	0.77	x	2.49	x	91.35	X	0.63	x	0.7	=	69.51	(75)
Northeast 0.9x	0.77	x	2.49	x	97.38	x	0.63	x	0.7	=	74.11	(75)
Northeast 0.9x	0.77	x	2.49	x	91.1	x	0.63	x	0.7	=	69.33	(75)
Northeast 0.9x	0.77	x	2.49	x	72.63	x	0.63	x	0.7	=	55.27	(75)
Northeast 0.9x	0.77	x	2.49	x	50.42	x	0.63	x	0.7	=	38.37	(75)
Northeast 0.9x	0.77	x	2.49	x	28.07	x	0.63	x	0.7	=	21.36	(75)
Northeast 0.9x	0.77	x	2.49	x	14.2	x	0.63	x	0.7	=	10.8	(75)
Northeast 0.9x	0.77	x	2.49	x	9.21	x	0.63	x	0.7	=	7.01	(75)
Northwest 0.9x	0.77	x	4.89	x	11.28	x	0.63	x	0.7	=	16.86	(81)
Northwest 0.9x	0.77	x	1.9	x	11.28	x	0.63	x	0.7	=	6.55	(81)
Northwest 0.9x	0.77	x	2.58	x	11.28	x	0.63	x	0.7	=	8.9	(81)
Northwest 0.9x	0.77	x	4.89	x	22.97	x	0.63	X	0.7	=	34.32	(81)
Northwest 0.9x	0.77	x	1.9	x	22.97	x	0.63	X	0.7	=	13.34	(81)
Northwest 0.9x	0.77	X	2.58	x	22.97	x	0.63	x	0.7	=	18.11	(81)
Northwest 0.9x	0.77	X	4.89	x	41.38	x	0.63	x	0.7	=	61.84	(81)
Northwest 0.9x	0.77	x	1.9	x	41.38	x	0.63	X	0.7	=	24.03	(81)
Northwest 0.9x	0.77	X	2.58	x	41.38	x	0.63	x	0.7	=	32.63	(81)
Northwest 0.9x	0.77	X	4.89	x	67.96	x	0.63	x	0.7	=	101.56	(81)
Northwest 0.9x	0.77	x	1.9	x	67.96	x	0.63	x	0.7	=	39.46	(81)
Northwest 0.9x	0.77	x	2.58	x	67.96	x	0.63	x	0.7	=	53.58	(81)
Northwest 0.9x	0.77	x	4.89	x	91.35	X	0.63	X	0.7	=	136.51	(81)
Northwest 0.9x	0.77	x	1.9	x	91.35	x	0.63	x	0.7	=	53.04	(81)
Northwest 0.9x	0.77	x	2.58	x	91.35	x	0.63	x	0.7	=	72.02	(81)
Northwest 0.9x	0.77	x	4.89	x	97.38	x	0.63	X	0.7	=	145.54	(81)
Northwest 0.9x	0.77	x	1.9	x	97.38	x	0.63	x	0.7	=	56.55	(81)
Northwest 0.9x	0.77	x	2.58	x	97.38	x	0.63	x	0.7	=	76.79	(81)
Northwest 0.9x	0.77	x	4.89	x	91.1	x	0.63	x	0.7	=	136.15	(81)
Northwest 0.9x	0.77	X	1.9	x	91.1	x	0.63	x	0.7	=	52.9	(81)
Northwest 0.9x	0.77	X	2.58	x	91.1	x	0.63	x	0.7	=	71.83	(81)
Northwest 0.9x	0.77	X	4.89	x	72.63	x	0.63	x	0.7	=	108.54	(81)
Northwest 0.9x	0.77	x	1.9	x	72.63	x	0.63	x	0.7] =	42.17	(81)
Northwest 0.9x	0.77	X	2.58	x	72.63	x	0.63	x	0.7] =	57.26	(81)
Northwest 0.9x	0.77	X	4.89	x	50.42	x	0.63	x	0.7] =	75.35	(81)
Northwest 0.9x	0.77	X	1.9	x	50.42	x	0.63	х	0.7	j =	29.28	(81)
Northwest 0.9x	0.77	X	2.58	x	50.42	x	0.63	x	0.7	j =	39.76	(81)
				-		-		•		-		

	st 0.9x 0.77 x 1.9 x 28.07 x 0.63 x 0.7 = 16.3 (81) st 0.9x 0.77 x 2.58 x 28.07 x 0.63 x 0.7 = 22.13 (81) st 0.9x 0.77 x 4.89 x 14.2 x 0.63 x 0.7 = 21.22 (81) st 0.9x 0.77 x 1.9 x 14.2 x 0.63 x 0.7 = 8.24 (81) st 0.9x 0.77 x 2.58 x 14.2 x 0.63 x 0.7 = 8.24 (81) st 0.9x 0.77 x 4.89 x 9.21 x 0.63 x 0.7 = 13.77 (81) st 0.9x 0.77 x 1.9 x 9.21 x 0.63 x 0.7 = 5.35 (81) st 0.9x 1 x 0.95 x 26 x 0.63 x<														
Northwest	t _{0.9x}	0.77	x	4.8	39	X	28.07	,	х	0.63	x	0.7	=	41.94	(81)
Northwest	t _{0.9x}	0.77	×	1.9	9	X	28.07	╡,	x $ar{\ }$	0.63	×	0.7	=	16.3	(81)
Northwest	0.9x	0.77	×	2.5	58	X	28.07	= ;	x =	0.63	x	0.7	<u> </u>	22.13	(81)
Northwest	0.9x	0.77	×	4.8	39	X	14.2	= ;	x F	0.63	×	0.7	=	21.22	(81)
Northwest	0.9x	0.77	×	1.9	9	X	14.2	= ,	x $\bar{\ }$	0.63	X	0.7	-	8.24	(81)
Northwest	t _{0.9x}	0.77	×	2.5	i8	X	14.2	╡,	x	0.63	×	0.7	=	11.19	(81)
Northwest	t 0.9x	0.77	×	4.8	39	X	9.21	<u> </u>	x $ar{ar{}}$	0.63	x	0.7	=	13.77	(81)
Northwest	t _{0.9x}	0.77	×	1.9	9	X	9.21	<u> </u>	x $ar{ar{}}$	0.63	×	0.7	=	5.35	(81)
Northwest	t _{0.9x}	0.77	×	2.5	58	X	9.21	<u> </u>	x [0.63	x	0.7	=	7.27	(81)
Rooflights	0.9x	1	x	0.9)5	X	26]	x [0.63	X	0.7	=	9.83	(82)
Rooflights	0.9x	1	x	0.9	95	X	54		x	0.63	x	0.7	=	20.41	(82)
Rooflights	0.9x	1	x	0.9	95	X	96] ;	x	0.63	x	0.7	=	36.29	(82)
Rooflights	0.9x	1	x	0.9)5	X	150] ;	x [0.63	x	0.7	=	56.7	(82)
Rooflights	0.9x	1	X	0.9)5	X	192] ;	x	0.63	X	0.7	=	72.57	(82)
Rooflights	0.9x	1	X	0.9)5	X	200] ;	x [0.63	X	0.7	=	75.6	(82)
Rooflights	0.9x	1	X	0.9	95	X	189] ;	x [0.63	x	0.7	=	71.44	(82)
Rooflights	0.9x	1	X	0.9	95	X	157		x	0.63	x	0.7	=	59.34	(82)
Rooflights	0.9x	1	X	0.9	95	X	115		x	0.63	x	0.7	=	43.47	(82)
Rooflights	0.9x	1	X	0.9	95	X	66] ;	x [0.63	x	0.7	=	24.95	(82)
Rooflights	0.9x	1	X	0.9	95	X	33		x [0.63	x	0.7	=	12.47	(82)
Rooflights	0.9x	1	X	0.9	95	X	21		x [0.63	x	0.7	=	7.94	(82)
<u> </u>						_		<u> </u>					Ι	1	
` ′									322.5	9 226.22	126.68	63.93	41.34		(83)
				` '	·	-						_	1	1	(0.1)
(84)m= 3	27.06	378.87	452	553.18	637.52	6	47.09 610.42	2 5	34.6	64 446.47	362.61	317.93	309.36		(84)
7. Mear	interna	al tempera	ature ((heating	seaso	n)									
Temper	ature d	uring hea	ting pe	eriods ir	n the liv	ing	area from T	able	9,	Th1 (°C)				21	(85)
Utilisatio	on facto	r for gain	s for li	ving are	ea, h1,r	n (s	ee Table 9a)					1	-	
<u></u>	Jan	Feb	Mar	Apr	May		Jun Jul		Au	g Sep	Oct	Nov	Dec		
(86)m=	1	1 ().99	0.96	0.87		0.71 0.55		0.64	0.89	0.99	1	1		(86)
Mean ir	iternal t	emperatu	re in I	iving are	ea T1 (follo	w steps 3 to	7 ir	n Ta	able 9c)					
(87)m=	19.44	19.59 1	19.9	20.33	20.72	2	20.92	1 2	20.96	6 20.77	20.28	19.78	19.41		(87)
Temper	ature d	uring hea	ting pe	eriods ir	n rest o	f dw	elling from	Table	e 9,	Th2 (°C)					
· -	19.79		9.79	19.8	19.8	$\overline{}$	9.81 19.81	$\overline{}$	19.8°	 	19.8	19.8	19.8]	(88)
Utilisatio	on facto	or for gain	s for r	est of d	wellina.	h2	m (see Tab	le 9a	a)			•		•	
(89)m=	1	`	0.99	0.95	0.82	$\overline{}$	0.6 0.41	\neg	0.49	0.82	0.98	1	1]	(89)
∟ Mean ir	iternal t	emperatu	re in t	he rest	of dwel	lina	T2 (follow s	tens	3 t	o 7 in Table	90)				
	18.38		8.84	19.27	19.62	Ť	9.78 19.81	-	19.8		19.22	18.73	18.36	1	(90)
()				··			1 .5.5					ing area ÷ (4	ļ	0.47	(91)
												- `			 ` ′

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

(92)m= 18.87	19.03	19.34	19.77	20.13	20.31	20.36	20.35	20.19	19.72	19.22	18.85		(92)
Apply adjustr	nent to t	he mean	interna	tempera	ature fro	m Table	4e, whe	ere appro	priate	•			
(93)m= 18.87	19.03	19.34	19.77	20.13	20.31	20.36	20.35	20.19	19.72	19.22	18.85		(93)
8. Space hea	ting requ	uirement											
Set Ti to the					ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisation	i	or gains	using Ta	ble 9a									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac		ains, hm											
(94)m= 1	0.99	0.99	0.95	0.84	0.65	0.48	0.56	0.85	0.98	1	1		(94)
Useful gains,	r		<u> </u>	_									
(95)m= 326.21	376.88	445.28	523.42	533.81	420.49	291.26	299.8	378.46	354.14	316.39	308.74		(95)
Monthly aver			-			1				1	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					i		-``	·	Ī	1	ı		
` '	1140.29	1034.11	868.58	672.7	452.68	297.56	312.21	483.63	727.39	970.34	1176.3		(97)
Space heatin		r						·					
(98)m= 633.89	513.01	438.09	248.51	103.34	0	0	0	0	277.7	470.84	645.47		_
							Tota	I per year	(kWh/year) = Sum(9	8) _{15,912} =	3330.85	(98)
Space heatin	g require	ement in	kWh/m²	/year								56.22	(99)
8c. Space co	olina red	uiremen	t										
Calculated fo	Ĭ			See Tab	ole 10h								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss rate	L		•		L	l				L	able 10)		
						Joiataic	מווע כאני	zillai leli	ipcialui				
(100)m= 0	0	0	0	0	744.78	586.32	601.37	0	0	0	0		(100)
(100)m= 0 Utilisation fac	0	0			· ·	1			·	i e	ı – í		(100)
(11)	0	0			· ·	1			·	i e	ı – í		(100)
Utilisation fac	0 etor for lo	0 pss hm 0	0	0	744.78	586.32	601.37	0	0	0	0		, ,
Utilisation fac	0 etor for lo	0 pss hm 0	0	0	744.78	586.32	0.87	0	0	0	0		, ,
Utilisation fac	0 tor for lo 0 mLm (V 0	0 pss hm 0 Vatts) = (0 0 100)m x 0	0 0 (101)m 0	744.78 0.85 634.95	586.32 0.91 533.42	0.87 521.62	0 0	0	0	0		(101)
Utilisation factors (101)m= 0 Useful loss, h (102)m= 0	0 tor for lo 0 mLm (V 0	0 pss hm 0 Vatts) = (0 0 100)m x 0	0 0 (101)m 0	744.78 0.85 634.95	586.32 0.91 533.42	0.87 521.62	0 0	0	0	0		(101)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar expression)	0 stor for lo	0 pss hm 0 Vatts) = (0 lculated 0	0 0 100)m x 0 for appli	0 0 (101)m 0 cable we	744.78 0.85 634.95 eather re 816.85	586.32 0.91 533.42 egion, se 773.25	601.37 0.87 521.62 ee Table 687.86	0 0 10) 0	0 0	0 0	0 0		(101)
Utilisation factors (101)m= 0 Useful loss, h (102)m= 0 Gains (solar (103)m= 0	0 stor for lo 0 mLm (V 0 gains ca 0 g require	0 pss hm 0 Vatts) = (0 lculated 0 ement fo	0 100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole of	744.78 0.85 634.95 eather re 816.85	586.32 0.91 533.42 egion, se 773.25	601.37 0.87 521.62 ee Table 687.86	0 0 10) 0	0 0	0 0	0 0		(101) (102)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar (103)m= 0 Space cooling	0 stor for lo 0 mLm (V 0 gains ca 0 g require	0 pss hm 0 Vatts) = (0 lculated 0 ement fo	0 100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole of	744.78 0.85 634.95 eather re 816.85	586.32 0.91 533.42 egion, se 773.25	601.37 0.87 521.62 ee Table 687.86	0 0 10) 0	0 0	0 0	0 0		(101) (102)
Utilisation fact (101)m= 0 Useful loss, h (102)m= 0 Gains (solar of the cooling set (104)m to th	otor for lo	0 ss hm 0 vatts) = (0 lculated 0 ement for 104)m <	0 0 100)m x 0 for appli 0 r month,	0 (101)m 0 cable we 0 whole o	744.78 0.85 634.95 eather re 816.85	586.32 0.91 533.42 egion, se 773.25 continuo	601.37 0.87 521.62 ee Table 687.86 ous (kW	0 0 10) 0 (h) = 0.0	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (0 104)	0 0 0 102)m]		(101) (102)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction	0 stor for lo	0 pss hm 0 Vatts) = (0 lculated 0 ement fo. 104)m <	0 100)m x 0 for appli 0 r month, 3 × (98	0 (101)m 0 cable we 0 whole o	744.78 0.85 634.95 eather re 816.85	586.32 0.91 533.42 egion, se 773.25 continuo	601.37 0.87 521.62 ee Table 687.86 ous (kW	0 0 10) 0 (h) = 0.0	0 0 0 24 x [(10 0 = Sum(0 0 0 0 03)m - (0 0 0 102)m]	x (41)m	(101) (102) (103)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction Intermittency for the cooled factors (104)m for the cooled fraction (104)m= 0	otor for lo	0 ss hm 0 vatts) = (0 lculated 0 ement for 104)m < 0	0 0 100)m x 0 for appli 0 r month, 3 x (98	0 0 (101)m 0 cable we 0 whole o)m 0	744.78 0.85 634.95 eather re 816.85 dwelling,	586.32 0.91 533.42 egion, se 773.25 continue	601.37 0.87 521.62 ee Table 687.86 ous (kW 123.68	0 0 10) 0 (h) = 0.0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 03)m - (0 1,0,4) area ÷ (4	0 0 0 102)m];	x (41)m 433.08	(101) (102) (103)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction	0 stor for lo	0 pss hm 0 Vatts) = (0 lculated 0 ement fo. 104)m <	0 100)m x 0 for appli 0 r month, 3 × (98	0 (101)m 0 cable we 0 whole o	744.78 0.85 634.95 eather re 816.85	586.32 0.91 533.42 egion, se 773.25 continuo	601.37 0.87 521.62 ee Table 687.86 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled	0 0 0 03)m - (0 1,0,4) area ÷ (4	0 0 0 102)m]	x (41)m 433.08	(101) (102) (103) (104) (105)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar of (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction Intermittency for (106)m= 0	otor for lo	0 pss hm 0 Vatts) = (0 lculated 0 ement for 104)m < 0 able 10b 0	0 100)m x 0 for appli 0 r month, 3 × (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	744.78 0.85 634.95 eather re 816.85 dwelling, 130.97	586.32 0.91 533.42 egion, se 773.25 continue 178.44	0.87 521.62 ee Table 687.86 ous (kW 123.68	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 03)m - (0 1,0,4) area ÷ (4	0 0 0 102)m];	x (41)m 433.08	(101) (102) (103)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar of (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction Intermittency for (106)m= 0 Space cooling	otor for lo	ops hm op	0 0 100)m x 0 for appli 0 r month, 3 × (98 0	0 0 (101)m 0 cable we 0 whole of	744.78 0.85 634.95 eather re 816.85 dwelling, 130.97 0.25 × (105)	586.32 0.91 533.42 egion, se 773.25 continue 178.44 0.25 × (106)r	601.37 0.87 521.62 e Table 687.86 ous (kW 123.68	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled	0 0 0 0 0 03)m - (0 1,04) area ÷ (4	0 0 0 102)m];	x (41)m 433.08 1	(101) (102) (103) (104) (105)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar of (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction Intermittency for (106)m= 0	otor for lo	0 pss hm 0 Vatts) = (0 lculated 0 ement for 104)m < 0 able 10b 0	0 100)m x 0 for appli 0 r month, 3 × (98 0	0 0 (101)m 0 cable we 0 whole co)m 0	744.78 0.85 634.95 eather re 816.85 dwelling, 130.97	586.32 0.91 533.42 egion, se 773.25 continue 178.44	0.87 521.62 ee Table 687.86 ous (kW 123.68	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled to	0 0 0 0 0 0 1,0,4) area ÷ (4 0 (1,0,4)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	x (41)m 433.08 1	(101) (102) (103) (104) (105) (106)
Utilisation fact (101)m= 0 Useful loss, r (102)m= 0 Gains (solar of the set (104)m to the set (104)m to the set (106)m= 0 Cooled fraction Intermittency f (106)m= 0 Space cooling (107)m= 0	otor for lo	0 pss hm 0 Vatts) = (0 lculated 0 ement for 104)m < 0 ment for 0	0 100)m x 0 for appli 0 r month, 3 × (98 0) 0 month =	0 0 (104)m 0 0 (104)m 0	744.78 0.85 634.95 eather re 816.85 dwelling, 130.97 0.25 × (105)	586.32 0.91 533.42 egion, se 773.25 continue 178.44 0.25 × (106)r	601.37 0.87 521.62 e Table 687.86 ous (kW 123.68	0 0 10) 0 Total 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled to 0) = Sum(0 = Sum(0 0 0 0 0 0 1,0,4) area ÷ (4 0 (1,0,4)	0 0 0 102)m];	x (41)m 433.08 1	(101) (102) (103) (104) (105) (106)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar of (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction Intermittency for (106)m= 0 Space cooling	otor for lo	0 pss hm 0 Vatts) = (0 lculated 0 ement for 104)m < 0 ment for 0	0 100)m x 0 for appli 0 r month, 3 × (98 0) 0 month =	0 0 (104)m 0 0 (104)m 0	744.78 0.85 634.95 eather re 816.85 dwelling, 130.97 0.25 × (105)	586.32 0.91 533.42 egion, se 773.25 continue 178.44 0.25 × (106)r	601.37 0.87 521.62 e Table 687.86 ous (kW 123.68	0 0 10) 0 Total 0 Total 0 Total	0 0 0 24 x [(10 0 = Sum(cooled to	0 0 0 0 0 0 1,0,4) area ÷ (4 0 (1,0,4)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	x (41)m 433.08 1	(101) (102) (103) (104) (105) (106)
Utilisation fact (101)m= 0 Useful loss, r (102)m= 0 Gains (solar of the set (104)m to the set (104)m to the set (106)m= 0 Cooled fraction Intermittency f (106)m= 0 Space cooling (107)m= 0	otor for lo	ops hm ovatts) = (0 0 100)m x 0 for appli 0 r month, 3 × (98 0 month = 0	0 0 (104)m 0 (104)m 0	744.78 0.85 634.95 eather re 816.85 dwelling, 130.97 0.25 × (105) 32.74	586.32 0.91 533.42 egion, se 773.25 continue 178.44 0.25 × (106)r 44.61	0.87 521.62 ee Table 687.86 ous (kW 123.68 0.25	0 0 10) 0 Total 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled : 0 = Sum(0 = Sum(0 : (4) =	0 0 0 0 0 0 1,0,4) area ÷ (4 0 (1,0,4)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	x (41)m 433.08 1	(101) (102) (103) (104) (105) (106)
Utilisation factors (101)m= 0 Useful loss, r (102)m= 0 Gains (solar of the color of	otor for lo	obss hm obss hm obss hm obss hm obss hm observed and observed above the served above the se	0 0 100)m x 0 for appli 0 r month, 3 × (98 0 month = 0	0 0 (104)m 0 (104)m 0	744.78 0.85 634.95 eather re 816.85 dwelling, 130.97 0.25 × (105) 32.74	586.32 0.91 533.42 egion, se 773.25 continue 178.44 0.25 × (106)r 44.61	0.87 521.62 ee Table 687.86 ous (kW 123.68 0.25	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled : 0 = Sum(0 = Sum(0 : (4) =	0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,7)	0 0 0 0 102)m];	x (41)m 433.08 1	(101) (102) (103) (104) (105) (106)
Utilisation factors (101)m= 0 Useful loss, horizontal (102)m= 0 Gains (solar (103)m= 0 Space cooling set (104)m to (104)m= 0 Cooled fraction Intermittency for (106)m= 0 Space cooling (107)m= 0 Space cooling (107)m= 0	otor for lo	ops hm op	0 100)m x 0 for appli 0 r month, 3 × (98 0 month = 0	0 0 (101)m 0 cable we 0 whole of)m 0 (104)m 0 vear only un	744.78 0.85 634.95 eather re 816.85 dwelling, 130.97 0.25 × (105) 32.74	586.32 0.91 533.42 egion, se 773.25 continue 178.44 0.25 × (106)r 44.61	0.87 521.62 ee Table 687.86 ous (kW 123.68 0.25	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled b) 0 = Sum(0 = Sum(0 + (4) =	0 0 0 0 0 0 0 1,0,4) area ÷ (4 0 1,0,7)	0 0 0 0 102)m];	433.08 1 0 108.27 1.83	(101) (102) (103) (104) (105) (106) (107) (108)

			User D	otaile:						
A N	Obrida I I a alva all	(- NI			OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	2		Stroma Softwa					016363 on: 1.0.4.16	
Software Hame.	Ottoma 1 O/ ti 201			Address:				VCISIO	71. 1.0.4.10	
Address :			, ,							
1. Overall dwelling dime	ensions:									
Ground floor				a(m²)	(1-)		ight(m)] ₍₀₌₎ =	Volume(m³	<u>-</u>
	N. (41 N. (4 N. (4 IN. (4	\.			(1a) x		2.7	(2a) =	196.69	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	7:	2.85	(4)					_
Dwelling volume					(3a)+(3b))+(3c)+(3c	l)+(3e)+	.(3n) =	196.69	(5)
2. Ventilation rate:	main se	econdary		other		total			m³ per hou	r
North an of all large are	heating h	eating	_		, ₋ -			40 - 1	-	_
Number of chimneys	0 +	0	+ _	0] = [0		40 =	0	(6a)
Number of open flues	0 +	0	+	0]	0		20 =	0	(6b)
Number of intermittent fa					L	3	X '	10 =	30	(7a)
Number of passive vents	;					0	X '	10 =	0	(7b)
Number of flueless gas f	ires					0	X 4	40 =	0	(7c)
								Air ch	anges per ho	our
Infiltration due to chimne	vs_flues and fans = (6)	a)+(6b)+(7a))+(7b)+(7	7c) =	Г	30		÷ (5) =	0.15	(8)
	peen carried out or is intende				ontinue fr			(0)	0.13	
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber f				•	uction			0	(11)
deducting areas of openi	resent, use the value corresp ngs); if equal user 0.35	oonaing to tr	ne great	er wan are	a (aner					
	floor, enter 0.2 (unseal	ed) or 0.1	(seale	d), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
Percentage of window	s and doors draught st	ripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate				(8) + (10)	. , , ,	, , ,	, ,		0	(16)
Air permeability value,	•		•	•	•	etre of e	envelope	area	5	(17)
If based on air permeabil	-					io boing u	and		0.4	(18)
Number of sides sheltere		s been done	or a deg	јгее ан рег	пеаышу	is being u	seu		3	(19)
Shelter factor				(20) = 1 -	0.075 x (1	9)] =			0.78	(20)
Infiltration rate incorpora	ting shelter factor			(21) = (18)	x (20) =				0.31	(21)
Infiltration rate modified f	or monthly wind speed									_
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								=	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2\m ÷ 4									
	2)m ÷ 4 1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
(1.00	3.00	0.00	J.02	•		L <u>-</u>		I	

Adjusted infiltration	rate (allow	ing for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.4 0.	39 0.38	0.34	0.34	0.3	0.3	0.29	0.31	0.34	0.35	0.37		
Calculate effective	•	rate for t	he appli	cable ca	ise	•	•	•		•	•	
If mechanical ve		andiy N. (2)2h) = (22a	a) v Emy (aguation (NEN otho	nuino (22h	·\ = (22a)			0	(23a
If balanced with hea			, ,	,	. `	,, .	•)) = (23a)			0	(23h
	-	-	_					Ola)	00-1 [4 (00-)	0	(230
a) If balanced m	ecnanicai v	entilation 0	with ne	at recov	ery (MV	HR) (248	$\frac{1}{1} = \frac{2}{0}$	20)m + (,	23b) × [*	$\frac{1 - (23c)}{0}$	÷ 100] I	(24a
												(240
b) If balanced m (24b)m= 0	echanicai v	entiliation 0	0 Without	neat red		VIV) (241 1 0	$\int_{0}^{\infty} \int_{0}^{\infty} dx = (2x)^{2}$	20)m + (2 0	230)	0		(24)
	!	<u> </u>	<u> </u>	ļ					U			(24)
c) If whole hous if (22b)m < 0			•	•				5 x (23h	1)			
<u> </u>	0	0	0	0	0	0 (22)	0	0	0	0		(24
d) If natural vent	ilation or wh	nole hous	L	<u> </u>	ventilati	on from	<u> </u>					
if (22b)m =			•	•				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		(240
Effective air cha	nge rate - e	nter (24a	n) or (24h	b) 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 losses ar	d hoat loss	paramet	or:	•		•	•					
ELEMENT	Gross area (m²)	Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/F	()	k-value kJ/m²·l		A X k kJ/K
Doors				2	 x	1		2	'		•	(26)
Windows Type 1				4.25		/[1/(1.4)+	0.041 =	5.63				(27)
Windows Type 2				5.9	_	/[1/(1.4)+		7.82	=			(27)
Windows Type 3				4.47	〓 .	/[1/(1.4)+		5.93	=			(27)
Windows Type 4				0.91	= ,	/[1/(1.4)+		1.21				(27)
Rooflights					= .	/[1/(1.7) +	_		_			
_	10.50	45.5		0.68175	=			1.15897	<u></u>			(27)
Walls Type1	40.58	15.5	3	25.05	=	0.18	=	4.51	ᆿ ¦		╡	(29)
Walls Type2	56.98	2	_	54.98	3 ×	0.18	=	9.9	<u> </u>		Ⅎ ⊨	(29)
Roof	72.85	0.68	3	72.17	7 X	0.13	=	9.38				(30)
Total area of elem	ents, m²			170.4	1							(31)
Party wall				23.2	X	0	=	0			<u> </u>	(32
Party floor				72.85	5							(32
* for windows and roof ** include the areas on					lated using	g formula 1	l/[(1/U-valu	ue)+0.04] a	s given in	paragraph	3.2	
Fabric heat loss, V	I/K = S(A x)	(U)				(26)(30) + (32) =				47.46	(33
Heat capacity Cm	$= S(A \times k)$						((28).	(30) + (32	2) + (32a).	(32e) =	19233.	21 (34)
Thermal mass par	ameter (TM	P = Cm -	÷ TFA) ir	n kJ/m²K			Indica	ative Value	Medium		250	(35
For design assessmen can be used instead of			construct	tion are no	t known pi	recisely the	e indicative	e values of	TMP in Ta	able 1f		
Thermal bridges :	S (L x Y) ca	lculated	using Ap	pendix I	K						12.16	(36)

Total fabric heat loss					(33) +	(36) =		İ	59.63	(37)
Ventilation heat loss calculated mont	nlv				(38)m		39.03	(01)		
Jan Feb Mar Ap	i 	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 37.59 37.39 37.19 36.28		35.31	35.31	35.16	35.61	36.1	36.45	36.82		(38)
Heat transfer coefficient, W/K		ı		1	(39)m	= (37) + (37)	38)m		l	
(39)m= 97.21 97.02 96.82 95.9	95.73	94.93	94.93	94.78	95.24	95.73	96.08	96.44		
Heat loss parameter (HLP), W/m²K	•	•	•	•		Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	95.9	(39)
(40)m= 1.33 1.33 1.33 1.32	1.31	1.3	1.3	1.3	1.31	1.31	1.32	1.32		
Number of days in month (Table 1a)	•			•	,	Average =	Sum(40) _{1.}	12 /12=	1.32	(40)
Jan Feb Mar Ap	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28 31 30	31	30	31	31	30	31	30	31		(41)
	•									
4. Water heating energy requirement	it:							kWh/ye	ear:	
								,		
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - e	m(-0.000	349 v (TI	FΔ -13 9	1)2)] + 0 (0013 x (TFΔ -13		31		(42)
if TFA £ 13.9, N = 1	τρ(-0.000τ	J-J X (11	A-10.5	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,) X 010 X (11 A - 10.	.0)			
Annual average hot water usage in li								.14		(43)
Reduce the annual average hot water usage in not more that 125 litres per person per day (a.	-	_	_	to achieve	a water us	se target o	f		•	
	_	.	·						1	
Jan Feb Mar Ap		Jun	Jul Table 10 v	Aug	Sep	Oct	Nov	Dec		
					07.00		04.40	00.05	1	
(44)m= 98.05 94.49 90.92 87.36	83.79	80.23	80.23	83.79	87.36	90.92	94.49	98.05	1000.00	(44)
Energy content of hot water used - calculated	monthly = 4.	.190 x Vd,ı	m x nm x L	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1069.69	(44)
(45)m= 145.41 127.18 131.24 114.4	2 109.78	94.74	87.79	100.74	101.94	118.8	129.68	140.82		
	· · · · · · · · · · · · · · · · · · ·			h (40		Total = Su	m(45) ₁₁₂ =		1402.53	(45)
If instantaneous water heating at point of use	no not wate	r storage),	enter 0 in	boxes (46)) to (61)				Ī	
(46)m= 0 0 0 0 Water storage loss:	0	0	0	0	0	0	0	0		(46)
Storage volume (litres) including any	solar or V	VWHRS	storane	within sa	ame ves	ല		0		(47)
If community heating and no tank in			•		ATTIO 100	001		<u> </u>		(41)
Otherwise if no stored hot water (this	•			` '	ers) ente	er '0' in <i>(</i>	47)			
Water storage loss:					,		,			
a) If manufacturer's declared loss fa	ctor is kno	wn (kWl	h/day):					0		(48)
Temperature factor from Table 2b								0		(49)
Energy lost from water storage, kWh	year			(48) x (49)) =			0		(50)
b) If manufacturer's declared cylinder									! 	
Hot water storage loss factor from Ta	ble 2 (kW	h/litre/da	ay)					0		(51)
If community heating see section 4.3 Volume factor from Table 2a								n		(52)
Temperature factor from Table 2b								0		(52) (53)
Energy lost from water storage, kWh	vear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54) in (55)	, 001			(· ·) / · (• ·)	, (=	/	-	0		(55)
. , . , , ,								-	I	` ,

Water storage	loss cal	culated f	or 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)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	t loss (ar	nnual) fro	m Table	3							0		(58)
Primary circuit	•	•			59)m = ((58) ÷ 36	55 × (41)	m					
(modified by	factor f	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 eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 123.6	108.1	111.55	97.25	93.32	80.53	74.62	85.63	86.65	100.98	110.23	119.7		(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	al lines if	FGHRS	and/or V	WHRS	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= 123.6	108.1	111.55	97.25	93.32	80.53	74.62	85.63	86.65	100.98	110.23	119.7		
		!					Outp	out from wa	ater heate	r (annual)₁	12	1192.15	(64)
Heat gains fro	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]	_
(65)m= 30.9	27.03	27.89	24.31	23.33	20.13	18.65	24.44	24.00	25.25	07.50	00.00	<u>-</u>	(65)
				20.00	20.13	10.00	21.41	21.66	25.25	27.56	29.93		(03)
include (57)	m in cal				<u> </u>	<u> </u>				<u> </u>	<u> </u>	eating	(00)
include (57) 5. Internal g		culation o	of (65)m	only if c	<u> </u>	<u> </u>				<u> </u>	<u> </u>	eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>				<u> </u>	<u> </u>	eating	(03)
· ,	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>		or hot w		<u> </u>	<u> </u>	eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the d	dwelling		ater is fr	om com	munity h	eating	(66)
5. Internal games Metabolic gair Jan	ains (see ns (Table Feb 115.66	e Table 5 e 5), Wat Mar	of (65)m and 5a ts Apr 115.66	only if c): May 115.66	Jun	Jul 115.66	Aug 115.66	or hot w Sep 115.66	ater is fr	om com	munity h	eating	
5. Internal games Metabolic gair Jan (66)m= 115.66	ains (see ns (Table Feb 115.66	e Table 5 e 5), Wat Mar	of (65)m and 5a ts Apr 115.66	only if c): May 115.66	Jun	Jul 115.66	Aug 115.66	or hot w Sep 115.66	ater is fr	om com	munity h	eating	
5. Internal games Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17	res (Table Feb 115.66 (calcula	E Table 5 E 5), Wat Mar 115.66 ted in Ap	of (65)m and 5a ts Apr 115.66 ppendix 9.94	May 115.66 L, equati	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov	Dec	eating	(66)
5. Internal gain Metabolic gain Jan (66)m= 115.66 Lighting gains	res (Table Feb 115.66 (calcula	E Table 5 E 5), Wat Mar 115.66 ted in Ap	of (65)m and 5a ts Apr 115.66 ppendix 9.94	May 115.66 L, equati	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov	Dec	eating	(66)
5. Internal games Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances games (68)m= 203.86	res (Table Feb 115.66 (calcula 16.14 tins (calcula 205.97	culation of Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64	of (65)m and 5a ts Apr 115.66 opendix 9.94 Appendix 189.29	only if controls: May 115.66 L, equation 7.43 dix L, equation 174.97	Jun 115.66 ion L9 o 6.27 uation L	Jul 115.66 r L9a), a 6.78 13 or L1: 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta	Oct 115.66 15.01 ble 5 167.07	Nov 115.66	Dec 115.66	eating	(66) (67)
5. Internal gi Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga	res (Table Feb 115.66 (calcula 16.14 tins (calcula 205.97	culation of Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64	of (65)m and 5a ts Apr 115.66 opendix 9.94 Appendix 189.29	only if controls: May 115.66 L, equation 7.43 dix L, equation 174.97	Jun 115.66 ion L9 o 6.27 uation L	Jul 115.66 r L9a), a 6.78 13 or L1: 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta	Oct 115.66 15.01 ble 5 167.07	Nov 115.66	Dec 115.66	eating	(66) (67)
5. Internal graph Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57	res (Table Feb 115.66 (calcula 16.14 lins (calcula 205.97 s (calcula 34.57	culation of Earlie Solution of Earlie Earlie Solution of Earlie Earlie Solution of Earlie Ear	of (65)m and 5a ts Apr 115.66 opendix 9.94 Append 189.29 opendix 34.57	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equat	Jun 115.66 ion L9 of 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a)	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Tall 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68	eating	(66) (67) (68)
5. Internal games Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances games (68)m= 203.86 Cooking gains	res (Table Feb 115.66 (calcula 16.14 lins (calcula 205.97 s (calcula 34.57	culation of Earlie Solution of Earlie Earlie Solution of Earlie Earlie Solution of Earlie Ear	of (65)m and 5a ts Apr 115.66 opendix 9.94 Append 189.29 opendix 34.57	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equat	Jun 115.66 ion L9 of 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a)	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Tall 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68	eating	(66) (67) (68)
5. Internal given by the second of the secon	res (Table Feb 115.66 (calcula 16.14 ins (calcula 205.97 c (calcula 34.57 ins gains 0	culation of the culation of th	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0	only if controls: May 115.66 L, equati 7.43 dix L, equati 174.97 L, equati 34.57	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86	eating	(66) (67) (68) (69)
5. Internal given by Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa	res (Table Feb 115.66 (calcula 16.14 ins (calcula 205.97 c (calcula 34.57 ins gains 0	culation of the culation of th	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0	only if controls: May 115.66 L, equati 7.43 dix L, equati 174.97 L, equati 34.57	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86	eating	(66) (67) (68) (69)
5. Internal gives Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances gains (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -92.53	res (Table Feb 115.66 (calcula 16.14 tins (calcula 34.57 res gains 0 vaporatio -92.53	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64 ated in Ap 34.57 (Table 5 0 on (negation of the second of the s	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0 tive value	only if controls: May 115.66 L, equation 7.43 dix L, equation 174.97 L, equation 34.57 0 es) (Tab	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(66) (67) (68) (69) (70)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 0 Losses e.g. ev	res (Table Feb 115.66 (calcula 16.14 tins (calcula 34.57 res gains 0 vaporatio -92.53	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64 ated in Ap 34.57 (Table 5 0 on (negation of the second of the s	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0 tive value	only if controls: May 115.66 L, equation 7.43 dix L, equation 174.97 L, equation 34.57 0 es) (Tab	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(66) (67) (68) (69) (70)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -92.53 Water heating	res (Table Feb 115.66 (calcula 16.14 tins (calcula 34.57 res gains 0 representation of the second se	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64 ated in Ap 34.57 (Table 5 0 on (negation of the part o	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 0 tive valu -92.53	only if control only if contro	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0 le 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1: 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57 0	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57 0	Oct 115.66 15.01 ble 5 167.07 5 34.57 0 -92.53	Nov 115.66 17.52 181.4 34.57 0	Dec 115.66 18.68 194.86 34.57 0	eating	(66) (67) (68) (69) (70) (71)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -92.53 Water heating (72)m= 41.53	res (Table Feb 115.66 (calcula 16.14 tins (calcula 34.57 res gains 0 representation of the second se	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64 ated in Ap 34.57 (Table 5 0 on (negation of the part o	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 0 tive valu -92.53	only if control only if contro	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0 le 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57 0	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57 0	Oct 115.66 15.01 ble 5 167.07 5 34.57 0 -92.53	Nov 115.66 17.52 181.4 34.57 0	Dec 115.66 18.68 194.86 34.57 0	eating	(66) (67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	0.91	x	11.28	x	0.63	x	0.7] =	3.14	(75)
Northeast 0.9x	0.77	x	0.91	x	22.97	X	0.63	x	0.7	=	6.39	(75)
Northeast 0.9x	0.77	x	0.91	x	41.38	x	0.63	x	0.7	=	11.51	(75)
Northeast 0.9x	0.77	x	0.91	x	67.96	x	0.63	x	0.7	=	18.9	(75)
Northeast 0.9x	0.77	x	0.91	x	91.35	X	0.63	x	0.7	=	25.4	(75)
Northeast 0.9x	0.77	x	0.91	x	97.38	x	0.63	x	0.7	=	27.08	(75)
Northeast 0.9x	0.77	x	0.91	x	91.1	x	0.63	x	0.7	=	25.34	(75)
Northeast 0.9x	0.77	X	0.91	x	72.63	x	0.63	x	0.7	=	20.2	(75)
Northeast 0.9x	0.77	x	0.91	x	50.42	x	0.63	x	0.7	=	14.02	(75)
Northeast 0.9x	0.77	x	0.91	x	28.07	x	0.63	x	0.7	=	7.81	(75)
Northeast 0.9x	0.77	X	0.91	x	14.2	X	0.63	X	0.7	=	3.95	(75)
Northeast 0.9x	0.77	x	0.91	x	9.21	x	0.63	x	0.7	=	2.56	(75)
Southeast 0.9x	0.77	x	4.25	x	36.79	x	0.63	x	0.7	=	47.79	(77)
Southeast 0.9x	0.77	x	5.9	x	36.79	x	0.63	x	0.7	=	66.34	(77)
Southeast 0.9x	0.77	X	4.47	x	36.79	x	0.63	x	0.7	=	50.26	(77)
Southeast 0.9x	0.77	X	4.25	x	62.67	x	0.63	x	0.7	=	81.4	(77)
Southeast 0.9x	0.77	X	5.9	x	62.67	X	0.63	x	0.7	=	113.01	(77)
Southeast 0.9x	0.77	x	4.47	x	62.67	x	0.63	x	0.7	=	85.62	(77)
Southeast 0.9x	0.77	X	4.25	x	85.75	x	0.63	X	0.7	=	111.38	(77)
Southeast 0.9x	0.77	X	5.9	x	85.75	x	0.63	x	0.7	=	154.62	(77)
Southeast 0.9x	0.77	X	4.47	x	85.75	x	0.63	x	0.7	=	117.15	(77)
Southeast 0.9x	0.77	X	4.25	x	106.25	x	0.63	X	0.7	=	138.01	(77)
Southeast 0.9x	0.77	x	5.9	x	106.25	x	0.63	x	0.7	=	191.58	(77)
Southeast 0.9x	0.77	x	4.47	x	106.25	x	0.63	x	0.7	=	145.15	(77)
Southeast 0.9x	0.77	x	4.25	x	119.01	X	0.63	x	0.7	=	154.58	(77)
Southeast 0.9x	0.77	X	5.9	x	119.01	x	0.63	X	0.7	=	214.59	(77)
Southeast 0.9x	0.77	x	4.47	x	119.01	x	0.63	x	0.7	=	162.58	(77)
Southeast 0.9x	0.77	X	4.25	x	118.15	x	0.63	x	0.7	=	153.46	(77)
Southeast 0.9x	0.77	X	5.9	x	118.15	x	0.63	X	0.7	=	213.04	(77)
Southeast 0.9x	0.77	X	4.47	x	118.15	x	0.63	x	0.7	=	161.4	(77)
Southeast 0.9x	0.77	x	4.25	x	113.91	X	0.63	x	0.7	=	147.95	(77)
Southeast 0.9x	0.77	x	5.9	x	113.91	x	0.63	x	0.7	=	205.39	(77)
Southeast 0.9x	0.77	x	4.47	x	113.91	x	0.63	x	0.7	=	155.61	(77)
Southeast 0.9x	0.77	x	4.25	x	104.39	x	0.63	x	0.7	=	135.59	(77)
Southeast 0.9x	0.77	X	5.9	x	104.39	x	0.63	x	0.7	=	188.23	(77)
Southeast 0.9x	0.77	X	4.47	x	104.39	x	0.63	x	0.7] =	142.61	(77)
Southeast 0.9x	0.77	X	4.25	x	92.85	x	0.63	x	0.7] =	120.6	(77)
Southeast 0.9x	0.77	X	5.9	x	92.85	x	0.63	x	0.7] =	167.42	(77)
Southeast 0.9x	0.77	X	4.47	x	92.85	x	0.63	x	0.7] =	126.84	(77)
				-		-		•		-		_

Southoost o o		_					1		_				— ,
Southeast 0.9x	0.77	×	4.25	=	X	69.27	X	0.63	×	0.7	=	89.97	(77)
Southeast 0.9x	0.77	×	5.9		X	69.27	X	0.63	×	0.7	=	124.9	(77)
Southeast 0.9x	0.77	×	4.47	7	X	69.27	X	0.63	X	0.7	=	94.63	(77)
Southeast 0.9x	0.77	×	4.25	5	X	44.07	X	0.63	×	0.7	=	57.24	(77)
Southeast 0.9x	0.77	X	5.9		X	44.07	X	0.63	X	0.7	=	79.46	(77)
Southeast _{0.9x}	0.77	X	4.47	7	X	44.07	X	0.63	X	0.7	=	60.2	(77)
Southeast 0.9x	0.77	X	4.25	5	X	31.49	X	0.63	X	0.7	=	40.9	(77)
Southeast _{0.9x}	0.77	x	5.9		X	31.49	X	0.63	X	0.7	=	56.78	(77)
Southeast _{0.9x}	0.77	X	4.47	7	X	31.49	X	0.63	X	0.7	=	43.02	(77)
Rooflights 0.9x	1	X	0.68	3	x	26	X	0.63	X	0.7	=	7.04	(82)
Rooflights 0.9x	1	x	0.68	3	x	54	x	0.63	X	0.7	=	14.61	(82)
Rooflights 0.9x	1	x	0.68	3	x	96	X	0.63	X	0.7	=	25.98	(82)
Rooflights 0.9x	1	x	0.68	3	x	150	x	0.63	x	0.7	=	40.59	(82)
Rooflights 0.9x	1	x	0.68	3	x	192	x	0.63	x	0.7	=	51.95	(82)
Rooflights 0.9x	1	×	0.68	3	x	200	x	0.63	x	0.7	=	54.12	(82)
Rooflights 0.9x	1	×	0.68	3	x	189	x	0.63	X	0.7	=	51.14	(82)
Rooflights 0.9x	1	x	0.68	3	x	157	x	0.63	x	0.7	=	42.48	(82)
Rooflights 0.9x	1	x	0.68	3	x	115	x	0.63	x	0.7	=	31.12	(82)
Rooflights 0.9x	1	×	0.68	3	x	66	x	0.63	x	0.7	=	17.86	(82)
Rooflights 0.9x	1	×	0.68	3	x	33	x	0.63	x	0.7	= =	8.93	(82)
Rooflights 0.9x	1	×	0.68	3	x	21	x	0.63	×	0.7	=	5.68	(82)
L							,						
Solar gains in	watts calcu	ılated	for each	month	1		(83)m	n = Sum(74)m .	(82)m				
(83)m= 174.57	· I	20.63	534.23	609.1	$\overline{}$	09.1 585.43	529		335.10	3 209.79	148.93		(83)
Total gains – ir	nternal and	solar	(84)m =	(73)m	+ (8	33)m , watts							
(84)m= 495.83	621.05 72	9.58	824.92	880.55	86	62.54 827.49	774	.77 715.34	608.8	7 504.68	460.39		(84)
7. Mean inter	nal tempera	ature (heating	seasor	1)	·							
Temperature						area from Tal	ble 9	Th1 (°C)				21	(85)
Utilisation fac	•	•			-			()					(22)
Jan		Mar	Apr	May	ì	Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 1		.97	0.93	0.82	+	0.66 0.49	0.5		0.96	0.99	1		(86)
Mean internal	<u> </u>	re in i	20.5	20.79	$\overline{}$	0.95 20.99	20.	<u> </u>	20.48	19.96	19.55		(87)
` '	ļ					!		<u> </u>	20.40	19.90	19.55		(07)
Temperature		~~`			_		_	· · · · ·		1		I	(00)
(88)m= 19.81	19.82	9.82	19.83	19.83	1	9.84 19.84	19.	84 19.84	19.83	19.83	19.82		(88)
Utilisation fac	tor for gains	s for r	est of dw	elling,	h2,	m (see Table	9a)					•	
(89)m= 1	0.99 0	.96	0.9	0.77		0.56 0.37	0.4	0.7	0.93	0.99	1		(89)
Mean internal	temperatu	re in t	he rest c	of dwell	ing	T2 (follow ste	eps 3	to 7 in Tabl	e 9c)				
(90)m= 18.55	18.78	9.09	19.45	19.7	1	9.82 19.84	19.	84 19.77	19.44	18.92	18.51		(90)
	•				•	•		·	LA = Liv	ving area ÷ (4	4) =	0.45	(91)

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

(92)m= 19.02	19.24	19.56	19.92	20.19	20.32	20.35	20.35	20.27	19.9	19.38	18.98		(92)
Apply adjus	tment to t	he mear	internal	tempera	ture fro	m Table	4e, whe	re appro	priate				
(93)m= 19.02	19.24	19.56	19.92	20.19	20.32	20.35	20.35	20.27	19.9	19.38	18.98		(93)
8. Space he	· ·												
Set Ti to the			•		ed at ste	ep 11 of	Table 9b	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisation					lun	led	۸۰۰۰	Con	Oot	Nov	Doo		
Jan Utilisation fa		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m= 0.99	0.98	0.96	0.9	0.78	0.6	0.43	0.47	0.73	0.94	0.99	1		(94)
Useful gains					0.0	0.10	0.17	0.10	0.01	0.00	•		()
(95)m= 492.98		701.98	745.58	690.88	516.65	351.72	367.1	522.81	569.58	498.36	458.45		(95)
Monthly ave			perature	from Ta									
(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 ra	ite for me	an intern	al tempe	erature, L	 _m , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 1430.5	3 1391.39	1264.05	1056.89	812.61	543.18	356.13	374.24	587.45	890.64	1180.24	1425.08		(97)
Space heat	ing require	ement fo	r each n	nonth, kV	Vh/mont	h = 0.02	4 x [(97)	m – (95)m] x (4	1)m			
(98)m= 697.54	523.99	418.18	224.14	90.57	0	0	0	0	238.87	490.96	719.17		
	•	•					Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	3403.41	(98)
Space heat	ina reauir	ement in	kWh/m²	/vear								46.72	(99)
8c. Space c				,									
Calculated t	Ĭ			See Tab	la 10h								
Jan		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss ra			•					•					
(100)m= 0	0	0	0	0	892.35	702.49	720.35	0	0	0	0		(100)
Utilisation fa	actor for lo	· .											
		oss hm											
(101)m= 0	0	oss hm	0	0	0.89	0.94	0.92	0	0	0	0		(101)
$\begin{array}{c} \text{(101)m=} & 0\\ \text{Useful loss,} \end{array}$	0	0			0.89	0.94	0.92	0	0	0	0		(101)
	0	0			0.89 794.08	0.94		0	0	0	0		(101) (102)
Useful loss,	0 hmLm (V	0 Vatts) = (100)m x	(101)m	794.08	659.76	663.78	0					, ,
Useful loss, (102)m= 0	0 hmLm (V	0 Vatts) = (100)m x	(101)m	794.08 ather re	659.76	663.78 e Table	0					, ,
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools	hmLm (V 0 r gains ca 0	0 Vatts) = (0 Iculated 0 ement fo	100)m x 0 for appli 0 r month,	(101)m 0 cable we 0	794.08 ather re 1084.95	659.76 egion, se 1042.73	663.78 ee Table 983.98	0 10) 0	0	0	0	x (41)m	(102)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools set (104)m	o hmLm (V o r gains can o ing require to zero if (0 Vatts) = (0 Iculated 0 ement fo 104)m <	100)m x 0 for appli 0 r month, 3 × (98	(101)m 0 cable we 0 whole do	794.08 eather re 1084.95 welling,	659.76 egion, se 1042.73 continue	663.78 ee Table 983.98 ous (kW	0 10) 0 (h) = 0.0	0 0 24 x [(10	0 0 03)m – (0 0 102)m];	x (41)m	(102)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools	hmLm (V 0 r gains ca 0	0 Vatts) = (0 Iculated 0 ement fo	100)m x 0 for appli 0 r month,	(101)m 0 cable we 0	794.08 ather re 1084.95	659.76 egion, se 1042.73	663.78 ee Table 983.98	0 10) 0 (h) = 0.0	0 0 24 x [(10	0 0 03)m – (0 0 102)m];		(102)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools set (104)m= 0	o hmLm (V o r gains ca	0 Vatts) = (0 Iculated 0 ement fo 104)m <	100)m x 0 for appli 0 r month, 3 × (98	(101)m 0 cable we 0 whole do	794.08 eather re 1084.95 welling,	659.76 egion, se 1042.73 continue	663.78 ee Table 983.98 ous (kW	0 $10)$ 0 $(h) = 0.0$ 0 $Total$	0 24 x [(10 0 = Sum(0 03)m - (0 104)	0 0 102)m] 2 0	732.58	(102)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools set (104)m (104)m= 0 Cooled fracti	o hmLm (V o o r gains car o o o o o o o o o o o o o o o o o o o	0 Vatts) = (0 Iculated 0 ement fo (104)m < 0	100)m x 0 for appli 0 r month, 3 × (98	(101)m 0 cable we 0 whole do	794.08 eather re 1084.95 welling,	659.76 egion, se 1042.73 continue	663.78 ee Table 983.98 ous (kW	0 $10)$ 0 $(h) = 0.0$ 0 $Total$	0 24 x [(10 0 = Sum(0 0 03)m – (0 0 102)m] 2 0		(102)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools set (104)m= 0	o hmLm (V o o r gains car o o o o o o o o o o o o o o o o o o o	0 Vatts) = (0 Iculated 0 ement fo (104)m < 0	100)m x 0 for appli 0 r month, 3 × (98	(101)m 0 cable we 0 whole do	794.08 eather re 1084.95 welling,	659.76 egion, se 1042.73 continue	663.78 ee Table 983.98 ous (kW	0 $10)$ 0 $(h) = 0.0$ 0 $Total$	0 24 x [(10 0 = Sum(0 03)m - (0 104)	0 0 102)m] 2 0	732.58	(102)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools set (104)m= 0 Cooled fracti Intermittency	o hmLm (V o r gains can o ing require to zero if o o o o o factor (Tates)	0 Vatts) = (0 Iculated 0 ement fo (104)m < 0	100)m x 0 for appli 0 r month, 3 × (98 0	cable we o whole do m o	794.08 eather re 1084.95 welling, 209.42	659.76 egion, se 1042.73 continuo 284.93	663.78 ee Table 983.98 ous (kW 238.23	0 10) 0 (h) = 0.0 0 Total f C =	0 24 x [(10 0 = Sum(cooled :	0 03)m - (0 104) area ÷ (4	0 102)m]; 0 = 1) =	732.58	(102)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools set (104)m= 0 Cooled fracti Intermittency	hmLm (V	0 Vatts) = (0 lculated 0 ement for (104)m < 0 able 10b 0	100)m x 0 for appli 0 r month, 3 × (98 0	cable we whole de o o o o o o o o o o o o o	794.08 eather re 1084.95 welling, 209.42	659.76 egion, se 1042.73 continuo 284.93	663.78 ee Table 983.98 ous (kW 238.23	0 10) 0 (h) = 0.0 0 Total f C =	0 24 x [(10 0 = Sum(cooled a	0 03)m - (0 104) area ÷ (4	0 0 102)m] > 0 = 4) =	732.58 1	(102) (103) (104) (105)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools set (104)m= 0 Cooled fracti Intermittency (106)m= 0	hmLm (V	0 Vatts) = (0 lculated 0 ement for (104)m < 0 able 10b 0	100)m x 0 for appli 0 r month, 3 × (98 0	cable we whole de o o o o o o o o o o o o o	794.08 eather re 1084.95 welling, 209.42	659.76 egion, se 1042.73 continuo 284.93	663.78 ee Table 983.98 ous (kW 238.23	0 10) 0 (h) = 0.0 0 Total f C =	0 24 x [(10 0 = Sum(cooled a	0 03)m - (0 104) area ÷ (4	0 0 102)m] > 0 = 4) =	732.58 1	(102) (103) (104) (105)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cooliset (104)m= 0 Cooled fracti Intermittency (106)m= 0 Space coolin	o hmLm (V o r gains can o r ga	0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 able 10b 0 ment for	100)m x 0 for appli 0 r month, 3 × (98 0	(101)m 0 cable we 0 whole delaym 0	794.08 eather re 1084.95 welling, 209.42 0.25 × (105)	659.76 egion, se 1042.73 continue 284.93 0.25 × (106)r	663.78 ee Table 983.98 ous (kW 238.23	0 10) 0 Total f C = 0 Total	0 24 x [(10 0 = Sum(cooled :	0 03)m - (0 1,04) area ÷ (4 0 (1,04)	0 102)m] 2 0 = 1) =	732.58 1	(102) (103) (104) (105)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cooliset (104)m= 0 Cooled fracti Intermittency (106)m= 0 Space coolin	o hmLm (V o o r gains can o o o o o o o o o o o o o o o o o o o	0 Vatts) = (0 Iculated 0 ement for (104)m < 0 able 10b 0 ment for	100)m x 0 for appli 0 r month, 3 × (98 0) 0	(101)m 0 cable we 0 whole di)m 0 (104)m	794.08 eather re 1084.95 welling, 209.42 0.25 × (105)	659.76 egion, se 1042.73 continue 284.93 0.25 × (106)r	663.78 ee Table 983.98 ous (kW 238.23	0 10) 0 Total f C = 0 Total 0 Total	0 24 x [(10 0 = Sum(cooled :	0 03)m - (0 1,04) area ÷ (4 0 (1,04)	0 0 102)m] 2 0 = 4) = 0	732.58	(102) (103) (104) (105) (106)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space cools set (104)m= 0 Cooled fracti Intermittency (106)m= 0 Space coolin (107)m= 0	on g required 0	0 Vatts) = (0 Iculated 0 ement fo 104)m < 0 ment for 0 ment in k	100)m x 0 for appli 0 r month, 3 × (98 0) 0 month = 0	(101)m 0 cable we 0 whole delaym 0 (104)m 0	794.08 eather re 1084.95 welling, 209.42 0.25 × (105) 52.36	659.76 egion, se 1042.73 continue 284.93 0.25 × (106)r 71.23	663.78 ee Table 983.98 ous (kW 238.23 0.25 m 59.56	0 10) 0 Total f C = 0 Total (107)	0 24 x [(10 0 = Sum(cooled : 0 = Sum(0 = Sum(0 + Sum(0 + (4) =	0 03)m - (0 1,04) area ÷ (4 0 (1,04)	0 0 102)m] 2 0 = 4) = 0	732.58 1 0	(102) (103) (104) (105) (106)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space coolin (104)m= 0 Cooled fracti Intermittency (106)m= 0 Space coolin (107)m= 0 Space coolin	hmLm (V	0 Vatts) = (0 Iculated 0 ement for 0 able 10b 0 ment for 0 ment in k iency (ca	100)m x 0 for appli 0 r month, 3 × (98 0) 0 month = 0	(101)m 0 cable we 0 whole delaym 0 (104)m 0	794.08 eather re 1084.95 welling, 209.42 0.25 × (105) 52.36	659.76 egion, se 1042.73 continue 284.93 0.25 × (106)r 71.23	663.78 ee Table 983.98 ous (kW 238.23 0.25 m 59.56	0 10) 0 Total f C = 0 Total (107)	0 24 x [(10 0 = Sum(cooled : 0 = Sum(0 = Sum(0 + Sum(0 + (4) =	0 0 03)m - (0 1,04) area ÷ (4 0 1,04) 0 1,07)	0 0 102)m] 2 0 = 4) = 0	732.58 1 0	(102) (103) (104) (105) (106)
Useful loss, (102)m= 0 Gains (sola (103)m= 0 Space coolin set (104)m= 0 Cooled fracti Intermittency (106)m= 0 Space coolin (107)m= 0 Space coolin 8f. Fabric En	o hmLm (V o r gains ca o ing require to zero if (o o factor (Ta o g require o g require ergy Efficien	0 Vatts) = (0 Iculated 0 ement for 104)m < 0 ment for 0 ment in k iency (cancy	100)m x 0 for appli 0 r month, 3 × (98 0 month = 0 wwh/m²/y	(101)m 0 cable we 0 whole di)m 0 (104)m 0 /ear	794.08 eather re 1084.95 welling, 209.42 0.25 × (105) 52.36	659.76 egion, se 1042.73 continue 284.93 0.25 × (106)r 71.23	663.78 ee Table 983.98 ous (kW 238.23 0.25 m 59.56	0 10) 0 Total f C = 0 Total (107)	0 24 x [(10) 0 = Sum(cooled a 0 = Sum(0 = Sum(0 = Sum(0 + (4) =	0 0 03)m - (0 1,04) area ÷ (4 0 1,04) 0 1,07)	0 0 102)m] 2 0 = 4) = 0	732.58 1 0 183.14 2.51	(102) (103) (104) (105) (106) (107) (108)

		I I a a a B	N - 4 - 11						
		User D	etails:						
Assessor Name:	Chris Hocknell		Strom					016363	
Software Name:	Stroma FSAP 2012	Property A		are Ve			versic	on: 1.0.4.16	
Address :	,	Toperty I	Addiess	. Apartir	iciil 4				
1. Overall dwelling dime	nsions:								
		Area	a(m²)	_	Av. He	ight(m)	_	Volume(m³)	<u> </u>
Ground floor			61.4	(1a) x	2	2.7	(2a) =	165.78	(3a)
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n) (61.4	(4)					
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	165.78	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	r
Number of chimneys	0 + 0	+	0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	7 + 7	0	Ī = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns			_ [2	x -	10 =	20	(7a)
Number of passive vents				Ē	0	x -	10 =	0	(7b)
Number of flueless gas fi	res			F	0	x	40 =	0	(7c)
				L					
							Air ch	nanges per ho	ur
•	ys, flues and fans = $(6a)+(6b)+($				20		÷ (5) =	0.12	(8)
If a pressurisation test has b Number of storeys in the	een carried out or is intended, procee	ed to (17), o	otherwise (continue fi	om (9) to	(16)		0	(9)
Additional infiltration	ic dwelling (113)					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame o	r 0.35 fo	r masoni	ry consti	uction			0	(11)
• • • • • • • • • • • • • • • • • • • •	resent, use the value corresponding t	o the great	ter wall are	ea (after			'		_
deducting areas of openir If suspended wooden f	igs); if equal user 0.35 iloor, enter 0.2 (unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	· · · · · ·	•	,					0	(13)
Percentage of windows	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2		_			0	(15)
Infiltration rate	250		(8) + (10)					0	(16)
•	q50, expressed in cubic metro ity value, then $(18) = [(17) \div 20] + (18)$	•	•	•	etre ot e	envelope	area	5	(17)
•	s if a pressurisation test has been do				is being u	sed		0.37	(18)
Number of sides sheltere	d							2	(19)
Shelter factor			` '	[0.075 x (19)] =			0.85	(20)
Infiltration rate incorporat	_		(21) = (18	3) x (20) =				0.32	(21)
Infiltration rate modified for		Jul	Δυα	Sep	Oct	Nov	Doo	1	
L I		Jui	Aug	l Seb	Oct	Nov	Dec]	
Monthly average wind sp (22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7	1	
, , , , ,	1 1 1			<u> </u>	<u> </u>	L,		J	
Wind Factor (22a)m = (22	' 	ı	_			•		1	
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18]	

Adjusted infiltration	n rate (allow	ing for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.4 0	.39 0.39	0.35	0.34	0.3	0.3	0.29	0.32	0.34	0.35	0.37]	
Calculate effective	•	rate for t	he appli	cable ca	se		!					
If mechanical vo		andis N. (O	2h) - (22-	·		NIT\\ atha	i (22h	\			0	(23a)
If exhaust air heat p			, ,	, ,	. `	,, .	,) = (23a)			0	(23b)
If balanced with hea	-	-	_					51. \ (1)		4 (00)	0	(23c)
a) If balanced n		1			, 	, 	ŕ	 	-	' ' ') ÷ 100] 1	(240)
(24a)m= 0	0 0	0	0	0	0	0	0	0	0	0	J	(24a)
b) If balanced n (24b)m= 0	nechanicai ve	entilation 0	without	neat red	covery (r	VIV) (24b	$\int_{0}^{\infty} \int_{0}^{\infty} dt = (22)$	2b)m + (2 0	23b) 0	0	1	(24b)
	l			<u> </u>		<u> </u>		U	U	0	J	(240)
c) If whole hous	e extract ver 0.5 × (23b), t		•	•				5 × (23h)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0	1	(24c)
d) If natural ven	tilation or wh	ıole hous	e positiv	/e input	ventilati	on from I	oft				J	
,	1, then (24d)		•	•				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 cha	inge rate - ei	nter (24a) or (24b	o) or (24	c) or (24	ld) in box	(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 losses a	nd heat loss	naramete	zr.								_	
ELEMENT	Gross area (m²)	Openin m	gs	Net Ar A ,r		U-valı W/m2		A X U (W/ł	()	k-value		A X k kJ/K
Doors	area (m)	•••		2	 x	1	 =	2	, 	KO/III		(26)
Windows Type 1				1.69	_	/[1/(1.4)+	!	2.24	=			(27)
Windows Type 2				0.42	_	/[1/(1.4)+		0.56	=			(27)
Windows Type 3				2.87	_	/[1/(1.4)+		3.8	᠆			(27)
Windows Type 4				3.82	_	/[1/(1.4)+		5.06	믐			(27)
Windows Type 5					_	/[1/(1.4)+			╡			, ,
Walls Type 1		10.0		2.87	=			3.8	륵 ,			(27)
· _	51.43	13.36		38.07	=	0.18	=	6.85	닠 ¦		╡	(29)
Walls Type2	35.95	2		33.95	5 X	0.18	_ -	6.11	닠 !			(29)
Roof	61.4	0		61.4	X	0.13	=	7.98				(30)
Total area of elem	ents, m²			148.7	8							(31)
Party wall				17.92	<u>X</u>	0	=	0	يا ك			(32)
				61.4								(32a)
Party floor				-11- 1	ated using	g formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	n paragrapi	h 3.2	
Party floor * for windows and roo. ** include the areas or												
* for windows and roo	n both sides of in	nternal wall				(26)(30)) + (32) =				40.66	(33)
* for windows and roo ** include the areas or	n both sides of in N/K = S (A x	nternal wall				(26)(30)		.(30) + (32	<u>2</u>) + (32a).	(32e) =	40.66 17050	
* for windows and roo ** include the areas of Fabric heat loss, \	both sides of in $N/K = S(A \times X)$ $= S(A \times X)$	nternal wall : U)	ls and pari	titions		(26)(30)	((28).	.(30) + (32 tive Value:	, , ,	(32e) =		
* for windows and roo. ** include the areas of Fabric heat loss, \text{\text{Heat capacity Cm}}	n both sides of in N/K = S (A x = S(A x k) rameter (TMI nts where the de	nternal wall U) P = Cm ÷ etails of the	ls and pari	n kJ/m²K			((28).	tive Value:	Medium	, ,	17050	.8 (34)
* for windows and roo. ** include the areas of Fabric heat loss, \text{\text{N}} Heat capacity Cm Thermal mass pa For design assessment	n both sides of in N/K = S (A x x) = S(A x k) rameter (TMI) ats where the defined calculates and the sides of interesting the sides of int	nternal wall U) P = Cm ÷ etails of the	s and pan	n kJ/m²K ion are no	t known pi		((28).	tive Value:	Medium	, ,	17050	(34)

Ventilation heat loss calculated monthly (38)m = 0.33 * (25)m x (5)	Total fabric he	eat loss							(33) +	(36) =		İ	53.18	(37)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan			alculated	l monthl	V				• ,	,	25)m x (5)		33.10	
(38)me 31.77 31.6 31.43 30.64 30.49 29.8 29.8 29.8 30.07 30.49 30.79 31.1 (38) Heat transfer coefficient, W/K (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (39)me (37) + (38)m (40)me (30)me (4) m (41)me (30)me (4) m (42)me (30)me (4) m (43)me (31)me (4) m (44)me (30)me (4) m (45)me (30)me (4) m (46)me (30)me (4) m (47)me (30)me (4) m (48)me (31)me (4) m (49)me (31)me (4) m (40)me (30)me (40)me (4) m (40)me (30)me (40)me (4) m (41)me (30)me (40)me (4) m (42)me (30)me (40)me (4) m (43)me (30)me (40)me (4		т —			<u> </u>	Jun	Jul	Aug						
(39) 84.95 84.77 84.61 83.82 83.67 82.98 82.98 82.98 82.85 83.25 83.87 83.97 84.28					-			Ť		_				(38)
(30)ms 84.95 84.77 84.61 83.82 83.67 82.98 82.98 82.98 82.85 83.25 83.67 83.97 84.28 Average * Sum(39)	Heat transfer	coefficie	nt, W/K	<u> </u>	Į	<u> </u>	!		(39)m	= (37) + (37)	 38)m			
Heat loss parameter (HLP), W/m²K			É	83.82	83.67	82.98	82.98	82.85				84.28		
Average = Sum(40)r; /12= 1.37	Heat loss para	ameter (F	HLP), W	m²K	Į	Į.				_		12 /12=	83.82	(39)
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 1.38	1.38	1.38	1.37	1.36	1.35	1.35	1.35	1.36	1.36	1.37	1.37		
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Number of day	ys in mo	nth (Tab	le 1a)	!		!	•	,	Average =	Sum(40) _{1.}	12 /12=	1.37	(40)
4. Water heating energy requirement: **Note: That is a sumed occupancy, N if TFA > 13,9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA f 13,9, N = 1 **Annual average hot water usage in litres per day Vd, average = (25 x N) + 36		_		· ·	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)2)] + 0.0013 x (TFA - 13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd.average = (25 x N) + 36 Annual average hot water usage in litres per day Vd.average = (25 x N) + 36 Below the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 90.42 87.13 83.84 80.55 77.27 73.98 73.98 77.27 80.55 83.84 87.13 90.42 Total = Sum(44): = 986.36 44) Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 134.09 117.27 121.01 105.5 101.23 87.36 80.95 92.89 94 109.55 119.58 129.85 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		+				30	-	Ť		31	30	31		(41)
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA - 13.9)2)] + 0.0013 x (TFA - 13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd.average = (25 x N) + 36 Annual average hot water usage in litres per day Vd.average = (25 x N) + 36 Below the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd.m = factor from Table 1c x (43) (44)m= 90.42 87.13 83.84 80.55 77.27 73.98 73.98 77.27 80.55 83.84 87.13 90.42 Total = Sum(44): = 986.36 44) Energy content of hot water used - calculated monthly = 4.190 x Vd.m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 134.09 117.27 121.01 105.5 101.23 87.36 80.95 92.89 94 109.55 119.58 129.85 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0														
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Note Note		•	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		82	2.2		(43)
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(44)m= 90.42 87.13 83.84 80.55 77.27 73.98 73.98 77.27 80.55 83.84 87.13 90.42 Total = Sum(44)						l .			Sep	Oct	Nov	Dec		
Total = Sum(44): 12 = 986.36 (44)	Hot water usage	in litres per	r day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m=	(44)m= 90.42	87.13	83.84	80.55	77.27	73.98	73.98	77.27	80.55	83.84	87.13	90.42		_
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m=	Energy content of	f hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			. ,		986.36	(44)
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(45)m= 134.09	117.27	121.01	105.5	101.23	87.36	80.95	92.89	94	109.55	119.58	129.85		
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) × (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52) Temperature factor from Table 2b 0 (53)										Total = Su	m(45) ₁₁₂ =		1293.28	(45)
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) o (50) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b o (52) Temperature factor from Table 2b	If instantaneous v	vater heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)					
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Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b (48) × (49) = 0 (50) (51) (52) Temperature factor from Table 2b (53)	-	_			_			. ,	are) ant	ar 'O' in <i>(</i>	47)			
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Temperature factor from Table 2b 0 (53)	-	•		on 4.3										
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Energy lost from water storage, kWh/year $(47) \times (51) \times (52) \times (53) = 0$ (54)	•							, _ · · · ·	:			U		` '
			_	, KWh/ye	ear			(47) x (51)) x (52) x (53) =	-			(54)
Enter (50) or (54) in (55) 0 (55)	LINGI (30) 01	() +) III (5))									U		(၁၁)

Water storage	loss cal	culated f	or 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)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	/ factor fi	rom Tabl	le H5 if t	here is s	solar wat	ter 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 eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 113.97	99.68	102.86	89.68	86.05	74.25	68.81	78.96	79.9	93.11	101.64	110.38		(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	WHRS	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= 113.97	99.68	102.86	89.68	86.05	74.25	68.81	78.96	79.9	93.11	101.64	110.38		
							Outp	out from wa	ater heate	r (annual)₁	12	1099.29	(64)
Heat gains fro	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]	_
(65)m= 28.49	24.92	25.72	22.42	21.51	18.56	17.2	19.74	19.97	23.28	25.41	27.59	_	(65)
include (57)	m in cald	culation of	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	nunity h	l eating	
include (57) 5. Internal g			` '	•	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal g	ains (see	e Table 5	and 5a	•	ylinder i	s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	
, ,	ains (see	e Table 5	and 5a	•	ylinder is	s in the o	dwelling	or hot w	ater is fr	rom com	munity h	eating	
5. Internal g	ains (see	Table 5	and 5a):						ı	ı	eating	(66)
5. Internal games Metabolic gair Jan	rs (Table Feb	2 Table 5 2 5), Wat Mar 101.05	and 5a ts Apr 101.05	May	Jun 101.05	Jul 101.05	Aug 101.05	Sep 101.05	Oct	Nov	Dec	eating	(66)
5. Internal games Metabolic gair Jan (66)m= 101.05	rs (Table Feb	2 Table 5 2 5), Wat Mar 101.05	and 5a ts Apr 101.05	May	Jun 101.05	Jul 101.05	Aug 101.05	Sep 101.05	Oct	Nov	Dec	eating	(66) (67)
5. Internal games Metabolic gain Jan (66)m= 101.05 Lighting gains (67)m= 15.74	res (Table Feb 101.05 (calcula 13.98	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.37	ts Apr 101.05 ppendix 8.61	May 101.05 L, equati	Jun 101.05 ion L9 oi 5.43	Jul 101.05 r L9a), a 5.87	Aug 101.05 Iso see	Sep 101.05 Table 5	Oct 101.05	Nov 101.05	Dec 101.05	eating	` ,
5. Internal gain Metabolic gain Jan (66)m= 101.05 Lighting gains	res (Table Feb 101.05 (calcula 13.98	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.37	ts Apr 101.05 ppendix 8.61	May 101.05 L, equati	Jun 101.05 ion L9 oi 5.43	Jul 101.05 r L9a), a 5.87	Aug 101.05 Iso see	Sep 101.05 Table 5	Oct 101.05	Nov 101.05	Dec 101.05	eating	` ,
5. Internal games Metabolic gair Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances games (68)m= 176.46	res (Table Feb 101.05 (calcula 13.98 ins (calcula 178.29	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68	ts Apr 101.05 ppendix 8.61 Appendix 163.86	May 101.05 L, equati 6.44 dix L, eq	Jun 101.05 ion L9 o 5.43 uation L 139.8	Jul 101.05 r L9a), a 5.87 13 or L1	Aug 101.05 Iso see 7.63 3a), also	Sep 101.05 Table 5 10.24 see Ta 134.8	Oct 101.05 13.01 ble 5 144.62	Nov 101.05	Dec 101.05	eating	(67)
5. Internal gi Metabolic gair Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances ga	res (Table Feb 101.05 (calcula 13.98 ins (calcula 178.29	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68	ts Apr 101.05 ppendix 8.61 Appendix 163.86	May 101.05 L, equati 6.44 dix L, eq	Jun 101.05 ion L9 o 5.43 uation L 139.8	Jul 101.05 r L9a), a 5.87 13 or L1	Aug 101.05 Iso see 7.63 3a), also	Sep 101.05 Table 5 10.24 see Ta 134.8	Oct 101.05 13.01 ble 5 144.62	Nov 101.05	Dec 101.05	eating	(67)
Metabolic gair Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances ga (68)m= 176.46 Cooking gains (69)m= 33.1	res (Table Feb 101.05 (calcula 13.98 ins (calcula 178.29 c (calcula 33.1	e Table 5 e 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68 ited in Ap 33.1	ts Apr 101.05 ppendix 8.61 Appendix 163.86 ppendix 33.1	May 101.05 L, equati 6.44 dix L, equati 151.46 L, equat	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a)	Aug 101.05 Iso see 7.63 3a), also 130.18	Sep 101.05 Table 5 10.24 see Tale ee Table	Oct 101.05 13.01 ble 5 144.62 5	Nov 101.05 15.18	Dec 101.05 16.18 168.68	eating	(67) (68)
5. Internal games Metabolic gain Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances games (68)m= 176.46 Cooking gains	res (Table Feb 101.05 (calcula 13.98 ins (calcula 178.29 c (calcula 33.1	e Table 5 e 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68 ited in Ap 33.1	ts Apr 101.05 ppendix 8.61 Appendix 163.86 ppendix 33.1	May 101.05 L, equati 6.44 dix L, equati 151.46 L, equat	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a)	Aug 101.05 Iso see 7.63 3a), also 130.18	Sep 101.05 Table 5 10.24 see Tale ee Table	Oct 101.05 13.01 ble 5 144.62 5	Nov 101.05 15.18	Dec 101.05 16.18 168.68	eating	(67) (68)
5. Internal given by the second of the secon	res (Table Feb 101.05 (calcula 13.98 ins (calcula 33.1 rs gains 0	2 Table 5 2 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68 tted in Ap 33.1 (Table 5	Apr 101.05 ppendix 8.61 Appendix 163.86 ppendix 33.1 5a)	May 101.05 L, equati 6.44 dix L, equat 151.46 L, equat 33.1	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	Jul 101.05 r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.24 see Ta 134.8 ee Table 33.1	Oct 101.05 13.01 ble 5 144.62 5 33.1	Nov 101.05 15.18 157.02	Dec 101.05 16.18 168.68 33.1	eating	(67) (68) (69)
5. Internal games Metabolic gain Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances games (68)m= 176.46 Cooking gains (69)m= 33.1 Pumps and fames	res (Table Feb 101.05 (calcula 13.98 ins (calcula 33.1 rs gains 0	2 Table 5 2 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68 tted in Ap 33.1 (Table 5	Apr 101.05 ppendix 8.61 Appendix 163.86 ppendix 33.1 5a)	May 101.05 L, equati 6.44 dix L, equat 151.46 L, equat 33.1	Jun 101.05 ion L9 of 5.43 uation L 139.8 tion L15 33.1	Jul 101.05 r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.24 see Ta 134.8 ee Table 33.1	Oct 101.05 13.01 ble 5 144.62 5 33.1	Nov 101.05 15.18 157.02	Dec 101.05 16.18 168.68 33.1	eating	(67) (68) (69)
Metabolic gair Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances ga (68)m= 176.46 Cooking gains (69)m= 33.1 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -80.84	res (Table Feb 101.05 (calcula 13.98 ins (calcula 178.29 c (calcula 33.1 ns gains 0 raporatio	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68 ated in Ap 33.1 (Table 5 0 on (negat	ts Apr 101.05 ppendix 8.61 Appendix 163.86 ppendix 33.1 5a) 0 tive value	May 101.05 L, equati 6.44 dix L, equati 151.46 L, equati 33.1 0 es) (Tab	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18 0, also se 33.1	Sep 101.05 Table 5 10.24 see Tale 33.1	Oct 101.05 13.01 ble 5 144.62 5 33.1	Nov 101.05 15.18 157.02 33.1	Dec 101.05 16.18 168.68 33.1	eating	(67) (68) (69) (70)
Metabolic gair Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances ga (68)m= 176.46 Cooking gains (69)m= 33.1 Pumps and fa (70)m= 0 Losses e.g. ev	res (Table Feb 101.05 (calcula 13.98 ins (calcula 178.29 c (calcula 33.1 ns gains 0 raporatio	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68 ated in Ap 33.1 (Table 5 0 on (negat	ts Apr 101.05 ppendix 8.61 Appendix 163.86 ppendix 33.1 5a) 0 tive value	May 101.05 L, equati 6.44 dix L, equati 151.46 L, equati 33.1 0 es) (Tab	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18 0, also se 33.1	Sep 101.05 Table 5 10.24 see Tale 33.1	Oct 101.05 13.01 ble 5 144.62 5 33.1	Nov 101.05 15.18 157.02 33.1	Dec 101.05 16.18 168.68 33.1	eating	(67) (68) (69) (70)
Metabolic gair Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances ga (68)m= 176.46 Cooking gains (69)m= 33.1 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -80.84 Water heating	res (Table Feb 101.05 (calcula 13.98 ins (calcula 33.1 res gains 0 vaporatio 37.08	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68 ited in Ap 33.1 (Table 5 0 in (negation 1.80.84) Table 5) 34.56	s and 5a ts Apr 101.05 opendix 8.61 Appendix 163.86 opendix 33.1 5a) 0	May 101.05 L, equati 6.44 dix L, equati 151.46 L, equati 33.1 0 es) (Tab	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1 0 lle 5) -80.84	Jul 101.05 r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18 0, also se 33.1	Sep 101.05 Table 5 10.24 see Tal 134.8 ee Table 33.1 0	Oct 101.05 13.01 ble 5 144.62 5 33.1 0 -80.84	Nov 101.05 15.18 157.02 33.1 0	Dec 101.05 16.18 168.68 33.1 0 -80.84	eating	(67) (68) (69) (70) (71)
Metabolic gair Jan (66)m= 101.05 Lighting gains (67)m= 15.74 Appliances ga (68)m= 176.46 Cooking gains (69)m= 33.1 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -80.84 Water heating (72)m= 38.3	res (Table Feb 101.05 (calcula 13.98 ins (calcula 33.1 res gains 0 vaporatio 37.08	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.37 ulated in 173.68 ited in Ap 33.1 (Table 5 0 in (negation 1.80.84) Table 5) 34.56	s and 5a ts Apr 101.05 opendix 8.61 Appendix 163.86 opendix 33.1 5a) 0	May 101.05 L, equati 6.44 dix L, equati 151.46 L, equati 33.1 0 es) (Tab	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1 0 lle 5) -80.84	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18 0, also se 33.1	Sep 101.05 Table 5 10.24 see Tal 134.8 ee Table 33.1 0	Oct 101.05 13.01 ble 5 144.62 5 33.1 0 -80.84	Nov 101.05 15.18 157.02 33.1 0	Dec 101.05 16.18 168.68 33.1 0 -80.84	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.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southwest _{0.9x}	0.77	X	3.82	x	36.79		0.63	x	0.7	=	42.95	(79)
Southwest _{0.9x}	0.77	x	2.87	x	36.79		0.63	x	0.7	=	32.27	(79)
Southwest _{0.9x}	0.77	x	3.82	x	62.67		0.63	x	0.7	=	73.17	(79)
Southwest _{0.9x}	0.77	X	2.87	x	62.67		0.63	x	0.7	=	54.97	(79)
Southwest _{0.9x}	0.77	X	3.82	X	85.75		0.63	X	0.7	=	100.11	(79)
Southwest _{0.9x}	0.77	X	2.87	x	85.75		0.63	x	0.7	=	75.21	(79)
Southwest _{0.9x}	0.77	x	3.82	x	106.25		0.63	x	0.7	=	124.04	(79)
Southwest _{0.9x}	0.77	x	2.87	x	106.25		0.63	x	0.7	=	93.19	(79)
Southwest _{0.9x}	0.77	x	3.82	x	119.01		0.63	x	0.7	=	138.94	(79)
Southwest _{0.9x}	0.77	x	2.87	x	119.01		0.63	x	0.7	=	104.39	(79)
Southwest _{0.9x}	0.77	x	3.82	x	118.15		0.63	x	0.7	=	137.93	(79)
Southwest _{0.9x}	0.77	x	2.87	x	118.15		0.63	x	0.7	=	103.63	(79)
Southwest _{0.9x}	0.77	x	3.82	x	113.91		0.63	x	0.7	=	132.98	(79)
Southwest _{0.9x}	0.77	x	2.87	x	113.91		0.63	x	0.7	=	99.91	(79)
Southwest _{0.9x}	0.77	x	3.82	x	104.39		0.63	x	0.7	=	121.87	(79)
Southwest _{0.9x}	0.77	x	2.87	x	104.39		0.63	X	0.7	=	91.56	(79)
Southwest _{0.9x}	0.77	x	3.82	x	92.85		0.63	x	0.7	=	108.4	(79)
Southwest _{0.9x}	0.77	x	2.87	x	92.85		0.63	x	0.7	=	81.44	(79)
Southwest _{0.9x}	0.77	x	3.82	x	69.27		0.63	x	0.7	=	80.87	(79)
Southwest _{0.9x}	0.77	x	2.87	x	69.27		0.63	x	0.7	=	60.76	(79)
Southwest _{0.9x}	0.77	x	3.82	x	44.07		0.63	x	0.7	=	51.45	(79)
Southwest _{0.9x}	0.77	X	2.87	X	44.07		0.63	x	0.7	=	38.65	(79)
Southwest _{0.9x}	0.77	X	3.82	X	31.49		0.63	X	0.7	=	36.76	(79)
Southwest _{0.9x}	0.77	X	2.87	X	31.49		0.63	X	0.7	=	27.62	(79)
Northwest 0.9x	0.77	X	1.69	X	11.28	X	0.63	X	0.7	=	11.65	(81)
Northwest 0.9x	0.77	X	0.42	X	11.28	X	0.63	X	0.7	=	1.45	(81)
Northwest 0.9x	0.77	X	2.87	X	11.28	X	0.63	X	0.7	=	9.9	(81)
Northwest 0.9x	0.77	X	1.69	X	22.97	X	0.63	X	0.7	=	23.72	(81)
Northwest 0.9x	0.77	X	0.42	x	22.97	x	0.63	x	0.7	=	2.95	(81)
Northwest 0.9x	0.77	X	2.87	X	22.97	X	0.63	X	0.7	=	20.14	(81)
Northwest 0.9x	0.77	X	1.69	X	41.38	X	0.63	X	0.7	=	42.74	(81)
Northwest 0.9x	0.77	X	0.42	X	41.38	X	0.63	X	0.7	=	5.31	(81)
Northwest 0.9x	0.77	X	2.87	X	41.38	X	0.63	X	0.7	=	36.29	(81)
Northwest 0.9x	0.77	X	1.69	X	67.96	X	0.63	X	0.7	=	70.2	(81)
Northwest 0.9x	0.77	X	0.42	x	67.96	x	0.63	x	0.7	=	8.72	(81)
Northwest 0.9x	0.77	X	2.87	x	67.96	x	0.63	x	0.7	=	59.6	(81)
Northwest 0.9x	0.77	X	1.69	x	91.35	x	0.63	x	0.7	=	94.36	(81)
Northwest 0.9x	0.77	X	0.42	x	91.35	x	0.63	x	0.7] =	11.72	(81)
Northwest 0.9x	0.77	X	2.87	x	91.35	x	0.63	X	0.7	=	80.12	(81)

Northwest 0.9x	0.77	X	1.69	>		97.38	x	0.63	X	0.7	=	100.6	(81)
Northwest 0.9x	0.77	x	0.42	<u> </u>		97.38	x	0.63	x	0.7	=	12.5	(81)
Northwest 0.9x	0.77	X	2.87	—		97.38	x	0.63	X	0.7	=	85.42	(81)
Northwest 0.9x	0.77	X	1.69)		91.1	x	0.63	x	0.7	=	94.1	(81)
Northwest 0.9x	0.77	X	0.42	<u> </u>		91.1	x	0.63	x	0.7	=	11.69	(81)
Northwest 0.9x	0.77	X	2.87	—		91.1	x	0.63	X	0.7	=	79.91	(81)
Northwest 0.9x	0.77	X	1.69)		72.63	x	0.63	x	0.7	=	75.02	(81)
Northwest 0.9x	0.77	X	0.42)		72.63	x	0.63	x	0.7	=	9.32	(81)
Northwest _{0.9x}	0.77	X	2.87)		72.63	X	0.63	x	0.7	_	63.7	(81)
Northwest 0.9x	0.77	X	1.69)		50.42	x	0.63	x	0.7	=	52.08	(81)
Northwest _{0.9x}	0.77	X	0.42)		50.42	x	0.63	x	0.7	_	6.47	(81)
Northwest _{0.9x}	0.77	X	2.87)		50.42	x	0.63	X	0.7	=	44.22	(81)
Northwest 0.9x	0.77	X	1.69)		28.07	x	0.63	X	0.7	=	28.99	(81)
Northwest _{0.9x}	0.77	X	0.42)		28.07	x	0.63	X	0.7	=	3.6	(81)
Northwest 0.9x	0.77	X	2.87)		28.07	x	0.63	X	0.7	=	24.62	(81)
Northwest 0.9x	0.77	X	1.69)		14.2	x	0.63	X	0.7	=	14.66	(81)
Northwest 0.9x	0.77	X	0.42)		14.2	X	0.63	X	0.7	=	1.82	(81)
Northwest 0.9x	0.77	X	2.87	,		14.2	X	0.63	X	0.7	=	12.45	(81)
Northwest 0.9x	0.77	X	1.69)		9.21	X	0.63	X	0.7	=	9.52	(81)
Northwest 0.9x	0.77	X	0.42	>		9.21	X	0.63	X	0.7	=	1.18	(81)
Northwest 0.9x	0.77	X	2.87)		9.21	X	0.63	X	0.7	=	8.08	(81)
Solar gains in	watts, calc	ulated	for each m	onth			(83)m	= Sum(74)m .	(82)m			i	
(83)m= 98.23		259.67		9.53	440.08	418.6	361	.48 292.62	198.83	3 119.04	83.16		(83)
Total gains –			` ' 	.		1	1 .	.				1	(0.4)
(84)m= 382.04	457.63	532.6	612.68 66	9.65	664.41	632.92	579	.14 518.72	441.06	379.85	358.42		(84)
7. Mean inte	rnal temper	rature (heating se	ason)									_
Temperature	during hea	ating pe	eriods in the	e livin	g area	from Tal	ble 9	Th1 (°C)				21	(85)
Utilisation fa	ctor for gair	ns for li	ving area,	h1,m	(see T	able 9a)	•					1	
Jan	Feb	Mar	Apr I	May	Jun	Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 1	0.99	0.98	0.95 0	.87	0.71	0.55	0.6	0.85	0.97	1	1		(86)
Mean interna	al temperati	ure in li	iving area	T1 (fol	low ste	eps 3 to 7	7 in T	able 9c)		_			
(87)m= 19.48	19.66	19.97	20.37 20	0.71	20.92	20.98	20.	97 20.81	20.35	19.84	19.44		(87)
Temperature	during hea	ating pe	eriods in re	st of c	welling	g from Ta	able 9	9, Th2 (°C)					
(88)m= 19.78	19.78	19.78	19.79 19	9.79	19.8	19.8	19	.8 19.8	19.79	19.79	19.78		(88)
Utilisation fa	ctor for gair	ns for re	est of dwel	lina. h	2.m (s	ee Table	9a)			-		•	
(89)m= 1	 -	0.98		.82	0.61	0.41	0.4	8 0.78	0.96	0.99	1		(89)
Mean interna	al temperati	ure in t	he rest of o	lwellir	na T2 (follow sta	ens 3	to 7 in Tabl	le 9c)			1	
(90)m= 18.41		18.9		9.6	19.76	19.8	19.		19.28	18.78	18.38		(90)
. ,					-		-			ving area ÷ (4		0.5	(91)
													_

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

(92)m=	18.94	19.13	19.43	19.83	20.16	20.34	20.38	20.38	20.25	19.82	19.3	18.91		(92)
Apply	/ adjustn	nent to t	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	opriate				
(93)m=	18.94	19.13	19.43	19.83	20.16	20.34	20.38	20.38	20.25	19.82	19.3	18.91		(93)
8. Sp	ace hea	ting requ	uirement											
			ernal ter			ed at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the u			or gains u					Ι.	I -					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
			ains, hm		0.04	0.00	0.40		0.04		0.00			(04)
(94)m=	1	0.99	0.98	0.94	0.84	0.66	0.48	0.55	0.81	0.96	0.99	1		(94)
	380.48	453.43	W = (94)	1)M X (84 573.48	4)m 560.07	439.2	306.78	317.28	420.02	424.04	276.76	257.2		(95)
(95)m=							300.78	317.28	420.02	424.04	376.76	357.3		(95)
(96)m=	4.3	4.9	rnal tem	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
						<u> </u>		l	l	<u> </u>	7.1	4.2		(90)
	1243.55		an intern 1093.96	915.8	707.43	476.15	314.06	329.53	- (96)III 511.71	771.03	1024.82	1239.71		(97)
• •												1239.71		(37)
•	642.13	505.75	ement fo 426.65	246.47	109.63	0	n = 0.02	24 X [(97)m = (95 0	258.16	466.6	656.52		
(98)m=	042.13	303.73	420.05	240.47	109.03	U	U						0044.00	(08)
								Tota	ıl per year	(kwn/year	') = Sum(9	8) _{15,912} =	3311.92	(98)
Spac	e heating	g require	ement in	kWh/m ²	/year								53.94	(99)
8c. S	pace co	oling red	luiremen	t										
Calcu	ulated for	r June, c	luly and	August.	See Tal	ole 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	loss rate	Lm (ca	lculated	using 2	°C inter	nal temp	perature	and ext	ernal ten	nperatur	e from T	able 10)	ı	
(100)m=	0	0	0	0	0	780.03	614.07	629.7	0	0	0	0		(100)
Utilisa	ation fac	tor for Ic	ss hm							•			ı	
(101)m=	0	0	0	0	0	0.85	0.91	0.88	0	0	0	0		(101)
		mLm (V	/atts) = (100)m x	(101)m					,			l	
(102)m=	0	0	0	0	0	662.84	558.69	554.29	0	0	0	0		(102)
		gains ca	culated	for appli	cable we		_	i	10)	1			l	
(103)m=		0	0	0	0	851.96	813.67	751.98	0	0	0	0		(103)
			<i>ment foi</i> 104)m <			lwelling,	continuo	ous (kW	h = 0.0	24 x [(10	03)m – (°	102)m] x	x (41)m	
(104)m=		0	0	0	0	136.17	189.7	147.08	0	0	0	0		
									Total	= Sum(104)	=	472.96	(104)
Cooled	d fractior	1							f C =	cooled	area ÷ (4	1) =	1	(105)
Interm	ittency fa	actor (Ta	able 10b)										
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
									Total	l = Sum(104)	=	0	(106)
Space	cooling	requirer	nent for	month =	(104)m	× (105)	× (106)r	n						_
(107)m=	0	0	0	^	_	1 04 04	47.43	26.77	0	0	0	0		
			Ŭ	0	0	34.04	47.45	36.77	U		Ů	ŭ		
				U	0	34.04	47.45	30.77		= Sum(=	118.24	(107)
Space	cooling	requirer	nent in k	-		34.04	47.43	30.77	Total				118.24	(107)
•		•	-	:Wh/m²/y	/ear				Total	 = Sum(÷ (4) =				=
8f. Fat		gy Effici	ment in k	:Wh/m²/y	/ear				Total (107) ee sectio	 = Sum() ÷ (4) = on 11)	107)			=
8f. Fabri	oric Energy	gy Effici / Efficier	ment in k	:Wh/m²/y	ear only un				Total (107) ee sectio	 = Sum(÷ (4) =	107)		1.93	(108)

		l lsor F	Details:						
Access Nows	Chris Hestrall	– USEFL		_ NI	. .		OTD A	016262	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 2012		Strom Softwa					016363 on: 1.0.4.16	
Contware Hame.		Property	Address				V 01010	71. 1.0.1.10	
Address :		į		·					
1. Overall dwelling dime	nsions:								
Ground floor			a(m²)	(1a) x		ight(m)	(2a) =	Volume(m ³	(3a)
	a) ((] •	4	2.7	(2a) -	203.58	(Ja)
•	a)+(1b)+(1c)+(1d)+(1e)+(1	¹¹⁾	75.4	(4)) . (O -) . (O -	4) . (0 -) .	(0)		_
Dwelling volume				(3a)+(3b)+(3C)+(3C	d)+(3e)+	.(3n) =	203.58	(5)
2. Ventilation rate:	main seconda	rv	other		total			m³ per hou	ır
Number of chimneye	heating heating	-, □ + □		7 = 6			40 =	-	_
Number of chimneys		╛┊┝	0	」	0		20 =	0	(6a)
Number of open flues		' L	0	┚╶┟	0			0	(6b)
Number of intermittent fa				Ļ	3		10 =	30	(7a)
Number of passive vents				Ĺ	0		10 =	0	(7b)
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)
							Air ch	nanges per ho	our
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a)+(7b)+((7c) =	Г	30		÷ (5) =	0.15	(8)
If a pressurisation test has b	een carried out or is intended, proced	ed to (17),	otherwise o	continue fr	rom (9) to				``
Number of storeys in the	ne dwelling (ns)							0	(9)
Additional infiltration: 0	.25 for steel or timber frame o	r 0 35 fo	r masoni	ny consti	ruction	[(9)	-1]x0.1 =	0	(10)
	resent, use the value corresponding t			•	uction			0	(11)
deducting areas of openir	ngs); if equal user 0.35 loor, enter 0.2 (unsealed) or 0	1 (200)	ad) alaa	ontor O					7(40)
If no draught lobby, en	,	i (Scale	eu), eise	enter 0				0	(12)
• •	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	2 x (14) ÷ 1	100] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
•	q50, expressed in cubic metr	•	•	•	etre of e	envelope	area	5	(17)
•	ity value, then $(18) = [(17) \div 20] +$ s if a pressurisation test has been do				is heina u	sed		0.4	(18)
Number of sides sheltere	·	ne or a de	gree an pe	тисарту	is being u	300		1	(19)
Shelter factor			(20) = 1 -	[0.075 x (19)] =			0.92	(20)
Infiltration rate incorporat	_		(21) = (18	s) x (20) =				0.37	(21)
Infiltration rate modified for		1					ı	1	
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		1 00	1 0 7		1 40	1 45	1.7	1	
(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	2)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		

0.47	tion rate (allow 0.46 0.45	o.4	eiter an 0.4	a wina s	o.35	(21a) x	0.37	0.4	0.41	0.43	1	
1 1	tive air change	1 1				0.34	0.37	0.4	0.41	0.43		
If mechanical	-		,,								0	(2
If exhaust air hea	at pump using App	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N	N5)) , other	wise (23b) = (23a)			0	(2
If balanced with	heat recovery: effic	ciency in %	allowing f	or in-use f	actor (fron	n Table 4h) =				0	(2
a) If balanced	d mechanical vo	entilation	with he	at recove	ery (MVI	HR) (24a)m = (22	2b)m + (2	23b) × [´	1 – (23c)	÷ 100]	
24a)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
b) If balanced	d mechanical ve	entilation	without	heat rec	overy (N	ИV) (24b)m = (22	2b)m + (2	23b)	ī		
24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
,	ouse extract ver		•	•				- (00)	,			
<u> </u>	< 0.5 × (23b),	, ` ,	, ,		<u> </u>	r `		<u> </u>	,	١ ,	I	(2
24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
,	entilation or wh = 1, then (24d		•	•				0.51				
24d)m= 0.61	0.61 0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(2
Effective air of	change rate - e	nter (24a	or (24k	o) or (24	c) or (24	d) in box	(25)				•	
25)m= 0.61	0.61 0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(2
2 Heat leases	and hoat loop	paramata	\r.			•						
LEMENT	and heat loss Gross	Opening		Net Ar	22	U-valı	ام	AXU		k-value	<u> </u>	ΑXk
LEWENI	area (m²)	m		A,r		W/m2		(W/ł	<)	kJ/m²·l		kJ/K
oors (2	X	1	=	2				(2
Vindows Type	1			0.93	x1	/[1/(1.4)+	0.04] =	1.23				(2
Vindows Type	2			1.98	x1	/[1/(1.4)+	0.04] =	2.62	$\overline{}$			(2
Vindows Type	3			1.63	x1	/[1/(1.4)+	0.04] =	2.16				(2
							_					
Vindows Type	4			2.04	x1.	/[1/(1.4)+	L	2.7				
				2.04	╡ .	/[1/(1.4)+ /[1/(1.4)+	0.04] =	2.7 7.54				(2
Vindows Type	5				x1.	- ' '	0.04] = [0.04] = [(2
Vindows Type Vindows Type	5 6			5.69	x1.	/[1/(1.4)+	0.04] = [0.04] = [0.04] = [7.54				(2
Vindows Type Vindows Type Vindows Type	5 6			5.69	x1.	/[1/(1.4)+ /[1/(1.4)+	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [7.54 1.15				(; (; (;
Vindows Type Vindows Type Vindows Type Rooflights	5 6 7	16.08	3	5.69 0.87 1.47 0.77057	x1. x1. x1. x1. x1.	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [7.54 1.15 1.95 1.30998			-	(; (; (;
Vindows Type Vindows Type Vindows Type Vindows Type Rooflights Valls Type1 Valls Type2	5 6 7 68.45	16.08		5.69 0.87 1.47 0.77057 52.37	x1. x1. x1. x1. x2. x2. x3. x3. x4. x4. x4. x4. x4. x4. x4. x4.	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [7.54 1.15 1.95 1.309988 9.43]	(3)
Vindows Type Vindows Type Vindows Type Rooflights	5 6 7 68.45 4.03	2		5.69 0.87 1.47 0.77057 52.37 2.03	x1. x1. x1. x2. x2. x3. x4. x4. x4. x4. x4. x4. x4. x4. x4.	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.18	0.04] = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$ = $\begin{bmatrix} 0.04 \end{bmatrix}$	7.54 1.15 1.95 1.309989 9.43 0.37				(2)
Vindows Type Vindows Type Vindows Type Rooflights Valls Type1 Valls Type2 Roof	5 6 7 68.45 4.03 75.4			5.69 0.87 1.47 0.77057 52.37 2.03 74.63	x1. x1. x1. x1. x1. x2. x2. x3. x4. x4. x4. x4. x4. x4. x4. x4. x4. x4	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) +	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [7.54 1.15 1.95 1.309988 9.43				(3)
Vindows Type Vindows Type Vindows Type Rooflights Valls Type1 Valls Type2 Roof Total area of ele	5 6 7 68.45 4.03 75.4	2		5.69 0.87 1.47 0.77057 52.37 2.03 74.63 147.8	x1. x1. x1. x2. x2. x3. x4. x4. x4. x4. x4. x4. x4. x4. x4. x4	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.18 0.18	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [7.54 1.15 1.95 1.309988 9.43 0.37 9.7				(3)
Vindows Type Vindows Type Vindows Type Rooflights Valls Type1 Valls Type2 Roof Total area of electory	5 6 7 68.45 4.03 75.4	2		5.69 0.87 1.47 0.77057 52.37 2.03 74.63 147.8 42.95	x1. x1. x1. x2. x2. x3. x4. x4. x4. x4. x4. x4. x4. x4. x4. x4	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.18	0.04] = [0.04] = [0.04] = [0.04] = [0.04] = [= [= = [7.54 1.15 1.95 1.309989 9.43 0.37				(2) (2) (2) (2) (3) (4) (5) (6) (6) (6) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7
Vindows Type Vindows Type Vindows Type Vindows Type Rooflights Valls Type1 Valls Type2 Roof Total area of ele Party wall Party floor for windows and r	5 6 7 68.45 4.03 75.4 ements, m ²	2 0.77	ndow U-va	5.69 0.87 1.47 0.77057 52.37 2.03 74.63 147.8 42.95 75.4 alue calculations	x1. x1. x1. x2. x2. x3. x4. x4. x4. x4. x4. x4. x4. x4. x4. x4	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.18 0.13	0.04] = [0.04] = [7.54 1.15 1.95 1.309988 9.43 0.37 9.7		paragraph		(3)
Vindows Type Vindows Type Vindows Type Vindows Type Rooflights Valls Type1 Valls Type2 Roof Total area of ele Party wall Party floor for windows and re * include the areas	5 6 7 68.45 4.03 75.4 ements, m ²	2 0.77	ndow U-va	5.69 0.87 1.47 0.77057 52.37 2.03 74.63 147.8 42.95 75.4 alue calculations	x1. x1. x1. x1. x1. x2. x2. x2. x3. x4. x4. x4. x4. x4. x4. x4. x4. x4. x4	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.18 0.13	0.04] = [0.04] = [0.04	7.54 1.15 1.95 1.309988 9.43 0.37 9.7		paragraph	3.2	(2 (2 (2 (2 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3 (3
Vindows Type Vindows Type Vindows Type Vindows Type Rooflights Valls Type1 Valls Type2 Roof Total area of ele Party wall Party floor for windows and re * include the areas	68.45 4.03 75.4 ements, m² roof windows, use of so no both sides of its, W/K = S (A x	2 0.77	ndow U-va	5.69 0.87 1.47 0.77057 52.37 2.03 74.63 147.8 42.95 75.4 alue calculations	x1. x1. x1. x1. x1. x2. x2. x2. x3. x4. x4. x4. x4. x4. x4. x4. x4. x4. x4	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ /[1/(1.7) + 0.18 0.13 0 of formula 1.	0.04] = [0.04] = [0.04	7.54 1.15 1.95 1.309988 9.43 0.37 9.7	s given in			(2) (2) (2) (3) (3) (3) (4) (5)

	ısed instea	au oi a u e i	iaii e u caici	ılation.										
Therma	al bridge	s : S (L	x Y) cal	culated ı	using Ap	pendix I	K						14.96	(36)
	<i>of therma</i> abric hea		are not kn	own (36) =	= 0.15 x (3	1)			(33) ±	(36) =				7,07
			alculated	monthly	.,				• ,	` '	25)m x (5)		59	(37)
Ventua	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	40.97	40.68	40.4	39.08	38.84	37.69	37.69	37.47	38.13	38.84	39.33	39.86		(38
l Heat tr	ansfer c	oefficier	nt W/K			<u> </u>	<u> </u>	<u> </u>	(39)m	= (37) + (37)	1 38)m		l	
(39)m=	99.96	99.68	99.4	98.08	97.83	96.68	96.68	96.47	97.12	97.83	98.33	98.85		
ı Heat Ic	oss para	meter (H	HLP), W/	m²K		l	I	I		Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	98.08	(39
40)m=	1.33	1.32	1.32	1.3	1.3	1.28	1.28	1.28	1.29	1.3	1.3	1.31		
L						ı			,	Average =	Sum(40) ₁ .	12 /12=	1.3	(40
Numbe			nth (Tabl					l .					1	
(44)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(41
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41
4. Wa	iter heat	ing ener	gy requi	rement:								kWh/ye	ear:	
if TF	ed occu A > 13.9 A £ 13.9), N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (¯	ΓFA -13.		37		(42
Reduce	the annua	l average		usage by	5% if the a	lwelling is	designed	(25 x N) to achieve		se target o		.48		(43
ı				~~, (~ ·.	aici acc, i	ioi ariu co	ld)							
	Jan	Feb	Mar			Jun	Jul	Aug	Sep	Oct	Nov	Dec		
lot wate			Mar day for ea	Apr	May	Jun	Jul	Aug (43)	Sep	Oct	Nov	Dec		
ſ				Apr	May	Jun	Jul		Sep 88.67	Oct 92.29	Nov 95.91	Dec 99.53		
44)m=	er usage ir 99.53	95.91	92.29	Apr ach month 88.67	May Vd,m = fa 85.05	Jun ctor from	Jul Table 1c x 81.43	(43)	88.67	92.29 Total = Su	95.91 m(44) ₁₁₂ =	99.53	1085.79	(44
44)m= [Energy c	er usage ir 99.53	95.91	92.29	Apr ach month 88.67	May Vd,m = fa 85.05	Jun ctor from	Jul Table 1c x 81.43	(43) 85.05	88.67	92.29 Total = Su	95.91 m(44) ₁₁₂ =	99.53	1085.79	(4-
44)m= Energy o 45)m=	99.53 content of	95.91 hot water	92.29 used - calc 133.21	Apr ach month 88.67 culated mo	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44	Jun ctor from 7 81.43 190 x Vd,r 96.16	Jul Table 1c x 81.43 m x nm x E 89.11	(43) 85.05 07m / 3600 102.25	88.67 kWh/mor 103.47	92.29 Total = Su tth (see Ta 120.59	95.91 m(44) ₁₁₂ = ables 1b, 1	99.53 = c, 1d) 142.94	1085.79 1423.64	<u> </u>
44)m=	99.53 content of 147.6 taneous w	95.91 hot water 129.09 ater heatin	92.29 used - calc 133.21 ng at point	Apr ach month 88.67 culated mo 116.14	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44 $o hot water$	Jun ctor from 7 81.43 190 x Vd,r 96.16	Jul Table 1c x 81.43 m x nm x L 89.11 enter 0 in	(43) 85.05 DTm / 3600 102.25 boxes (46)	88.67) kWh/mor 103.47) to (61)	92.29 Total = Sunth (see Tail 120.59 Total = Sunth I = S	95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	99.53 = c, 1d) 142.94		(4!
44)m=	99.53 content of 147.6 taneous w	95.91 hot water 129.09 ater heatii	92.29 used - calc 133.21	Apr ach month 88.67 culated mo	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44	Jun ctor from 7 81.43 190 x Vd,r 96.16	Jul Table 1c x 81.43 m x nm x E 89.11	(43) 85.05 07m / 3600 102.25	88.67 kWh/mor 103.47	92.29 Total = Su tth (see Ta 120.59	95.91 m(44) ₁₁₂ = ables 1b, 1	99.53 = c, 1d) 142.94		(4
44)m=	99.53 content of 147.6 taneous w 0 storage	95.91 hot water 129.09 ater heatin 0 loss:	92.29 used - calc 133.21 ng at point 0	Apr ach month 88.67 culated mo 116.14 of use (no	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44 $o hot water$ 0	Jun ctor from 7 81.43 190 x Vd,r 96.16 r storage),	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 0	(43) 85.05 DTm / 3600 102.25 boxes (46)	88.67 0 kWh/mor 103.47 0 to (61)	92.29 Total = Su th (see Ta 120.59 Total = Su 0	95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	99.53 = c, 1d) 142.94		(4 (4
finergy of the first anti-	99.53 content of 147.6 taneous w 0 storage e volume	95.91 hot water 129.09 ater heatin 0 loss: e (litres)	92.29 used - calc 133.21 ng at point 0	Apr ach month 88.67 culated mo 116.14 of use (no	May Vd,m = fac 85.05 onthly = 4. 111.44 o hot water 0 olar or W	Jun ctor from 7 81.43 190 x Vd,r 96.16 r storage), 0	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 0 storage	(43) 85.05 27m / 3600 102.25 boxes (46) 0	88.67 0 kWh/mor 103.47 0 to (61)	92.29 Total = Su th (see Ta 120.59 Total = Su 0	95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	99.53 = c, 1d) 142.94 =		(4 (4
44)m= [finergy contact 145)m= [finstant 146)m= [Vater solution 99.53 content of 147.6 taneous w 0 storage e volumemunity h	95.91 hot water 129.09 ater heatin 0 loss: e (litres) eating a	92.29 used - calc 133.21 ng at point 0 includin	Apr ach month 88.67 culated mo 116.14 of use (no 0	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44 $o hot water$ 0 $olar or W$ $velling, e$	Jun ctor from 7 81.43 190 x Vd,r 96.16 r storage), 0 /WHRS	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 0 storage	(43) 85.05 27m / 3600 102.25 boxes (46) 0	88.67 0 kWh/mor 103.47 0 to (61) 0	92.29 Total = Sunth (see Tail 120.59 Total = Sunth 0	95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	99.53 = c, 1d) 142.94 =		(4 (4	
44)m= [Finergy of 45)m= [Finstant 46)m= [Vater s Storage F comm Otherw Vater s	99.53 content of 147.6 taneous w 0 storage e volume munity h vise if no	hot water 129.09 ater heatin 0 loss: e (litres) eating a stored loss:	92.29 used - calc 133.21 ng at point 0 includin nd no ta hot wate	Apr ach month 88.67 culated mo 116.14 of use (no 0 g any so nk in dw	May $Vd,m = fa$ 85.05 $0nthly = 4.$ 111.44 $0 hot water$ 0 $0 velling, e$ $acludes i$	Jun ctor from 7 81.43 190 x Vd,r 96.16 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 0 storage 0 litres in neous co	(43) 85.05 0Tm / 3600 102.25 boxes (46) 0 within sa (47)	88.67 0 kWh/mor 103.47 0 to (61) 0	92.29 Total = Sunth (see Tail 120.59 Total = Sunth 0	95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ = 0	99.53 = c, 1d) 142.94 = 0		(4 (4 (4
44)m= [Energy of 45)m= [f instant 46)m= [Water s Storage f comm Otherw Water s a) If m	99.53 content of 147.6 taneous w 0 storage e volume munity h vise if no storage tanufacti	n litres per 95.91 hot water 129.09 ater heatin 0 loss: e (litres) eating a o stored loss: urer's de	92.29 used - calc 133.21 ng at point 0 including and no talchot water	Apr sch month 88.67 culated mo 116.14 of use (no 0 g any so nk in dw er (this in	May $Vd,m = fa$ 85.05 $0nthly = 4.$ 111.44 $0 hot water$ 0 $0 velling, e$ $acludes i$	Jun ctor from 7 81.43 190 x Vd,r 96.16 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 0 storage 0 litres in neous co	(43) 85.05 0Tm / 3600 102.25 boxes (46) 0 within sa (47)	88.67 0 kWh/mor 103.47 0 to (61) 0	92.29 Total = Sunth (see Tail 120.59 Total = Sunth 0	95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ = 0	99.53 = c, 1d) 142.94 = 0		(4)
44)m= [Energy of 45)m= [finstants 46)m= [Water s Storage f comm Otherw Water s a) If m Fempe	99.53 content of 147.6 taneous w 0 storage e volume munity h vise if no storage anufaction	hot water 129.09 ater heatin 0 loss: e (litres) eating a stored loss: urer's de	gat point o includin nd no ta hot wate eclared le	Apr sch month 88.67 culated mo 116.14 of use (no 0 g any so nk in dw er (this in coss facto 2b	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44 $o hot water$ 0 $velling, e$ $or is known$	Jun ctor from 7 81.43 190 x Vd,r 96.16 r storage), 0 /WHRS enter 110 nstantar	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in o storage litres in neous con/day):	(43) 85.05 0Tm / 3600 102.25 boxes (46) 0 within sa (47) ombi boil	88.67 0 kWh/mor 103.47 0 to (61) 0 ame vessers) enter	92.29 Total = Sunth (see Tail 120.59 Total = Sunth 0	95.91 m(44) ₁₁₂ = 131.63 m(45) ₁₁₂ = 0	99.53 = c, 1d) 142.94 = 0		(44)
44)m= [Energy c 45)m= [finstant 46)m= [Water s Storage f comn Otherw Water s a) If m Fempe Energy	99.53 content of 147.6 taneous w ostorage e volume munity h vise if no storage tanufaction erature factors v lost fro	n litres per 95.91 hot water 129.09 ater heatin 0 loss: e (litres) eating a o stored loss: urer's de actor fro m water	92.29 used - calc 133.21 ng at point 0 including and no talchot water	Apr sch month 88.67 culated mo 116.14 of use (no 0 g any so nk in dw er (this in coss facto 2b , kWh/ye	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44 $o hot water$ 0 $olar or Water is known in the control of the$	Jun ctor from 7 81.43 190 x Vd,r 96.16 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 0 storage 0 litres in neous con/day):	(43) 85.05 0Tm / 3600 102.25 boxes (46) 0 within sa (47)	88.67 0 kWh/mor 103.47 0 to (61) 0 ame vessers) enter	92.29 Total = Sunth (see Tail 120.59 Total = Sunth 0	95.91 m(44) ₁₁₂ = 131.63 m(45) ₁₁₂ = 0	99.53 = c, 1d) 142.94 = 0		(44) (44) (44) (44)
Energy of 45)m= [If instant: 46)m= [Water so therw Water so a) If m Tempe Energy b) If m Hot wa	99.53 content of 147.6 taneous w storage e volume munity h vise if no storage tanufacti rature fa v lost fro tanufacti ter storage	n litres per 95.91 hot water 129.09 ater heatin 0 loss: e (litres) eating a o stored loss: urer's de actor fro m water urer's de age loss	gat point o including the twater eclared learning at storage	Apr sch month 88.67 culated mo 116.14 of use (no 0 g any so nk in dw er (this in coss facto 2b , kWh/ye cylinder I om Tabl	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44 $o hot water$ 0 $olar or Water older or Water older or Water older or Water older or Water older or Water older older or San San San San San San San San San San$	Jun ctor from 1 81.43 190 x Vd,r 96.16 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 0 storage 0 litres in neous con/day): known:	(43) 85.05 0Tm / 3600 102.25 boxes (46) 0 within sa (47) ombi boil	88.67 0 kWh/mor 103.47 0 to (61) 0 ame vessers) enter	92.29 Total = Sunth (see Tail 120.59 Total = Sunth 0	95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ = 0	99.53 = c, 1d) 142.94 = 0		(45) (46) (47) (48) (49) (50)
(44)m= [Energy c (45)m= [If instant (46)m= [Water s Storage If comm Otherw Water s a) If m Tempe Energy b) If m Hot wa	99.53 content of 147.6 taneous w storage e volume munity h vise if no storage tanufacti rature fa v lost fro tanufacti ter storage	ater heating a stored loss: urer's de actor fro m water urer's de age loss eating s	used - calconding at point of the colored least or age eclared of factor free sections.	Apr sch month 88.67 culated mo 116.14 of use (no 0 g any so nk in dw er (this in coss facto 2b , kWh/ye cylinder I om Tabl	May $Vd,m = fa$ 85.05 $onthly = 4.$ 111.44 $o hot water$ 0 $olar or Water older or Water older or Water older or Water older or Water older or Water older older or San San San San San San San San San San$	Jun ctor from 1 81.43 190 x Vd,r 96.16 r storage), 0 /WHRS enter 110 nstantar wn (kWh	Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 0 storage 0 litres in neous con/day): known:	(43) 85.05 0Tm / 3600 102.25 boxes (46) 0 within sa (47) ombi boil	88.67 0 kWh/mor 103.47 0 to (61) 0 ame vessers) enter	92.29 Total = Sunth (see Tail 120.59 Total = Sunth 0	95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ = 0	99.53 = c, 1d) 142.94 = 0		(444 (45) (46) (47) (48) (49) (50) (51) (52)

Energy lost from		•	, kWh/ye	ear			(47) x (51) x (52) x (53) =		0		(54)
Enter (50) or (Water storage	, ,	•	or oach	month			((56)m = ((55) × (41)r	m		0		(55)
					_		., /			_	_	 	(50)
(56)m= 0 If cylinder contains	0 dodinated	0 oolor stor	0	0 m = (56)m	0 (50) /	0	0	0 7)m = (56)	0 m where (0	0 m Annond	iv L	(56)
·				11 – (30)111			1	<i>1</i>)iii – (30)	iii wiicie (i				
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	•	,									0		(58)
Primary circuit				,	,	` '	` '						
(modified by		- i				1						ı	(50)
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
Combi loss cal	culated f	or each	month ((61)m =	(60) ÷ 36	65 × (41))m					ı	
(61)m= 0	0	0	0	0	0	0	0	0	0	0	0		(61)
Total heat requ	ired for v	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 125.46	109.73	113.23	98.72	94.72	81.74	75.74	86.91	87.95	102.5	111.89	121.5		(62)
Solar DHW input c	alculated u	ising Appe	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	contributi	on to wate	er heating)		
(add additional	lines if F	GHRS	and/or V	WWHRS	applies	, see Ap	pendix (3)					
(63)m= 0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output from wa	ater heate	er											
(64)m= 125.46	109.73	113.23	98.72	94.72	81.74	75.74	86.91	87.95	102.5	111.89	121.5		_
							Outp	out from wa	ater heater	r (annual)₁	12	1210.1	(64)
Heat gains fror	n water h	neating	kWh/ma	onth 0 2!	5 ′ [0 85	x (45)m	+ (61)m	1 + 0 8 v	(//6)m	± (57)m	± (50)m	1	
			1	o	J [0.00	(40)11	' (O 1 <i>)</i> 11	1] 1 0.0 7	. [(4 0)iii	+ (3 <i>1)</i> 111	+ (59)111	J	
(65)m= 31.37	27.43	28.31	24.68	23.68	20.43	18.94	21.73	21.99	25.63	27.97	30.38	J	(65)
(65)m= 31.37 include (57)r	!	28.31	24.68	23.68	20.43	18.94	21.73	21.99	25.63	27.97	30.38		(65)
	n in calcı	28.31 ulation o	24.68 of (65)m	23.68 only if c	20.43	18.94	21.73	21.99	25.63	27.97	30.38		(65)
include (57)r 5. Internal ga	n in calcuins (see	28.31 ulation of Table 5	24.68 of (65)m and 5a	23.68 only if c	20.43	18.94	21.73	21.99	25.63	27.97	30.38		(65)
include (57)r	n in calcuins (see	28.31 ulation of Table 5	24.68 of (65)m and 5a	23.68 only if c	20.43	18.94	21.73 dwelling	21.99 or hot w	25.63	27.97	30.38		(65)
include (57)r 5. Internal ga Metabolic gain	m in calcuins (see	28.31 ulation of Table 5 5), Watt	24.68 of (65)m and 5a	23.68 only if c	20.43 ylinder i	18.94 s in the o	21.73	21.99	25.63 ater is fr	27.97 om com	30.38 munity h		(65)
include (57)r 5. Internal ga Metabolic gain: Jan (66)m= 118.49	ins (see s (Table Feb	28.31 ulation of Table 5 5), Watt Mar 118.49	24.68 of (65)m and 5a ts Apr 118.49	23.68 only if c : May 118.49	20.43 ylinder is Jun 118.49	18.94 s in the o	21.73 dwelling Aug 118.49	21.99 or hot w Sep 118.49	25.63 ater is fr	27.97 om com	30.38 munity h		
include (57)r 5. Internal ga Metabolic gain Jan	ins (see s (Table Feb	28.31 ulation of Table 5 5), Watt Mar 118.49	24.68 of (65)m and 5a ts Apr 118.49	23.68 only if c : May 118.49	20.43 ylinder is Jun 118.49	18.94 s in the o	21.73 dwelling Aug 118.49	21.99 or hot w Sep 118.49	25.63 ater is fr	27.97 om com	30.38 munity h		
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68	m in calculate s (Table Feb 118.49 (calculate 16.59	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.21	23.68 only if c : May 118.49 L, equati 7.64	20.43 ylinder is Jun 118.49 on L9 of 6.45	Jul 118.49 118.49 1 L9a), a	21.73 dwelling Aug 118.49 lso see 9.05	21.99 or hot w Sep 118.49 Table 5 12.15	25.63 ater is fr Oct 118.49	27.97 om com Nov 118.49	30.38 munity h		(66)
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai	m in calculate 16.59 ns (calculate	28.31 ulation of the control of the	24.68 of (65)m and 5a ts Apr 118.49 ppendix 10.21 Append	23.68 only if c : May 118.49 L, equati 7.64 dix L, equ	Jun 118.49 ion L9 of 6.45 uation L	Jul 118.49 r L9a), a 6.97	21.73 dwelling Aug 118.49 lso see 9.05	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal	25.63 ater is fr Oct 118.49	27.97 om com Nov 118.49	30.38 munity h		(66)
include (57)r 5. Internal ga Metabolic gain: Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56	m in calculate 16.59 ns (calculate 211.73	28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.21 Append 194.59	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86	20.43 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02	Jul 118.49 r L9a), a 6.97 13 or L1 156.78	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75	27.97 om com Nov 118.49	30.38 munity h		(66) (67)
include (57)r 5. Internal ga Metabolic gain: Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains	m in calculate S (Table Feb 118.49 (calculate 16.59 ns (calculate 211.73 (calculate (cal	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25	24.68 of (65)m and 5a as Apr 118.49 opendix 10.21 Append 194.59 opendix	23.68 only if c): May 118.49 L, equati 7.64 dix L, equati 179.86 L, equat	20.43 ylinder is Jun 118.49 fon L9 of 6.45 uation L 166.02 ion L15	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table	25.63 ater is fr Oct 118.49 15.43 ole 5 171.75 5	27.97 om com Nov 118.49 18.01	30.38 munity h		(66) (67) (68)
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85	m in calculate (calculate 211.73 (calculate 34.85	28.31 ulation of the control of the	24.68 of (65)m and 5a as Apr 118.49 opendix 10.21 Append 194.59 opendix 34.85	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86	20.43 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02	Jul 118.49 r L9a), a 6.97 13 or L1 156.78	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75	27.97 om com Nov 118.49	30.38 munity h		(66) (67)
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and far	m in calculate (calculate 211.73 (calculate 34.85 as gains (28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25 ed in Ap 34.85 (Table 5	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.21 Appendix 194.59 opendix 34.85 ia)	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	Jun 118.49 5 on L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	27.97 om com Nov 118.49 18.01 186.47	30.38 munity h Dec 118.49 19.2 200.31		(66) (67) (68) (69)
include (57)r 5. Internal ga Metabolic gain: Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and far (70)m= 0	m in calculate 16.59 ns (calculate 34.85 ns gains (28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25 ed in Ap 34.85 (Table 5	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.21 Appendix 194.59 opendix 34.85 oa) 0	23.68 only if c May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	20.43 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table	25.63 ater is fr Oct 118.49 15.43 ole 5 171.75 5	27.97 om com Nov 118.49 18.01	30.38 munity h		(66) (67) (68)
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and far (70)m= 0 Losses e.g. even	m in calculate (calculate 211.73 (calculate 34.85 as gains (28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25 ded in Ap 34.85 (Table 5 0 n (negat	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.21 Appendix 194.59 opendix 34.85 oa) o iive valu	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab	20.43 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5)	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85	21.99 or hot w Sep 118.49 Table 5 12.15 see Tal 160.08 ee Table 34.85	25.63 ater is fr Oct 118.49 15.43 ole 5 171.75 5 34.85	27.97 om com Nov 118.49 18.01 186.47 34.85	30.38 munity h Dec 118.49 19.2 200.31 34.85		(66) (67) (68) (69) (70)
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and far (70)m= 0 Losses e.g. evi (71)m= -94.79	m in calculate Feb (calculate 16.59) (calculate 34.85) as gains (apporatior -94.79)	28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25 ded in Ap 34.85 (Table 5 0 n (negat -94.79	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.21 Appendix 194.59 opendix 34.85 oa) 0	23.68 only if c May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	20.43 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	27.97 om com Nov 118.49 18.01 186.47	30.38 munity h Dec 118.49 19.2 200.31		(66) (67) (68) (69)
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and far (70)m= 0 Losses e.g. eve (71)m= -94.79 Water heating	m in calculate (calculate 34.85) as gains (Taporatior -94.79) gains (Taporation (Taporatio	28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25 ed in Ap 34.85 (Table 5 on (negat -94.79) able 5)	24.68 of (65)m and 5a as Apr 118.49 opendix 10.21 Appendix 34.85 opendix 34.85 opendix 34.85 opendix 34.85	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab	20.43 ylinder is Jun 118.49 fon L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a 34.85	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85	21.99 or hot w Sep 118.49 Table 5 12.15 see Tall 160.08 ee Table 34.85 0	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	27.97 om com Nov 118.49 18.01 186.47 34.85	30.38 munity h Dec 118.49 19.2 200.31 34.85		(66) (67) (68) (69) (70) (71)
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and far (70)m= 0 Losses e.g. ev (71)m= -94.79 Water heating (72)m= 42.16	m in calculate Feb 118.49 (calculate 16.59 ns (calculate 34.85 ns gains (0 aporation -94.79 gains (Ta 40.82	28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25 ded in Ap 34.85 (Table 5 0 n (negat -94.79	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.21 Appendix 194.59 opendix 34.85 oa) o iive valu	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab	20.43 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85 0	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 0 -94.79	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79	27.97 om com Nov 118.49 18.01 186.47 34.85 0 -94.79	30.38 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79		(66) (67) (68) (69) (70)
include (57)r 5. Internal ga Metabolic gain: Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and far (70)m= 0 Losses e.g. ev (71)m= -94.79 Water heating (72)m= 42.16 Total internal	m in calculate Feb (calculate 16.59) ms (calculate 34.85) ms gains (28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25 ded in Ap 34.85 (Table 5 0 n (negat -94.79 able 5) 38.05	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.21 Appendix 34.85 opendix 34.85 opendix 34.85 a) opendix 34.85 a)	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab -94.79	20.43 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79 28.38 (66)	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85 0	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85 0 -94.79 29.21 1+ (68)m	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 0 -94.79 30.54 + (69)m + (25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79 34.44 70)m + (7	27.97 om com Nov 118.49 18.01 186.47 34.85 0 -94.79 38.85 1)m + (72)	30.38 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79 40.83		(66) (67) (68) (69) (70) (71)
include (57)r 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and far (70)m= 0 Losses e.g. ev (71)m= -94.79 Water heating (72)m= 42.16	m in calculate S (Table Feb 118.49 (calculate 16.59 ns (calculate 211.73 (calculate 34.85 ns gains (0 aporatior -94.79 gains (Ta 40.82 gains = 327.69	28.31 ulation of Table 5 5), Watte Mar 118.49 ed in Ap 13.49 ulated in 206.25 ed in Ap 34.85 (Table 5 on (negat -94.79) able 5)	24.68 of (65)m and 5a as Apr 118.49 opendix 10.21 Appendix 34.85 opendix 34.85 opendix 34.85 opendix 34.85	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab	20.43 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	21.73 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85 0	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 0 -94.79	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79	27.97 om com Nov 118.49 18.01 186.47 34.85 0 -94.79	30.38 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79		(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.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	5.69	x	11.28	x	0.63	x	0.7	=	19.62	(75)
Northeast 0.9x	0.77	x	0.87	x	11.28	x	0.63	x	0.7	=	3	(75)
Northeast 0.9x	0.77	x	5.69	x	22.97	x	0.63	x	0.7	=	39.94	(75)
Northeast 0.9x	0.77	x	0.87	x	22.97	x	0.63	x	0.7	=	6.11	(75)
Northeast 0.9x	0.77	x	5.69	x	41.38	x	0.63	x	0.7	=	71.96	(75)
Northeast 0.9x	0.77	x	0.87	x	41.38	x	0.63	x	0.7	=	11	(75)
Northeast 0.9x	0.77	x	5.69	x	67.96	x	0.63	x	0.7] =	118.17	(75)
Northeast 0.9x	0.77	x	0.87	x	67.96	x	0.63	x	0.7	=	18.07	(75)
Northeast 0.9x	0.77	x	5.69	x	91.35	x	0.63	x	0.7	=	158.84	(75)
Northeast 0.9x	0.77	x	0.87	x	91.35	x	0.63	x	0.7	=	24.29	(75)
Northeast 0.9x	0.77	x	5.69	x	97.38	x	0.63	x	0.7	=	169.35	(75)
Northeast 0.9x	0.77	x	0.87	x	97.38	x	0.63	x	0.7	=	25.89	(75)
Northeast 0.9x	0.77	x	5.69	x	91.1	x	0.63	x	0.7	=	158.42	(75)
Northeast 0.9x	0.77	x	0.87	x	91.1	x	0.63	x	0.7	=	24.22	(75)
Northeast 0.9x	0.77	x	5.69	x	72.63	x	0.63	x	0.7	=	126.29	(75)
Northeast 0.9x	0.77	x	0.87	x	72.63	x	0.63	X	0.7	=	19.31	(75)
Northeast 0.9x	0.77	x	5.69	x	50.42	x	0.63	x	0.7	=	87.68	(75)
Northeast 0.9x	0.77	x	0.87	x	50.42	x	0.63	x	0.7	=	13.41	(75)
Northeast 0.9x	0.77	x	5.69	x	28.07	x	0.63	x	0.7	=	48.81	(75)
Northeast 0.9x	0.77	x	0.87	x	28.07	x	0.63	x	0.7	=	7.46	(75)
Northeast 0.9x	0.77	x	5.69	x	14.2	x	0.63	x	0.7	=	24.69	(75)
Northeast 0.9x	0.77	x	0.87	x	14.2	x	0.63	x	0.7	=	3.77	(75)
Northeast 0.9x	0.77	x	5.69	x	9.21	x	0.63	x	0.7	=	16.02	(75)
Northeast 0.9x	0.77	x	0.87	x	9.21	x	0.63	x	0.7	=	2.45	(75)
Southeast 0.9x	0.77	x	1.47	x	36.79	x	0.63	X	0.7	=	33.06	(77)
Southeast 0.9x	0.77	x	1.47	x	62.67	x	0.63	x	0.7	=	56.31	(77)
Southeast 0.9x	0.77	x	1.47	x	85.75	x	0.63	x	0.7	=	77.05	(77)
Southeast 0.9x	0.77	x	1.47	x	106.25	x	0.63	X	0.7	=	95.47	(77)
Southeast 0.9x	0.77	x	1.47	x	119.01	x	0.63	x	0.7] =	106.93	(77)
Southeast 0.9x	0.77	x	1.47	x	118.15	x	0.63	x	0.7	=	106.16	(77)
Southeast 0.9x	0.77	x	1.47	x	113.91	x	0.63	X	0.7	=	102.35	(77)
Southeast 0.9x	0.77	x	1.47	x	104.39	x	0.63	x	0.7	=	93.8	(77)
Southeast 0.9x	0.77	x	1.47	x	92.85	x	0.63	x	0.7	=	83.43	(77)
Southeast 0.9x	0.77	x	1.47	x	69.27	x	0.63	x	0.7	=	62.24	(77)
Southeast 0.9x	0.77	x	1.47	x	44.07	x	0.63	x	0.7	=	39.6	(77)
Southeast 0.9x	0.77	X	1.47	x	31.49	x	0.63	x	0.7] =	28.29	(77)
Southwest _{0.9x}	0.77	X	0.93	x	36.79	Ī	0.63	x	0.7] =	10.46	(79)
Southwest _{0.9x}	0.77	X	1.98	x	36.79]	0.63	х	0.7] =	22.26	(79)
Southwest _{0.9x}	0.77	X	1.63	x	36.79]	0.63	x	0.7] =	18.33	(79)
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Southwest _{0.9x}	0.77	1	0.04	1 .,	00.70	0.00	l "	0.7	1 =	00.04	(79)
Southwest _{0.9x}	0.77] X]	2.04	X I	36.79	0.63	X	0.7]	22.94	=
Southwest _{0.9x}	0.77	X	0.93	X I	62.67	0.63	X	0.7] = 1 _	17.81	(79)
Southwest _{0.9x}	0.77] X] .,	1.98	l X l	62.67	0.63	X	0.7] = 1 _	37.92	(79)
Southwest _{0.9x}	0.77	X	1.63	X	62.67	0.63	X	0.7] = 1	31.22	(79)
Southwest _{0.9x}	0.77	X	2.04	X	62.67	0.63	X	0.7] = 1	39.07	(79)
Southwesto.9x Southwesto.9x	0.77] X]	0.93	X 	85.75	0.63	X	0.7] = 1 _	24.37	(79)
Southwest _{0.9x}	0.77	X	1.98	X	85.75	0.63	X	0.7] = 1	51.89	(79)
<u> </u>	0.77	X	1.63	X	85.75	0.63	X	0.7] = 1	42.72	(79)
Southwesto.9x	0.77	X	2.04	X	85.75	0.63	X	0.7] = 1	53.46	(79)
Southwesto.9x	0.77	X	0.93	X	106.25	0.63	X	0.7] = 1	30.2	(79)
Southwest _{0.9x}	0.77	X	1.98	X	106.25	0.63	X	0.7] = 1	64.29	(79)
Southwest _{0.9x}	0.77	X	1.63	X	106.25	0.63	X	0.7] =	52.93	<u> </u> (79)
Southwest _{0.9x}	0.77	X	2.04	X	106.25	0.63	X	0.7	=	66.24	(79)
Southwest _{0.9x}	0.77	X	0.93	X	119.01	0.63	X	0.7	=	33.83	(79)
Southwest _{0.9x}	0.77	X	1.98	X	119.01	0.63	X	0.7] =	72.01	(79)
Southwest _{0.9x}	0.77	X	1.63	X	119.01	0.63	X	0.7] =	59.29	(79)
Southwest _{0.9x}	0.77	X	2.04	X	119.01	0.63	X	0.7	=	74.2	(79)
Southwest _{0.9x}	0.77	X	0.93	X	118.15	0.63	X	0.7	=	33.58	(79)
Southwest _{0.9x}	0.77	X	1.98	x	118.15	0.63	X	0.7	=	71.49	(79)
Southwest _{0.9x}	0.77	X	1.63	x	118.15	0.63	X	0.7	=	58.86	(79)
Southwest _{0.9x}	0.77	X	2.04	X	118.15	0.63	X	0.7	=	73.66	(79)
Southwest _{0.9x}	0.77	X	0.93	x	113.91	0.63	X	0.7	=	32.38	(79)
Southwest _{0.9x}	0.77	X	1.98	X	113.91	0.63	X	0.7	=	68.93	(79)
Southwest _{0.9x}	0.77	X	1.63	X	113.91	0.63	X	0.7	=	56.74	(79)
Southwest _{0.9x}	0.77	X	2.04	x	113.91	0.63	X	0.7	=	71.02	(79)
Southwest _{0.9x}	0.77	X	0.93	x	104.39	0.63	X	0.7	=	29.67	(79)
Southwest _{0.9x}	0.77	X	1.98	x	104.39	0.63	X	0.7	=	63.17	(79)
Southwest _{0.9x}	0.77	X	1.63	X	104.39	0.63	X	0.7	=	52	(79)
Southwest _{0.9x}	0.77	X	2.04	X	104.39	0.63	X	0.7	=	65.08	(79)
Southwest _{0.9x}	0.77	X	0.93	x	92.85	0.63	X	0.7	=	26.39	(79)
Southwest _{0.9x}	0.77	x	1.98	x	92.85	0.63	X	0.7	=	56.19	(79)
Southwest _{0.9x}	0.77	X	1.63	x	92.85	0.63	X	0.7	=	46.25	(79)
Southwest _{0.9x}	0.77	X	2.04	x	92.85	0.63	x	0.7	=	57.89	(79)
Southwest _{0.9x}	0.77	x	0.93	x	69.27	0.63	x	0.7] =	19.69	(79)
Southwest _{0.9x}	0.77	X	1.98	x	69.27	0.63	X	0.7	=	41.91	(79)
Southwest _{0.9x}	0.77	x	1.63	x	69.27	0.63	x	0.7] =	34.51	(79)
Southwest _{0.9x}	0.77	x	2.04	x	69.27	0.63	x	0.7] =	43.18	(79)
Southwest _{0.9x}	0.77	x	0.93	x	44.07	0.63	x	0.7] =	12.53	(79)
Southwest _{0.9x}	0.77	x	1.98	x	44.07	0.63	x	0.7] =	26.67	(79)
Southwest _{0.9x}	0.77	x	1.63	x	44.07	0.63	x	0.7] =	21.95	(79)
Southwest _{0.9x}	0.77	x	2.04	x	44.07	0.63	x	0.7] =	27.48	(79)
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Southwest _{0.9x} 0.77	X	0.9	3	X	31.49			0.63	X	0.7	=	8.95	(79)
Southwest _{0.9x} 0.77	x	1.9	8	X	31.49			0.63	x	0.7	=	19.05	(79)
Southwest _{0.9x} 0.77	x	1.6	3	X	31.49			0.63	x	0.7	=	15.69	(79)
Southwest _{0.9x} 0.77	x	2.0	14	X	31.49			0.63	x	0.7	=	19.63	(79)
Rooflights 0.9x 1	x	0.7	7	x	26		x	0.63	x	0.7	=	7.95	(82)
Rooflights 0.9x 1	X	0.7	7	X	54		x	0.63	x	0.7	=	16.52	(82)
Rooflights 0.9x 1	X	0.7	7	X	96		x	0.63	x	0.7	=	29.36	(82)
Rooflights 0.9x 1	X	0.7	7	x	150		x	0.63	x	0.7	=	45.88	(82)
Rooflights 0.9x 1	X	0.7	7	x	192		x	0.63	x	0.7	=	58.72	(82)
Rooflights 0.9x 1	X	0.7	7	X	200		x	0.63	x	0.7	=	61.17	(82)
Rooflights 0.9x 1	X	0.7	7	X	189		x	0.63	x	0.7	=	57.8	(82)
Rooflights _{0.9x}	X	0.7	7	X	157		x	0.63	x	0.7	=	48.02	(82)
Rooflights 0.9x 1	X	0.7	7	x	115		x	0.63	x	0.7	=	35.17	(82)
Rooflights 0.9x 1	X	0.7	7	x	66		x	0.63	x	0.7	=	20.19	(82)
Rooflights 0.9x 1	X	0.7	7	X	33		x [0.63	x	0.7	=	10.09	(82)
Rooflights 0.9x 1	X	0.7	7	x	21		x	0.63	x	0.7	=	6.42	(82)
Solar gains in watts, ca	alculated	for each	n month	1		(8:	3)m =	Sum(74)m .	(82)m				
(83)m= 137.62 244.9	361.81	491.25	588.11	_	00.16 571		497.3	1 1	277.98	166.78	116.51	7	(83)
Total gains – internal a	nd solar	 = (84)m	: (73)m	+ (8	<u>l</u> 33)m , wat	tts						_	
			· , ,	Ť						_		7	
(84)m= 466.56 572.6	678.15	788.87	865.98	8	59.55 819	9.6 7	748.7	5 667.72	558.15	468.65	435.39		(84)
` '					59.55 819	9.6	748.7	5 667.72	558.15	468.65	435.39		(84)
7. Mean internal temp	erature ((heating	seasor	1)					558.15	468.65	435.39	21	
7. Mean internal temp Temperature during h	erature ((heating eriods ir	seasor the livi	n) ing	area from	Table			558.15	468.65	435.39	21	(84)
7. Mean internal temp Temperature during h Utilisation factor for ga	erature (eating peatins for li	(heating eriods ir iving are	seasor the livi ea, h1,m	ing n (se	area from	Table	e 9, ⁻	Γh1 (°C)				21	
7. Mean internal temp Temperature during h Utilisation factor for ga	erature (eating po ains for li Mar	(heating eriods in iving are Apr	seasor the livi ea, h1,m May	ing n (s	area from ee Table 9 Jun Ju	Table 9a) ul	e 9, ⁻ Auç	Γh1 (°C)	Oct	Nov	Dec	21	(85)
7. Mean internal temp Temperature during h Utilisation factor for ga	erature (eating peatins for li	(heating eriods ir iving are	seasor the livi ea, h1,m	ing n (s	area from	Table 9a) ul	e 9, ⁻	Γh1 (°C)				21	
7. Mean internal temp Temperature during h Utilisation factor for ga	erature (eating positions for limited Mar 0.98	(heating eriods in iving are Apr 0.94	seasor the livi ea, h1,m May	ing n (se	area from ee Table 9 Jun Ju 0.67 0.5	Table 9a) ul	e 9, - Aug 0.57	Γh1 (°C) g Sep 0.82	Oct	Nov	Dec	21	(85)
7. Mean internal temp Temperature during h Utilisation factor for ga Jan Feb (86)m= 1 0.99	erature (eating positions for limited Mar 0.98	(heating eriods in iving are Apr 0.94	seasor the livi ea, h1,m May	ing n (so	area from ee Table 9 Jun Ju 0.67 0.5	Table 9a) ul 51 to 7 ii	e 9, - Aug 0.57	Fh1 (°C) g Sep 0.82 ble 9c)	Oct	Nov 0.99	Dec	21	(85)
7. Mean internal temp Temperature during h Utilisation factor for ga Jan Feb (86)m= 1 0.99 Mean internal temperature during h Utilisation factor for ga	eating positions for limited Mar 0.98 ature in l	(heating eriods in iving are 0.94 iving are 20.46	seasor the livi ea, h1,m May 0.84 ea T1 (for	ing (secollo	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20.	Table 9a) ul to 7 ii	20.98	Sep 0.82 ble 9c) 20.85	Oct 0.97	Nov 0.99	Dec 1	21	(85)
7. Mean internal temp Temperature during h Utilisation factor for ga Jan Feb (86)m= 1 0.99 Mean internal temperature during h Utilisation factor for ga Jan Feb (86)m= 1 0.99	eating positions for limited Mar 0.98 ature in l	(heating eriods in iving are 0.94 iving are 20.46	seasor the livi ea, h1,m May 0.84 ea T1 (for	ing (so	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20.	Table 9a) ul to 7 ii	20.98	Sep 0.82 ble 9c) 20.85 Th2 (°C)	Oct 0.97	Nov 0.99	Dec 1	21	(85)
7. Mean internal temp Temperature during h Utilisation factor for ga Jan Feb (86)m= 1 0.99 Mean internal temperature (87)m= 19.55 19.75 Temperature during h (88)m= 19.82 19.82	eating peains for li Mar 0.98 ature in l 20.06 eating pe	(heating eriods in Apr 0.94 iving are 20.46 eriods in 19.84	seasor the livies, h1,m May 0.84 ea T1 (f 20.78 n rest of	ng (secollo	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. relling from 9.85 19.	Table 9a) ul to 7 ii 99 n Tabl	Aug 0.57 n Ta 20.98 le 9,	Sep 0.82 ble 9c) 20.85 Th2 (°C)	Oct 0.97	Nov 0.99	Dec 1	21	(85) (86) (87)
7. Mean internal temp Temperature during h Utilisation factor for ga Jan Feb (86)m= 1 0.99 Mean internal temperature during h	eating peains for li Mar 0.98 ature in l 20.06 eating pe	(heating eriods in Apr 0.94 iving are 20.46 eriods in 19.84	seasor the livies, h1,m May 0.84 ea T1 (f 20.78 n rest of	ng (sollo 2 dw 1 h2,	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. relling from 9.85 19.	Table 9a) ul 51 to 7 ii 99 n Tabl 85	Aug 0.57 n Ta 20.98 le 9,	Sep 0.82 ble 9c) 20.85 Th2 (°C)	Oct 0.97	Nov 0.99	Dec 1	21	(85) (86) (87)
7. Mean internal temporature during house and the state of the state o	eating positions for line atture in language 20.06 eating positions for range 20.98	(heating eriods in iving are 20.46 eriods in 19.84 est of do	seasor the livies, h1,m May 0.84 ea T1 (for 20.78 or rest of 19.84 welling, 0.78	1) (sollo ollo 2 h2,	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3	Table 9a) ul to 7 ii 99 n Table 85 able 9a	Aug 0.57 n Ta 20.98 le 9, 19.86 a) 0.44	Sep 0.82 ble 9c) 20.85 Th2 (°C) 19.85	Oct 0.97 20.42 19.84 0.95	Nov 0.99 19.91	Dec 1 19.52	21	(85) (86) (87) (88)
7. Mean internal temp Temperature during h Utilisation factor for ga Jan Feb (86)m=	eating positions for limited Mar 0.98 atture in l 20.06 eating positions for r 0.98 atture in t	(heating eriods in 19.84 eriods in 19.92 the rest of data and the control of the	season the living the	ing (solloolloolloolloolloolloolloolloollool	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3 T2 (follow	Table 9a) ul to 7 ii 99 m Tabl 85 able 9a 38	Auq 0.57 n Ta 20.98 le 9, 19.86 a) 0.44 s 3 t	Sep 0.82 ble 9c) 20.85 Th2 (°C) 19.85 0.74 0 7 in Table	Oct 0.97 20.42 19.84 0.95 e 9c)	Nov 0.99 19.91 19.84	Dec 1 19.52 19.83	21	(85) (86) (87) (88) (89)
7. Mean internal temporature during house and the state of the state o	eating positions for line atture in language 20.06 eating positions for range 20.98	(heating eriods in iving are 20.46 eriods in 19.84 est of do	seasor the livies, h1,m May 0.84 ea T1 (for 20.78 or rest of 19.84 welling, 0.78	ing (solloolloolloolloolloolloolloolloollool	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3	Table 9a) ul to 7 ii 99 m Tabl 85 able 9a 38	Aug 0.57 n Ta 20.98 le 9, 19.86 a) 0.44	Sep 0.82 ble 9c) 3 20.85 Th2 (°C) 6 19.85 0.74 0 7 in Table 19.77	Oct 0.97 20.42 19.84 0.95 e 9c) 19.39	Nov 0.99 19.91 19.84 0.99	Dec 1 19.52 19.83		(85) (86) (87) (88) (89)
7. Mean internal temp Temperature during h Utilisation factor for ga Jan Feb (86)m=	eating positions for limited Mar 0.98 atture in l 20.06 eating positions for r 0.98 atture in t	(heating eriods in 19.84 eriods in 19.92 the rest of data and the control of the	season the living the	ing (solloolloolloolloolloolloolloolloollool	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3 T2 (follow	Table 9a) ul to 7 ii 99 m Tabl 85 able 9a 38	Auq 0.57 n Ta 20.98 le 9, 19.86 a) 0.44 s 3 t	Sep 0.82 ble 9c) 3 20.85 Th2 (°C) 6 19.85 0.74 0 7 in Table 19.77	Oct 0.97 20.42 19.84 0.95 e 9c) 19.39	Nov 0.99 19.91 19.84	Dec 1 19.52 19.83	21	(85) (86) (87) (88) (89)
7. Mean internal temporature during house and house and house and house and house and house and house and ho	eating positions for line atture in language 20.06 eating positions for range 20.08 eating positions for range 20.08 eature in table 20.03 eature in table 20.03 eature (for eature (for eating positions) eature in table 20.03 eature (for eature (f	cheating eriods in 19.84 eriods in 19.84 eriods in 19.42 er the whom	seasor the livi ea, h1,m May 0.84 ea T1 (ff 20.78 rest of 19.84 welling, 0.78 of dwell 19.7	ing (sollowing) (s	area from ee Table 9 Jun Ju 0.67 0.6 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3 T2 (follow 9.83 19.	Table 9a) ul to 7 ii 99 m Table 85 able 9a 38 v steps 85	Aug 0.57 n Ta 20.98 le 9, 19.86 a) 0.44 s 3 t 19.85	Fh1 (°C) g Sep 0.82 ble 9c) 3 20.85 Th2 (°C) 6 19.85 0.74 0 7 in Table 6 19.77	Oct 0.97 20.42 19.84 0.95 e 9c) 19.39	Nov 0.99 19.91 19.84 0.99 18.88 ing area ÷ (4	Dec 1 19.52 19.83 1 18.49		(85) (86) (87) (88) (89) (90) (91)
7. Mean internal temporature during house and house and house and house and house and house and house and ho	eating positions for line attree in language 20.06 eating positions for ranguage 20.08 eating positions for ranguage 20.08 eature in tage 20.08 eature (for 19.39 eature (for 19.39 eature in tage 20.08 eature (for 19.39 eature in tage 20.08 eature (for 19.39 eature in tage 20.08 eature (for 19.39 eature in tage 20.08 eature (for 19.39 eature in tage 20.08 eature in	(heating eriods in iving are 20.46 eriods in 19.84 est of do 0.92 the rest of 19.42 er the who 19.79	seasor the livi ea, h1,m May 0.84 ea T1 (fr 20.78 n rest of 19.84 welling, 0.78 of dwell 19.7 ole dwe 20.08	ollo 2 h2,	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3 T2 (follow 9.83 19. g) = fLA × 0.23 20.	Table 9a) ul to 7 ii 99 n Table 85 able 9a 38 v steps 85	Aug 0.57 n Ta 20.98 le 9, 19.86 a) 0.44 s 3 t 19.85 (1 - 20.25	Sep 0.82 ble 9c) 3 20.85 Th2 (°C) 6 19.85 0.74 0 7 in Table 6 19.77 f fLA) × T2 6 20.16	Oct 0.97 20.42 19.84 0.95 e 9c) 19.39 LA = Liv	Nov 0.99 19.91 19.84 0.99 18.88 ing area ÷ (4	Dec 1 19.52 19.83		(85) (86) (87) (88) (89)
7. Mean internal temporature during house and house and house and house and house and house and house and ho	eating positions for line atture in language 20.06 eating positions for range 20.08 eating positions for range 20.08 eature in table 20.03 eature in table 20.03 eature (for 19.03 eature mean	cheating eriods in the iving are 20.46 eriods in 19.84 est of do 0.92 the rest of 19.42 er the whom 19.79 internal	season the livi ea, h1,m May 0.84 ea T1 (ff 20.78 n rest of 19.84 welling, 0.78 of dwell 19.7 ole dwe 20.08 temper	h2, (ling 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3 T2 (follow 9.83 19. g) = fLA × 0.23 20. re from Ta	Table 9a) ul to 7 ii 99 m Table 85 able 9a 38 v steps 85 T1 + 25 able 4	Aug 0.57 n Ta 20.98 le 9, 19.86 0.44 s 3 t 19.85 (1 – 20.25 le, w	Sep 0.82 ble 9c) 3 20.85 Th2 (°C) 6 19.85 0.74 0 7 in Table 6 19.77 ffLA) × T2 6 20.16 here appro	Oct 0.97 20.42 19.84 0.95 e 9c) 19.39 LA = Liv	Nov 0.99 19.91 19.84 0.99 18.88 ing area ÷ (4	Dec 1 19.52 19.83 1 18.49 4) =		(85) (86) (87) (88) (89) (90) (91) (92)
7. Mean internal temporature during house and house and house and house and house and house and house and ho	eating positions for line attree in language 20.06 eating positions for ranguage 20.08 eating positions for ranguage 20.08 eature in tage 20.08 eature (for 19.39 eature (for 19.39 eature in tage 20.08 eature (for 19.39 eature in tage 20.08 eature (for 19.39 eature in tage 20.08 eature (for 19.39 eature in tage 20.08 eature (for 19.39 eature in tage 20.08 eature in	(heating eriods in iving are 20.46 eriods in 19.84 est of do 0.92 the rest of 19.42 er the who 19.79	seasor the livi ea, h1,m May 0.84 ea T1 (fr 20.78 n rest of 19.84 welling, 0.78 of dwell 19.7 ole dwe 20.08	h2, (ling 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3 T2 (follow 9.83 19. g) = fLA × 0.23 20.	Table 9a) ul to 7 ii 99 m Table 85 able 9a 38 v steps 85 T1 + 25 able 4	Aug 0.57 n Ta 20.98 le 9, 19.86 a) 0.44 s 3 t 19.85 (1 - 20.25	Sep 0.82 ble 9c) 3 20.85 Th2 (°C) 6 19.85 0.74 0 7 in Table 6 19.77 ffLA) × T2 6 20.16 here appro	Oct 0.97 20.42 19.84 0.95 e 9c) 19.39 LA = Liv	Nov 0.99 19.91 19.84 0.99 18.88 ing area ÷ (4	Dec 1 19.52 19.83 1 18.49		(85) (86) (87) (88) (89) (90) (91)
7. Mean internal temporature during house and house and house and house and house and house and house and ho	eating positive in the control of th	cheating eriods in the iving are 20.46 eriods in 19.84 est of do 0.92 the rest of 19.42 er the whom 19.79 internal	season the livi ea, h1,m May 0.84 ea T1 (ff 20.78 n rest of 19.84 welling, 0.78 of dwell 19.7 ole dwe 20.08 temper	h2, (ling 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3 T2 (follow 9.83 19. g) = fLA × 0.23 20. re from Ta	Table 9a) ul to 7 ii 99 m Table 85 able 9a 38 v steps 85 T1 + 25 able 4	Aug 0.57 n Ta 20.98 le 9, 19.86 0.44 s 3 t 19.85 (1 – 20.25 le, w	Sep 0.82 ble 9c) 3 20.85 Th2 (°C) 6 19.85 0.74 0 7 in Table 6 19.77 ffLA) × T2 6 20.16 here appro	Oct 0.97 20.42 19.84 0.95 e 9c) 19.39 LA = Liv	Nov 0.99 19.91 19.84 0.99 18.88 ing area ÷ (4	Dec 1 19.52 19.83 1 18.49 4) =		(85) (86) (87) (88) (89) (90) (91) (92)
7. Mean internal temporature during house and house and house and house and house and house and house and ho	erature (eating positions for limited positions for realist positi	cheating eriods in iving are 20.46 eriods in 19.84 est of dv 0.92 che rest of 19.42 er the whole 19.79 internal 19.79 enperatur	seasor in the livitea, h1,m May 0.84 ea T1 (fr 20.78 in rest of 19.84 welling, 0.78 of dwell 19.7 ole dwell 20.08 temper 20.08	h2, colloing the selling the	area from ee Table 9 Jun Ju 0.67 0.5 w steps 3 0.94 20. elling from 9.85 19. m (see Ta 0.57 0.3 T2 (follow 9.83 19. g) = fLA × 0.23 20. re from Ta 0.23 20.	Table 9a) ul to 7 ii .99 m Table .85 able 9a .85 T1 + .25 able 4 .25	Aug 0.57 n Ta 20.98 le 9, 19.86 a) 0.44 s 3 t 19.85 (1 – 20.25 le, w 20.25	Sep 0.82 ble 9c) 3 20.85 Th2 (°C) 5 19.85 0.74 0 7 in Table 6 19.77 f fLA) × T2 6 20.16 here approximates the second of the sec	Oct 0.97 20.42 19.84 0.95 e 9c) 19.39 LA = Liv	Nov 0.99 19.91 19.84 0.99 18.88 ing area ÷ (4	Dec 1 19.52 19.83 1 18.49 4) =	0.35	(85) (86) (87) (88) (89) (90) (91) (92)

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Mar

Jan

Feb

Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	1	0.99	0.97	0.92	0.8	0.6	0.43	0.49	0.77	0.95	0.99	1		(94)
Usefu	ıl gains,	hmGm	, W = (94	4)m x (8	4)m	•	•	•		•		•		
(95)m=	464.66	566.73	659.52	725.26	690.54	517.73	349.17	364.07	511.2	532.05	464.6	434.08		(95)
Mont	nly avera	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]			1	
(97)m=	1457.24	1413.48	1281.58	1068.03	820.14	543.98	353.37	371.58	588.21	895.93	1194.48	1448.47		(97)
-			ement fo		nonth, k	Wh/mon	th = 0.02	24 x [(97)m – (95		 		ı	
(98)m=	738.48	569.02	462.81	246.8	96.43	0	0	0	0	270.72	525.52	754.7		
								Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	3664.47	(98)
Spac	e heatin	g require	ement in	kWh/m²	²/year								48.6	(99)
8c. S	pace co	oling red	quiremen	nt										
		Ĭ	July and		See Tal	ble 10b								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat	loss rate	ELm (ca	lculated	using 2	5°C inter	nal tem	perature	and ext	ernal ter	nperatur	e from T	able 10)		
(100)m=	0	0	0	0	0	908.81	715.45	733.17	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm		_		-				_	_		
(101)m=	0	0	0	0	0	0.89	0.94	0.91	0	0	0	0		(101)
Usefu	ıl loss, h	mLm (V	Vatts) = ((100)m x	(101)m									
(102)m=	0	0	0	0	0	804.65	669.32	668.18	0	0	0	0		(102)
Gains	(solar	gains ca	lculated	for appli	cable w	eather re	egion, se	e Table	10)		i		1	
(103)m=	0	0	0	0	0	1082.43	1034.49	954.77	0	0	0	0		(103)
						dwelling,	continue	ous (kN	h') = 0.0	24 x [(10	03)m – (102)m] :	x (41)m	
(104)m=		0	(104)m <	0 0	0	200	271.69	213.23	0	0	0	0		
(104)111						200	27 1.00	210.20		I = Sum(=	684.92	(104)
Cooled	d fraction	า								cooled	,		1	(105)
			able 10b)								′ I		`
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
			•					•	Tota	l = Sum(104)	=	0	(106)
Space	cooling	require	ment for	month =	(104)m	× (105)	× (106)r	n						
(107)m=	0	0	0	0	0	50	67.92	53.31	0	0	0	0		
									Tota	I = Sum(107)	=	171.23	(107)
Space	cooling	require	ment in k	:Wh/m²/	year				(107) ÷ (4) =			2.27	(108)
8f. Fab	oric Ene	rgy Effic	iency (ca	alculated	l only un	der spec	cial cond	litions, s	ee sectio	on 11) _				
Fabri	c Energy	y Efficie	ncy						(99)	+ (108) :	=		50.87	(109)
Targe	et Fabri	c Enera	y Efficie	ency (TF	EE)								58.5	(109)
- 3		- 3	•	, ,	,									_

				User E	Details:						
Assessor Name: Software Name:	Chris Hoo Stroma F	_	2		Strom Softwa					016363 on: 1.0.4.16	
			Р	roperty	Address						
Address :											
1. Overall dwelling din	nensions:										
Ground floor					a(m²)	(1a) v	Av. Hei		1(20) -	Volume(m³)	_
	(4 -)	/4 -1\ · /4 -	\ (4			(1a) x	2	2.7	(2a) =	135.46	(3a)
Total floor area TFA = ((1a)+(1b)+(1c)+	-(1d)+(1e)+(1r	؛ (۱	50.17	(4)					_
Dwelling volume						(3a)+(3b)+(3c)+(3d)+(3e)+	.(3n) =	135.46	(5)
2. Ventilation rate:					- 11		4-4-1			2 1	
	main heating		econdar eating	ту 	other	_	total			m³ per houi	_
Number of chimneys	0	+	0	+	0	=	0	X 4	40 =	0	(6a)
Number of open flues	0	+	0] + [0] = [0	x 2	20 =	0	(6b)
Number of intermittent	fans						2	x '	10 =	20	(7a)
Number of passive ven	ts					Ē	0	x -	10 =	0	(7b)
Number of flueless gas	fires					F	0	X 4	40 =	0	☐ [7c]
· ·						L					」 ` ′
									Air ch	nanges per ho	ur
Infiltration due to chimn	eys, flues and	fans = (6	a)+(6b)+(7	a)+(7b)+((7c) =	Γ	20		÷ (5) =	0.15	(8)
If a pressurisation test has			ed, procee	d to (17),	otherwise (continue fr	om (9) to ((16)			_
Number of storeys in Additional infiltration	the dwelling (r	is)						[(0)	1100 1 =	0	(9)
Structural infiltration:	0.25 for steel o	r timber f	frame or	. 0 35 fo	r masoni	v constr	ruction	[(9)	-1]x0.1 =	0	(10)
if both types of wall are						•	dollon			0	(11)
deducting areas of ope	0 // /										_
If suspended wooder		,	ed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, e Percentage of windo			rinned							0	(13)
Window infiltration	ws and doors d	raugiit st	пррец		0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate					(8) + (10)	+ (11) + (1	- 12) + (13) -	+ (15) =		0	(16)
Air permeability value	e, q50, express	ed in cub	ic metre	s per ho	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permeat	oility value, the	1 (18) = [(1	7) ÷ 20]+(8	8), otherw	rise (18) = ((16)				0.3	(18)
Air permeability value app	•	ion test has	s been dor	ne or a de	gree air pe	rmeability	is being us	sed			_
Number of sides shelte Shelter factor	red				(20) = 1 -	[0 075 x (1	19)1 =			1 0.00	(19)
Infiltration rate incorpor	ating shelter fa	ctor			(21) = (18		.0/]			0.92	(20)
Infiltration rate modified	•		1		()	, (==)				0.28	(21)
Jan Feb	Mar Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind s	<u>'</u>					*F				1	
(22)m= 5.1 5	4.9 4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7]	
	I		I	1	1	I	1	ı	1	1	
Wind Factor (22a)m = (, ,			1	ı	1		1	1	
(22a)m= 1.27 1.25	1.23 1.1	1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltration	on rate (allo	wing for sl	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.35	0.34	0.3	0.3	0.26	0.26	0.25	0.28	0.3	0.31	0.32]	
Calculate effectiv	•	e rate for t	he appli	icable ca	ise						•	
If mechanical v		nnondiy N. /)2h) = (22	a) v Fmv (aguation (NEN otho	nuina (22h	·) = (22a)			0	(238
If exhaust air heat			, ,	,	. `	,, .	`)) = (23a)			0	(23k
If balanced with he	-	-	_					.		4 (00.)	0	(230
a) If balanced r	1	i	·	1	- 	- ^ ` ` 	í `	, 	- 	``) ÷ 100] 1	(24a
(24a)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(240
b) If balanced r				1	covery (I	VIV) (24) 1 0	$\int_{0}^{\infty} \int_{0}^{\infty} dt = (22)$	- ^ `	- 	Ι ,	1	(24
(24b)m= 0	!	0	0	. ,			<u> </u>	0	0	0		(24)
c) If whole hous if (22b)m <			•	•				5 x (23h	,)			
(24c)m = 0	0.5 × (235)	0	0	0	0	0) - (22)	0	0	0	0	1	(24
d) If natural ve				<u> </u>			<u> </u>				J	`
,	1, then (24		•	•				0.5]				
(24d)m= 0.56 (0.56	0.55	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55]	(240
Effective air ch	ange rate -	enter (24a) or (24l	b) or (24	c) or (24	d) in bo	x (25)	•	•	•	•	
(25)m= 0.56 (0.56	0.55	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55]	(25)
3. Heat losses a	nd hoot lod	o paramat	or:	,	•	,	•	,		•	4	
ELEMENT	Gross area (m²)	Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/I	K)	k-value		A X k kJ/K
Doors	arca (III)		•	2	x	1.3	 =	2.6		KO/III		(26)
Windows Type 1				9.56	_	/[1/(1.3)+			=			(27)
Windows Type 2					_	/[1/(1.3)+		11.81	\dashv			•
Windows Type 3				4.62	= ,	/[1/(1.3)+		5.71	᠆			(27)
• • • • • • • • • • • • • • • • • • • •				4.17	= ,	/[1/(1.6) +		5.15	=			(27)
Rooflights Type 1				1.05	= ~.	•	•	1.68				(27
Rooflights Type 2				1.79	X1	/[1/(1.6) +	0.04] =	2.864	ᆗ ,			(27
Walls Type1	35.48	22.5	2	12.96	5 X	0.15		1.94	닠 !		-	(29)
Walls Type2	30.48	2		28.48	3 X	0.13		3.8	_			(29)
Roof	50.17	2.84	1	47.33	3 X	0.1	=	4.73				(30)
Total area of eler	nents, m²			116.1	3							(31)
Party wall				26.97	7 X	0	=	0				(32
Party floor				50.17	7				[(32
* for windows and roc ** include the areas o					lated using	g formula 1	/[(1/U-valu	ue)+0.04] a	as given in	paragrapl	n 3.2	
abric heat loss,	W/K = S (A	ν Χ U)				(26)(30) + (32) =				45.18	(33
Heat capacity Cn	$I = S(A \times k)$)					((28).	(30) + (32	2) + (32a).	(32e) =	10845.	77 (34
Thermal mass pa	rameter (T	MP = Cm -	+ TFA) ir	n kJ/m²K			Indica	ative Value	: Medium		250	(35
									TMD: T			
For design assessme can be used instead o			construct	tion are no	t known pi	recisely the	e indicative	e values of	TMP IN T	able 1†		
ŭ	of a detailed ca	alculation.			•	recisely the	e indicative	e values of	TMP IN T	able 1f	14.19	(36

Total fabric h	eat loss							(33) +	(36) =		ı	59.37	(37)
Ventilation he		alculated	d monthl	V				` '	` '	25)m x (5)	l	30.01	(0.)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 25.1	25	24.89	24.4	24.31	23.88	23.88	23.8	24.04	24.31	24.5	24.69		(38)
Heat transfer	coefficie	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m= 84.48	84.37	84.27	83.77	83.68	83.25	83.25	83.17	83.42	83.68	83.87	84.06		
Heat loss par	rameter (I	HLP), W	/m²K	•	•	•			Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	83.77	(39)
(40)m= 1.68	1.68	1.68	1.67	1.67	1.66	1.66	1.66	1.66	1.67	1.67	1.68		
Number of da	ays in mo	nth (Tab	le 1a)	•	•	•		,	Average =	Sum(40) _{1.}	12 /12=	1.67	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
	•			•									
4. Water he	ating ene	rav reau	irement [.]								kWh/ye	ar.	
T. Water field	attrig cric	igy requi	il Cilicili.								KVVIII yC	,ai.	
Assumed occ											.7		(42)
if TFA > 13 if TFA £ 13		+ 1.76 x	[1 - exp	(-0.0003	849 x (TF	FA -13.9)2)] + 0.0	0013 x (ΓFA -13.	9)			
Annual avera	•	ater usad	ne in litre	es ner da	av Vd av	erane =	(25 x N)	+ 36		7.4	.46		(43)
Reduce the ann									se target o		.46		(43)
not more that 12	25 litres per	person pei	r day (all w	ater use, l	hot and co	ld)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	in litres per	day for ea	<u> </u>		ctor from	Table 1c x				ı			
(44)m= 81.9	78.93	75.95	72.97	69.99	67.01	67.01	69.99	72.97	75.95	78.93	81.9		
									Total = Su	m(44) ₁₁₂ =		893.51	(44)
Energy content of	of hot water	used - cal	culated me	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 121.46	106.23	109.62	95.57	91.7	79.13	73.33	84.14	85.15	99.23	108.32	117.63		
	•						•		Total = Su	m(45) ₁₁₂ =		1171.53	(45)
If instantaneous	water heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46,) to (61)					
(46)m= 0	0	0	0	0	0	0	0	0	0	0	0		(46)
Water storag													
Storage volui	` '		•			_		ame ves	sel		0		(47)
If community	_			_			` '						
Otherwise if r		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storag a) If manufac		oclared I	oss fact	or is kno	wp (k\\/k	n/day):							(40)
•				JI 15 KI10	wii (Kvvi	i/uay).					0		(48)
Temperature							(40) (40)				0		(49)
Energy lost fr b) If manufac		_	-		or is not		(48) x (49)) =			0		(50)
Hot water sto			-								0		(51)
If community	•			, , , , , ,	3. 40	,					~		(-1)
Volume facto	-		-								0		(52)
Temperature	factor fro	m Table	2b								0		(53)
Energy lost fr	om water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or		•	,					•		-	0		(55)
• •													•

Water sto	rage loss ca	lculated t	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 co	ontains dedicate	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=	0 0	0	0	0	0	0	0	0	0	0	0		(57)
Primary c	ircuit loss (a	nnual) fro	om Table	e 3							0		(58)
•	ircuit loss ca	•			59)m = ((58) ÷ 36	55 × (41)	m					
(modifie	ed by factor t	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 los	ss calculated	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	t required for	water h	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 10	03.24 90.3	93.18	81.24	77.95	67.26	62.33	71.52	72.38	84.35	92.07	99.99		(62)
Solar DHW	input calculated	l using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add addi	tional lines if	FGHRS	and/or V	WWHRS	applies	, see Ap	pendix (3)					
(63)m=	0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output fro	om water hea	ater	•										
(64)m= 10	03.24 90.3	93.18	81.24	77.95	67.26	62.33	71.52	72.38	84.35	92.07	99.99		
							Outp	out from wa	ater heate	r (annual) ₁	12	995.8	(64)
Heat gain	s from water	heating,	kWh/mo	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	_
(65)m= 25	5.81 22.57	23.29	20.31	19.49	16.82	15.58	17.88	40.00	04.00		<u> </u>	- 	(65)
· /			20.01	19.49	10.02	15.56	17.00	18.09	21.09	23.02	25		(03)
	l		<u> </u>	l .	<u> </u>	<u> </u>				<u> </u>		eating	(00)
include	(57)m in cal	culation (of (65)m	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(03)
include 5. Intern	(57)m in cal nal gains (se	culation of the culture of the cultu	of (65)m and 5a	only if c	<u> </u>	<u> </u>				<u> </u>		eating	(03)
include 5. Interr	(57)m in cal	culation of the culture of the cultu	of (65)m and 5a	only if c	<u> </u>	<u> </u>		or hot w		<u> </u>		eating	(03)
include 5. Intern Metabolic	(57)m in cal nal gains (se gains (Table	culation of the culation of the culation of the culation of the culture of the cu	of (65)m and 5a	only if c	ylinder i	s in the d	dwelling		ater is fr	om com	munity h	eating	(66)
include 5. Intern Metabolic (66)m= 8-	(57)m in cal nal gains (se gains (Table Jan Feb	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76	only if constant of the consta	ylinder is Jun 84.76	Jul 84.76	Aug 84.76	or hot w Sep 84.76	ater is fr	om com	munity h	eating	
include 5. Intern Metabolic (66)m= 84 Lighting g	(57)m in cal nal gains (se gains (Table Jan Feb 4.76 84.76	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76	only if constant of the consta	ylinder is Jun 84.76	Jul 84.76	Aug 84.76	or hot w Sep 84.76	ater is fr	om com	munity h	eating	
include 5. Intern Metabolic (66)m= 84 Lighting g (67)m= 1:	(57)m in cal nal gains (se gains (Table Jan Feb 4.76 84.76 gains (calcula 3.17 11.69	e Table 5 e 5), Wat Mar 84.76 ated in Ap 9.51	of (65)m 6 and 5a tts Apr 84.76 ppendix 7.2	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraints of the constraints on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on	Jun 84.76 ion L9 o	Jul 84.76 r L9a), a	Aug 84.76 Iso see	Sep 84.76 Table 5 8.57	Oct 84.76	Nov 84.76	Dec	eating	(66)
include 5. Intern Metabolic (66)m= 84 Lighting g (67)m= 1: Appliance	(57)m in cal nal gains (se gains (Table Jan Feb 4.76 84.76 gains (calcula	e Table 5 e 5), Wat Mar 84.76 ated in Ap 9.51	of (65)m 6 and 5a tts Apr 84.76 ppendix 7.2	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraints of the constraints on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on	Jun 84.76 ion L9 o	Jul 84.76 r L9a), a	Aug 84.76 Iso see	Sep 84.76 Table 5 8.57	Oct 84.76	Nov 84.76	Dec	eating	(66)
include 5. Intern Metabolic (66)m= 84 Lighting g (67)m= 13 Appliance (68)m= 14	(57)m in cal nal gains (se gains (Table Jan Feb 4.76 84.76 gains (calcula 3.17 11.69 es gains (calcula 47.68 149.21	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.2 n Append 137.13	only if construction only if c	Jun 84.76 ion L9 of 4.54 uation L	Jul 84.76 r L9a), a 4.91 13 or L1	Aug 84.76 Iso see 6.38 3a), also	Sep 84.76 Table 5 8.57 see Ta 112.81	Oct 84.76 10.88 ble 5 121.03	Nov 84.76	Dec 84.76	eating	(66) (67)
include 5. Intern Metabolic (66)m= 8. Lighting g (67)m= 1: Appliance (68)m= 14 Cooking g	(57)m in cal nal gains (se gains (Table Jan Feb 4.76 84.76 gains (calcula 3.17 11.69 es gains (calcula	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.2 n Append 137.13	only if construction only if c	Jun 84.76 ion L9 of 4.54 uation L	Jul 84.76 r L9a), a 4.91 13 or L1	Aug 84.76 Iso see 6.38 3a), also	Sep 84.76 Table 5 8.57 see Ta 112.81	Oct 84.76 10.88 ble 5 121.03	Nov 84.76	Dec 84.76	eating	(66) (67)
include 5. Intern Metabolic (66)m= 8. Lighting g (67)m= 1: Appliance (68)m= 14 Cooking g (69)m= 3:	(57)m in calmal gains (second) (58) (Table 14.76 84.76 gains (calculation) (calculatio	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.2 Append 137.13 ppendix 31.48	only if constructions: May 84.76 L, equat 5.38 dix L, eq 126.75 L, equat	Jun 84.76 ion L9 of 4.54 uation L 116.99 ion L15	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a)	Aug 84.76 Iso see 6.38 3a), also 108.95	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table	Oct 84.76 10.88 ble 5 121.03	Nov 84.76 12.69	Dec 84.76	eating	(66) (67) (68)
include 5. Intern Metabolic (66)m= 8. Lighting g (67)m= 1: Appliance (68)m= 14 Cooking g (69)m= 3:	(57)m in cal nal gains (se gains (Table Jan Feb 4.76 84.76 gains (calcula 3.17 11.69 es gains (calcula 47.68 149.21 gains (calcula	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.2 Appendix 137.13 ppendix 31.48	only if constructions: May 84.76 L, equat 5.38 dix L, eq 126.75 L, equat	Jun 84.76 ion L9 of 4.54 uation L 116.99 ion L15	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a)	Aug 84.76 Iso see 6.38 3a), also 108.95	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table	Oct 84.76 10.88 ble 5 121.03	Nov 84.76 12.69	Dec 84.76	eating	(66) (67) (68)
include 5. Intern Metabolic (66)m= 8. Lighting g (67)m= 1: Appliance (68)m= 14 Cooking g (69)m= 3 Pumps ar (70)m=	(57)m in cal nal gains (se gains (Table Jan Feb 4.76 84.76 gains (calcula 3.17 11.69 es gains (calcula 1.48 31.48 nd fans gains	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.2 n Append 137.13 ppendix 31.48 5a) 0	only if co): May 84.76 L, equat 5.38 dix L, eq 126.75 L, equat 31.48	Jun 84.76 ion L9 of 4.54 uation L 116.99 ion L15 31.48	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48	Oct 84.76 10.88 ble 5 121.03 5 31.48	Nov 84.76 12.69 131.41	Dec 84.76 13.53 141.16 31.48	eating	(66) (67) (68) (69)
include 5. Intern Metabolic (66)m= 8.4 Lighting g (67)m= 1: Appliance (68)m= 14 Cooking g (69)m= 3: Pumps ar (70)m= Losses e.	(57)m in cal nal gains (see gains (Table Jan Feb 4.76 84.76 gains (calcula 3.17 11.69 es gains (calcula 47.68 149.21 gains (calcula 1.48 31.48 and fans gains	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.2 n Append 137.13 ppendix 31.48 5a) 0	only if co): May 84.76 L, equat 5.38 dix L, eq 126.75 L, equat 31.48	Jun 84.76 ion L9 of 4.54 uation L 116.99 ion L15 31.48	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48	Oct 84.76 10.88 ble 5 121.03 5 31.48	Nov 84.76 12.69 131.41	Dec 84.76 13.53 141.16 31.48	eating	(66) (67) (68) (69)
include 5. Intern Metabolic (66)m= 84 Lighting g (67)m= 13 Appliance (68)m= 14 Cooking g (69)m= 3 Pumps ar (70)m= Losses e. (71)m= -6	(57)m in cal nal gains (see gains (Table Jan Feb 4.76 84.76 gains (calcula 3.17 11.69 es gains (calcula 1.48 149.21 gains (calcula 1.48 31.48 nd fans gains 0 0 g. evaporatic 67.8 -67.8	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.2 n Append 137.13 ppendix 31.48 5a) 0 tive value	only if construction only if c	Jun 84.76 ion L9 of 4.54 uation L 116.99 ion L15 31.48 0	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95 0, also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48	Oct 84.76 10.88 ble 5 121.03 5 31.48	Nov 84.76 12.69 131.41	Dec 84.76 13.53 141.16 31.48	eating	(66) (67) (68) (69) (70)
include 5. Intern Metabolic (66)m= 8. Lighting g (67)m= 1: Appliance (68)m= 14 Cooking g (69)m= 3 Pumps ar (70)m= Losses e. (71)m= -6 Water hea	(57)m in call gains (see gains (Table 4.76 84.76 gains (calcula 3.17 11.69 es gains (calcula 1.48 31.48 and fans gains 0 0 0 g. evaporatic	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.2 n Append 137.13 ppendix 31.48 5a) 0 tive value	only if construction only if c	Jun 84.76 ion L9 of 4.54 uation L 116.99 ion L15 31.48 0	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95 0, also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48	Oct 84.76 10.88 ble 5 121.03 5 31.48	Nov 84.76 12.69 131.41	Dec 84.76 13.53 141.16 31.48	eating	(66) (67) (68) (69) (70)
include 5. Intern Metabolic (66)m= 8.4 Lighting g (67)m= 1: Appliance (68)m= 14 Cooking g (69)m= 3: Pumps ar (70)m= Losses e. (71)m= -6 Water hea (72)m= 3.4	(57)m in call gains (see gains (Table 4.76 84.76 gains (calcula 3.17 11.69 gains (calcula 1.48 31.48 gains (calcula 1.48 gains (calc	culation of the culation of the culation of the culation of the culated in Appendix at the culated in	of (65)m of and 5a ts Apr 84.76 opendix 7.2 Appendix 137.13 ppendix 31.48 5a) 0 tive value -67.8	only if construction only if c	Jun 84.76 ion L9 of 4.54 uation L 116.99 ion L15 31.48 0 le 5) -67.8	Jul 84.76 r L9a), a 4.91 13 or L1: 110.48 or L15a; 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95 o, also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48 0 -67.8	Oct 84.76 10.88 ble 5 121.03 5 31.48 0 -67.8	Nov 84.76 12.69 131.41 31.48 0	Dec 84.76 13.53 141.16 31.48 0	eating	(66) (67) (68) (69) (70) (71)
include 5. Interr Metabolic (66)m= 8. Lighting g (67)m= 1: Appliance (68)m= 14 Cooking g (69)m= 3 Pumps ar (70)m=	(57)m in cal nal gains (see gains (Table Jan Feb 4.76 84.76 gains (calcula 3.17 11.69 es gains (calcula 1.48 31.48 nd fans gains 0 0 g. evaporation 67.8 -67.8 ating gains (culation of the culation of the culation of the culation of the culated in Appendix at the culated in	of (65)m of and 5a ts Apr 84.76 opendix 7.2 Appendix 137.13 ppendix 31.48 5a) 0 tive value -67.8	only if construction only if c	Jun 84.76 ion L9 of 4.54 uation L 116.99 ion L15 31.48 0 le 5) -67.8	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95 o, also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48 0 -67.8	Oct 84.76 10.88 ble 5 121.03 5 31.48 0 -67.8	Nov 84.76 12.69 131.41 31.48 0	Dec 84.76 13.53 141.16 31.48 0	eating	(66) (67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	9.56	x	11.28	x	0.55	x	0.7] =	28.78	(75)
Northeast 0.9x	0.77	x	4.62	x	11.28	x	0.55	x	0.7	=	13.91	(75)
Northeast 0.9x	0.77	x	9.56	x	22.97	x	0.55	x	0.7	=	58.58	(75)
Northeast 0.9x	0.77	x	4.62	x	22.97	x	0.55	x	0.7	=	28.31	(75)
Northeast 0.9x	0.77	x	9.56	x	41.38	x	0.55	x	0.7	=	105.54	(75)
Northeast 0.9x	0.77	x	4.62	x	41.38	x	0.55	x	0.7	=	51.01	(75)
Northeast 0.9x	0.77	x	9.56	x	67.96	x	0.55	x	0.7	=	173.33	(75)
Northeast 0.9x	0.77	x	4.62	x	67.96	x	0.55	x	0.7	=	83.77	(75)
Northeast 0.9x	0.77	x	9.56	x	91.35	x	0.55	x	0.7	=	232.99	(75)
Northeast 0.9x	0.77	x	4.62	x	91.35	x	0.55	x	0.7	=	112.6	(75)
Northeast 0.9x	0.77	x	9.56	x	97.38	x	0.55	x	0.7	=	248.39	(75)
Northeast 0.9x	0.77	x	4.62	x	97.38	x	0.55	x	0.7	=	120.04	(75)
Northeast 0.9x	0.77	x	9.56	x	91.1	x	0.55	X	0.7	=	232.37	(75)
Northeast 0.9x	0.77	x	4.62	x	91.1	x	0.55	x	0.7	=	112.29	(75)
Northeast 0.9x	0.77	x	9.56	x	72.63	x	0.55	x	0.7] =	185.25	(75)
Northeast 0.9x	0.77	X	4.62	x	72.63	X	0.55	X	0.7] =	89.52	(75)
Northeast 0.9x	0.77	X	9.56	x	50.42	x	0.55	X	0.7	=	128.61	(75)
Northeast 0.9x	0.77	X	4.62	x	50.42	x	0.55	x	0.7	=	62.15	(75)
Northeast 0.9x	0.77	X	9.56	x	28.07	x	0.55	x	0.7	=	71.59	(75)
Northeast 0.9x	0.77	X	4.62	x	28.07	x	0.55	X	0.7	=	34.6	(75)
Northeast 0.9x	0.77	X	9.56	x	14.2	x	0.55	x	0.7	=	36.21	(75)
Northeast 0.9x	0.77	X	4.62	x	14.2	x	0.55	x	0.7	=	17.5	(75)
Northeast 0.9x	0.77	x	9.56	x	9.21	x	0.55	x	0.7] =	23.5	(75)
Northeast 0.9x	0.77	x	4.62	x	9.21	x	0.55	x	0.7	=	11.36	(75)
Northwest 0.9x	0.77	x	4.17	x	11.28	x	0.55	x	0.7	=	25.11	(81)
Northwest 0.9x	0.77	X	4.17	x	22.97	x	0.55	X	0.7	=	51.1	(81)
Northwest 0.9x	0.77	X	4.17	x	41.38	X	0.55	X	0.7] =	92.07	(81)
Northwest 0.9x	0.77	X	4.17	x	67.96	X	0.55	X	0.7	=	151.21	(81)
Northwest 0.9x	0.77	x	4.17	x	91.35	x	0.55	X	0.7] =	203.26	(81)
Northwest 0.9x	0.77	x	4.17	x	97.38	x	0.55	x	0.7	=	216.7	(81)
Northwest 0.9x	0.77	x	4.17	x	91.1	X	0.55	X	0.7] =	202.71	(81)
Northwest 0.9x	0.77	X	4.17	x	72.63	x	0.55	x	0.7	=	161.61	(81)
Northwest 0.9x	0.77	X	4.17	x	50.42	x	0.55	x	0.7	=	112.19	(81)
Northwest 0.9x	0.77	X	4.17	x	28.07	x	0.55	x	0.7] =	62.45	(81)
Northwest 0.9x	0.77	x	4.17	x	14.2	x	0.55	x	0.7] =	31.59	(81)
Northwest 0.9x	0.77	x	4.17	x	9.21	x	0.55	x	0.7	Ī =	20.5	(81)
Rooflights 0.9x	1	X	1.05	x	26	x	0.55	x	0.8	j =	10.81	(82)
Rooflights 0.9x	1	X	1.79	x	26	×	0.55	x	0.8	j =	18.43	(82)
Rooflights 0.9x	1	X	1.05	x	54	×	0.55	x	0.8	j =	22.45	(82)
				-		•		•		-		_

- a:							,		_				_
Rooflights 0.9x	1	X	1.7	9	X	54	X	0.55	X	0.8	=	38.28	(82)
Rooflights _{0.9x}	1	X	1.0	5	X	96	X	0.55	X	0.8	=	39.92	(82)
Rooflights 0.9x	1	X	1.7	9	X	96	X	0.55	X	0.8	=	68.05	(82)
Rooflights 0.9x	1	X	1.0	5	X	150	X	0.55	X	0.8	=	62.37	(82)
Rooflights 0.9x	1	X	1.7	9	X	150	X	0.55	X	0.8	=	106.33	(82)
Rooflights _{0.9x}	1	X	1.0	5	X	192	X	0.55	X	0.8	=	79.83	(82)
Rooflights 0.9x	1	X	1.7	9	x	192	x	0.55	X	0.8	-	136.1	(82)
Rooflights 0.9x	1	X	1.0	5	x	200	x	0.55	X	0.8	=	83.16	(82)
Rooflights 0.9x	1	X	1.7	9	x	200	X	0.55	X	0.8	=	141.77	(82)
Rooflights 0.9x	1	X	1.0	5	x	189	X	0.55	X	0.8	=	78.59	(82)
Rooflights 0.9x	1	x	1.7	9	x	189	x	0.55	x	0.8		133.97	(82)
Rooflights 0.9x	1	x	1.0	5	x	157	x	0.55	х	0.8		65.28	(82)
Rooflights _{0.9x}	1	X	1.7	9	x	157	x	0.55	x	0.8		111.29	(82)
Rooflights _{0.9x}	1	X	1.0	5	x	115	x	0.55	X	0.8		47.82	(82)
Rooflights _{0.9x}	1	X	1.7	9	x	115	x	0.55	x	0.8		81.52	(82)
Rooflights _{0.9x}	1	×	1.0	5	x	66	j x	0.55	x	0.8		27.44	(82)
Rooflights _{0.9x}	1	X	1.7	9	x	66	x	0.55	X	0.8		46.78	(82)
Rooflights _{0.9x}	1	X	1.0	5	x	33	x	0.55	x	0.8	=	13.72	(82)
Rooflights 0.9x	1	x	1.7	9	X	33	X	0.55	x	0.8		23.39	(82)
Rooflights 0.9x	1	x	1.0	5	x	21	x	0.55	x	0.8	=	8.73	(82)
Rooflights 0.9x	1	×	1.7	9	X	21	x	0.55	x	0.8	=	14.89	(82)
_													
Solar gains in	watte cald	rulated	for each	n month	1		(83)m	n = Sum(74)m	(82)m				
(83)m= 97.03		356.59	577.01	764.78	$\overline{}$	10.06 759.93	612		242.8		78.98		(83)
Total gains – i	nternal an	d solar	(84)m =	: (73)m	+ (8	33)m , watts	<u> </u>	<u> </u>					
(84)m= 340.99	441.65	591.18	797.96	971.53	10	03.38 944.69	800	.73 627.21	451.5	4 346.91	315.7		(84)
7. Mean inter	nal tempe	rature ((heating	season)				ļ				
Temperature			•			area from Tal	hle 0	Th1 (°C)				21	(85)
Utilisation fac	•	•			-		JIC J	, 1111 (0)				21	(00)
Jan	Feb Feb	Mar	Apr	May	Ť	Jun Jul	Δ	ug Sep	Oct	Nov	Dec		
(86)m= 1	0.99	0.97	0.87	0.7	-	0.51 0.38	0.4		0.96	0.99	1		(86)
	<u> </u>	I	!			I			1 0.00	0.00	<u>'</u>		()
Mean interna			_		_	i	_		1 00 05		40.40	Ī	(07)
(87)m= 19.17	19.43	19.89	20.46	20.82		0.96 20.99	20.	98 20.83	20.25	19.6	19.13		(87)
Temperature	_				_	_	able 9	9, Th2 (°C)				•	
(88)m= 19.55	19.55	19.56	19.56	19.56	1	9.57 19.57	19.	57 19.57	19.56	19.56	19.56		(88)
Utilisation fac	tor for gai	ns for r	est of dv	welling,	h2,	m (see Table	9a)						
(89)m= 0.99	0.99	0.95	0.83	0.62		0.4 0.26	0.3	33 0.65	0.94	0.99	1		(89)
Mean interna	I temperat	ture in t	he rest	of dwell	ina	T2 (follow ste	eps 3	to 7 in Tab	le 9c)			-	
(90)m= 17.93		18.64	19.17	19.47	Ť	9.56 19.57	19.		19	18.36	17.89		(90)
L	<u> </u>		[1			·	fLA = Li	ving area ÷ (4	1) =	0.47	(91)
												<u> </u>	

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

18.52 18.77 19.23 19.78 20.11 20.22 20.24 20.23 20.12 19.59 18.95 18.47
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= 0.99 0.98 0.95 0.84 0.65 0.45 0.32 0.39 0.7 0.94 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 338.81 434.49 561.11 669.92 630.57 453.6 300.28 313.01 436.26 422.78 342.6 314.16 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= 1201.22 1170.57 1072.68 911.45 703.6 467.82 303.06 318.93 502.17 752.6 993.43 1199.92 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 0 0 245.38 468.6 659.01
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Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Utilisation factor for gains, hm: (94)m= 0.99 0.98 0.95 0.84 0.65 0.45 0.32 0.39 0.7 0.94 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 338.81 434.49 561.11 669.92 630.57 453.6 300.28 313.01 436.26 422.78 342.6 314.16 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= 1201.22 1170.57 1072.68 911.45 703.6 467.82 303.06 318.93 502.17 752.6 993.43 1199.92 Space heating requirement for each month, kWh/mo
Utilisation factor for gains, hm: (94)m= 0.99 0.98 0.95 0.84 0.65 0.45 0.32 0.39 0.7 0.94 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 338.81 434.49 561.11 669.92 630.57 453.6 300.28 313.01 436.26 422.78 342.6 314.16 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= 1201.22 1170.57 1072.68 911.45 703.6 467.82 303.06 318.93 502.17 752.6 993.43 1199.92 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 0 0 245.38 468.6 659.01
(94)m= 0.99 0.98 0.95 0.84 0.65 0.45 0.32 0.39 0.7 0.94 0.99 1 Useful gains, hmGm , W = (94)m x (84)m (95)m= 338.81 434.49 561.11 669.92 630.57 453.6 300.28 313.01 436.26 422.78 342.6 314.16 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= 1201.22 1170.57 1072.68 911.45 703.6 467.82 303.06 318.93 502.17 752.6 993.43 1199.92 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 0 245.38 468.6 659.01
Useful gains, hmGm , W = (94)m x (84)m (95)m= 338.81 434.49 561.11 669.92 630.57 453.6 300.28 313.01 436.26 422.78 342.6 314.16 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= 1201.22 1170.57 1072.68 911.45 703.6 467.82 303.06 318.93 502.17 752.6 993.43 1199.92 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 0 245.38 468.6 659.01
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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= 1201.22 1170.57 1072.68 911.45 703.6 467.82 303.06 318.93 502.17 752.6 993.43 1199.92 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 0 0 245.38 468.6 659.01
(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= 1201.22 1170.57 1072.68 911.45 703.6 467.82 303.06 318.93 502.17 752.6 993.43 1199.92 Space heating requirement for each month, kWh/month = 0.024 x [(97)m – (95)m] x (41)m (98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 245.38 468.6 659.01
Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)m- (96)m] (97)m=
(97)m= 1201.22 1170.57 1072.68 911.45 703.6 467.82 303.06 318.93 502.17 752.6 993.43 1199.92 Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 245.38 468.6 659.01
Space heating requirement for each month, kWh/month = 0.024 x [(97)m - (95)m] x (41)m (98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 0 245.38 468.6 659.01
(98)m= 641.63 494.65 380.61 173.9 54.33 0 0 0 0 245.38 468.6 659.01
T-1-1
Total per year (kWh/year) = $Sum(98)_{15,912}$ = 3118.1
Space heating requirement in kWh/m²/year 62.15
8c. Space cooling requirement
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)m= 0 0 0 0 782.57 616.07 632.11 0 0 0 0
Utilisation factor for loss hm
(101)m= 0 0 0 0 0 0.92 0.95 0.92 0 0 0 0
Useful loss, hmLm (Watts) = (100)m x (101)m
(102)m= 0 0 0 0 720.58 586.41 582.32 0 0 0
Gains (solar gains calculated for applicable weather region, see Table 10)
(103)m= 0 0 0 0 0 1198.95 1131.23 969.98 0 0 0 0
Space cooling requirement for month, whole dwelling, continuous (kWh) = 0.024 \times [(103) m – (102) m] \times (41) m
set (104)m to zero if (104)m < 3 × (98)m
(104)m= 0 0 0 0 0 344.42 405.34 288.42 0 0 0 0
Total = Sum(1,04) = 1038.18
Cooled fraction $f C = cooled area \div (4) = 1$
Intermittency factor (Table 10b)
(106)m= 0 0 0 0 0 0.25 0.25 0.25 0 0 0
Total = Sum(1,04) = 0
Space cooling requirement for month = (104)m × (105) × (106)m
(107)m= 0 0 0 0 0 86.1 101.34 72.1 0 0 0 0
Total = Sum(107) = 259.54
Space cooling requirement in kWh/m²/year $(107) \div (4) = 5.17$
Space cooling requirement in kWh/m²/year $(107) \div (4) = 5.17$ 8f. Fabric Energy Efficiency (calculated only under special conditions, see section 11) Fabric Energy Efficiency $(99) + (108) = 67.32$

					lser D	etails:						
A N 1	01	-1-11-1	- 11				- 11			OTDO	040000	
Assessor Name Software Name:	-	ris Hockn oma FSA	_			Stroma Softwa					016363 on: 1.0.4.16	
Software Name.	Oti	oma i oz	(1 Z01Z	Prop		Address				VCISIC	лт. т.о. ч . то	
Address :												
1. Overall dwelling	dimension	s:										
One and the en						a(m²)			ight(m)	1	Volume(m³)	_
Ground floor					5	9.25	(1a) x	2	2.7	(2a) =	159.98	(3a)
Total floor area TFA	= (1a)+(1	b)+(1c)+(1	d)+(1e)+	(1n)	5	9.25	(4)					
Dwelling volume							(3a)+(3b)+(3c)+(3d	l)+(3e)+	.(3n) =	159.98	(5)
2. Ventilation rate:												
		main heating	secon heati			other	_	total			m³ per hour	_
Number of chimneys	•	0	+ 0		+	0] = [0	X 4	40 =	0	(6a)
Number of open flue	s [0	+ 0		+	0] = [0	x 2	20 =	0	(6b)
Number of intermitte	nt fans						Ī	2	X '	10 =	20	(7a)
Number of passive v	ents						Ī	0	x -	10 =	0	(7b)
Number of flueless g	as fires						Ė	0	X 4	40 =	0	(7c)
							_					_
										Air ch	nanges per ho	ur
Infiltration due to chi	•						[20		÷ (5) =	0.13	(8)
If a pressurisation test Number of storeys				oceed to) (1 <i>/</i>), c	otherwise o	ontinue fr	om (9) to ((16)		0	(9)
Additional infiltration		ciiiig (110)							[(9)	-1]x0.1 =	0	(10)
Structural infiltration		r steel or t	imber fram	e or 0.	35 for	· masonr	y constr	uction	1(-)		0	(11)
if both types of wall				ng to the	e greate	er wall are	a (after				-	_
deducting areas of o				or () 1 /	(coalo	ud) else	antar N					7(42)
If no draught lobby				JI U. I ((Seale	u), eise	enter o				0	(12)
Percentage of win				ed							0	(14)
Window infiltration						0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate						(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability va	lue, q50,	expressed	l in cubic m	etres p	er ho	ur per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permo	eability va	lue, then (18) = [(17) ÷ 2	20]+(8), 0	otherwi	se (18) = (16)				0.28	(18)
Air permeability value		ressurisation	test has beer	n done d	or a deg	gree air pe	rmeability	is being u	sed			_
Number of sides she Shelter factor	eltered					(20) = 1 -	0 075 x (1	19)1 =			3	(19)
Infiltration rate incorp	oorating st	nelter facto	or			(21) = (18)	`	. • /]			0.78	(20)
Infiltration rate modif	_					(= -) ()	()				0.21	(21)
Jan Feb		Apr	.	un	Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average win	- 1	· · ·	- 1	1			- 319	• •	1		1	
(22)m= 5.1 5	4.9	4.4	4.3 3.	8	3.8	3.7	4	4.3	4.5	4.7		
	(6.5)	· · · · ·					·		1	•	1	
Wind Factor (22a)m	``	т т	100 00) ₅ .	0.05	0.00	4	1 4 00	1 4 40	1 10	1	
(22a)m= 1.27 1.25	1.23	1.1	1.08 0.9	10 [(0.95	0.92	1	1.08	1.12	1.18]	

Adjusted infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	(21a) x	(22a)m					
0.27	0.27	0.26	0.23	0.23	0.2	0.2	0.2	0.21	0.23	0.24	0.25]	
Calculate effec		_	rate for t	he appli	cable ca	se			•				
If mechanica			andiv N. 72	(2h) = (22a	a) v Emy (oguation (NEN othor	avica (23h	v) = (23a)			0	(23a)
If balanced with)) = (23a)			0	(23b)
		-	-	_					2h\m + /'	22h) v [1 (220)	0	(23c)
a) If balance		0	0	0	0		0 (248	0	0	23D) * [0	0) + 100]]	(24a)
b) If balance				<u> </u>					ļ			J	(= .0)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole h			<u> </u>	ļ	<u> </u>		ļ				<u> </u>	J	
if (22b)m				-	-				.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural v	ventilatio	n or wh	ole hous	se positiv	ve input	ventilati	on from I	oft	•		•	_	
if (22b)m		` '	<u> </u>		<u>`</u>							7	
(24d)m= 0.54	0.54	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.53	0.53	0.53		(24d)
Effective air	 		<u> </u>	``	´``	ŕ `	 	<u> </u>				7	
(25)m= 0.54	0.54	0.53	0.53	0.53	0.52	0.52	0.52	0.52	0.53	0.53	0.53		(25)
3. Heat losses	s and he	at loss p	paramete	er:									
ELEMENT	Gros area		Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/ł	〈)	k-value kJ/m²·		A X k kJ/K
Doors					2	x	1.3	=	2.6				(26)
Windows Type													
	9 1				8.26	<u>x</u> 1	/[1/(1.3)+	0.04] =	10.21	=			(27)
Windows Type					8.26 4.21								(27) (27)
Windows Type Windows Type	2					x1	/[1/(1.3)+	0.04] =	10.21				
•	2 3				4.21	x1 x1	/[1/(1.3)+ /[1/(1.3)+	0.04] = 0.04] =	10.21 5.2				(27)
Windows Type	2 3				4.21 3.21	x1 x1 x1	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+	0.04] = 0.04] = 0.04] =	10.21 5.2 3.97				(27) (27) (27)
Windows Type Windows Type	2 3	5	20.08	5	4.21 3.21 4.37	x1 x1 x1 x1	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+	0.04] = 0.04] = 0.04] =	10.21 5.2 3.97 5.4			-	(27) (27) (27)
Windows Type Windows Type Rooflights	2 2 3 4	_	20.09	5	4.21 3.21 4.37 1.61	x1 x1 x1 x1 x1 x1 x1	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6) +	0.04] = 0.04] = 0.04] = 0.04] =	10.21 5.2 3.97 5.4 2.576 2.84				(27) (27) (27) (27b) (29)
Windows Type Windows Type Rooflights Walls Type1	38.9	7	2		4.21 3.21 4.37 1.61 18.9 43.47	x1 x1 x1 x1 x1 x x1 x x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13	0.04] = 0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	10.21 5.2 3.97 5.4 2.576 2.84 5.81				(27) (27) (27) (27b) (29) (29)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof	38.99 45.4 59.29	7 5			4.21 3.21 4.37 1.61 18.9 43.47	x1 x1 x1 x1 x x1 x x x x x x x x x x x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6) +	0.04] = 0.04]	10.21 5.2 3.97 5.4 2.576 2.84				(27) (27) (27) (27b) (29) (29) (30)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of el	38.99 45.4 59.29	7 5	2		4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6) + 0.15 0.13	0.04] = 0.04] = 0.04] = 0.04] = = = = = =	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76				(27) (27) (27) (27b) (29) (29) (30) (31)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of ele Party wall	38.99 45.4 59.29	7 5	2		4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.95	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13	0.04] = 0.04]	10.21 5.2 3.97 5.4 2.576 2.84 5.81				(27) (27) (27) (27b) (29) (29) (30) (31)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of el	38.99 45.4 59.20 Jements,	7 5 m²	1.61		4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.99 59.25	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13 0.1	0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76	s given in	paragraph		(27) (27) (27) (27b) (29) (29) (30) (31)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of ele Party wall Party floor	2 2 3 4 4 38.9 45.4 59.2 lements,	7 5 m²	1.61	indow U-va	4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.99 59.29 alue calculum and a second and	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13 0.1	0.04] = 0.04] = 0.04] = 0.04] = = = = = = =	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76	s given in	paragraph		(27) (27) (27) (27b) (29) (29) (30) (31)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of el Party wall Party floor * for windows and	38.94 38.94 45.4 59.29 Ilements,	7 5 m² ows, use e	1.61	indow U-va	4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.99 59.29 alue calculum and a second and	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13 0.1	0.04] = 0.04] = 0.04] = 0.04] = = = = =	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76	I I I I I I I I I I I I I I I I I I I	paragrapl	h 3.2	(27) (27) (27) (27b) (29) (29) (30) (31) (32)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of el Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity (38.99 45.4 59.29 lements, roof windows on both as on bo	5 m² ms, use esides of interest (A x A x k)	1.61 teffective winternal walk U)	indow U-va	4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.98 59.28 alue calculatitions	x1 x1 x1 x1 x1 x1 x x x x x x x x x x x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13 0.1	0.04] = 0.04] = 0.04] = 0.04] = 0.04] = = = =	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76 0	2) + (32a).			(27) (27) (27) (27b) (29) (30) (31) (32) (32a)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of ele Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity (Thermal mass	38.93 45.4 59.23 lements, roof windowns on both as on both as S. W/K = S(A) paramet	m² m² m² sides of in S (A x A x k) ter (TMF	1.61 1.61 2 1.61 U) P = Cm ÷	indow U-va Is and pan	4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.99 59.29 alue calculatitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13 0.1 0 q formula 1. (26)(30)	0.04] = 0.04]	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76 0 ue)+0.04] a	2) + (32a). : Medium	(32e) =	44.2	(27) (27) (27) (27b) (29) (29) (30) (31) (32) (32a)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of el Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity (Thermal mass For design assess	38.99 45.4 59.29 lements, roof windows on both as on both as so, W/K = Cm = S(A)	m² m² sides of intermediate (TMF) ter (TMF)	2 1.61 1.61 2. If the state of	indow U-va Is and pan	4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.99 59.29 alue calculatitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13 0.1 0 q formula 1. (26)(30)	0.04] = 0.04]	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76 0 ue)+0.04] a	2) + (32a). : Medium	(32e) =	44.2 15258.	(27) (27) (27) (27b) (29) (30) (31) (32) (32a) (33) (6) (34)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of ele Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity of Thermal mass For design assess can be used instead	38.99 45.4 59.20 lements, roof windows on both as on bo	5 m² sws, use esides of interest (TMF) ere the deailed calculation	1.61 1.61 1.61 2 1.61 2 1.61 2 1.61 2 1.61	indow U-va ls and part TFA) in construct	4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.99 143.6 25.99 alue calculatitions	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13 0.1 0 q formula 1. (26)(30)	0.04] = 0.04]	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76 0 ue)+0.04] a	2) + (32a). : Medium	(32e) =	44.2 15258. 250	(27) (27) (27) (27b) (29) (29) (30) (31) (32) (32a) (333) (34) (35)
Windows Type Windows Type Rooflights Walls Type1 Walls Type2 Roof Total area of el Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity (Thermal mass For design assess	38.99 45.4 59.29 lements, roof windons on both as on both as son both as son both as son with a series when ad of a detage and of a detage and of a detage and of a detage as a series when a series and of a detage as a series a	m² m² sides of intermediate (TMF) ere the de ailed calcux Y) calculate (TMF)	1.61 2 1.61 2 1.61 2 2 1.61 2 2 1.61 2 2 1.61 2 2 2 1.61 2 2 2 2 2 2 2 2 2 2 2 2 2	TFA) ir	4.21 3.21 4.37 1.61 18.9 43.47 57.64 143.6 25.99 59.29 alue calculatitions n kJ/m²K ion are no	x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x1 x	/[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.3)+ /[1/(1.6)+ 0.15 0.13 0.1 0 q formula 1. (26)(30)	0.04] = 0.04]	10.21 5.2 3.97 5.4 2.576 2.84 5.81 5.76 0 ue)+0.04] a	2) + (32a). : Medium	(32e) =	44.2 15258.	(27) (27) (27) (27b) (29) (29) (30) (31) (32) (32a) (333) (34) (35)

Total fabric h	eat loss							(33) +	(36) =			58.77	(37)
Ventilation he	eat loss ca	alculated	d monthly	y				(38)m	= 0.33 × ((25)m x (5)			``
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 28.35	28.27	28.2	27.85	27.78	27.48	27.48	27.42	27.6	27.78	27.91	28.05		(38)
Heat transfer	coefficie	nt, W/K						(39)m	= (37) + (38)m			
(39)m= 87.11	87.04	86.96	86.61	86.55	86.24	86.24	86.19	86.36	86.55	86.68	86.82		
Heat loss par	ameter (I	HLP), W	/m²K						Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	86.61	(39)
(40)m= 1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.45	1.46	1.46	1.46	1.47		
Number of da	ays in mo	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.46	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ating ene	rgy requ	irement:								kWh/ye	ear:	
Assumed occ if TFA > 13 if TFA £ 13	.9, N = 1		ː [1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (TFA -13		96		(42)
Annual avera Reduce the annu not more that 12	ge hot wa ual average	hot water	usage by	5% if the a	welling is	designed i			se target o		.76		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage							Ū	ССР	00.	1101	200		
(44)m= 88.83	85.6	82.37	79.14	75.91	72.68	72.68	75.91	79.14	82.37	85.6	88.83		
Energy content of	of hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x [OTm / 3600			m(44) ₁₁₂ =		969.1	(44)
(45)m= 131.74	115.22	118.9	103.66	99.46	85.83	79.53	91.26	92.35	107.63	117.49	127.58		
If instantaneous	water heati	ng at point	t of use (no	hot water	storage),	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1270.64	(45)
(46)m= 0	Το	0	0	0	0	0	0	0	0	0	0		(46)
Water storage	e loss:								<u> </u>				
Storage volur	me (litres)) includir	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community	_			-			. ,						
Otherwise if r		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage a) If manufact		eclared I	oss facto	or is kno	wn (kWł	n/dav):					0		(48)
Temperature					(., ,.					0		(49)
Energy lost fr				ear			(48) x (49)) =			0		(50)
b) If manufaction Hot water sto	cturer's de	eclared o	cylinder l	oss fact		known:					0		(51)
If community	•		on 4.3										
Volume facto			. 2h								0		(52)
Temperature							(4 7) (5 1)	··· (50) · · ·	E0)		0		(53)
Energy lost fr Enter (50) or		_	e, KVVN/ye	ғаг			(47) x (51)) X (52) X (ರ ು) =	—	0		(54) (55)
L.11.01 (00) 01	(5 1) 111 (6	,									J		(00)

Water sto	rage loss ca	lculated t	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 co	ontains dedicate	ed solar sto	rage, (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 ci	ircuit loss (a	nnual) fro	m Table	3							0		(58)
-	ircuit loss ca	•			59)m = ((58) ÷ 36	65 × (41)	m				•	
(modifie	ed by factor f	rom Tab	le H5 if t	here is s	solar wat	ter heatir	ng and a	cylinde	r thermo	stat)			
(59)m=	0 0	0	0	0	0	0	0	0	0	0	0		(59)
Combi los	s calculated	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	t required for	water h	eating ca	alculated	l for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 11	1.98 97.94	101.06	88.11	84.54	72.95	67.6	77.57	78.5	91.48	99.86	108.44		(62)
Solar DHW i	input calculated	l using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add addit	tional lines if	FGHRS	and/or \	WWHRS	applies	, see Ap	pendix (€)					
(63)m=	0 0	0	0	0	0	0	0	0	0	0	0		(63)
Output fro	m water hea	ater	-	-	-	-	-			-	-		
(64)m= 11	1.98 97.94	101.06	88.11	84.54	72.95	67.6	77.57	78.5	91.48	99.86	108.44		
	•	•					Outp	out from wa	ater heate	r (annual)	12	1080.05	(64)
Heat gain	s from water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	_
(65)m= 27	7.99 24.48	25.27	22.03	21.14	18.24	16.9	19.39	19.63	22.87	24.97	27.11		(65)
							1 .0.00	10.00	22.07	24.31	21.11		()
include	(57)m in cal	culation o	u of (65)m	only if c	ylinder i		<u> </u>			<u> </u>		l eating	()
	(57)m in cal			•	ylinder i		<u> </u>			<u> </u>		eating	
5. Intern	al gains (se	e Table 5	and 5a	•	ylinder i		<u> </u>			<u> </u>		eating	(12)
5. Intern	• •	e Table 5	and 5a	•	ylinder is		<u> </u>			<u> </u>		eating	
5. Intern	al gains (se	e Table 5	and 5a):		s in the d	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. Intern Metabolic (66)m= 98	gains (Table Jan Feb	e Table 5 e 5), Wat Mar 98.02	ts Apr 98.02): May 98.02	Jun 98.02	Jul 98.02	Aug 98.02	or hot w Sep 98.02	ater is fr	om com	munity h	eating	
5. Intern Metabolic (66)m= 98 Lighting g	gains (Table Jan Feb 3.02 98.02	e Table 5 e 5), Wat Mar 98.02	ts Apr 98.02): May 98.02	Jun 98.02	Jul 98.02	Aug 98.02	or hot w Sep 98.02	ater is fr	om com	munity h	eating	
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 15	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54	e Table 5 e 5), Wat Mar 98.02 ated in Ap 11.02	ts Apr 98.02 ppendix 8.34	May 98.02 L, equat 6.23	Jun 98.02 ion L9 o	Jul 98.02 r L9a), a	Aug 98.02 Iso see	Sep 98.02 Table 5	Oct 98.02	Nov 98.02	Dec 98.02	eating	(66)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 18 Appliance	gains (Table Jan Feb 3.02 98.02 ains (calcula	e Table 5 e 5), Wat Mar 98.02 ated in Ap 11.02	ts Apr 98.02 ppendix 8.34	May 98.02 L, equat 6.23	Jun 98.02 ion L9 o	Jul 98.02 r L9a), a	Aug 98.02 Iso see	Sep 98.02 Table 5	Oct 98.02	Nov 98.02	Dec 98.02	eating	(66)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 15 Appliance (68)m= 17	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calc	Mar 98.02 ated in Ap 11.02 culated in 168.35	s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83	May 98.02 L, equat 6.23 dix L, eq	Jun 98.02 ion L9 of 5.26 uation L	Jul 98.02 r L9a), a 5.69 13 or L1	Aug 98.02 lso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5 140.19	Nov 98.02	Dec 98.02	eating	(66) (67)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 15 Appliance (68)m= 17 Cooking g	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calc	Mar 98.02 ated in Ap 11.02 culated in 168.35	s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83	May 98.02 L, equat 6.23 dix L, eq	Jun 98.02 ion L9 of 5.26 uation L	Jul 98.02 r L9a), a 5.69 13 or L1	Aug 98.02 lso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5 140.19	Nov 98.02	Dec 98.02	eating	(66) (67)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 3	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calcula 11.05 172.83 gains (calcula	e Table 5 e 5), Wat Mar 98.02 ated in Ap 11.02 culated ir 168.35 ated in A 32.8	ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat	Jun 98.02 ion L9 of 5.26 uation L 135.51 tion L15	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a)	Aug 98.02 Iso see 7.39 3a), also 126.19	Sep 98.02 Table 5 9.92 see Tal 130.66	Oct 98.02 12.6 ble 5 140.19 5	Nov 98.02 14.7	Dec 98.02	eating	(66) (67) (68)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 18 Appliance (68)m= 17 Cooking g (69)m= 3	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calcula 11.05 172.83 gains (calcula 2.8 32.8	e Table 5 e 5), Wat Mar 98.02 ated in Ap 11.02 culated ir 168.35 ated in A 32.8	ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat	Jun 98.02 ion L9 of 5.26 uation L 135.51 tion L15	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a)	Aug 98.02 Iso see 7.39 3a), also 126.19	Sep 98.02 Table 5 9.92 see Tal 130.66	Oct 98.02 12.6 ble 5 140.19 5	Nov 98.02 14.7	Dec 98.02	eating	(66) (67) (68)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 18 Appliance (68)m= 17 Cooking g (69)m= 3 Pumps an (70)m=	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calcula 11.05 172.83 gains (calcula 2.8 32.8 and fans gains	Mar 98.02 ated in Ap 11.02 culated ir 168.35 ated in A 32.8 c (Table \$	s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a)	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat 32.8	Jun 98.02 ion L9 of 5.26 uation L 135.51 tion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.7 152.21	Dec 98.02 15.67 163.5	eating	(66) (67) (68) (69)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 18 Appliance (68)m= 17 Cooking g (69)m= 3 Pumps an (70)m= Losses e.	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calcula 71.05 172.83 gains (calcula 22.8 32.8 and fans gains	Mar 98.02 ated in Ap 11.02 culated ir 168.35 ated in A 32.8 c (Table \$	s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a)	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat 32.8	Jun 98.02 ion L9 of 5.26 uation L 135.51 tion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.7 152.21	Dec 98.02 15.67 163.5	eating	(66) (67) (68) (69)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 18 Appliance (68)m= 17 Cooking g (69)m= 3 Pumps an (70)m= Losses e. (71)m= -7	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calcula 1.05 172.83 gains (calcula 2.8 32.8 and fans gains 0 0 g. evaporation	Mar 98.02 ated in Ap 11.02 culated ir 168.35 ated in A 32.8 c (Table { 0 con (nega	ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8 5a) 0 tive valu	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat 32.8	Jun 98.02 ion L9 of 5.26 uation L 135.51 tion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Tal 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.7 152.21 32.8	Dec 98.02 15.67 163.5	eating	(66) (67) (68) (69) (70)
5. Intern Metabolic (66)m= 98 Lighting g (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 3 Pumps an (70)m=	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calcula 7.05 172.83 gains (calcula 2.8 32.8 nd fans gains 0 0 g. evaporatic 8.41 -78.41	Mar 98.02 ated in Ap 11.02 culated ir 168.35 ated in A 32.8 c (Table { 0 con (nega	ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8 5a) 0 tive valu	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat 32.8	Jun 98.02 ion L9 of 5.26 uation L 135.51 tion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Tal 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.7 152.21 32.8	Dec 98.02 15.67 163.5	eating	(66) (67) (68) (69) (70)
Metabolic (66)m= 98 Lighting g (67)m= 18 Appliance (68)m= 17 Cooking g (69)m= 3 Pumps an (70)m= Losses e. (71)m= -7 Water hea (72)m= 33	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 es gains (calcula 1.05 172.83 gains (calcula 2.8 32.8 nd fans gains 0 0 g. evaporation 8.41 -78.41 ating gains (e Table 5 e 5), Wat Mar 98.02 ated in Ap 11.02 culated ir 168.35 ated in A 32.8 c (Table 5 0 on (nega -78.41 Table 5) 33.96	s and 5a ts Apr 98.02 opendix 8.34 n Append 158.83 opendix 32.8 5a) 0 tive valu	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat 32.8 0 es) (Tab	Jun 98.02 ion L9 of 5.26 uation L 135.51 tion L15 32.8 0 ole 5) -78.41	Jul 98.02 r L9a), a 5.69 13 or L1: 127.97 or L15a; 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 See Tal 130.66 ee Table 32.8 0 -78.41	Oct 98.02 12.6 ble 5 140.19 5 32.8 0 -78.41	Nov 98.02 14.7 152.21 32.8 0 -78.41 34.67	Dec 98.02 15.67 163.5 0 -78.41 36.44	eating	(66) (67) (68) (69) (70) (71)
Metabolic (66)m= 98 Lighting g (67)m= 15 Appliance (68)m= 17 Cooking g (69)m= 3 Pumps an (70)m=	gains (Table Jan Feb 3.02 98.02 ains (calcula 5.25 13.54 as gains (calcula 2.8 32.8 ad fans gains 0 0 g. evaporatio 8.41 -78.41 ating gains (7.63 36.43	e Table 5 e 5), Wat Mar 98.02 ated in Ap 11.02 culated ir 168.35 ated in A 32.8 c (Table 5 0 on (nega -78.41 Table 5) 33.96	s and 5a ts Apr 98.02 opendix 8.34 n Append 158.83 opendix 32.8 5a) 0 tive valu	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat 32.8 0 es) (Tab	Jun 98.02 ion L9 of 5.26 uation L 135.51 tion L15 32.8 0 ole 5) -78.41	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 See Tal 130.66 ee Table 32.8 0 -78.41	Oct 98.02 12.6 ble 5 140.19 5 32.8 0 -78.41	Nov 98.02 14.7 152.21 32.8 0 -78.41 34.67	Dec 98.02 15.67 163.5 0 -78.41 36.44	eating	(66) (67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	-	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	4.21	x	11.28	x	0.55	x	0.7	=	12.67	(75)
Northeast 0.9x	0.77	x	4.21	x	22.97	x	0.55	x	0.7	=	25.8	(75)
Northeast 0.9x	0.77	x	4.21	x	41.38	x	0.55	x	0.7	=	46.48	(75)
Northeast 0.9x	0.77	X	4.21	x	67.96	x	0.55	x	0.7	=	76.33	(75)
Northeast 0.9x	0.77	x	4.21	x	91.35	x	0.55	x	0.7	=	102.6	(75)
Northeast 0.9x	0.77	x	4.21	x	97.38	x	0.55	x	0.7	=	109.39	(75)
Northeast 0.9x	0.77	x	4.21	x	91.1	x	0.55	x	0.7	=	102.33	(75)
Northeast 0.9x	0.77	x	4.21	x	72.63	x	0.55	x	0.7	=	81.58	(75)
Northeast 0.9x	0.77	X	4.21	x	50.42	x	0.55	x	0.7	=	56.63	(75)
Northeast 0.9x	0.77	x	4.21	x	28.07	x	0.55	x	0.7	=	31.53	(75)
Northeast 0.9x	0.77	x	4.21	x	14.2	x	0.55	x	0.7	=	15.95	(75)
Northeast 0.9x	0.77	X	4.21	x	9.21	x	0.55	x	0.7	=	10.35	(75)
Northwest 0.9x	0.77	X	8.26	x	11.28	x	0.55	x	0.7	=	24.87	(81)
Northwest 0.9x	0.77	X	3.21	x	11.28	x	0.55	x	0.7	=	9.66	(81)
Northwest 0.9x	0.77	X	4.37	x	11.28	x	0.55	x	0.7] =	13.16	(81)
Northwest 0.9x	0.77	x	8.26	X	22.97	X	0.55	X	0.7] =	50.61	(81)
Northwest 0.9x	0.77	x	3.21	X	22.97	x	0.55	X	0.7	=	19.67	(81)
Northwest 0.9x	0.77	x	4.37	x	22.97	x	0.55	x	0.7	=	26.78	(81)
Northwest 0.9x	0.77	x	8.26	X	41.38	X	0.55	X	0.7] =	91.19	(81)
Northwest 0.9x	0.77	x	3.21	x	41.38	x	0.55	X	0.7	=	35.44	(81)
Northwest 0.9x	0.77	x	4.37	x	41.38	x	0.55	x	0.7	=	48.25	(81)
Northwest 0.9x	0.77	x	8.26	X	67.96	X	0.55	X	0.7] =	149.76	(81)
Northwest 0.9x	0.77	X	3.21	x	67.96	x	0.55	X	0.7] =	58.2	(81)
Northwest 0.9x	0.77	X	4.37	x	67.96	x	0.55	x	0.7] =	79.23	(81)
Northwest 0.9x	0.77	x	8.26	x	91.35	X	0.55	X	0.7	=	201.31	(81)
Northwest 0.9x	0.77	x	3.21	x	91.35	x	0.55	X	0.7] =	78.23	(81)
Northwest 0.9x	0.77	x	4.37	x	91.35	x	0.55	x	0.7	=	106.5	(81)
Northwest 0.9x	0.77	x	8.26	x	97.38	x	0.55	x	0.7	=	214.62	(81)
Northwest 0.9x	0.77	X	3.21	x	97.38	x	0.55	x	0.7	=	83.4	(81)
Northwest 0.9x	0.77	X	4.37	x	97.38	x	0.55	X	0.7] =	113.54	(81)
Northwest 0.9x	0.77	x	8.26	x	91.1	x	0.55	X	0.7	=	200.77	(81)
Northwest 0.9x	0.77	x	3.21	x	91.1	x	0.55	X	0.7] =	78.02	(81)
Northwest 0.9x	0.77	x	4.37	X	91.1	X	0.55	X	0.7] =	106.22	(81)
Northwest 0.9x	0.77	x	8.26	x	72.63	x	0.55	X	0.7	=	160.06	(81)
Northwest 0.9x	0.77	x	3.21	x	72.63	x	0.55	X	0.7] =	62.2	(81)
Northwest 0.9x	0.77	X	4.37	x	72.63	x	0.55	x	0.7] =	84.68	(81)
Northwest 0.9x	0.77	X	8.26	x	50.42	x	0.55	x	0.7] =	111.12	(81)
Northwest 0.9x	0.77	X	3.21	×	50.42	×	0.55	x	0.7	j =	43.18	(81)
Northwest 0.9x	0.77	X	4.37	x	50.42	x	0.55	x	0.7] =	58.79	(81)
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Northwest _{0.9x}	0.77	X	8.2	:6	X	28.07	X	0.55	X	0.7	=	61.85	(81)
Northwest _{0.9x}	0.77	X	3.2	!1	X	28.07	X	0.55	X	0.7	=	24.04	(81)
Northwest 0.9x	0.77	X	4.3	57	X	28.07	X	0.55	X	0.7	=	32.72	(81)
Northwest 0.9x	0.77	X	8.2	16	X	14.2	X	0.55	X	0.7	=	31.29	(81)
Northwest 0.9x	0.77	X	3.2	!1	X	14.2	x	0.55	x	0.7		12.16	(81)
Northwest 0.9x	0.77	X	4.3	57	X	14.2	x	0.55	x	0.7	_	16.55	(81)
Northwest 0.9x	0.77	X	8.2	.6	X	9.21	X	0.55	x	0.7	-	20.31	(81)
Northwest _{0.9x}	0.77	X	3.2	1	X	9.21	x	0.55	x	0.7	=	7.89	(81)
Northwest _{0.9x}	0.77	X	4.3	37	X	9.21	x	0.55	x	0.7	=	10.74	(81)
Rooflights 0.9x	1	X	1.6	1	X	26	x	0.55	x	0.8	=	16.58	(82)
Rooflights _{0.9x}	1	X	1.6	51	X	54	x	0.55	x	0.8	=	34.43	(82)
Rooflights _{0.9x}	1	x	1.6	51	X	96	X	0.55	×	0.8	=	61.21	(82)
Rooflights 0.9x	1	x	1.6	51	X	150	T x	0.55	×	0.8	<u> </u>	95.63	(82)
Rooflights _{0.9x}	1	x	1.6	51	X	192	X	0.55	×	0.8		122.41	(82)
Rooflights 0.9x	1	x	1.6	51	X	200	x	0.55	x	0.8	<u> </u>	127.51	(82)
Rooflights _{0.9x}	1	x	1.6	51	X	189	Īx	0.55	×	0.8	<u> </u>	120.5	(82)
Rooflights 0.9x	1	x	1.6	51	X	157	X	0.55	x	0.8	<u> </u>	100.1	(82)
Rooflights 0.9x	1	x	1.6	51	X	115	x	0.55	x	0.8	<u> </u>	73.32	(82)
Rooflights 0.9x	1	x	1.6	51	X	66	Īx	0.55	×	0.8	<u> </u>	42.08	(82)
Rooflights 0.9x	1	x	1.6	1	X	33	Īx	0.55	x	0.8	=	21.04	(82)
Rooflights 0.9x	1	x	1.6	1	X	21	Īx	0.55	x	0.8	=	13.39	(82)
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Solar gains in	watts calc	ulated	for each	n montl	า		(83)m	n = Sum(74)m .	(82)m				
(83)m= 76.93	T T	82.56	459.16	611.06	1	48.46 607.84	488		192.2	96.98	62.68]	(83)
Total gains – i	nternal and	d solar	(84)m =	(73)m	+ (33)m , watts			<u> </u>	_	<u> </u>	J	
(84)m= 353.27	432.5 5	48.29	709.33	844.92	8	66.98 816.61	700	.67 563.29	428.1	5 350.97	330.7]	(84)
7. Mean inter	nal temper	ature (heating	seaso	n)	·	<u> </u>			,			
Temperature						area from Ta	ble 9	Th1 (°C)				21	(85)
Utilisation fac	•	•			_			, (•)					(3.3)
Jan	Feb	Mar	Apr	May	Ť	Jun Jul	_	ug Sep	Oct	Nov	Dec]	
(86)m= 1	 	0.98	0.93	0.79	+	0.6 0.45	0.5		0.98	1	1		(86)
Mean interna	l temnerati	ıra in l	ivina ara	 22 T1 /-	follo	w stens 3 to	7 in 7	ahle 9c)				ı	
(87)m= 19.35		19.92	20.41	20.79	$\overline{}$	0.95 20.99	20.		20.28	19.72	19.31]	(87)
` ′	<u> </u>	!						!		_		J	
Temperature (88)m= 19.71		19.71	19.72	19.72	$\overline{}$	9.72 19.72	19.		19.72	19.72	19.71	1	(88)
` ′	<u> </u>	!								102			()
Utilisation fac					$\overline{}$	<u>`</u>		4 0.74	0.00	1 0 00		1	(80)
(89)m= 1		0.98	0.9	0.72		0.49 0.33	0.	<u>İ</u>	0.96	0.99	1	J	(89)
Mean interna					Ť	<u>`</u>	-	1			1	1	
(90)m= 18.23	18.42	18.79	19.27	19.59		19.7 19.72	19.		19.15		18.19		(90)
								1	rLA = Liv	ving area ÷ (4	4) =	0.47	(91)
Maan interne		/5	ماند مطاء	مرام مارد	منالم	~\ _ fl	. /1	fl V \ ^ TO					

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

(92)m=	18.75	18.95	19.32	19.8	20.15	20.28	20.31	20.3	20.17	19.68	19.12	18.71		(92)
Apply	adjustn	nent to the	ne mean	internal	temper	ature fro	m Table	4e, whe	re appro	priate		•	l	
(93)m=	18.75	18.95	19.32	19.8	20.15	20.28	20.31	20.3	20.17	19.68	19.12	18.71		(93)
8. Sp	ace hea	ting requ	uirement											
				•		ed at ste	ep 11 of	Table 9l	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the u				using Ta										
1.169	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	ation fac	0.99	ains, hm _{0.97}	0.9	0.74	0.54	0.39	0.47	0.78	0.96	0.00	1 4		(94)
(94)m=						0.54	0.39	0.47	0.76	0.96	0.99	1		(34)
(95)m=	351.96	428.74	533.29	4)m x (84 639.96	628.94	469.54	316.2	328.18	437.7	411.94	348.46	329.77		(95)
				perature			310.2	020.10	407.7	411.54	040.40	323.77		(00)
(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)
				al tempe							7.1	7.2		(00)
(97)m=	1258.9	1222.65			731.34	490.27	320.11	336.5	524.56	785.64	1042.04	1259.95		(97)
				r each m		<u> </u>	<u> </u>				1)m			
(98)m=	674.76	533.51	432.54	219.23	76.19	0	0	0	0	278.03	499.38	692.06		
, ,								Tota	l per year	(kWh/year) = Sum(9	8) _{15.912} =	3405.7	(98)
Snac	o hoatin	a require	amont in	kWh/m²	?/vear				. ,	` ,	, ,	,	57.48	(99)
		• ,			/yeai								37.40	(99)
			luiremen											
Calcu	lated fo Jan			August.		ole 10b							ı	
	ı Jan I			Λ	1 1/0.	ا ۱۰۰۰۰۰	l 1ı l	۸	Can	O-4	Nave	Dag		
Heat		Feb	Mar	Apr	May 5°C inter	Jun nal temr	Jul	Aug	Sep	Oct	Nov e from T	Dec		
	loss rate	ELm (ca	lculated	using 25	5°C inter	nal temp	perature	and exte	ernal ten	nperatur	e from T	able 10)		(100)
(100)m=	loss rate	e Lm (ca	lculated 0			ı	l							(100)
(100)m= Utilisa	loss rate 0 ation fac	ELm (ca	lculated 0 ess hm	using 25	5°C inter	nal temp 810.7	638.21	and exte	ernal ten	nperatur	e from T	able 10)		(100)
(100)m= Utilisa (101)m=	loss rate 0 ation fac	e Lm (ca 0 tor for lo	lculated 0 ss hm 0	using 25	5°C inter 0	nal temp 810.7 0.9	perature	and exte	ernal ten	nperatur 0	e from T	able 10)		, ,
(100)m= Utilisa (101)m= Usefu	loss rate 0 ation fac 0 ul loss, h	e Lm (ca 0 tor for lo	lculated 0 ss hm 0	using 25	5°C inter 0	nal temp 810.7 0.9	638.21 0.94	and exte 655.03	ernal ten	nperatur 0	e from T	able 10)		, ,
(100)m= Utilisa (101)m= Usefu (102)m=	loss rate 0 ation fac 0 ul loss, h	e Lm (ca 0 tor for lc 0 mLm (W	lculated 0 ess hm 0 /atts) = (using 25 0 0	0 0 0 (101)m	810.7 0.9	0.94 599.75	and exte 655.03 0.9	ernal ten 0 0	nperatur 0	e from T 0	able 10) 0		(101)
(100)m= Utilisa (101)m= Usefu (102)m=	loss rate 0 ation face 0 ul loss, h 0 s (solar o	e Lm (ca 0 tor for lc 0 mLm (W	lculated 0 ess hm 0 /atts) = (0 0 100)m x	0 0 0 (101)m	728.95 eather re	0.94 599.75	and exte 655.03 0.9 591.9 ee Table	ernal ten 0 0	nperatur 0	e from T 0	able 10) 0		(101)
(100)m= Utilisa (101)m= Useft (102)m= Gains (103)m=	loss rate 0 ation face 0 ul loss, h 0 s (solar q	e Lm (ca 0 otor for lo 0 mLm (W 0 gains ca 0	lculated 0 ess hm 0 /atts) = (0 lculated 0	0 (100)m x 0 for appli	0 0 (101)m 0 cable we	728.95 eather re	0.94 599.75 egion, se	and exte 655.03 0.9 591.9 e Table 875.02	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0		(101)
(100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1	loss rate 0 ation face 0 ul loss, h 0 s (solar q 0 e cooling 04)m to	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 grequire	lculated 0 ess hm 0 /atts) = (0 culated 0 ement fo	0 (100)m x 0 for appli	0 0 (101)m 0 cable we 0 whole c	728.95 eather re	0.94 599.75 egion, se	and exte 655.03 0.9 591.9 e Table 875.02	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0		(101)
(100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m=	loss rate 0 ation face 0 ul loss, h 0 s (solar q 0 e cooling 04)m to	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 grequire	lculated 0 ess hm 0 /atts) = (0 culated 0 ement fo	o 100)m x o for appli r month,	0 0 (101)m 0 cable we 0 whole c	728.95 eather re	0.94 599.75 egion, se	and exte 655.03 0.9 591.9 e Table 875.02	0 0 0 10) 0 /h) = 0.0	0 0 0 0 24 x [(10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0		(101) (102) (103)
(100)m= Utilisa (101)m= Useft (102)m= Gains (103)m= Space set (1 (104)m=	loss rate 0 ation face 0 ul loss, h 0 s (solar o c cooling 04)m to	e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require zero if (lculated 0 oss hm 0 /atts) = (0 culated 0 ement fo 104)m <	0 100)m x 0 for appli 0 r month,	o 0 (101)m 0 cable we 0 whole o	728.95 eather readwelling,	0.94 599.75 egion, se 1005.97	and exte 655.03 0.9 591.9 e Table 875.02 ous (kW	0 0 10) 0 7h) = 0.0	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 102)m] 2	x (41)m 754.89	(101) (102) (103)
(100)m= Utilisa (101)m= Useft (102)m= Gains (103)m= Space set (1 (104)m=	loss rate 0 ation factor ation factor s (solar (sol	e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require zero if (lculated 0 oss hm 0 /atts) = (0 lculated 0 ement for 104)m <	0 (100)m x 0 for appli 0 r month, 3 × (98)	o 0 (101)m 0 cable we 0 whole o	728.95 eather readwelling,	0.94 599.75 egion, se 1005.97	and exte 655.03 0.9 591.9 e Table 875.02 ous (kW	0 0 10) 0 7h) = 0.0	0 0 0 0 24 x [(10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 102)m] 2	x (41)m	(101) (102) (103)
Utilisa (101)m= Usefu (102)m= Gains (103)m= Spac set (1 (104)m= Cooled Interm	loss rate 0 ation face 0 ul loss, h 0 s (solar (0 04)m to d fraction ittency face	e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 actor (Ta	lculated 0 ss hm 0 /atts) = (0 lculated 0 ement for 104)m < 0	0 (100)m x 0 for appli 0 r month, 3 × (98	o cable we whole o	728.95 eather re 1065.09 dwelling,	0.94 599.75 egion, se 1005.97 continuo	and exte 655.03 0.9 591.9 ee Table 875.02 ous (kW	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 102)m] >	x (41)m 754.89	(101) (102) (103)
(100)m= Utilisa (101)m= Useft (102)m= Gains (103)m= Spac set (1 (104)m=	loss rate 0 ation face 0 ul loss, h 0 s (solar (0 04)m to d fraction ittency face	e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require zero if (lculated 0 oss hm 0 /atts) = (0 lculated 0 ement for 104)m <	0 (100)m x 0 for appli 0 r month, 3 × (98)	o 0 (101)m 0 cable we 0 whole o	728.95 eather readwelling,	0.94 599.75 egion, se 1005.97	and exte 655.03 0.9 591.9 e Table 875.02 ous (kW	0 0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] 3 = 4) =	x (41)m 754.89 1	(101) (102) (103) (104) (105)
(100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Spac set (1 (104)m= Cooled Interm (106)m=	loss rate 0 ation face 0 al loss, h 0 s (solar of the cooling of t	e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	lculated 0 ess 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 × (98 0	o 0 (101)m 0 cable we 0 whole o)m 0	728.95 eather re 1065.09 welling, 242.02	0.94 599.75 egion, se 1005.97 continuo 302.23	and exte 655.03 0.9 591.9 ee Table 875.02 ous (kW 210.64	0 0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 102)m] >	x (41)m 754.89	(101) (102) (103)
(100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Interm (106)m=	loss rate 0 ation face 0 ul loss, h 0 s (solar q 0 d fraction ittency for cooling	e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta	lculated 0 ess 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 × (98	o 0 (101)m 0 cable we 0 whole o)m 0	728.95 eather re 1065.09 welling, 242.02	0.94 599.75 egion, se 1005.97 continuo 302.23	and exte 655.03 0.9 591.9 ee Table 875.02 ous (kW 210.64	0 0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] 3 = 4) =	x (41)m 754.89 1	(101) (102) (103) (104) (105)
(100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Interm (106)m=	loss rate 0 ation face 0 ul loss, h 0 s (solar q 0 d fraction ittency for cooling	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 n actor (Ta 0	lculated 0 sss hm 0 /atts) = (0 lculated 0 ement for 104)m < 0 ment for	o 100)m x 0 for appli 0 r month, 3 × (98 0	0 (101)m 0 cable we 0 whole c)m 0	728.95 eather re 1065.09 welling, 242.02 × (105)	0.94 599.75 egion, se 1005.97 continuo 302.23 0.25 × (106)r	and exte 655.03 0.9 591.9 e Table 875.02 ous (kW 210.64	0 0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	x (41)m 754.89 1	(101) (102) (103) (104) (105)
(100)m= Utilisa (101)m= Useft (102)m= Gains (103)m= Space set (1 (104)m= Coolect Interm (106)m= Space (107)m=	loss rate 0 ation factor s (solar of the cooling) cooling 0 cooling	e Lm (ca 0 ttor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 requirer 0	lculated 0 oss hm 0 /atts) = (0 culated 0 ement for 104)m < 0 ment for 0	0 (100)m x 0 for appli 0 r month, 3 × (98 0) 0	0 (101)m 0 cable we 0 whole c)m 0	728.95 eather re 1065.09 welling, 242.02 × (105)	0.94 599.75 egion, se 1005.97 continuo 302.23 0.25 × (106)r	and exte 655.03 0.9 591.9 e Table 875.02 ous (kW 210.64	0 0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled :	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	x (41)m 754.89 1 0	(101) (102) (103) (104) (105) (106)
(100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Cooled Interm (106)m= Space (107)m=	loss rate 0 ation face 0 ul loss, h 0 s (solar q 0 d fraction ittency f 0 cooling 0	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 requirer 0	lculated 0 sss hm 0 /atts) = (0 lculated 0 ement for 0 able 10b 0 ment for 0	o 100)m x 0 100)m x 0 for appli 0 r month, 3 × (98 0	0 (101)m 0 cable we 0 whole c)m 0	728.95 eather re 1065.09 welling, 242.02 0.25 × (105) 60.51	0.94 599.75 egion, see 1005.97 continuo 302.23 0.25 × (106)r 75.56	and exte 655.03 0.9 591.9 e Table 875.02 ous (kW 210.64	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled a 0 = Sum(0 = Sum(0 + S	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	x (41)m 754.89 1	(101) (102) (103) (104) (105) (106)
(100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Interm (106)m= Space (107)m= Space	loss rate 0 ation face 0 ation	e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require zero if (0 requirer 0	lculated 0 loss hm 0 l/atts) = (0 lculated 0 lculated 0 lement fo 104)m < 0 ment for 0 ment for 0 ment in k lency (called)	0 (100)m x 0 for appli 0 r month, 3 × (98 0) 0	0 (101)m 0 cable we 0 whole c)m 0	728.95 eather re 1065.09 welling, 242.02 0.25 × (105) 60.51	0.94 599.75 egion, see 1005.97 continuo 302.23 0.25 × (106)r 75.56	and exte 655.03 0.9 591.9 e Table 875.02 ous (kW 210.64	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled a 0 = Sum(0 = Sum(0 + S	e from T 0 0 0 0 0 03)m - (0 1,0,4) area ÷ (4 0 1,0,4) 0 1,0,7)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	x (41)m 754.89 1 0	(101) (102) (103) (104) (105) (106)

Stroma Number: STRO016363 Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.16
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.16
Address: 1. Overall dwelling dimensions: Area(m²)
Area(m²)
Area(m²) Av. Height(m) Volume(m³)
Ground floor Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1d)+((1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1d)+((1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+((1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+((1n) Total floor area TFA = (1a)+(1b)+(1c)+((1n) Total floor area TFA = (1a)+(1b)+(1c)+((1n) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+((1n) Total floor area TFA = (1a)+(1b)+(1c)+((1n)) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+((1n)) Total floor area TFA = (1a)+(1b)+(1c)+((1n)) Total floor area TFA = (1a)+(1b)+(1c)+((1n)) Total floor area TFA = (1a)+(1b)+((1n)) Total floor area TFA = (1a)+((1n))
Dwelling volume $ (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 196.69 $ (5) $ 2. \text{ Ventilation rate:} $
2. Ventilation rate: main heating
2. Ventilation rate: main heating heating heating heating
Number of chimneys Number of chimneys
Number of chimneys $0 + 0 + 0 + 0 = 0$ $\times 40 = 0$ (6a) Number of open flues $0 + 0 + 0 + 0 = 0$ $\times 20 = 0$ (6b) Number of intermittent fans $0 + 0 + 0 = 0$ $\times 20 = 0$ (6b) Number of intermittent fans $0 \times 10 = 0$ (7a) Number of passive vents $0 \times 10 = 0$ (7b) Number of flueless gas fires $0 \times 40 = 0$ (7c) Air changes per hour Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ (7c) Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ (7c) Number of storeys in the dwelling (ns) Additional infiltration $0 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times$
Number of intermittent fans Number of passive vents Number of flueless gas fires Number of flueless gas fires Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30
Number of passive vents 0
Number of flueless gas fires Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30
Air changes per hour Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(7a)+(7b)+(7c) = 30
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) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 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
Number of storeys in the dwelling (ns) Additional infiltration Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction 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
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction o (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 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
deducting areas of openings); if equal user 0.35
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0
If no draught lobby, enter 0.05, else enter 0
Percentage of windows and doors draught stripped $ 0 (14) $ Window infiltration $ 0.25 - [0.2 \times (14) \div 100] = 0 $ (15)
Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0$ (15) Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used
Number of sides sheltered 3 (19) Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78$ (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.23 (21)
Infiltration rate modified for monthly wind speed
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Monthly average wind speed from Table 7
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7
Wind Factor (22a)m = (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 infiltra	ation rate	e (allowi	ng for sh	nelter an	d wind s	speed) =	: (21a) x	(22a)m					
0.3	0.29	0.29	0.26	0.25	0.22	0.22	0.22	0.23	0.25	0.26	0.28]	
Calculate effec		•	rate for t	he appli	cable ca	se					•		
If mechanica			andiv N. (O	2h) - (22a	a) v Emy (4	aguatian (NEW atho	nuina (22h	·) = (22a)			0	(23a
If exhaust air he		0		, ,	, ,	. `	,, .	`)) = (23a)			0	(231
If balanced with		-	-	_					.		4 (22.)	0	(230
a) If balance					·	, 	1 	í `	, 		- `) ÷ 100] 1	(24)
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0	J	(248
b) If balance	a mecna	anicai ve	ntilation	without	neat red	overy (I	VIV) (24) T 0	$\int_{0}^{\infty} \int_{0}^{\infty} dt = (22)$	2b)m + (2 0		0	1	(24
` ′					<u> </u>			<u> </u>	0	0	0]	(24)
c) If whole ho if (22b)m				•	•				5 x (23h	1)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0	1	(24
d) If natural v	ventilatio	n or wh	ole hous	L nositiv	l ve input	L ventilati	on from	l loft	ļ		<u> </u>	J	
if (22b)m				•	•				0.5]				
(24d)m= 0.54	0.54	0.54	0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.53	0.54]	(24
Effective air	change	rate - er	nter (24a) or (24k	o) or (24	c) or (24	ld) in bo	x (25)			•	•	
(25)m= 0.54	0.54	0.54	0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.53	0.54]	(25
3. Heat losses	e and ho	at loce i	aramoto	or:								•	
ELEMENT	Gros area	ss	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/I	〈)	k-value		A X k kJ/K
Doors	J J.J.	()	•••		2	 x	1.3	 =	2.6	, 			(26
Nindows Type	1				7.1	_	/[1/(1.3)+	0.04] =	8.77	=			(27
Nindows Type					9.86	_	/[1/(1.3)+		12.18	=			(27
Windows Type					7.48	〓 .	/[1/(1.3)+		9.24	╡			(27
Windows Type					1.53	=	/[1/(1.3)+		1.89	=			(27
Rooflights	•					=	/[1/(1.6) +			=			
· ·	40.5		05.00		1.14	=			1.824	륵 ,			(27
Walls Type1	40.5		25.9	<u>/</u>	14.61	=	0.15	╡ -	2.19	닠 ¦			(29
Walls Type2	56.9		2	_	54.98	=	0.13		7.34	닠 ¦		\exists \vdash	(29)
Roof	72.8		1.14		71.71	×	0.1	=	7.17				(30
Total area of el	iements	, m <u>*</u>			170.4	1							(31
Party wall					23.2	X	0	=	0			_	(32
Party floor					72.85					L			(32
* for windows and i ** include the area						ated using	g formula 1	/[(1/U-valu	ue)+0.04] a	s given in	paragraph	n 3.2	
abric heat los				o ana pan			(26)(30) + (32) =				53.1	1 (33
Heat capacity (•	,						(30) + (32	2) + (32a).	(32e) =	17245.	
	,	,	2 - Cm -	- TFΔ) ir	n k l/m²K			,	ative Value	, , ,	• /	250	(35
Thermal mass	parame		- CIII ·	11/\/	1 100/111 10								(00
For design assessi	ments wh	ere the de	tails of the	,			recisely the	e indicative	e values of	TMP in T	able 1f		
Thermal mass For design assessi can be used instea Thermal bridge	ments who	ere the de tailed calc	tails of the ulation.	construct	ion are no	t known pi	recisely the	e indicative	e values of	TMP in T	able 1f	16.3 ⁻	1 (36

Total fabric he	at loss							(33) +	(36) =		ı	69.42	(37)
Ventilation hea		alculated	l monthly	/				` '	` ,	25)m x (5)		09.42	(0,)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 35.35	35.24	35.13	34.61	34.52	34.06	34.06	33.98	34.24	34.52	34.71	34.92		(38)
Heat transfer of	coefficier	nt, W/K				ı		(39)m	= (37) + (37)	38)m		l	
(39)m= 104.78	104.66	104.55	104.03	103.94	103.49	103.49	103.4	103.66	103.94	104.13	104.34		
Heat loss para	meter (F	HLP), W	′m²K			•			Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	104.03	(39)
(40)m= 1.44	1.44	1.44	1.43	1.43	1.42	1.42	1.42	1.42	1.43	1.43	1.43		
Number of day	ys in moi	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.43	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	tina enei	rav reau	rement:								kWh/ye	ear:	
		9) 10 40									, , , , , , , , , , , , , , , , , , ,		
Assumed occu			[4 ava	/ n nnnn)40 v /TI	-)	2012 v /	TEA 40		31		(42)
if TFA > 13.9 if TFA £ 13.9		+ 1.76 X	[i - exp	(-0.0003	649 X (11	-A -13.9)2)] + 0.0	JU 13 X (IFA - 13.	9)			
Annual average	•	ater usag	ge in litre	s per da	ay Vd,av	erage =	(25 x N)	+ 36		89	.14		(43)
Reduce the annua	_				-	-	to achieve	a water us	se target o				. ,
not more that 125	litres per p	person pei	day (all w	ater use, l	hot and co	ld)							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i	in litres per	day for ea	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m= 98.05	94.49	90.92	87.36	83.79	80.23	80.23	83.79	87.36	90.92	94.49	98.05		_
Energy content of	f hot water	used - cal	culated mo	onthly = 4 .	190 x Vd,r	n x nm x C	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		1069.69	(44)
(45)m= 145.41	127.18	131.24	114.42	109.78	94.74	87.79	100.74	101.94	118.8	129.68	140.82		
					ļ			_	Total = Su	m(45) ₁₁₂ =		1402.53	(45)
If instantaneous w	vater heatii	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)) to (61)			'		
(46)m= 0	0	0	0	0	0	0	0	0	0	0	0		(46)
Water storage													
Storage volum	, ,					•		ame ves	sel		0		(47)
If community h	•			_			, ,			\			
Otherwise if no		hot wate	er (this in	icludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage a) If manufact		eclared I	nee fact	nr is kno	wn (k\//h	J/day).					0		(48)
Temperature f) 13 KHO	vvii (ivvii	"day).					0		
•				oor			(40) × (40)	\ _			0		(49)
Energy lost from b) If manufact		_	-		or is not		(48) x (49)) =			0		(50)
Hot water stor			-								0		(51)
If community h	neating s	ee secti	on 4.3	·		- /							. ,
Volume factor											0		(52)
Temperature f	actor fro	m Table	2b								0		(53)
Energy lost fro	om water	storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or	(54) in (5	55)									0		(55)

Water storage	loss cal	culated f	or 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)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	t loss (ar	nnual) fro	m Table	3							0		(58)
Primary circuit	•	•			59)m = ((58) ÷ 36	55 × (41)	m					
(modified by	factor f	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 eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 123.6	108.1	111.55	97.25	93.32	80.53	74.62	85.63	86.65	100.98	110.23	119.7		(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	al lines if	FGHRS	and/or V	WHRS	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= 123.6	108.1	111.55	97.25	93.32	80.53	74.62	85.63	86.65	100.98	110.23	119.7		
		!					Outp	out from wa	ater heate	r (annual)₁	12	1192.15	(64)
Heat gains fro	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]	_
(65)m= 30.9	27.03	27.89	24.31	23.33	20.13	18.65	24.44	24.00	25.25	07.50	00.00	<u>-</u>	(65)
				20.00	20.10	10.00	21.41	21.66	25.25	27.56	29.93		(03)
include (57)	m in cal				<u> </u>	<u> </u>				<u> </u>	<u> </u>	eating	(00)
include (57) 5. Internal g		culation o	of (65)m	only if c	<u> </u>	<u> </u>				<u> </u>	<u> </u>	eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>				<u> </u>	<u> </u>	eating	(03)
· ,	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>		or hot w		<u> </u>	<u> </u>	eating	(03)
5. Internal g	ains (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the d	dwelling		ater is fr	om com	munity h	eating	(66)
5. Internal games Metabolic gair Jan	ains (see ns (Table Feb 115.66	e Table 5 e 5), Wat Mar	of (65)m and 5a ts Apr 115.66	only if c): May 115.66	Jun	Jul 115.66	Aug 115.66	or hot w Sep 115.66	ater is fr	om com	munity h	eating	
5. Internal games Metabolic gair Jan (66)m= 115.66	ains (see ns (Table Feb 115.66	e Table 5 e 5), Wat Mar	of (65)m and 5a ts Apr 115.66	only if c): May 115.66	Jun	Jul 115.66	Aug 115.66	or hot w Sep 115.66	ater is fr	om com	munity h	eating	
5. Internal games Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17	res (Table Feb 115.66 (calcula 16.14	E Table 5 E 5), Wat Mar 115.66 ted in Ap	of (65)m and 5a ts Apr 115.66 ppendix 9.94	May 115.66 L, equati	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov	Dec	eating	(66)
5. Internal gain Metabolic gain Jan (66)m= 115.66 Lighting gains	res (Table Feb 115.66 (calcula 16.14	E Table 5 E 5), Wat Mar 115.66 ted in Ap	of (65)m and 5a ts Apr 115.66 ppendix 9.94	May 115.66 L, equati	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov	Dec	eating	(66)
5. Internal games Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances games (68)m= 203.86	res (Table Feb 115.66 (calcula 16.14 tins (calcula 205.97	culation of Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64	of (65)m and 5a ts Apr 115.66 opendix 9.94 Appendix 189.29	only if controls: May 115.66 L, equation 7.43 dix L, equation 174.97	Jun 115.66 ion L9 o 6.27 uation L	Jul 115.66 r L9a), a 6.78 13 or L1: 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta	Oct 115.66 15.01 ble 5 167.07	Nov 115.66	Dec 115.66	eating	(66) (67)
5. Internal gi Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga	res (Table Feb 115.66 (calcula 16.14 tins (calcula 205.97	culation of Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64	of (65)m and 5a ts Apr 115.66 opendix 9.94 Appendix 189.29	only if controls: May 115.66 L, equation 7.43 dix L, equation 174.97	Jun 115.66 ion L9 o 6.27 uation L	Jul 115.66 r L9a), a 6.78 13 or L1: 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta	Oct 115.66 15.01 ble 5 167.07	Nov 115.66	Dec 115.66	eating	(66) (67)
5. Internal graph Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57	res (Table Feb 115.66 (calcula 16.14 lins (calcula 205.97 s (calcula 34.57	culation of Earlie Solution of Earlie Earlie Solution of Earlie Earlie Solution of Earlie Ear	of (65)m and 5a ts Apr 115.66 opendix 9.94 Append 189.29 opendix 34.57	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equat	Jun 115.66 ion L9 of 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a)	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Tall 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68	eating	(66) (67) (68)
5. Internal games Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances games (68)m= 203.86 Cooking gains	res (Table Feb 115.66 (calcula 16.14 lins (calcula 205.97 s (calcula 34.57	culation of Earlie Solution of Earlie Earlie Solution of Earlie Earlie Solution of Earlie Ear	of (65)m and 5a ts Apr 115.66 opendix 9.94 Append 189.29 opendix 34.57	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equat	Jun 115.66 ion L9 of 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a)	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Tall 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68	eating	(66) (67) (68)
5. Internal given by the second of the secon	res (Table Feb 115.66 (calcula 16.14 ins (calcula 205.97 c (calcula 34.57 ins gains 0	culation of the culation of th	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0	only if controls: May 115.66 L, equati 7.43 dix L, equati 174.97 L, equati 34.57	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(66) (67) (68) (69)
5. Internal given by Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa	res (Table Feb 115.66 (calcula 16.14 ins (calcula 205.97 c (calcula 34.57 ins gains 0	culation of the culation of th	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0	only if controls: May 115.66 L, equati 7.43 dix L, equati 174.97 L, equati 34.57	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86	eating	(66) (67) (68) (69)
5. Internal gives Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances gains (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -92.53	res (Table Feb 115.66 (calcula 16.14 tins (calcula 34.57 res gains 0 vaporatio -92.53	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64 ated in Ap 34.57 (Table 5 0 on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) of the period of	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0 tive value	only if controls: May 115.66 L, equation 7.43 dix L, equation 174.97 L, equation 34.57 0 es) (Tab	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(66) (67) (68) (69) (70)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 0 Losses e.g. ev	res (Table Feb 115.66 (calcula 16.14 tins (calcula 34.57 res gains 0 vaporatio -92.53	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64 ated in Ap 34.57 (Table 5 0 on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) on (negation of the period) of the period of	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0 tive value	only if controls: May 115.66 L, equation 7.43 dix L, equation 174.97 L, equation 34.57 0 es) (Tab	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(66) (67) (68) (69) (70)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -92.53 Water heating	res (Table Feb 115.66 (calcula 16.14 lins (calcula 34.57 res gains 0 reporation 92.53 gains (Table 140.22	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64 ated in Ap 34.57 (Table 5 0 on (negation of the part o	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 0 tive valu -92.53	only if control only if contro	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0 le 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1: 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57 0	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57 0	Oct 115.66 15.01 ble 5 167.07 5 34.57 0 -92.53	Nov 115.66 17.52 181.4 34.57 0	Dec 115.66 18.68 194.86 34.57 0	eating	(66) (67) (68) (69) (70) (71)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 0 Losses e.g. ev (71)m= -92.53 Water heating (72)m= 41.53	res (Table Feb 115.66 (calcula 16.14 lins (calcula 34.57 res gains 0 reporation 92.53 gains (Table 140.22	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 culated in 200.64 ated in Ap 34.57 (Table 5 0 on (negation of the part o	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 0 tive valu -92.53	only if control only if contro	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0 le 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57 0	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57 0	Oct 115.66 15.01 ble 5 167.07 5 34.57 0 -92.53	Nov 115.66 17.52 181.4 34.57 0	Dec 115.66 18.68 194.86 34.57 0	eating	(66) (67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	1.53	x	11.28	x	0.55	x	0.7	=	4.61	(75)
Northeast 0.9x	0.77	x	1.53	x	22.97	x	0.55	x	0.7	=	9.38	(75)
Northeast 0.9x	0.77	x	1.53	x	41.38	x	0.55	x	0.7	=	16.89	(75)
Northeast 0.9x	0.77	x	1.53	x	67.96	x	0.55	x	0.7	=	27.74	(75)
Northeast 0.9x	0.77	x	1.53	x	91.35	x	0.55	x	0.7	=	37.29	(75)
Northeast 0.9x	0.77	x	1.53	x	97.38	x	0.55	x	0.7	=	39.75	(75)
Northeast 0.9x	0.77	x	1.53	x	91.1	x	0.55	x	0.7] =	37.19	(75)
Northeast 0.9x	0.77	x	1.53	x	72.63	x	0.55	x	0.7	=	29.65	(75)
Northeast 0.9x	0.77	x	1.53	x	50.42	x	0.55	x	0.7	=	20.58	(75)
Northeast 0.9x	0.77	x	1.53	x	28.07	x	0.55	x	0.7	=	11.46	(75)
Northeast 0.9x	0.77	X	1.53	x	14.2	X	0.55	X	0.7	=	5.8	(75)
Northeast 0.9x	0.77	x	1.53	x	9.21	x	0.55	x	0.7	=	3.76	(75)
Southeast 0.9x	0.77	x	7.1	x	36.79	x	0.55	x	0.7	=	69.7	(77)
Southeast 0.9x	0.77	x	9.86	x	36.79	x	0.55	x	0.7	=	96.79	(77)
Southeast 0.9x	0.77	x	7.48	x	36.79	x	0.55	x	0.7	=	73.43	(77)
Southeast 0.9x	0.77	x	7.1	x	62.67	x	0.55	X	0.7	=	118.72	(77)
Southeast 0.9x	0.77	x	9.86	x	62.67	x	0.55	x	0.7	=	164.87	(77)
Southeast 0.9x	0.77	x	7.48	x	62.67	x	0.55	x	0.7	=	125.08	(77)
Southeast 0.9x	0.77	x	7.1	x	85.75	x	0.55	X	0.7	=	162.44	(77)
Southeast 0.9x	0.77	x	9.86	x	85.75	x	0.55	x	0.7	=	225.59	(77)
Southeast 0.9x	0.77	x	7.48	x	85.75	x	0.55	x	0.7	=	171.14	(77)
Southeast 0.9x	0.77	x	7.1	x	106.25	x	0.55	X	0.7	=	201.27	(77)
Southeast 0.9x	0.77	x	9.86	x	106.25	x	0.55	x	0.7	=	279.52	(77)
Southeast 0.9x	0.77	x	7.48	x	106.25	x	0.55	x	0.7	=	212.05	(77)
Southeast 0.9x	0.77	x	7.1	x	119.01	x	0.55	X	0.7	=	225.44	(77)
Southeast 0.9x	0.77	x	9.86	x	119.01	x	0.55	x	0.7	=	313.08	(77)
Southeast 0.9x	0.77	x	7.48	x	119.01	x	0.55	x	0.7	=	237.51	(77)
Southeast 0.9x	0.77	X	7.1	x	118.15	X	0.55	X	0.7	=	223.81	(77)
Southeast 0.9x	0.77	x	9.86	x	118.15	x	0.55	x	0.7	=	310.82	(77)
Southeast 0.9x	0.77	x	7.48	x	118.15	x	0.55	x	0.7	=	235.79	(77)
Southeast 0.9x	0.77	x	7.1	x	113.91	x	0.55	x	0.7	=	215.78	(77)
Southeast 0.9x	0.77	x	9.86	x	113.91	x	0.55	x	0.7	=	299.66	(77)
Southeast 0.9x	0.77	x	7.48	x	113.91	x	0.55	x	0.7] =	227.33	(77)
Southeast 0.9x	0.77	x	7.1	x	104.39	x	0.55	x	0.7	=	197.75	(77)
Southeast 0.9x	0.77	x	9.86	x	104.39	x	0.55	x	0.7	=	274.62	(77)
Southeast 0.9x	0.77	X	7.48	x	104.39	x	0.55	x	0.7] =	208.33	(77)
Southeast 0.9x	0.77	X	7.1	x	92.85	x	0.55	x	0.7] =	175.89	(77)
Southeast 0.9x	0.77	X	9.86	x	92.85	×	0.55	x	0.7] =	244.27	(77)
Southeast 0.9x	0.77	X	7.48	x	92.85	x	0.55	x	0.7] =	185.3	(77)
				-		-		•		-		_

Southeast 0.9x	0.77	x	7.4		x	CO 27	1 x	0.55	×	0.7		424.24	(77)
Southeast 0.9x	0.77	-	7.1			69.27	1	0.55	=	0.7		131.21	╡` ′
Southeast 0.9x	0.77] X]	9.86		X	69.27] X]	0.55	X	0.7		182.22	(77)
Southeast 0.9x	0.77]	7.48		X	69.27] X] v	0.55	x x	0.7		138.24	(77) (77)
Southeast 0.9x	0.77] X] .,	7.1	=	X	44.07] X]	0.55	╡	0.7		83.48	╡` ′
Southeast 0.9x	0.77] X] ,	9.86		X	44.07	X	0.55	_ X	0.7		115.94	$= \frac{1}{1} \frac{(77)}{(77)}$
Southeast 0.9x	0.77] X] ,	7.48	<u> </u>	X	44.07] X] ,	0.55	_ X	0.7		87.95	$ = \frac{1}{(77)} $
Southeast 0.9x	0.77] X] ,	7.1		X	31.49] X] ,	0.55	_ X	0.7		59.65	╡` ′
Southeast 0.9x	0.77] X] ,	9.86		X	31.49	X	0.55	_ X	0.7		82.83	$= \frac{1}{1} \frac{(77)}{(77)}$
Rooflights 0.9x	0.77] x] _v	7.48	_	X	31.49] X] v	0.55	_ X	0.7		62.84	(82)
Rooflights 0.9x	1] X] ,	1.14		X	26] X] ,	0.55	_ X	0.8		11.74	╡` ′
Rooflights 0.9x	1] X] ,	1.14		X	54	X	0.55	_ X	0.8	=	24.38	(82)
Rooflights 0.9x	1] X]	1.14	=	X	96] X]	0.55	X	0.8	=	43.34	(82)
Rooflights 0.9x	1] X]	1.14		X	150] X]	0.55	ן × ה	0.8	=	67.72	(82)
Rooflights 0.9x	1] X]	1.14		X	192] X]	0.55	X	0.8	=	86.68	(82)
Rooflights 0.9x	1] X] .,	1.14	=	X	200] X]	0.55	_ X	0.8		90.29 85.32	(82)
Rooflights 0.9x	1	x x	1.14		X X	189	x x	0.55	X X	0.8		70.88	(82)
Rooflights 0.9x	1] ^] x	1.14		x	157 115] ^] x	0.55 0.55	^ x	0.8	= -	51.92	(82)
Rooflights 0.9x	1] ^] x	1.14	==	x	66] ^] x	0.55	-	0.8	=	29.8	(82)
Rooflights 0.9x	<u>'</u>] ^] x	1.14		x	33] ^] x	0.55	^ x	0.8	=	14.9	(82)
Rooflights 0.9x	<u>'</u>]	1.14		x	21] ^] x	0.55	×	0.8	= =	9.48	(82)
3 1 0.0X	'] ^	1.14		^	21] ^	0.55	^	0.0		9.40	(02)
Solar gains in wa	itte calcul	atad	for each	month	,		(83)m	n = Sum(74)m .	(82)m				
1 1	42.43 619		788.29	900	T	00.46 865.28	781		492.9	3 308.06	218.56		(83)
Total gains – inte	rnal and s	olar	$\frac{1}{(84)m} =$	(73)m	+ (8	33)m , watts	<u> </u>	<u> </u>					
(84)m= 577.53 7	62.46 928	3.35	1078.99	1171.45	1	153.9 1107.34	102	6.9 933.29	766.6	4 602.96	530.03		(84)
7. Mean internal	l temperat	ure (heating	seasor	1)	•		•		•			
Temperature du	·				1	area from Tal	ole 9	Th1 (°C)				21	(85)
Utilisation factor	•	•			_								
		1ar	Apr	May	Ť	Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.98 0.9	95	0.87	0.72	(0.41	0.4	5 0.69	0.92	0.99	1		(86)
Mean internal te	emperature	e in li	iving are	a T1 (f	ollo	w steps 3 to 7	in T	able 9c)		•		1	
	19.85 20.	$\overline{}$	20.6	20.86	_	0.97 20.99	20.	<u> </u>	20.54	19.95	19.5		(87)
Temperature du	ıring heati	na ne	eriods in	rest of	dw	elling from Ta	hle (Th2 (°C)		- !			
· — —		.74	19.74	19.74	_	9.75 19.75	19.	<u> </u>	19.74	19.74	19.74		(88)
Utilisation factor	for gains	for r	ect of du	elling	h2	m (see Table	02/	!					
	0.97 0.9		0.83	0.65	$\overline{}$	0.45 0.29	0.3	3 0.59	0.89	0.98	0.99		(89)
` '		!				ļ.						1	•
Mean internal te	mperature 18.74 19		19.45	19.66	Ť	9.73 19.75	19.		e 9c) 19.41	18.85	18.4		(90)
(00)1112 10.40 1	19		10.70	10.00	<u> </u>	0.70 19.70	19.			ring area ÷ (4		0.45	(91)
										.5 3.50	,	0.40	

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

(92)m= 18	3.95	19.24	19.6	19.97	20.19	20.29	20.3	20.3	20.25	19.91	19.34	18.89		(92)
Apply ad	justme	nt to th	ne mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18	3.95	19.24	19.6	19.97	20.19	20.29	20.3	20.3	20.25	19.91	19.34	18.89		(93)
8. Space	heatir	ng requ	iirement											
Set Ti to the utilisa						ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
<u>۔ </u>					iviay	oun	Jul	Aug	ОСР	Oct	1404	Dec		
		0.97	0.93	0.83	0.68	0.5	0.34	0.39	0.63	0.89	0.98	0.99		(94)
Useful ga	ains, hı	mGm,	W = (94	1)m x (84	1)m							ļ		
		740.32	861.81	900.45	798.17	571.49	380.55	398.83	591	682.7	589.4	526.14		(95)
Monthly a	averag	je exte	rnal tem	perature	from Ta	able 8								
(96)m= 4	1.3	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	s rate f	or mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m= 153	34.88 1	500.75	1369.69	1151.33	882.85	588.34	383.29	403.44	637.03	968.12	1275.03	1532.67		(97)
Space he	Ť			r each m	nonth, k\	Wh/mont	h = 0.02	4 x [(97)m – (95	<u> </u>	1)m	1		
(98)m= 71	6.64 5	511.01	377.86	180.63	63	0	0	0	0	212.35	493.66	748.86		_
								Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	3304.01	(98)
Space he	eating	require	ement in	kWh/m²	/year								45.35	(99)
8c. Spac	e cooli	ing req	uiremen	nt										
Calcu <u>late</u>	ed for J	June, J	uly and	August.	See Tal	ole 10b								
	Jan	ᄃᇷᅵ	N 4											
	, and	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat loss						nal temp	perature	and exte	· ·					
Heat loss	s rate L	_m (cal 0	lculated 0						· ·					(100)
Heat loss (100)m= Utilisation	s rate L 0 n facto	_m (cal 0 or for lo	lculated 0 ss hm	using 25	5°C inter	nal temp 972.76	perature 765.79	and exte	ernal ten	nperatur 0	e from T	able 10)		
Heat loss (100)m= Utilisation (101)m=	o rate L o n facto	m (cal	o ss hm	using 25 0	5°C inter	nal temp 972.76 0.93	perature	and exte	ernal ten	nperatur	e from T	able 10)		(100) (101)
Heat loss (100)m= Utilisation (101)m= Useful lo	o rate L o n facto o ss, hm	_m (cal 0 or for lo 0 oLm (W	o ss hm o /atts) = (using 25 0 0 (100)m x	5°C inter 0 0	972.76 0.93	765.79 0.96	and external and e	ernal ten	nperatur 0	e from T 0	able 10) 0		(101)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m=	n facto ss, hm	_m (cal 0 or for lo 0 nLm (W	0 ss hm 0 /atts) = (0 0 100)m x	0 0 (101)m	972.76 0.93	0.96 735.61	and exter 785.85 0.95	ernal ten 0 0	nperatur 0	e from T	able 10)		
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc	n facto ss, hm olar ga	m (cal or for lo on Lm (W on Lm cal	o ss hm o /atts) = (o culated	using 25 0 0 100)m x 0 for appli	0 0 (101)m 0 cable we	972.76 0.93 901.81 eather re	0.96 735.61 egion, se	and external and e	ernal ten 0 0 10)	o 0 0	e from T 0 0	able 10) 0 0		(101)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (so (103)m=	s rate L 0 n facto 0 ss, hm 0 olar ga 0	m (cal 0 or for lo 0 oLm (W 0 uins cal 0	culated	0 (100)m x 0 for appli	0 0 (101)m 0 cable we	972.76 0.93 901.81 eather re	0.96 735.61 egion, se	and external and e	0 0 0 10)	o 0 0	0 0 0	able 10) 0 0 0	« (41)m	(101)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc	on facto on facto on facto on facto on facto on facto on facto on facto on facto on facto on facto	m (cal 0 0 or for lo 0 oLm (W 0 olins cal 0 orequire	culated 0 ss hm 0 /atts) = (0 culated 0	0 (100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole c	972.76 0.93 901.81 eather re	0.96 735.61 egion, se	and external and e	0 0 10) 0	o 0 0	0 0 0	able 10) 0 0 0	x (41)m	(101)
Heat loss (100)m= Utilisation (101)m= Useful los (102)m= Gains (so (103)m= Space co set (104)	on facto on facto on facto on facto on facto on facto on facto on facto on facto on facto on facto	m (cal 0 0 or for lo 0 oLm (W 0 olins cal 0 orequire	culated 0 ss hm 0 /atts) = (0 culated 0	0 (100)m x 0 for appli 0 r month,	0 0 (101)m 0 cable we 0 whole c	972.76 0.93 901.81 eather re	0.96 735.61 egion, se	and external and e	0 0 10) 0	o 0 0	0 0 0	able 10) 0 0 0	x (41)m	(101)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc (103)m= Space cc set (104) (104)m=	s rate L 0 n facto 0 sss, hm 0 olar ga 0 om to ze 0	m (cal 0 or for lo 0 on Lm (W 0 on lins cal 0 or equire ero if (culated 0 ss hm 0 /atts) = (0 culated 0 ement for 104)m <	0 100)m x 0 for appli 0 r month,	o 0 (101)m 0 cable we 0 whole o	972.76 0.93 901.81 eather re 1419.39	0.96 735.61 egion, se 1364.06	and external and e	0 0 10) 0 7/h) = 0.00	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 102)m] 3	c (41)m 1234.34	(101)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra	n facto n facto sss, hm o olar ga oooling i m to ze o	m (cal 0 or for lo 0 olum (W 0 olins cal 0 require ero if (ss hm 0 /atts) = (0 culated 0 ment for 104)m <	0 (100)m x 0 for appli 0 r month, 3 × (98)	o 0 (101)m 0 cable we 0 whole o	972.76 0.93 901.81 eather re 1419.39	0.96 735.61 egion, se 1364.06	and external and e	0 0 10) 0 7/h) = 0.00	0 0 0 0 24 x [(10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 102)m] 3	. ,	(101) (102) (103)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra Intermitter	n facto n facto n facto o sss, hm o olar ga ooling r om to z o action ncy fac	m (cal 0 0 or for lo 0 on Lm (W 0 onins cal 0 orequire ero if (0 0 ottor (Ta	culated 0 ss hm 0 /atts) = (0 culated 0 ment for 104)m < 0	0 (100)m x 0 for appli 0 r month, 3 × (98)	o 0 (101)m 0 cable we 0 whole o	972.76 0.93 901.81 eather re 1419.39 dwelling, 372.66	0.96 735.61 egion, se 1364.06 continuo	and extermination and extermin	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 102)m] 3	1234.34	(101) (102) (103)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra Intermitter	n facto n facto sss, hm o olar ga oooling i m to ze o	m (cal 0 or for lo 0 olum (W 0 olins cal 0 require ero if (ss hm 0 /atts) = (0 culated 0 ment for 104)m <	0 (100)m x 0 for appli 0 r month, 3 × (98)	o 0 (101)m 0 cable we 0 whole o	972.76 0.93 901.81 eather re 1419.39	0.96 735.61 egion, se 1364.06	and external and e	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] 3 = 4) =	1234.34	(101) (102) (103) (104) (105)
Heat loss (100)m= Utilisation (101)m= Useful lo (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra Intermitter (106)m=	n facto n facto ss, hm olar ga ooling i m to z o action ncy fac	m (cal 0 or for lo 0 on Lm (W 0 inins cal 0 require ero if (' 0 ctor (Ta	culated	0 (100)m x 0 for appli 0 r month, 3 × (98 0	0 0 (101)m 0 cable we 0 whole o	972.76 0.93 901.81 eather re 1419.39 dwelling, 372.66	0.96 735.61 egion, se 1364.06 continuo 467.56	and exter 785.85 0.95 744.14 ee Table 1273.87 ous (kW 394.12	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 102)m] 3	1234.34	(101) (102) (103)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra Intermitter (106)m= Space coc	n facto n facto ss, hm olar ga ooling i m to z o action ncy fac	m (cal 0 or for lo 0 on Lm (W 0 inins cal 0 require ero if (' 0 ctor (Ta	culated	0 (100)m x 0 for appli 0 r month, 3 × (98 0	0 0 (101)m 0 cable we 0 whole o	972.76 0.93 901.81 eather re 1419.39 dwelling, 372.66	0.96 735.61 egion, se 1364.06 continuo 467.56	and extermination and extermination and extermination of the second second and extermination of the second and extermination o	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	able 10) 0 0 0 102)m] 3 = 4) =	1234.34	(101) (102) (103) (104) (105)
Heat loss (100)m= Utilisation (101)m= Useful loc (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra Intermitter (106)m=	n facto n fact	m (cal 0 or for lo 0 on Lm (W 0 on scal 0 or require ero if (' 0 or ctor (Ta 0 or cal equiren	culated 0 ss hm 0 /atts) = (0 culated 0 ment for 0 able 10b 0	0 100)m x 0 for appli 0 r month, 3 × (98) 0	0 (104)m 0 (104)m	972.76 0.93 901.81 eather reconstruction 1419.39 dwelling, 372.66 0.25 × (105)	0.96 735.61 egion, se 1364.06 continue 467.56 0.25 × (106)r	and extermination and extermin	0 0 10) 0 Total f C =	0 0 0 24 x [(10 0 = Sum(cooled a	e from T 0 0 0 0 0 03)m - (0 1,04) area ÷ (4 0 (1,04)	able 10) 0 0 102)m] 0 = 4) =	1234.34	(101) (102) (103) (104) (105)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra Intermitter (106)m= Space coc (107)m=	n facto n facto ss, hm o olar ga ooling i m to z o action ncy facto o oling re o	m (cal 0 or for lo 0 on Lm (W 0 onins cal 0 require ero if (0 ctor (Ta 0 equiren 0	culated	0 (100)m x 0 for appli 0 r month, 3 × (98) 0) 0	0 (104)m 0 (104)m 0	972.76 0.93 901.81 eather reconstruction 1419.39 dwelling, 372.66 0.25 × (105)	0.96 735.61 egion, se 1364.06 continue 467.56 0.25 × (106)r	and extermination and extermin	0 0 10) 0 Total f C = 0 Total	0 0 0 24 x [(10 0 = Sum(cooled a	e from T 0 0 0 0 0 03)m - (0 1,04) area ÷ (4 0 (1,04)	able 10) 0 0 0 102)m] 3 = 4) = 0 0	1234.34 1 0 308.59	(101) (102) (103) (104) (105) (106)
Heat loss (100)m= Utilisation (101)m= Useful loc (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra Intermitter (106)m= Space coc (107)m=	s rate L o n facto sss, hm o olar ga om to ze om to ze one coling re oling re oling re oling re	m (cal 0 or for lo 0 on Lm (W 0 on lins cal 0 orequire ero if (' 0 ctor (Ta 0 equiren 0	lculated 0 ss hm 0 /atts) = (0 culated 0 ment for 0 nent for 0 nent in k	0 100)m x 0 for appli 0 r month, 3 × (98) 0 month = 0	0 (104)m 0 (104)m 0 (104)m	972.76 0.93 901.81 eather re 1419.39 dwelling, 372.66 0.25 × (105) 93.17	0.96 735.61 egion, se 1364.06 continue 467.56 0.25 × (106)r 116.89	and extermination and extermin	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled a 0 = Sum(0 = Sum(0 + Sum(0 + (4) =	e from T 0 0 0 0 0 03)m - (0 1,04) area ÷ (4 0 (1,04)	able 10) 0 0 0 102)m] 3 = 4) = 0 0	1234.34	(101) (102) (103) (104) (105) (106)
Heat loss (100)m= Utilisation (101)m= Useful lo. (102)m= Gains (sc (103)m= Space cc set (104) (104)m= Cooled fra Intermitter (106)m= Space coc (107)m=	n facto n facto n facto n facto n facto n sss, hm n o n lolar ga n o n olar ga n to z n o n oling re n o n oling re n o loling re n o loling re	m (cal 0 or for lo 0 on Lm (W 0 onins cal 0 orequire ero if (' 0 equiren 0 equiren 0 y Efficie	culated 0 ss hm 0 /atts) = (0 culated 0 ment for 0 nent for 0 nent in k ency (ca	0 100)m x 0 for appli 0 r month, 3 × (98) 0 month = 0	0 (104)m 0 (104)m 0 (104)m	972.76 0.93 901.81 eather re 1419.39 dwelling, 372.66 0.25 × (105) 93.17	0.96 735.61 egion, se 1364.06 continue 467.56 0.25 × (106)r 116.89	and extermination and extermin	0 0 10) 0 Total f C = 0 Total (107)	0 0 0 24 x [(10 0 = Sum(cooled a 0 = Sum(0 = Sum(0 + Sum(0 + (4) =	e from T 0 0 0 0 0 03)m - (0 1,0,4) area ÷ (4 0 1,0,4) 0 1,0,7)	able 10) 0 0 0 102)m] 3 = 4) = 0 0	1234.34 1 0 308.59	(101) (102) (103) (104) (105) (106)

Assessor Name: Chris Hocknell Stroma Number: STRO016363 Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.16
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.16 Property Address: Apartment 4 Address: Apartment 4 Address: Apartment 4 Area(m²) Av. Height(m) Volume(m³) Ground floor 61.4 (1a) x 2.7 (2a) = 165.78 (3a) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 61.4 (4) (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 165.78 (5) Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 165.78 (5) 2. Ventilation rate: main heating heating heating + 0 + 0 = 0 x40 = 0 (6a) Number of chimneys 0 + 0 + 0 = 0 x20 = 0 (6b) Number of open flues 0 + 0 + 0 = 0 x20 = 0 (6b) Number of passive vents 0 x10 = 0 (7b) Number of flueless gas fires 0 x40 = 0 (7c)
Address: 1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³) Ground floor Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 61.4 (4) Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 165.78 (5) 2. Ventilation rate: Number of chimneys 0 + 0 + 0 = 0 × 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 × 20 = 0 (6b) Number of intermittent fans Number of passive vents Number of flueless gas fires Area(m²) Av. Height(m) Volume(m³) (3a) (3a) (3a) (5) 2. Ventilation rate: 0 × 40 = 0 (6a) (6b) Number of open flues 0 + 0 + 0 = 0 × 20 = 0 (6b) Number of passive vents Number of flueless gas fires 0 × 40 = 0 (7b)
Area(m²) Av. Height(m) Volume(m³)
Area(m²) Av. Height(m) Volume(m³) Ground floor 61.4 (1a) x 2.7 (2a) = 165.78 (3a) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 61.4 (4) Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 165.78 (5) 2. Ventilation rate: Number of chimneys 0 + 0 + 0 = 0 x40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 x20 = 0 (6b) Number of intermittent fans Number of passive vents Number of flueless gas fires 0 x40 = 0 (7b) Number of flueless gas fires
Ground floor Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 165.78 (5) 2. Ventilation rate: Main heating heating heating heating heating heating heating hour of open flues 0
Dwelling volume
2. Ventilation rate: Main heating Number of chimneys 0
2. Ventilation rate: main heating secondary heating other total m³ per hour Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 x 20 = 0 (6b) Number of intermittent fans 2 x 10 = 20 (7a) Number of passive vents 0 x 10 = 0 (7b) Number of flueless gas fires 0 x 40 = 0 (7c)
Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 x 20 = 0 (6b) Number of intermittent fans 2 x 10 = 20 (7a) Number of passive vents 0 x 10 = 0 (7b) Number of flueless gas fires 0 x 40 = 0 (7c)
Number of chimneys 0 + 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 x 20 = 0 (6b) Number of intermittent fans 2 x 10 = 20 (7a) Number of passive vents 0 x 10 = 0 (7b) Number of flueless gas fires 0 x 40 = 0 (7c)
Number of intermittent fans $ \begin{array}{cccccccccccccccccccccccccccccccccc$
Number of passive vents $ \begin{array}{c ccccc} 0 & x & 10 & = & 0 & (7b) \\ \hline Number of flueless gas fires & 0 & x & 40 & = & 0 & (7c) \end{array} $
Number of flueless gas fires $0 x = 0 (7c)$
Trainiser of nacious gas mos
Air changes per hour
Air changes per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 20 $\div (5) =$ 0.12 (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)
Additional infiltration $[(9)-1] \times 0.1 = 0 $ (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction o (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
If no draught lobby, enter 0.05, else enter 0 0 (13)
Percentage of windows and doors draught stripped $0.25 - [0.2 \times (14) \div 100] = 0 \tag{14}$ Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0 \tag{15}$
Infiltration rate $ (8) + (10) + (11) + (12) + (13) + (15) = 0 $ (16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.27 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered 2 (19)
Number of sides sheltered $2 mtext{(19)}$ Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.85 mtext{(20)}$
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.23 (21)
Infiltration rate modified for monthly wind speed
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Monthly average wind speed from Table 7
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7
Wind Factor (22a)m = (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 infiltra	ition rate (allow	ving for sl	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.29	0.29 0.28	0.25	0.25	0.22	0.22	0.21	0.23	0.25	0.26	0.27]	
Calculate effec	•	rate for t	he appli	cable ca	se				<u> </u>		_	
If mechanical											0	(23a
	at pump using App							o) = (23a)			0	(23b
	heat recovery: effi	-	_								0	(230
a) If balanced	d mechanical v	entilation	with he	at recove	ery (MV	HR) (24a	a)m = (2)	2b)m + (23b) × [1 – (23c) ÷ 100]	
(24a)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24a
b) If balanced	d mechanical v	entilation	without	heat red	covery (I	MV) (24b	o)m = (2	2b)m + (2	23b)	1	7	
(24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(24b
,	buse extract ve $< 0.5 \times (23b)$,		•	•				.5 × (23b))			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
,	rentilation or w = 1, then (24c		•	•				0.5]			_	
(24d)m= 0.54	0.54 0.54	0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.53	0.54		(240
Effective air of	change rate - e	enter (24a) or (24l	b) or (24	c) or (24	ld) in bo	x (25)		-	-	_	
(25)m= 0.54	0.54 0.54	0.53	0.53	0.52	0.52	0.52	0.53	0.53	0.53	0.54		(25)
3. Heat losses	and heat loss	paramet	er:	•			•				_	
ELEMENT	Gross area (m²)	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/I	〈)	k-valu kJ/m²·		A X k kJ/K
Doors				2	x	1.3	=	2.6				(26)
Windows Type	1			3.7	x1	/[1/(1.3)+	0.04] =	4.57				(27)
Windows Type	2			0.91	x1	/[1/(1.3)+	0.04] =	1.12				(27)
Windows Type	3			6.29	x1	/[1/(1.3)+	0.04] =	7.77				(27)
Windows Type	4			8.37	x1	/[1/(1.3)+	0.04] =	10.34	=			(27)
Windows Type	5			6.29	x1	/[1/(1.3)+	0.04] =	7.77	=			(27)
Walls Type1	51.43	29.2	6	22.17	=	0.15		3.33	=		$\neg \vdash$	(29)
Walls Type2	35.95	2		33.95	=	0.13		4.53	륵 ¦		╡ 누	(29)
Roof	61.4	0	=	61.4	=	0.13		6.14	륵 ¦		북 누	(30)
Total area of el					=	0.1		0.14				
	ements, m			148.7	=							(31)
Party wall				17.92	=	0	=	0			╡	(32)
Party floor				61.4				\ 0.047	. <u>.</u>			(32a
* for windows and i ** include the areas					atea using	g tormula 1	1/[(1/U-vail	ue)+0.04] a	is given in	i paragrapi	n 3.2	
Fabric heat loss			<i>p</i>			(26)(30) + (32) =				52.76	(33)
Heat capacity C		,					((28).	(30) + (32	2) + (32a).	(32e) =	14029	
. ,	` ,									*		
Thermal mass i	parameter (TM	1P = Cm -	+ TFA) ir	า kJ/m²K			Indica	ative Value:	iviedium		250	[(35)
Thermal mass For design assessican be used instea	ments where the a	letails of the	,			recisely the				able 1f	250	(35)
•	ments where the a d of a detailed cal	letails of the Iculation.	construct	tion are not	t known p	recisely the				able 1f	250	

Total fabric h	eat loss							(33) +	(36) =			68.55	(37)
Ventilation he	eat loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			`
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 29.71	29.62	29.53	29.11	29.03	28.66	28.66	28.59	28.8	29.03	29.19	29.35		(38)
Heat transfer	coefficie	nt, W/K						(39)m	= (37) + (37)	38)m			
(39)m= 98.26	98.17	98.08	97.66	97.58	97.21	97.21	97.15	97.36	97.58	97.74	97.91		
Heat loss par	rameter (I	HLP), W	/m²K						Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	97.66	(39)
(40)m= 1.6	1.6	1.6	1.59	1.59	1.58	1.58	1.58	1.59	1.59	1.59	1.59		
Number of da	ays in mo	nth (Tab	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.59	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
		•					•		•			•	
4. Water he	ating ene	rgy requi	irement:								kWh/ye	ear:	
Assumed occif TFA > 13	3.9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13.		02		(42)
Annual avera Reduce the ann not more that 12	nge hot wa ual average	hot water	usage by	5% if the a	welling is	designed i			se target o		2.2		(43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage	in litres per	r day for ea	ach month	Vd,m = fa	ctor from T	Table 1c x	(43)						
(44)m= 90.42	87.13	83.84	80.55	77.27	73.98	73.98	77.27	80.55	83.84	87.13	90.42		_
Energy content	of hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	n x nm x E	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1		986.36	(44)
(45)m= 134.09	117.27	121.01	105.5	101.23	87.36	80.95	92.89	94	109.55	119.58	129.85		
If instantaneous	water heati	ng at point	of use (no	hot water	storage),	enter 0 in	boxes (46)		Total = Su	m(45) ₁₁₂ =		1293.28	(45)
(46)m= 0	0	0	0	0	0	0	0	0	0	0	0		(46)
Water storag												•	
Storage volu	` '					•		ame ves	sel		0		(47)
If community Otherwise if	no stored			-			. ,	ers) ente	er '0' in (47)			
Water storag a) If manufa		eclared I	oss facto	or is kno	wn (kWh	n/day):					0		(48)
Temperature	factor fro	m Table	2b			• ,					0		(49)
Energy lost fi	rom water	storage	, kWh/ye	ear			(48) x (49)) =			0		(50)
b) If manufactory	rage loss	factor fr	om Tabl								0		(51)
If community Volume factor	•		on 4.3								0		(52)
Temperature			2b								0		(52)
Energy lost fi				ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or		_	,				. ,	•		-	0		(55)
												•	

	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contains	dedicated	d solar sto	rage, (57)ı	n = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ı ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary	y circuit	loss (an	nual) fro	m Table	3							0		(58)
Primar	y circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(mod	dified by	factor fr	om 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 cal	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 h	eat requ	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	113.97	99.68	102.86	89.68	86.05	74.25	68.81	78.96	79.9	93.11	101.64	110.38		(62)
Solar DH	-IW input o	alculated	using App	endix G oı	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	'	
(add ad	dditional	lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	from wa	ater hea	ter			-	-			-	-	-		
(64)m=	113.97	99.68	102.86	89.68	86.05	74.25	68.81	78.96	79.9	93.11	101.64	110.38		
•								Outp	out from wa	ater heate	r (annual)₁	12	1099.29	(64)
Heat ga	ains fror	n water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	κ [(46)m	+ (57)m	+ (59)m]	_
(65)m=	28.49	24.92	25.72	22.42	21.51	18.56	17.2	19.74	19.97	23.28	25.41	27.59		(65)
inclu	ude (57)r	n in calc	culation of	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
	. , ,		Table 5			•						•		
		•	5), Wat		,									
Wetabe	Jan	3 (Table		te										
(66)m=		Feb	Mar		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	101.05	Feb 101.05		Apr 101.05	May 101.05	Jun 101.05	Jul 101.05	Aug 101.05	Sep 101.05	Oct	Nov 101.05	Dec 101.05		(66)
` ′ [101.05	Mar 101.05	Apr 101.05	101.05	101.05	101.05	101.05	101.05	-				(66)
Lighting		101.05	Mar 101.05	Apr 101.05	101.05	101.05	-	101.05	101.05	-				(66) (67)
Lighting (67)m=	g gains 15.73	101.05 (calculat 13.97	Mar 101.05 ted in Ap 11.36	Apr 101.05 opendix 8.6	101.05 _, equat	101.05 ion L9 o	101.05 r L9a), a 5.87	101.05 Iso see	101.05 Table 5	101.05	101.05	101.05		, ,
Lighting (67)m= Appliar	g gains 15.73 nces gai	101.05 (calculat 13.97 ns (calc	Mar 101.05 ted in Ap 11.36 ulated in	Apr 101.05 ppendix 8.6 Append	101.05 L, equat 6.43 dix L, eq	101.05 ion L9 o 5.43 uation L	101.05 r L9a), a 5.87 13 or L1	101.05 Iso see 7.63 3a), also	101.05 Table 5 10.23 see Ta	101.05 13 ble 5	101.05	101.05		(67)
Lighting (67)m= Appliar (68)m=	g gains 15.73 nces gai	101.05 (calculat 13.97 ns (calc 178.29	Mar 101.05 ted in Ap 11.36 ulated in	Apr 101.05 ppendix 8.6 Append 163.86	101.05 L, equat 6.43 dix L, eq	101.05 ion L9 of 5.43 uation L	101.05 r L9a), a 5.87 13 or L1 132.02	101.05 Iso see 7.63 3a), also	101.05 Table 5 10.23 see Ta	13 ble 5 144.62	101.05	101.05		, ,
Lighting (67)m= Appliar (68)m=	g gains 15.73 nces gai	101.05 (calculat 13.97 ns (calc 178.29	Mar 101.05 ted in Ap 11.36 ulated in	Apr 101.05 ppendix 8.6 Append 163.86	101.05 L, equat 6.43 dix L, eq	101.05 ion L9 of 5.43 uation L	101.05 r L9a), a 5.87 13 or L1	101.05 Iso see 7.63 3a), also	101.05 Table 5 10.23 see Ta	13 ble 5 144.62	101.05	101.05		(67)
Lighting (67)m= Appliar (68)m= Cookin (69)m=	g gains 15.73 nces gai 176.46 ng gains 33.1	101.05 (calculated 13.97) ns (calculated 178.29) (calculated 133.1)	Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in A 33.1	Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1	101.05 L, equat 6.43 dix L, eq 151.46 L, equat	101.05 ion L9 of 5.43 uation L 139.8 ion L15	101.05 r L9a), a 5.87 13 or L1 132.02 or L15a	101.05 Iso see 7.63 3a), also 130.18	101.05 Table 5 10.23 see Ta 134.8 ee Table	101.05 13 ble 5 144.62	101.05 15.17 157.02	101.05 16.17 168.68		(67) (68)
Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps	g gains 15.73 nces gai 176.46 ng gains 33.1	101.05 (calculated 13.97) ns (calculated 178.29) (calculated 133.1)	Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in A	Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1	101.05 L, equat 6.43 dix L, eq 151.46 L, equat	101.05 ion L9 of 5.43 uation L 139.8 ion L15	101.05 r L9a), a 5.87 13 or L1 132.02 or L15a	101.05 Iso see 7.63 3a), also 130.18	101.05 Table 5 10.23 see Ta 134.8 ee Table	101.05 13 ble 5 144.62	101.05 15.17 157.02	101.05 16.17 168.68		(67) (68)
Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	g gains 15.73 nces gai 176.46 ng gains 33.1 s and far	101.05 (calculated 13.97) ns (calculated 178.29) (calculated 33.1) ns gains	Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in Ap 33.1 (Table 5	Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1 5a)	101.05 L, equat 6.43 dix L, eq 151.46 L, equat 33.1	101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	101.05 Iso see 7.63 3a), also 130.18), also se 33.1	101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1	101.05 13 ble 5 144.62 5 33.1	101.05 15.17 157.02 33.1	101.05 16.17 168.68 33.1		(67) (68) (69)
Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m=	g gains 15.73 nces gai 176.46 ng gains 33.1 s and far	101.05 (calculated 13.97) ns (calculated 178.29) (calculated 33.1) ns gains	Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in A 33.1 (Table 5	Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1 5a)	101.05 L, equat 6.43 dix L, eq 151.46 L, equat 33.1	101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	101.05 Iso see 7.63 3a), also 130.18), also se 33.1	101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1	101.05 13 ble 5 144.62 5 33.1	101.05 15.17 157.02 33.1	101.05 16.17 168.68 33.1		(67) (68) (69)
Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	g gains 15.73 nces gai 176.46 ng gains 33.1 s and far 0 s e.g. ev -80.84	101.05 (calcular 13.97 ns (calc 178.29 (calcula 33.1 ns gains 0 aporatio -80.84	Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in A 33.1 (Table 5 0 on (negating)	Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1 5a) 0	101.05 L, equat 6.43 dix L, eq 151.46 L, equat 33.1 0 es) (Tab	101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	101.05 Iso see 7.63 3a), also 130.18 0, also se 33.1	101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1	101.05 13 ble 5 144.62 5 33.1	101.05 15.17 157.02 33.1	101.05 16.17 168.68 33.1		(67) (68) (69) (70)
Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	g gains 15.73 nces gai 176.46 ng gains 33.1 s and far 0 s e.g. ev -80.84	101.05 (calculated 13.97) ns (calculated 178.29) (calculated 33.1) ns gains 0 aporatio	Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in A 33.1 (Table 5 0 on (negating)	Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1 5a) 0	101.05 L, equat 6.43 dix L, eq 151.46 L, equat 33.1 0 es) (Tab	101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	101.05 Iso see 7.63 3a), also 130.18 0, also se 33.1	101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1	101.05 13 ble 5 144.62 5 33.1	101.05 15.17 157.02 33.1	101.05 16.17 168.68 33.1		(67) (68) (69) (70)
Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water I (72)m=	g gains 15.73 nces gai 176.46 ng gains 33.1 s and far 0 s e.g. ev -80.84 heating 38.3	101.05 (calculated 13.97) ns (calculated 178.29) (calculated 33.1) ns gains 0 aporation -80.84 gains (T	Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in Ap 33.1 (Table 5 0 in (negation -80.84 Table 5) 34.56	Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1 5a) 0 tive valu -80.84	101.05 L, equat 6.43 dix L, eq 151.46 L, equat 33.1 0 es) (Tab	101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1 0 le 5) -80.84	101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	101.05 Iso see 7.63 3a), also 130.18 0, also se 33.1 0	101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1 0 -80.84	101.05 13 ble 5 144.62 5 33.1 0 -80.84	101.05 15.17 157.02 33.1 0 -80.84	101.05 16.17 168.68 33.1 0		(67) (68) (69) (70) (71)
Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water I (72)m=	g gains 15.73 nces gai 176.46 ng gains 33.1 s and far 0 s e.g. ev -80.84 heating 38.3	101.05 (calculated 13.97) ns (calculated 178.29) (calculated 33.1) ns gains 0 aporation -80.84 gains (Taggins (Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in Ap 33.1 (Table 5 0 in (negation -80.84 Table 5) 34.56	Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1 5a) 0 tive valu -80.84	101.05 L, equat 6.43 dix L, eq 151.46 L, equat 33.1 0 es) (Tab	101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1 0 le 5) -80.84	101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1 0	101.05 Iso see 7.63 3a), also 130.18 0, also se 33.1 0	101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1 0 -80.84	101.05 13 ble 5 144.62 5 33.1 0 -80.84	101.05 15.17 157.02 33.1 0 -80.84	101.05 16.17 168.68 33.1 0		(67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southwest _{0.9x}	0.77	X	8.37	x	36.79		0.55	x	0.7	=	82.17	(79)
Southwest _{0.9x}	0.77	x	6.29	x	36.79		0.55	x	0.7	=	61.75	(79)
Southwest _{0.9x}	0.77	x	8.37	x	62.67		0.55	x	0.7	=	139.96	(79)
Southwest _{0.9x}	0.77	x	6.29	x	62.67		0.55	x	0.7	=	105.18	(79)
Southwest _{0.9x}	0.77	x	8.37	x	85.75		0.55	x	0.7	=	191.5	(79)
Southwest _{0.9x}	0.77	x	6.29	x	85.75		0.55	x	0.7	=	143.91	(79)
Southwest _{0.9x}	0.77	x	8.37	x	106.25		0.55	x	0.7	=	237.28	(79)
Southwest _{0.9x}	0.77	x	6.29	x	106.25		0.55	x	0.7	=	178.31	(79)
Southwest _{0.9x}	0.77	x	8.37	x	119.01		0.55	x	0.7	=	265.77	(79)
Southwest _{0.9x}	0.77	x	6.29	x	119.01		0.55	x	0.7	=	199.72	(79)
Southwest _{0.9x}	0.77	x	8.37	x	118.15		0.55	x	0.7	=	263.85	(79)
Southwest _{0.9x}	0.77	x	6.29	x	118.15		0.55	x	0.7	=	198.28	(79)
Southwest _{0.9x}	0.77	x	8.37	x	113.91		0.55	x	0.7	=	254.38	(79)
Southwest _{0.9x}	0.77	x	6.29	x	113.91		0.55	x	0.7	=	191.16	(79)
Southwest _{0.9x}	0.77	x	8.37	X	104.39		0.55	x	0.7] =	233.12	(79)
Southwest _{0.9x}	0.77	x	6.29	X	104.39		0.55	X	0.7] =	175.19	(79)
Southwest _{0.9x}	0.77	x	8.37	X	92.85		0.55	X	0.7	=	207.35	(79)
Southwest _{0.9x}	0.77	x	6.29	x	92.85		0.55	x	0.7	=	155.82	(79)
Southwest _{0.9x}	0.77	x	8.37	X	69.27		0.55	X	0.7] =	154.69	(79)
Southwest _{0.9x}	0.77	x	6.29	X	69.27		0.55	X	0.7	=	116.25	(79)
Southwest _{0.9x}	0.77	x	8.37	X	44.07		0.55	x	0.7] =	98.42	(79)
Southwest _{0.9x}	0.77	x	6.29	X	44.07		0.55	X	0.7] =	73.96	(79)
Southwest _{0.9x}	0.77	x	8.37	X	31.49		0.55	X	0.7] =	70.32	(79)
Southwest _{0.9x}	0.77	x	6.29	X	31.49		0.55	X	0.7] =	52.84	(79)
Northwest 0.9x	0.77	x	3.7	X	11.28	X	0.55	X	0.7	=	22.28	(81)
Northwest 0.9x	0.77	x	0.91	x	11.28	x	0.55	x	0.7	=	2.74	(81)
Northwest 0.9x	0.77	x	6.29	x	11.28	x	0.55	x	0.7	=	18.94	(81)
Northwest 0.9x	0.77	X	3.7	X	22.97	X	0.55	X	0.7	=	45.34	(81)
Northwest 0.9x	0.77	x	0.91	X	22.97	X	0.55	x	0.7	=	5.58	(81)
Northwest 0.9x	0.77	x	6.29	x	22.97	x	0.55	x	0.7	=	38.54	(81)
Northwest 0.9x	0.77	x	3.7	x	41.38	x	0.55	x	0.7	=	81.7	(81)
Northwest 0.9x	0.77	x	0.91	x	41.38	x	0.55	x	0.7	=	10.05	(81)
Northwest 0.9x	0.77	x	6.29	x	41.38	x	0.55	x	0.7	=	69.44	(81)
Northwest 0.9x	0.77	x	3.7	X	67.96	X	0.55	X	0.7	=	134.17	(81)
Northwest 0.9x	0.77	x	0.91	X	67.96	x	0.55	x	0.7] =	16.5	(81)
Northwest 0.9x	0.77	X	6.29	x	67.96	x	0.55	x	0.7] =	114.04	(81)
Northwest 0.9x	0.77	X	3.7	x	91.35	x	0.55	x	0.7] =	180.35	(81)
Northwest 0.9x	0.77	X	0.91	x	91.35	x	0.55	x	0.7	j =	22.18	(81)
Northwest 0.9x	0.77	X	6.29	x	91.35	x	0.55	x	0.7] =	153.3	(81)
				-		-		•		=		

Northwest	_		1						٦
Northwest 0.9x 0.77 x 3.7	X	97.38	X	0.55	X	0.7	_ =	192.27	(81)
Northwest 0.9x 0.77 x 0.91	×	97.38	X	0.55	×	0.7	_ =	23.64	(81)
Northwest 0.9x 0.77 x 6.29	X	97.38	X	0.55	X	0.7	=	163.43	(81)
Northwest 0.9x 0.77 x 3.7	X	91.1	X	0.55	X	0.7	=	179.87	(81)
Northwest 0.9x 0.77 x 0.91	X	91.1	X	0.55	X	0.7	=	22.12	(81)
Northwest 0.9x 0.77 x 6.29	X	91.1	X	0.55	X	0.7	=	152.89	(81)
Northwest 0.9x 0.77 x 3.7	X	72.63	X	0.55	X	0.7	=	143.39	(81)
Northwest 0.9x 0.77 x 0.91	X	72.63	X	0.55	x	0.7	=	17.63	(81)
Northwest 0.9x 0.77 x 6.29	X	72.63	X	0.55	x	0.7	=	121.88	(81)
Northwest 0.9x 0.77 x 3.7	X	50.42	X	0.55	x	0.7	=	99.55	(81)
Northwest 0.9x 0.77 x 0.91	X	50.42	X	0.55	x	0.7	=	12.24	(81)
Northwest 0.9x 0.77 x 6.29	x	50.42	X	0.55	x	0.7		84.62	(81)
Northwest 0.9x 0.77 x 3.7	X	28.07	X	0.55	x	0.7	=	55.41	(81)
Northwest 0.9x 0.77 x 0.91	×	28.07	X	0.55	×	0.7		6.81	(81)
Northwest 0.9x 0.77 x 6.29	×	28.07	X	0.55	x	0.7	=	47.1	(81)
Northwest 0.9x 0.77 x 3.7	×	14.2	X	0.55	×	0.7	-	28.03	(81)
Northwest 0.9x 0.77 x 0.91	×	14.2	x	0.55	x	0.7	╡ =	3.45	(81)
Northwest 0.9x 0.77 x 6.29	×	14.2	X	0.55	×	0.7	=	23.83	(81)
Northwest 0.9x 0.77 x 3.7	×	9.21	j×	0.55	×	0.7	_ =	18.19	(81)
Northwest 0.9x 0.77 x 0.91	= x	9.21	X	0.55	x	0.7	= =	2.24	(81)
Northwest 0.9x 0.77 x 6.29	×	9.21) x	0.55	x	0.7	=	15.46	(81)
		<u> </u>	_		_	-			_
Solar gains in watts, calculated for each mo	nth		(83)m	n = Sum(74)m	(82)m				
(83)m= 187.86 334.6 496.59 680.3 821		41.47 800.41	691		380.26	227.68	159.05]	(83)
Total gains – internal and solar (84)m = (73)m + (83)m , watts		!			<u> </u>	J	
(84)m= 471.67 617.27 769.52 937.21 106 ⁻¹		065.8 1014.73	908	.87 785.67	622.48	3 488.47	434.3]	(84)
7. Mean internal temperature (heating sea	oon)		ļ				l .		
Temperature during heating periods in the		aroa from Tak	hla O	Th1 (°C)				21	(85)
	_		DIE 9	, 1111 (C)				21	(03)
Utilisation factor for gains for living area, h	Ť		T _	Can	Oct	Nov	Daa	l	
	ay	Jun Jul 0.55 0.41	0.4	ug Sep	Oct 0.94	Nov 0.99	Dec		(86)
` '				!	0.94	0.99	1		(00)
Mean internal temperature in living area T		i	1	 				1	(0-)
(87)m= 19.34 19.62 20.03 20.49 20.	81 2	20.95 20.99	20.	98 20.86	20.39	19.76	19.28		(87)
Temperature during heating periods in res	t of dv	elling from Ta	able 9	9, Th2 (°C)					
(88)m= 19.61 19.61 19.62 19.62 19.	62	19.63	19.	63 19.62	19.62	19.62	19.62		(88)
Utilisation factor for gains for rest of dwelli	ng, h2	,m (see Table	9a)						
(89)m= 0.99 0.98 0.94 0.84 0.6		0.45 0.29	0.3	34 0.63	0.91	0.98	0.99		(89)
Mean internal temperature in the rest of dy	velling	T2 (follow sta	ene 3	to 7 in Table	2 9c)	•	•		
(90)m= 18.15 18.43 18.82 19.25 19.		12 (10110W Ste	19.		19.17	18.57	18.09]	(90)
(47)		1 .5.52	1			ring area ÷ (4		0.5	(91)
Managinta malitary and the Control of the Control o	منالمييا	~\ = fl A × T1	. /1	fl A \ v TO				L	` ′

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

(92)m=	18.74	19.02	19.42	19.87	20.16	20.28	20.3	20.3	20.21	19.78	19.16	18.69		(92)
Apply a	ıdjustm	ent to th	ne mean	internal	temper	ature fro	m Table	4e, whe	re appro	opriate				
(93)m=	18.74	19.02	19.42	19.87	20.16	20.28	20.3	20.3	20.21	19.78	19.16	18.69		(93)
8. Spac	ce heat	ing requ	iirement											
						ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilis	- 1	i		using Ta		lum	11	۸۰۰۰	Con	Oat	Nov	Daa		
Litilicati	Jan	Feb	Mar ains, hm	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.99	0.98	0.94	0.85	0.69	0.5	0.35	0.41	0.67	0.91	0.98	0.99		(94)
` /				1)m x (84		0.0	0.00	0.41	0.07	0.01	0.00	0.00		(= -)
	467.33	602.34	722.18	792.7	728.72	530.95	355.94	371.45	529.57	567.58	479.21	431.32		(95)
` ′				perature										, ,
(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)
	ss rate	for mea	an intern	al tempe	erature.	Lm . W =	-[(39)m :	x [(93)m	 – (96)m	1				
_	419.18	1386.4	1267.38		825.45	551.88	359.94	378.64	594.58	895.71	1178.83	1418.27		(97)
Space h	heating	require	ement fo	r each m	nonth, k\	Nh/mont	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 7	708.18	526.89	405.63	200.43	71.97	0	0	0	0	244.13	503.73	734.29		
_								Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	3395.22	(98)
Space h	heating	require	ement in	kWh/m²	/vear								55.3	(99)
•		•			, y ou.									
			uiremen		Soo Tol	ala 10h								
Calcula	Jan	Feb	Mar	August. Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat los						ı	l					able 10)		
(100)m=	0	0	0	0	0	913.82	719.39	738.32	0	0	0	0		(100)
Utilisatio	on fact	or for lo	ss hm											
(101)m=	0	0	0	0	0	0.91	0.95	0.93	0	0	0	0		(101)
Useful I	loss, h	nLm (W	/atts) = (100)m x	(101)m									
(102)m=	0	0	0	0	0	834.6	682.85	684.41	0	0	0	0		(102)
Gains (solar g	ains cal	culated	for appli	cable we	eather re	gion, se	e Table	10)					
(103)m=	0	0	0	0	0	1321.12	1259.94	1137.38	0	0	0	0		(103)
•	_	•		r month, 3 × (98)		lwelling,	continuo	ous (kW	h') = 0.0	24 x [(10	03)m – (102)m] :	k (41)m	
(104)m=	0	0	0	0	0	350.3	429.35	337.01	0	0	0	0		
(101)						000.0	0.00	007.101		= Sum(=	1116.66	(104)
Cooled fi	raction									cooled	,		1	(105)
Intermitte	ency fa	ctor (Ta	ble 10b)							`	, ,		
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0	0	0	0		
									Total	= Sum(104)	=	0	(106)
Space co	ooling	requiren	nent for	month =	(104)m	× (105)	× (106)r	n				,		
(107)m=	0	0	0	0	0	87.57	107.34	84.25	0	0	0	0		_
									Total	= Sum(107)	=	279.16	(107)
Space co	ooling	requiren	nent in k	:Wh/m²/y	ear/				(107)) ÷ (4) =			4.55	(108)
8f Eabrid	c Enor	av Effici	ency (ca	loulated	only un	der ener	cial cond	litione e	oo coctic	on 11)				
or. I abrid	CEITE	gy Ellici	ericy (ca	iiculateu	Offig un	uei spec	Jiai Coriu	illions, s	ee seciic) <u> </u>				

			Hser	Details:						
Assessor Name:	Chris Hoo	knell	0001		a Num	hor		STDO	016363	
Software Name:		SAP 2012			a Nulli are Vel				on: 1.0.4.16	
			Property	/ Address						
Address :										
1. Overall dwelling dir	nensions:		_							
Ground floor			Are	ea(m²) 75.4	(1a) x		ight(m) 2.7	(2a) =	Volume(m ³) (3a)
	(1a)+(1b)+(1a)	ı (1d) ⊥ (1o) ⊥	(1p)]`		2.1	_(2a) -	203.50	(Ja)
Total floor area TFA =	(1a)+(1b)+(1c)-	r(10)+(1e)+	(111)	75.4	(4))	1) . (0 -) .	(0)		_
Dwelling volume					(3a)+(3b)+(3c)+(3c	l)+(3e)+	(3n) =	203.58	(5)
2. Ventilation rate:	main	secon	larv	other		total			m³ per hou	r
N	heating	heatin	<u>g</u> _					40 -		_
Number of chimneys	0	+ 0	+ [0	╛╹	0		40 =	0	(6a)
Number of open flues	0	+ 0	+	0	_ = [0		20 =	0	(6b)
Number of intermittent	fans					3	X '	10 =	30	(7a)
Number of passive ver	nts					0	X	10 =	0	(7b)
Number of flueless gas	fires					0	X 4	40 =	0	(7c)
								Air ch	nanges per ho	r
Inditantian due to object	and flues and	fono - (60)+(6b	\+/7a\+/7h\-	L(7o) =						_
Infiltration due to chimr If a pressurisation test ha	•				continue fr	30 om (9) to i		÷ (5) =	0.15	(8)
Number of storeys in			, , , , , , , , , , , , , , , , , , ,	, carerinee .	ooninao n	0111 (0) 10 ((10)		0	(9)
Additional infiltration		•					[(9)	-1]x0.1 =	0	(10)
Structural infiltration:	0.25 for steel of	or timber frame	or 0.35 f	or mason	ry constr	ruction			0	(11)
if both types of wall are			g to the gre	ater wall are	ea (after					
deducting areas of ope If suspended woode			r 0.1 (sea	led), else	enter 0				0	(12)
If no draught lobby,		,	0.1 (000	.04), 0.00	011101 0				0	(13)
Percentage of windo			d						0	(14)
Window infiltration				0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate				(8) + (10)	+ (11) + (1	12) + (13) -	+ (15) =		0	(16)
Air permeability valu	e, q50, express	ed in cubic me	tres per h	our per s	quare m	etre of e	nvelope	area	3	(17)
If based on air permea	bility value, the	$n (18) = [(17) \div 20]$]+(8), other	wise (18) =	(16)				0.3	(18)
Air permeability value app		tion test has been	done or a d	egree air pe	rmeability	is being u	sed			_
Number of sides shelte Shelter factor	ered			(20) = 1 -	[0.075 x (1	19)1 =			1	(19)
Infiltration rate incorpor	rating shaltar fa	ctor		(21) = (18		.0/]			0.92	$\frac{1}{2}$
Infiltration rate modified	•			(21) (10) X (20)				0.28	(21)
Jan Feb	Mar Apr	May Ju	n Jul	Aug	Sep	Oct	Nov	Dec]	
Monthly average wind			"	I ''ug	1 000	1 000	1 1101	1 200	J	
(22)m= 5.1 5	4.9 4.4	4.3 3.8	3.8	3.7	4	4.3	4.5	4.7]	
	1				I	<u> </u>	I	1	J	
Wind Factor (22a)m =		, ,			·	1	•		1	
(22a)m= 1.27 1.25	1.23 1.1	1.08 0.9	0.95	0.92	1	1.08	1.12	1.18		

Adjusted infiltrat	tion rate	(allowi	ng for sh	nelter an	nd wind s	speed) =	(21a) x	(22a)m					
0.35	0.34	0.34	0.3	0.3	0.26	0.26	0.25	0.28	0.3	0.31	0.32		
Calculate effect		•	rate for t	he appli	cable ca	se		!				Γ	
If mechanical If exhaust air hea			andiv N. (2)	2h) = (22a	a) v Emy (auation (VEVV otho	nuina (22h	\ = (22a)			0	(23a)
		0		, ,	, ,	. ,	,, .	,) – (23a)			0	(23b)
If balanced with h		-	-	_					Ola \	00-1 [4 (00 -)	0	(23c)
a) If balanced					at recove	- 	TR) (248	ŕ	<u> </u>		```	i ÷ 100] I	(24a)
(24a)m= 0	0	0	0	0		0		0	0	0	0		(24a)
b) If balanced					1		- 	``	r `		Ι ,	1	(24b)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240)
c) If whole ho if (22b)m				•	•				5 x (23h	1)			
(24c)m= 0	0	0	0	0	0	0	0 (22.	0	0	0	0]	(24c)
d) If natural v	entilatio	n or wh	ole hous		ļ	ventilatio	on from	<u> </u>					
if (22b)m				•	•				0.5]				
(24d)m= 0.56	0.56	0.56	0.55	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55		(24d)
Effective air c	change r	ate - er	nter (24a) or (24b	b) or (24	c) or (24	d) in bo	(25)	-		-		
(25)m= 0.56	0.56	0.56	0.55	0.54	0.53	0.53	0.53	0.54	0.54	0.55	0.55		(25)
3. Heat losses	and hea	at loss r	naramete	or.									
ELEMENT	Gross	·	Openin		Net Ar	ea	U-val	ue	AXU		k-value	9	ΑΧk
LLLIVILIVI	area (_	m		A ,r		W/m2		(W/I	<)	kJ/m²·		kJ/K
Doors					2	X	1.3	=	2.6				(26)
Windows Type	1				1.27	x1	/[1/(1.3)+	0.04] =	1.57				(27)
Windows Type 2	2				2.7	x1	/[1/(1.3)+	0.04] =	3.34				(27)
Windows Type	3				2.22	x1	/[1/(1.3)+	0.04] =	2.74				(27)
Windows Type	4				2.78	x1	/[1/(1.3)+	0.04] =	3.44				(27)
Windows Type	5				7.75	x1	/[1/(1.3)+	0.04] =	9.58				(27)
Windows Type	6				1.19	x1	/[1/(1.3)+	0.04] =	1.47				(27)
Windows Type	7				2		/[1/(1.3)+	0.04] =	2.47				(27)
Rooflights					1.05	= _{x1}	/[1/(1.6) +	0.04] =	1.68				(27b)
Walls Type1	68.45		21.91	1	46.54	_	0.15		6.98	=		$\neg \vdash$	(29)
Walls Type2	4.03	=	2	`	2.03	=	0.13	= :	0.27	=		-	(29)
Roof	75.4	_	1.05	_	74.35		0.1	╡ :	7.44	=		╡	(30)
Total area of ele	L	m²	1.00			=	0.1		7.44				(31)
Party wall					147.8	=			^				(31)
-					42.95	=	0		0			╡╞	
Party floor * for windows and re	oof winds	WO 1100 =	offootive	ndow II	75.4		o formula d	/[/1/ !	(0) (0 041 -	lo airea i-	naraarari		(32a)
** include the areas						ลเซน นรแไป	i ioiiiiuia I	/[(I/U-Vall	ı c)+ ∪.∪4∫ a	s giveii III	μαιαγιαβί	I U.Z	
Fabric heat loss	s, W/K =	S (A x	U)				(26)(30) + (32) =				45.94	(33)
Heat capacity C	Cm = S(A	Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	13772.4	(34)
Thermal mass p	oaramet	er (TMF	o = Cm ÷	· TFA) ir	n kJ/m²K			Indica	tive Value:	Medium		250	(35)

can be u	ısed inste	ad of a de	tailed calci	ulation.										
			x Y) cal		using Ap	pendix I	K						17.49	(36)
	Ŭ	`	are not kn		0 .	•								(\
Total fa	abric hea	at loss							(33) +	(36) =			63.43	(37)
Ventila	ition hea	it loss ca	alculated	l monthly	y				(38)m	= 0.33 × (25)m x (5)			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m=	37.72	37.56	37.4	36.67	36.53	35.88	35.88	35.77	36.13	36.53	36.81	37.1		(38)
Heat tr	ansfer c	oefficier	nt, W/K	-	_	-	-		(39)m	= (37) + (3	38)m	-		
(39)m=	101.16	101	100.84	100.1	99.96	99.32	99.32	99.2	99.57	99.96	100.24	100.53		
Heat lo	oss para	meter (H	HLP), W/	m²K			-			Average = = (39)m ÷	Sum(39) ₁ (4)	12 /12=	100.1	(39)
(40)m=	1.34	1.34	1.34	1.33	1.33	1.32	1.32	1.32	1.32	1.33	1.33	1.33		
Numbe	er of day	s in mor	nth (Tab	le 1a)					•	Average =	Sum(40) ₁	12 /12=	1.33	(40)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
(41)m=	31	28	31	30	31	30	31	31	30	31	30	31		(41)
			•			•						•	•	
4. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
Λ · · · · ·			A.I										1	(40)
if TF	ed occu A > 13.9 A £ 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.(0013 x (⁻	ΓFA -13.		.37		(42)
Annua	l averag	e hot wa						(25 x N)).48]	(43)
		_	hot water person per			_	-	to achieve	a water us	se target o	f		4	
notmore	. 1						•		0	0.4	N1		1	
Hot wate	Jan er usage ir	Feb	Mar day for ea	Apr ach month	May Vd.m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m=	99.53	95.91	92.29	88.67	85.05	81.43	81.43	85.05	88.67	92.29	95.91	99.53	1	
(44)111-	99.55	95.91	92.29	00.07	05.05	01.43	01.43	05.05			m(44) ₁₁₂ =		1085.79	(44)
Energy o	content of	hot water	used - cal	culated mo	onthly = 4.	190 x Vd,r	m x nm x E	OTm / 3600					1000.73	(
(45)m=	147.6	129.09	133.21	116.14	111.44	96.16	89.11	102.25	103.47	120.59	131.63	142.94]	
						!				Total = Su	m(45) ₁₁₂ =	-	1423.64	(45)
If instant	taneous w	ater heatii	ng at point	of use (no	hot water	r storage),	enter 0 in	boxes (46)) to (61)					
(46)m=	0	0	0	0	0	0	0	0	0	0	0	0		(46)
	storage		\ includin	na anv e	olar or M	WHDS	etorage	within sa	me vec	പ			1	(47)
•		, ,	ind no ta				_		arric ves	301		0	J	(47)
	-	-			-			ombi boil	ers) ente	er '0' in (47)			
	storage			(-					, .		,			
a) If m	anufact	urer's de	eclared l	oss facto	or is kno	wn (kWł	n/day):					0]	(48)
Tempe	erature fa	actor fro	m Table	2b								0]	(49)
			storage	-				(48) x (49)) =			0]	(50)
			eclared o	-									- 1	,
		_	factor free section		e∠(KWI	ıı/ııtre/da	iy)					0	J	(51)
	e factor	-		UII 7.U								0	1	(52)
			m Table	2b								0	1	(53)
													•	

Energy lost from		_	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (, ,	,	or ooob	month			((E6)m = ('EE\ ~ (41\)	~		0		(55)
Water storage		i				1	,	(55) × (41)r			_	1	(50)
(56)m= 0 If cylinder contains	0 hetcaibeh	0 solar stor	0	0 = (56)m	0 × [(50) = (0 H11)1 ÷ (5	0 0) else (5)	0 = (56)	0 m where (0 H11) is fro	0 m Annend	iv H	(56)
					1		1			•			(57)
(57)m= 0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primary circuit	`	,			50)	(EQ) 00	· - (44)				0		(58)
Primary circuit (modified by				•		. ,	` '		r thermo	ctat)			
(59)m= 0	0	0	0	0	0	0	0	0	0	0	0		(59)
· · ·			-			<u> </u>					_		` ,
Combi loss cal	culated f	or each	montn (01)m = 0	(60) ÷ 36	05 × (41)m 0		0	0	0		(61)
(* /						<u> </u>	<u> </u>	0			(57) 1	(FO) + (C1)	` '
Total heat requ				94.72	81.74		`				`	(59)m + (61)m 	(62)
` '		113.23	98.72			75.74	86.91	87.95	102.5	111.89	121.5		(02)
Solar DHW input c (add additional									contribut	on to wate	er neating)		
(63)m= 0	0	0	0	0	0) 0 To	0		0	0	0		(63)
Output from wa	ater heat		-	-									` ,
(64)m= 125.46		113.23	98.72	94.72	81.74	75.74	86.91	87.95	102.5	111.89	121.5		
(6.1)	1000		00	· · · · <u>-</u>	J	1		out from wa				1210.1	(64)
Heat gains fron	n water h	neating	k\/\/h/m/	anth 0 24	5 ′ [0 85	x (45)m							」 ` ′
Ticat gains iron	ii watei i	icatii ig,		JIIIII	0.00								
(65)m= 31.37	27.43					- ` 	<u> </u>	_			· · ·	1	(65)
(65)m= 31.37 include (57)n	27.43 n in calci	28.31	24.68	23.68	20.43	18.94	21.73	21.99	25.63	27.97	30.38		(65)
include (57)n	n in calc	28.31 ulation o	24.68 of (65)m	23.68 only if c	20.43	18.94	21.73	21.99	25.63	27.97	30.38		(65)
include (57)n 5. Internal ga	n in calcuins (see	28.31 ulation of Table 5	24.68 of (65)m and 5a	23.68 only if c	20.43	18.94	21.73	21.99	25.63	27.97	30.38		(65)
include (57)r 5. Internal ga Metabolic gains	m in calcuins (see	28.31 ulation of Table 5 5), Watt	24.68 of (65)m and 5a	23.68 only if c	20.43 ylinder is	18.94 s in the o	21.73 dwelling	21.99 or hot w	25.63 ater is fr	27.97 om com	30.38 munity h		(65)
include (57)n 5. Internal ga Metabolic gains Jan	m in calcuins (see	28.31 ulation of the state of	24.68 of (65)m and 5a ts Apr	23.68 only if c	20.43 ylinder is	18.94 s in the o	21.73	21.99	25.63	27.97 om com	30.38		(65)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49	m in calcuins (see s (Table Feb 118.49	28.31 ulation of Table 5 5), Watt Mar 118.49	24.68 of (65)m and 5a ts Apr 118.49	23.68 only if c : : : : ::::::::::::::::::::::::::::	20.43 ylinder is Jun 118.49	18.94 s in the o	21.73 dwelling Aug 118.49	21.99 or hot w Sep 118.49	25.63 ater is fr	27.97 om com	30.38 munity h		
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains	m in calculate	28.31 ulation of the control of the	24.68 of (65)m and 5a ats Apr 118.49 opendix	23.68 only if c : May 118.49 L, equati	Jun 118.49	Jul 118.49 118.49	21.73 dwelling Aug 118.49 lso see	21.99 or hot w Sep 118.49 Table 5	25.63 ater is fr Oct 118.49	27.97 om com Nov 118.49	30.38 munity h		
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68	m in calculate s (Table Feb 118.49 (calculate 16.59	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.22	23.68 only if c : May 118.49 L, equati 7.64	20.43 ylinder is Jun 118.49 ion L9 of	Jul 118.49 118.49 1 L9a), a	21.73 dwelling Aug 118.49 lso see 9.06	21.99 or hot w Sep 118.49 Table 5 12.15	25.63 ater is fr Oct 118.49	27.97 om com	30.38 munity h		(66)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain	m in calculate 16.59 ns (calculate 16.59	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in	24.68 of (65)m and 5a ts Apr 118.49 pendix 10.22 Append	23.68 only if c : May 118.49 L, equati 7.64 dix L, equ	Jun 118.49 ion L9 of 6.45 uation L	Jul 118.49 r L9a), a 6.97	21.73 dwelling Aug 118.49 lso see 9.06 3a), also	21.99 or hot w Sep 118.49 Table 5 12.15	25.63 ater is fr Oct 118.49	27.97 om com Nov 118.49	30.38 munity h		(66)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56	m in calculate 16.59 ns (calculate 211.73	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25	24.68 of (65)m and 5a as Apr 118.49 opendix 1 10.22 Append 194.59	23.68 only if c): May 118.49 L, equati 7.64 dix L, equati 179.86	Jun 118.49 ion L9 of 6.45 uation L	Jul 118.49 r L9a), a 6.97 13 or L1	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75	27.97 om com Nov 118.49	30.38 munity h		(66) (67)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56 Cooking gains	m in calculate 16.59 ns (calculate 211.73	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25	24.68 of (65)m and 5a as Apr 118.49 opendix 1 10.22 Append 194.59	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat	20.43 ylinder is Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15	Jul 118.49 r L9a), a 6.97 13 or L1	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75	27.97 om com Nov 118.49	30.38 munity h		(66) (67)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56 Cooking gains (69)m= 34.85	m in calculate (calculate 211.73 (calculate 34.85	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ted in Ap 34.85	24.68 of (65)m and 5a as Apr 118.49 opendix 10.22 Append 194.59 opendix 34.85	23.68 only if c): May 118.49 L, equati 7.64 dix L, equati 179.86	Jun 118.49 ion L9 of 6.45 uation L	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tall 160.08 ee Table	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5	27.97 om com Nov 118.49 18.01	30.38 munity h		(66) (67) (68)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and fan	m in calculate (calculate 211.73 (calculate 34.85	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ted in Ap 34.85	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.22 Append 194.59 opendix 34.85 ia)	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a 34.85	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	27.97 om com Nov 118.49 18.01 186.47	30.38 munity h Dec 118.49 19.2 200.31		(66) (67) (68)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and fan (70)m= 0	m in calculate 16.59 (calculate 211.73 (calculate 34.85 as gains (28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ed in Ap 34.85 (Table 5	24.68 of (65)m and 5a as Apr 118.49 opendix 10.22 Append 194.59 opendix 34.85 a) 0	23.68 only if c May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tall 160.08 ee Table	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5	27.97 om com Nov 118.49 18.01	30.38 munity h		(66) (67) (68) (69)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and fan (70)m= 0 Losses e.g. eva	m in calculate (calculate 211.73 (calculate 34.85 as gains (apporation)	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ded in Ap 34.85 (Table 5 0 n (negat	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.22 Appendix 194.59 opendix 34.85 opendix 0 ive valu	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 18.94 s in the o Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a 34.85	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85	21.99 or hot w Sep 118.49 Table 5 12.15 see Tal 160.08 ee Table 34.85	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	27.97 om com Nov 118.49 18.01 186.47 34.85	30.38 munity h Dec 118.49 19.2 200.31		(66) (67) (68) (69) (70)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gai (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and fan (70)m= 0 Losses e.g. eva (71)m= -94.79	m in calculate Feb (calculate 16.59) (calculate 34.85) as gains (apporatior -94.79)	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ced in Ap 34.85 (Table 5 0 n (negat -94.79	24.68 of (65)m and 5a as Apr 118.49 opendix 10.22 Append 194.59 opendix 34.85 a) 0	23.68 only if c May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a 34.85	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	27.97 om com Nov 118.49 18.01 186.47	30.38 munity h Dec 118.49 19.2 200.31		(66) (67) (68) (69)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and fan (70)m= 0 Losses e.g. eva (71)m= -94.79 Water heating	m in calculate 16.59 (calculate 34.85 as gains (apporation -94.79) gains (Table 1.00)	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ced in Ap 34.85 (Table 5 0 n (negat -94.79 able 5)	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.22 Appendix 34.59 opendix 34.85 ia) 0 iive valu -94.79	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab	20.43 ylinder is Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a 34.85	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tall 160.08 ee Table 34.85 0	25.63 ater is fr Oct 118.49 15.43 ole 5 171.75 5 34.85	27.97 om com Nov 118.49 18.01 186.47 34.85	30.38 munity h Dec 118.49 19.2 200.31 34.85		(66) (67) (68) (69) (70)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and fan (70)m= 0 Losses e.g. eva (71)m= -94.79 Water heating (72)m= 42.16	m in calculate Feb 118.49 (calculate 16.59 ns (calculate 34.85 ns gains (28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ded in Ap 34.85 (Table 5 0 n (negat -94.79	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.22 Appendix 194.59 opendix 34.85 opendix 0 ive valu	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab	20.43 ylinder is Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a 34.85	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85 0	21.99 or hot w Sep 118.49 Table 5 12.15 see Tal 160.08 ee Table 34.85 0 -94.79	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79	27.97 om com Nov 118.49 18.01 186.47 34.85 0 -94.79	30.38 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79		(66) (67) (68) (69) (70)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and fan (70)m= 0 Losses e.g. evo (71)m= -94.79 Water heating (72)m= 42.16 Total internal	m in calculate Feb (calculate 16.59) ms (calculate 34.85) ms gains (28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ted in Ap 34.85 (Table 5 0 n (negat -94.79 able 5) 38.05	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.22 Appendix 34.85 opendix 34.85 opendix 34.85 a) opendix 34.85 a) opendix 34.85	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab -94.79	20.43 ylinder is Jun 118.49 ion L9 or 6.45 uation L 166.02 tion L15 34.85 0 lle 5) -94.79 28.38 (66)	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a 34.85 0 -94.79 25.45 om + (67)m	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85 0 -94.79 29.21 1+ (68)m	21.99 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 0 -94.79 30.54 + (69)m + (25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79 34.44 70)m + (7	27.97 om com Nov 118.49 18.01 186.47 34.85 0 -94.79 38.85 1)m + (72)	30.38 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79 40.83		(66) (67) (68) (69) (70) (71)
include (57)n 5. Internal ga Metabolic gains Jan (66)m= 118.49 Lighting gains (67)m= 18.68 Appliances gain (68)m= 209.56 Cooking gains (69)m= 34.85 Pumps and fan (70)m= 0 Losses e.g. eva (71)m= -94.79 Water heating (72)m= 42.16	m in calculate S (Table Feb 118.49 (calculate 16.59 ns (calculate 211.73 (calculate 34.85 ns gains (0 aporatior -94.79 gains (Ta 40.82 gains = 327.7	28.31 ulation of Table 5 5), Watt Mar 118.49 ed in Ap 13.49 ulated in 206.25 ced in Ap 34.85 (Table 5 0 n (negat -94.79 able 5)	24.68 of (65)m and 5a ats Apr 118.49 opendix 10.22 Appendix 34.59 opendix 34.85 ia) 0 iive valu -94.79	23.68 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab	20.43 ylinder is Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a 34.85	21.73 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85 0	21.99 or hot w Sep 118.49 Table 5 12.15 see Tal 160.08 ee Table 34.85 0 -94.79	25.63 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79	27.97 om com Nov 118.49 18.01 186.47 34.85 0 -94.79	30.38 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79		(66) (67) (68) (69) (70)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	7.75	x	11.28	x	0.55	x	0.7	=	23.33	(75)
Northeast 0.9x	0.77	x	1.19	x	11.28	x	0.55	x	0.7	=	3.58	(75)
Northeast 0.9x	0.77	x	7.75	x	22.97	x	0.55	x	0.7	=	47.49	(75)
Northeast 0.9x	0.77	x	1.19	x	22.97	x	0.55	x	0.7	=	7.29	(75)
Northeast 0.9x	0.77	x	7.75	x	41.38	x	0.55	x	0.7	=	85.56	(75)
Northeast 0.9x	0.77	x	1.19	x	41.38	x	0.55	x	0.7	=	13.14	(75)
Northeast 0.9x	0.77	x	7.75	x	67.96	x	0.55	x	0.7] =	140.51	(75)
Northeast 0.9x	0.77	x	1.19	x	67.96	x	0.55	x	0.7	=	21.58	(75)
Northeast 0.9x	0.77	x	7.75	x	91.35	x	0.55	x	0.7	=	188.88	(75)
Northeast 0.9x	0.77	x	1.19	x	91.35	x	0.55	x	0.7	=	29	(75)
Northeast 0.9x	0.77	X	7.75	x	97.38	X	0.55	X	0.7	=	201.37	(75)
Northeast 0.9x	0.77	x	1.19	x	97.38	x	0.55	x	0.7	=	30.92	(75)
Northeast 0.9x	0.77	x	7.75	x	91.1	x	0.55	x	0.7	=	188.37	(75)
Northeast 0.9x	0.77	x	1.19	x	91.1	x	0.55	x	0.7	=	28.92	(75)
Northeast 0.9x	0.77	x	7.75	x	72.63	x	0.55	x	0.7	=	150.17	(75)
Northeast 0.9x	0.77	x	1.19	x	72.63	x	0.55	x	0.7	=	23.06	(75)
Northeast 0.9x	0.77	x	7.75	x	50.42	x	0.55	x	0.7	=	104.26	(75)
Northeast 0.9x	0.77	x	1.19	x	50.42	x	0.55	x	0.7	=	16.01	(75)
Northeast 0.9x	0.77	x	7.75	x	28.07	x	0.55	x	0.7	=	58.04	(75)
Northeast 0.9x	0.77	x	1.19	x	28.07	x	0.55	x	0.7	=	8.91	(75)
Northeast 0.9x	0.77	x	7.75	x	14.2	x	0.55	x	0.7	=	29.36	(75)
Northeast 0.9x	0.77	x	1.19	x	14.2	x	0.55	X	0.7	=	4.51	(75)
Northeast 0.9x	0.77	x	7.75	x	9.21	x	0.55	x	0.7	=	19.05	(75)
Northeast 0.9x	0.77	x	1.19	x	9.21	x	0.55	x	0.7] =	2.93	(75)
Southeast 0.9x	0.77	x	2	x	36.79	x	0.55	X	0.7	=	39.27	(77)
Southeast 0.9x	0.77	x	2	x	62.67	x	0.55	x	0.7	=	66.89	(77)
Southeast 0.9x	0.77	x	2	x	85.75	x	0.55	x	0.7] =	91.52	(77)
Southeast 0.9x	0.77	x	2	x	106.25	x	0.55	x	0.7	=	113.39	(77)
Southeast 0.9x	0.77	x	2	x	119.01	x	0.55	x	0.7] =	127.01	(77)
Southeast 0.9x	0.77	x	2	x	118.15	x	0.55	x	0.7	=	126.09	(77)
Southeast 0.9x	0.77	x	2	x	113.91	x	0.55	X	0.7	=	121.57	(77)
Southeast 0.9x	0.77	x	2	x	104.39	x	0.55	x	0.7	=	111.41	(77)
Southeast 0.9x	0.77	x	2	x	92.85	x	0.55	x	0.7	=	99.09	(77)
Southeast 0.9x	0.77	x	2	x	69.27	x	0.55	x	0.7	=	73.92	(77)
Southeast 0.9x	0.77	x	2	x	44.07	x	0.55	x	0.7	=	47.03	(77)
Southeast 0.9x	0.77	X	2	x	31.49	x	0.55	x	0.7] =	33.6	(77)
Southwest _{0.9x}	0.77	X	1.27	x	36.79	Ī	0.55	x	0.7] =	12.47	(79)
Southwest _{0.9x}	0.77	X	2.7	x	36.79]	0.55	х	0.7] =	26.51	(79)
Southwest _{0.9x}	0.77	X	2.22	x	36.79]	0.55	x	0.7] =	21.79	(79)
				-		-		•		-		_

Southwest _{0.9x}	^ ==	1 .,	0.70	1		0.55	l .,	0.7	1 _	07.00	7(70)
<u>L</u>	0.77	X	2.78	X	36.79	0.55	X	0.7] = 1	27.29	(79)
Southwesters	0.77	X	1.27	X	62.67	0.55	X	0.7] = 1	21.24	(79)
Southwesters	0.77] X	2.7	X	62.67	0.55	X	0.7] = 1	45.15	(79)
Southwest _{0.9x}	0.77	X	2.22	X	62.67	0.55	X	0.7] =	37.12	(79)
Southwest _{0.9x}	0.77	X	2.78	X	62.67	0.55	X	0.7] -	46.49	(79)
Southwest _{0.9x}	0.77	X	1.27	X	85.75	0.55	X	0.7	=	29.06	(79)
Southwest _{0.9x}	0.77	X	2.7	X	85.75	0.55	X	0.7] =	61.77	(79)
Southwest _{0.9x}	0.77	X	2.22	x	85.75	0.55	X	0.7] =	50.79	(79)
Southwest _{0.9x}	0.77	X	2.78	X	85.75	0.55	X	0.7	=	63.6	(79)
Southwest _{0.9x}	0.77	X	1.27	X	106.25	0.55	X	0.7	=	36	(79)
Southwest _{0.9x}	0.77	X	2.7	x	106.25	0.55	X	0.7	=	76.54	(79)
Southwest _{0.9x}	0.77	X	2.22	X	106.25	0.55	X	0.7	=	62.93	(79)
Southwest _{0.9x}	0.77	X	2.78	X	106.25	0.55	X	0.7	=	78.81	(79)
Southwest _{0.9x}	0.77	X	1.27	X	119.01	0.55	X	0.7	=	40.33	(79)
Southwest _{0.9x}	0.77	X	2.7	X	119.01	0.55	x	0.7	=	85.73	(79)
Southwest _{0.9x}	0.77	x	2.22	x	119.01	0.55	x	0.7	=	70.49	(79)
Southwest _{0.9x}	0.77	x	2.78	x	119.01	0.55	x	0.7	=	88.27	(79)
Southwest _{0.9x}	0.77	X	1.27	x	118.15	0.55	x	0.7] =	40.03	(79)
Southwest _{0.9x}	0.77	x	2.7	x	118.15	0.55	x	0.7] =	85.11	(79)
Southwest _{0.9x}	0.77	x	2.22	x	118.15	0.55	x	0.7	=	69.98	(79)
Southwest _{0.9x}	0.77	X	2.78	x	118.15	0.55	x	0.7	=	87.63	(79)
Southwest _{0.9x}	0.77	x	1.27	x	113.91	0.55	x	0.7] =	38.6	(79)
Southwest _{0.9x}	0.77	x	2.7	x	113.91	0.55	x	0.7	Ī =	82.06	(79)
Southwest _{0.9x}	0.77	x	2.22	x	113.91	0.55	x	0.7	Ī =	67.47	(79)
Southwest _{0.9x}	0.77	x	2.78	x	113.91	0.55	x	0.7	j =	84.49	(79)
Southwest _{0.9x}	0.77	x	1.27	x	104.39	0.55	x	0.7	j =	35.37	(79)
Southwest _{0.9x}	0.77	x	2.7	x	104.39	0.55	x	0.7	j =	75.2	(79)
Southwest _{0.9x}	0.77	х	2.22	x	104.39	0.55	x	0.7	j =	61.83	(79)
Southwest _{0.9x}	0.77	x	2.78	x	104.39	0.55	x	0.7	j =	77.43	(79)
Southwest _{0.9x}	0.77	x	1.27	x	92.85	0.55	x	0.7	j =	31.46	(79)
Southwest _{0.9x}	0.77	х	2.7	x	92.85	0.55	x	0.7] =	66.89	(79)
Southwest _{0.9x}	0.77	x	2.22	x	92.85	0.55	x	0.7	j =	55	(79)
Southwest _{0.9x}	0.77	x	2.78	×	92.85	0.55	x	0.7	j =	68.87	(79)
Southwest _{0.9x}	0.77	x	1.27	x	69.27	0.55	x	0.7	j =	23.47	(79)
Southwest _{0.9x}	0.77	x	2.7	x	69.27	0.55	x	0.7	i =	49.9	(79)
Southwest _{0.9x}	0.77	X	2.22	x	69.27	0.55	x	0.7	i =	41.03	(79)
Southwest _{0.9x}	0.77	X	2.78	x	69.27	0.55	x	0.7	j =	51.38	(79)
Southwest _{0.9x}	0.77	X	1.27	x	44.07	0.55	x	0.7	j =	14.93	(79)
Southwest _{0.9x}	0.77) x	2.7	X	44.07	0.55	x	0.7] =	31.75	(79)
Southwest _{0.9x}	0.77	X	2.22	×	44.07	0.55	x	0.7]] =	26.1	(79)
Southwest _{0.9x}	0.77	X	2.78] x	44.07	0.55	x	0.7]] =	32.69	(79)
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Southwest _{0.9x}	0.77	X	1.2	27	X	3	1.49]	0.55	×	0.7	=	10.67	(79)
Southwest _{0.9x}	0.77	X	2.	7	X	3	1.49]	0.55	X	0.7	=	22.68	(79)
Southwest _{0.9x}	0.77	X	2.2	22	X	3	1.49		0.55	X	0.7	=	18.65	(79)
Southwest _{0.9x}	0.77	X	2.7	78	X	3	1.49]	0.55	X	0.7	=	23.36	(79)
Rooflights 0.9x	1	X	1.0)5	X		26	X	0.55	X	0.8	=	10.81	(82)
Rooflights 0.9x	1	X	1.0)5	x		54	x	0.55	x	0.8	=	22.45	(82)
Rooflights 0.9x	1	X	1.0)5	X		96	x	0.55	x	0.8	=	39.92	(82)
Rooflights 0.9x	1	x	1.0)5	X		150	x	0.55	x	0.8	=	62.37	(82)
Rooflights 0.9x	1	X	1.0)5	X	,	192	x	0.55	x	0.8	=	79.83	(82)
Rooflights 0.9x	1	X	1.0)5	X	:	200	x	0.55	×	0.8	=	83.16	(82)
Rooflights 0.9x	1	x	1.0)5	X		189	x	0.55	x	0.8	=	78.59	(82)
Rooflights 0.9x	1	X	1.0)5	X	,	157	x	0.55	x	0.8	=	65.28	(82)
Rooflights 0.9x	1	x	1.0)5	X		115	x	0.55	x	0.8	=	47.82	(82)
Rooflights 0.9x	1	x	1.0)5	X		66	x	0.55	x	0.8	=	27.44	(82)
Rooflights 0.9x	1	X	1.0)5	X		33	x	0.55	x	0.8	=	13.72	(82)
Rooflights 0.9x	1	x	1.0)5	X		21	x	0.55	x	0.8	=	8.73	(82)
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Solar gains in	watts, cal	lculated	for eac	h month	h			(83)m	n = Sum(74)m .	(82)m				
(83)m= 165.05	294.11	435.36	592.14	709.55	7	24.3	690.06	599	.75 489.39	334.0	9 200.09	139.67]	(83)
Total gains – i	nternal ar	nd solar	(84)m =	(73)m	+ (83)m	, watts		•				_	
(84)m= 493.99	621.81	751.7	889.77	987.42	9	983.7	937.8	851	.16 750.71	614.2	6 501.97	458.56		(84)
7. Mean inter	nal tempe	erature ((heating	seaso	n)									
7. Mean inter Temperature	•		`			area 1	from Tat	ole 9	, Th1 (°C)				21	(85)
	during he	eating p	eriods ir	n the liv	ing			ole 9	, Th1 (°C)				21	(85)
Temperature	during he	eating p	eriods ir	n the liv	ring n (s				, Th1 (°C)	Oc	t Nov	Dec	21	(85)
Temperature Utilisation fac	during he	eating points	eriods ir iving are	n the liv ea, h1,n	ring n (s	ее Та	ble 9a)		ug Sep	Oc:	+	Dec 1	21	(85)
Temperature Utilisation fac Jan (86)m= 1	during he stor for ga Feb 0.99	eating points for line Mar	eriods ir iving are Apr 0.92	n the livea, h1,n May	ring m (s	ee Ta Jun ^{0.61}	ble 9a) Jul 0.46	A 0.5	ug Sep 52 0.78	-	+		21	
Temperature Utilisation fac	during he stor for ga Feb 0.99	eating points for line Mar	eriods ir iving are Apr 0.92	n the livea, h1,n May	n (s	ee Ta Jun ^{0.61}	ble 9a) Jul 0.46	A 0.5	ug Sep 52 0.78 able 9c)	-	0.99		21	
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.56	tor for ga Feb 0.99 I tempera	eating points for line Mar 0.97 eature in l	eriods ir iving are Apr 0.92 iving are 20.52	n the livea, h1,n May 0.79 ea T1 (1	follo	ee Ta Jun 0.61 ow ste	Jul 0.46 ps 3 to 7 20.99	0.5 7 in T 20.	ug Sep 52 0.78 Table 9c) 98 20.88	0.96	0.99	1	21	(86)
Temperature Utilisation factors Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature	during he tor for ga Feb 0.99 I tempera 19.78 during he	eating points for line Mar 0.97 ature in la 20.12 eating points	eriods ir iving are Apr 0.92 iving are 20.52 eriods ir	n the livea, h1,n May 0.79 ea T1 (1 20.82	follo	ee Ta Jun 0.61 ow ste 20.96 velling	Jul 0.46 ps 3 to 7 20.99 from Ta	A 0.57 in T 20.	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C)	0.96 20.46	0.99	19.52	21	(86)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81	during he tor for garent feb 0.99 temperare 19.78 during he	eating points for line Mar 0.97 eature in la 20.12 eating points 19.81	Apr 0.92 iving are 20.52 eriods ir	n the livea, h1,n May 0.79 ea T1 (1 20.82 n rest or	follo	ee Ta Jun 0.61 ow ste 20.96 velling	Jul 0.46 ps 3 to 7 20.99 from Ta	A 0.57 in T 20.	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C)	0.96	0.99	1	21	(86)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact	during heter for gate to for for gate to for gate to for gate to for gate to for gate to for gate to for gate to f	eating points for II Mar 0.97 ature in II 20.12 eating points for recognitions for rec	eriods in iving are 0.92 iving are 20.52 eriods in 19.82 est of decrease in the control of the c	n the livea, h1,r May 0.79 ea T1 (1 20.82 n rest of 19.82 welling,	m (s	ee Ta Jun 0.61 ow ste 20.96 velling 9.83 ,m (se	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83	A 0.57 in T 20.00 able 9 19.00 9a)	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82	0.96 20.46 19.82	0.99	19.52	21	(86) (87) (88)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1	tor for ga Feb 0.99 I tempera 19.78 during he 19.81 ctor for ga 0.99	eating points for II Mar 0.97 ature in II 20.12 eating points for r 0.97	eriods in iving are 0.92 iving are 20.52 eriods in 19.82 est of do 0.89	n the livea, h1,r May 0.79 ea T1 (1 20.82 n rest or 19.82 welling, 0.73	follo	ee Ta Jun 0.61 ww ste 20.96 velling 19.83 m (see 0.51	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34	A 0.57 in T 20. able 9 19. 9a) 0.	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82	0.96 20.46 19.82	0.99	19.52	21	(86)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1 Mean interna	during he tor for ga Feb 0.99 I tempera 19.78 during he 19.81 etor for ga 0.99 I tempera	eating points for 10 10 10 10 10 10 10 10 10 10 10 10 10	eriods in iving are 0.92 iving are 20.52 eriods in 19.82 est of dro.89 the rest	n the livea, h1,r May 0.79 ea T1 (f 20.82 n rest of 19.82 welling, 0.73	folloging folloging folloging folloging folloging folloging for folloging following following following following following for following followin	ee Ta Jun 0.61 ow ste 20.96 velling 19.83 m (se 0.51	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34 ollow ste	A 0.8 7 in T 20. 20. 19. 19. 9a) 0. eps 3	ug Sep 62 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table	0.96 20.46 19.82 0.94 le 9c)	0.99 0.99 19.92 19.82 0.99	1 19.52 19.81	21	(86) (87) (88) (89)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1	tor for ga Feb 0.99 I tempera 19.78 during he 19.81 ctor for ga 0.99	eating points for II Mar 0.97 ature in II 20.12 eating points for r 0.97	eriods in iving are 0.92 iving are 20.52 eriods in 19.82 est of do 0.89	n the livea, h1,r May 0.79 ea T1 (1 20.82 n rest or 19.82 welling, 0.73	folloging folloging folloging folloging folloging folloging for folloging following following following following following for following followin	ee Ta Jun 0.61 ww ste 20.96 velling 19.83 m (see 0.51	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34	A 0.57 in T 20. able 9 19. 9a) 0.	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table 82 19.76	0.96 20.46 19.82 0.94 e 9c) 19.4	0.99 19.92 19.82 0.99	1 19.52 19.81 1		(86) (87) (88) (89)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1 Mean interna	during he tor for ga Feb 0.99 I tempera 19.78 during he 19.81 etor for ga 0.99 I tempera	eating points for 10 10 10 10 10 10 10 10 10 10 10 10 10	eriods in iving are 0.92 iving are 20.52 eriods in 19.82 est of dro.89 the rest	n the livea, h1,r May 0.79 ea T1 (f 20.82 n rest of 19.82 welling, 0.73	folloging folloging folloging folloging folloging folloging for folloging following following following following following for following followin	ee Ta Jun 0.61 ow ste 20.96 velling 19.83 m (se 0.51	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34 ollow ste	A 0.8 7 in T 20. 20. 19. 19. 9a) 0. eps 3	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table 82 19.76	0.96 20.46 19.82 0.94 e 9c) 19.4	0.99 0.99 19.92 19.82 0.99	1 19.52 19.81 1	21	(86) (87) (88) (89)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1 Mean interna	during heter for gate to for for gate to f	eating points for II Mar 0.97 ature in II 20.12 eating points for r 0.97 ature in t 19.07	eriods in iving are 0.92 iving are 20.52 eriods in 19.82 est of do 0.89 the rest 19.46	n the livea, h1,r May 0.79 ea T1 (1 20.82 n rest of 19.82 welling, 0.73 of dwel 19.71	follo follo follo f dw	ee Ta Jun 0.61 ww ste 20.96 velling 19.83 m (se 0.51 T2 (fo 19.81	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34 ollow ste 19.83	A 0.5 7 in T 20. 4 ble 9 9a) 0. eps 3	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table 82 19.76	0.96 20.46 19.82 0.94 e 9c) 19.4 fLA = Li	0.99 19.92 19.82 0.99	1 19.52 19.81 1		(86) (87) (88) (89)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1 Mean interna (90)m= 18.51	during heter for gate to for for gate to f	eating points for II Mar 0.97 ature in II 20.12 eating points for r 0.97 ature in t 19.07	eriods in iving are 0.92 iving are 20.52 eriods in 19.82 est of do 0.89 the rest 19.46	n the livea, h1,r May 0.79 ea T1 (1 20.82 n rest of 19.82 welling, 0.73 of dwel 19.71	follo	ee Ta Jun 0.61 ww ste 20.96 velling 19.83 m (se 0.51 T2 (fo 19.81	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34 ollow ste 19.83	A 0.5 7 in T 20. 4 ble 9 9a) 0. eps 3	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table 82 19.76 — fLA) × T2	0.96 20.46 19.82 0.94 e 9c) 19.4 fLA = Li	0.99 19.92 19.82 0.99 18.88 ving area ÷ (-	1 19.52 19.81 1		(86) (87) (88) (89)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1 Mean interna (90)m= 18.51 Mean interna	during heter for gate to for for gate to f	eating points for II Mar 0.97 ature in II 20.12 eating points for r 0.97 ature in t 19.07 ature (for 19.44)	eriods in iving are Apr 0.92 iving are 20.52 eriods in 19.82 est of do 0.89 the rest 19.46 r the whole 19.84	n the livea, h1,r May 0.79 ea T1 (1 20.82 n rest or 19.82 welling, 0.73 of dwel 19.71 ole dwe 20.11	ing (s) (s) (s) (s) (s) (s) (s) (s) (s) (s)	ee Ta Jun 0.61 ww ste 0.96 velling 9.83 m (se 0.51 T2 (fo 19.81 g) = fl 20.22	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34 ollow ste 19.83 A × T1 20.24	A A 0.8 17 in 1 20. 20. 20. 20. 20. 20. 20. 20. 20. 20.	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table 82 19.76 — fLA) × T2 24 20.16	0.96 20.46 19.82 0.94 e 9c) 19.4 fLA = Li	0.99 19.92 19.82 0.99 18.88 ving area ÷ (4)	1 19.52 19.81 1 18.47 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1 Mean interna (90)m= 18.51 Mean interna (92)m= 18.88 Apply adjustn (93)m= 18.88	during heter for garen for	eating points for II Mar 0.97 ature in II 20.12 eating points for r 0.97 ature in t 19.07 ature (for 19.44 in e mean 19.44	eriods in iving are Apr 0.92 iving are 20.52 eriods in 19.82 est of do 0.89 the rest 19.46 r the whole 19.84	n the livea, h1,r May 0.79 ea T1 (1 20.82 n rest or 19.82 welling, 0.73 of dwel 19.71 ole dwe 20.11	follo follo follo follo follo follo follo follo follo follo follo follo z follo follo z follo follo z follo z follo follo z follo follo z follo follo z follo follo follo z follo follo z follo follo follo z follo follo follo z follo follo follo z follo follo follo follo z follo	ee Ta Jun 0.61 ww ste 0.96 velling 9.83 m (se 0.51 T2 (fo 19.81 g) = fl 20.22	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34 ollow ste 19.83 A × T1 20.24	A A 0.8 17 in 1 20. 20. 20. 20. 20. 20. 20. 20. 20. 20.	ug Sep 52 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table 82 19.76 — fLA) × T2 24 20.16 where approximation in the second sec	0.96 20.46 19.82 0.94 e 9c) 19.4 fLA = Li	0.99 19.92 19.82 0.99 18.88 ving area ÷ (1 19.52 19.81 1 18.47 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1 Mean interna (90)m= 18.51 Mean interna (92)m= 18.88 Apply adjustn (93)m= 18.88 8. Space hear	during he ctor for garent for for garent for garent for garent for garent for garent for garent for for garent for for garent for for garent fo	eating points for II Mar 0.97 ature in II 20.12 eating points for r 0.97 ature in t 19.07 ature (for r) 19.44 irement	eriods in iving are 0.92 iving are 20.52 eriods in 19.82 est of dro.89 the rest 19.46 r the whole 19.84 internal 19.84	the livea, h1,r May 0.79 ea T1 (f 20.82 n rest of 19.82 welling, 0.73 of dwel 19.71 ole dwe 20.11 tempe 20.11	follo fo	ee Ta Jun 0.61 ow ste 20.96 velling 9.83 m (se 0.51 T2 (fo 9.81) g) = fl 20.22 ure fro 20.22	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34 collow ste 19.83 A × T1 20.24 m Table 20.24	A 0.5 7 in 1 20. able 9 9a) 0. eps 3 19. + (1 20. able 9 4e, 20.	ug Sep 62 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table 82 19.76 — fLA) × T2 24 20.16 where approximately approximat	0.96 20.46 19.82 0.94 19.78 19.78	0.99 19.92 19.82 0.99 18.88 ving area ÷ (1 19.52 19.81 1 18.47 4) =	0.35	(86) (87) (88) (89) (90) (91) (92)
Temperature Utilisation fact Jan (86)m= 1 Mean interna (87)m= 19.56 Temperature (88)m= 19.81 Utilisation fact (89)m= 1 Mean interna (90)m= 18.51 Mean interna (92)m= 18.88 Apply adjustn (93)m= 18.88	during heretor for garen set of garen set of for garen set of ga	eating points for II Mar 0.97 ature in II 20.12 eating points for r 0.97 ature in t 19.07 ature (for r) 19.44 irement ernal ten	eriods in iving are Apr 0.92 iving are 20.52 eriods in 19.82 est of di 0.89 the rest 19.46 r the who 19.84 internal 19.84 internal 19.84 inperature	n the livea, h1,r May 0.79 ea T1 (1 20.82 n rest or 19.82 welling, 0.73 of dwel 19.71 ole dwere 20.11 tempe 20.11 re obtains	follo fo	ee Ta Jun 0.61 ow ste 20.96 velling 9.83 m (se 0.51 T2 (fo 9.81) g) = fl 20.22 ure fro 20.22	Jul 0.46 ps 3 to 7 20.99 from Ta 19.83 ee Table 0.34 collow ste 19.83 A × T1 20.24 m Table 20.24	A 0.5 7 in 1 20. able 9 9a) 0. eps 3 19. + (1 20. able 9 4e, 20.	ug Sep 62 0.78 Table 9c) 98 20.88 9, Th2 (°C) 83 19.82 4 0.69 to 7 in Table 82 19.76 — fLA) × T2 24 20.16 where approximately approximat	0.96 20.46 19.82 0.94 19.78 19.78	0.99 19.92 19.82 0.99 18.88 ving area ÷ (1 19.52 19.81 1 18.47 4) =	0.35	(86) (87) (88) (89) (90) (91) (92)

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Mar

Jan

Feb

Utilisa	ation fac	tor for g	ains, hm	:										
(94)m=	0.99	0.99	0.96	0.89	0.75	0.55	0.38	0.44	0.72	0.94	0.99	1		(94)
Usefu	ıl gains,	hmGm	, W = (94	1)m x (84	4)m	•	•	•				•	l	
(95)m=	491.46	613.24	723.11	793.03	737.06	538.42	358.4	374.94	540.07	576.62	496.37	456.85		(95)
Month	nly aver	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	e for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]				
(97)m=	1475.26	1435.02	1305.08	1094.67	840.22	557.95	361.42	380.55	603.26	917.45	1217.86	1472.17		(97)
Space	e 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=	731.94	552.24	432.99	217.18	76.75	0	0	0	0	253.58	519.47	755.4		
·							-	Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	3539.55	(98)
Space	e heatin	g require	ement in	kWh/m²	² /year								46.94	(99)
•		oling rec			,									
		r June, c			See Tal	hle 10h								
Calcu	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat		l	<u> </u>	•			l					able 10)		
(100)m=		0	0	0	0	933.59	734.95	753.91	0	0	0	0		(100)
Utilisa	ation fac	tor for lo	ss hm			ļ	<u> </u>	ļ				ļ		
(101)m=	0	0	0	0	0	0.91	0.95	0.93	0	0	0	0		(101)
Usefu	ıl loss, h	ımLm (V	vatts) = (100)m x	(101)m									
(102)m=	0	0	0	0	0	849.45	698.58	700.63	0	0	0	0		(102)
Gains	(solar	gains ca	lculated	for appli	cable we	eather re	egion, se	e Table	10)				l	
(103)m=		0	0	0	0		1169.14		0	0	0	0		(103)
Space	e coolin	g require	ement fo	r month,	whole c	dwelling,	continu	ous (kW	h = 0.0	24 x [(10	03)m – (102)m] :	x (41)m	
set (1	04)m to	zero if ((104)m <	3 × (98)m		•						ı	
(104)m=	0	0	0	0	0	269.54	350.1	275.97	0	0	0	0		_
										= Sum(,	=	895.62	(104)
	d fraction		-61- 406	`					f C =	cooled	area ÷ (4	4) =	1	(105)
		actor (Ta			0	0.05	0.25	0.25	0	0	0			
(106)m=	0	0	0	0	0	0.25	0.25	0.25	0 T-4-	0	0	0		7(400)
Snace	cooling	requirer	ment for	month =	(104)m	× (105)	x (106)r	m	rota	l = Sum(1 U4)	=	0	(106)
(107)m=		0	0	0	0	67.39	87.53	68.99	0	0	0	0		
(101)	_			ŭ		07.00	07.00	00.00		= Sum(=	223.91	(107)
Cnass	ممانمم			\						,	19087)	_		= '
•		requirer							` ′) ÷ (4) =			2.97	(108)
		rgy Effici		alculated	only un	der spec	cial cond	litions, s		ĺ				
Fabrio	c Energ	y Efficier	псу						(99)	+ (108) =	=		49.91	(109)

eight associates

SAP Worksheets Energy Statement 34A-36 Kilburn High Road

SAP Worksheets

TER Worksheets

			User D	otaile:						
A N	Obrida I I a also all				- NI			OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	2		Stroma Softwa	_				016363 on: 1.0.4.16	
Contware rume.	31131114 T 3711 Z 311			Address:				7 01010		
Address :					·					
1. Overall dwelling dime	ensions:									
Ground floor				a(m²)	(1a) v		ight(m)	(2a) =	Volume(m³	(3a)
	-> (4 -> (4 -> (4 - > (4 - >))	\			(1a) x		2.7	(2a) -	135.46	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)) 5	0.17	(4)) . (0) . (0	10 - (0) -	(0.)		_
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	135.46	(5)
2. Ventilation rate:	main se	condary	1	other		total			m³ per hou	r
Number of objection	heating h	eating	′ 1 + [1 = F			40 =	-	_
Number of chimneys		0	!	0	<u> </u>	0			0	(6a)
Number of open flues	0 +	0	+	0	」	0		20 =	0	(6b)
Number of intermittent fa					L	2		10 =	20	(7a)
Number of passive vents	3					0	X '	10 =	0	(7b)
Number of flueless gas fi	ires					0	X 4	40 =	0	(7c)
								Air ch	anges per ho	our
Infiltration due to chimne	vs_flues and fans = (6a	a)+(6b)+(7a	a)+(7b)+(7c) =	Г	20		÷ (5) =	0.15	(8)
	peen carried out or is intende				ontinue fr			(0)	0.13	
Number of storeys in the	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber f				•	uction			0	(11)
deducting areas of openi	resent, use the value corresp ngs); if equal user 0.35	oonaing to t	ine great	er waii are	а (апег					
If suspended wooden	floor, enter 0.2 (unseale	ed) or 0.1	l (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
•	s and doors draught str	ripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate				(8) + (10)	. , , ,	, , ,	. ,		0	(16)
•	q50, expressed in cub		•	-	•	etre of e	envelope	area	5	(17)
If based on air permeabil	iity value, then (10) = [(17) es if a pressurisation test has					ic boing u	cod		0.4	(18)
Number of sides sheltere		been done	or a deg	gree an per	пеаышу	is being u	seu		1	(19)
Shelter factor				(20) = 1 -	0.075 x (1	9)] =			0.92	(20)
Infiltration rate incorporate	ting shelter factor			(21) = (18)	x (20) =				0.37	(21)
Infiltration rate modified f	or monthly wind speed							'		
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
	2)m ÷ 4 1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
(1.00			L 3.02	•		L <u>-</u>		I	

Adjusted infilt	ration rate	(allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.47	0.46	0.45	0.4	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
Calculate effe		_	rate for t	he appli	cable ca	se	•	!			•		
If mechanic			on allow NL (O	Ol-) (OO -	-		N/5/\\ -4/		·			0	(23a
If exhaust air h									o) = (23a)			0	(23b
If balanced wit		-	•	_								0	(230
a) If balance					·	- ` ` 	, , , , , , , , , , , , , , , , , , , 	ŕ	, 	<u> </u>	' ' ') ÷ 100] 1	(04-
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24 a
b) If balance							, 	í `	r Ó Tì		1 .	1	(0.41)
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24)
c) If whole I if (22b)	house extra m < 0.5 × (•	•				.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)	l ventilatior m = 1, ther			•	•				0.5]				
(24d)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(24d
Effective air	r change ra	ate - er	iter (24a) or (24b	o) or (24	c) or (24	ld) in box	x (25)	-			•	
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59]	(25)
3. Heat losse	es and hea	ıt loss p	paramete	er:							•	•	
ELEMENT	Gross area (r		Openin m		Net Ar A ,r		U-val W/m2		A X U (W/k	()	k-value kJ/m²·		A X k kJ/K
Doors					2	X	1	=	2				(26)
Windows Typ	e 1				3.97	x1	/[1/(1.4)+	0.04] =	5.26				(27)
Windows Typ	e 2				1.92	x1	/[1/(1.4)+	0.04] =	2.55				(27)
Windows Typ	e 3				1.73	x1	/[1/(1.4)+	0.04] =	2.29				(27)
Rooflights Typ	pe 1				0.43649	94 x1	/[1/(1.7) +	0.04] =	0.742048	9			(27b
Rooflights Typ	pe 2				0.74412		/[1/(1.7) +	0.04] =	1.265017	_			(27)
Walls Type1	35.48		9.35		26.13	_	0.18		4.7	=			(29)
Walls Type2	30.48	=	2		28.48	_	0.18		5.13	=		7	(29)
Roof	50.17	=	1.18		48.99	=	0.13	= =	6.37	북 ¦			(30)
Total area of		 m²	1.10		116.1	_	0.10		0.01				(31)
Party wall	Cicinonio, i					=		<u> </u>	•	–			
Party floor					26.97	_	0	=	0			- -	(32)
i aliv iiuuli		ve uco o	ffective wi	ndow II	50.17		a formula 1	/[/1/ val	(A) LO 041 ~	e aivon in	naraaran		(328
•	d roof window	vs, use e	nective wi			aleu using	g IOITIIUIA T	η(170-vait	1 0)+0.04j a	s giveri iri	paragrapi	13.2	
* for windows and ** include the are		ides of in	ternal wal	ls and par	titions								
* for windows and ** include the are	eas on both si			ls and par	titions		(26)(30)) + (32) =				32.47	7 (33)
* for windows and ** include the are Fabric heat lo	eas on both si oss, W/K =	S (A x		ls and par	titions		(26)(30)		(30) + (32) + (32a).	(32e) =	1336	=======================================
* for windows and	eas on both si ess, W/K = v Cm = S(A	S (A x	U)	·			(26)(30)	((28).	(30) + (32 ative Value:		(32e) =		3 (34)
* for windows and ** include the are Fabric heat lo Heat capacity Thermal mass For design assess	eas on both si SS, W/K = CM = S(A S paramete Sesments wher	S (A x x k) er (TMF re the de	U) P = Cm ÷ tails of the	- TFA) ir	n kJ/m²K			((28).	itive Value:	Medium		1336	3 (34)
* for windows and ** include the are Fabric heat lo Heat capacity	eas on both si ess, W/K = r Cm = S(A s paramete essments wher ead of a detail	S (A x x k) er (TMF re the de	U) P = Cm ÷ tails of the ulation.	- TFA) ir construct	า kJ/m²K ion are not	t known pr		((28).	itive Value:	Medium		1336	3 (34)

Total fabric heat loss				(22) ±	(26) -		ı	42.04	7(07)
Ventilation heat loss calculated monthly				` '	(36) =	25)m x (5)		43.61	(37)
	, lup	Jul	Δυα	` '			1		
Jan Feb Mar Apr May (38)m= 27.27 27.08 26.89 26.01 25.85	_	25.08	Aug 24.94	Sep 25.37	Oct 25.85	Nov 26.18	Dec 26.53		(38)
Heat transfer coefficient, W/K	1 20.00	1 -0.00			= (37) + (37)				,
(39)m= 70.88 70.68 70.5 69.62 69.45	68.69	68.69	68.55	68.98	69.45	69.79	70.13		
		<u> </u>	<u>!</u>		L Average =	Sum(39) _{1.}	12 /12=	69.62	(39)
Heat loss parameter (HLP), W/m²K				(40)m	= (39)m ÷	(4)	,		
(40)m= 1.41 1.41 1.39 1.38	1.37	1.37	1.37	1.37	1.38	1.39	1.4		_
Number of days in month (Table 1a)				,	Average =	Sum(40) _{1.}	12 /12=	1.39	(40)
Jan Feb Mar Apr May	/ Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28 31 30 31	30	31	31	30	31	30	31		(41)
	•								
4. Water heating energy requirement:							kWh/ye	ear:	
Assumed assumes at N							-		
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000)349 x (TF	FA -13.9)2)1 + 0.0	0013 x (⁻	ΓFA -13.		.7		(42)
if TFA £ 13.9, N = 1	(, ,,	•		- /			
Annual average hot water usage in litres per o	•	_	` ,		o targat a		.46		(43)
Reduce the annual average hot water usage by 5% if the not more that 125 litres per person per day (all water use	•	-	to acriieve	a water us	se largel o	I			
Jan Feb Mar Apr May	/ Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres per day for each month Vd,m =				Seb	Oct	INOV	Dec		
(44)m= 81.9 78.93 75.95 72.97 69.99	67.01	67.01	69.99	72.97	75.95	78.93	81.9		
		<u> </u>		-	L Γotal = Su	l m(44) ₁₁₂ =		893.51	(44)
Energy content of hot water used - calculated monthly =	4.190 x Vd,r	m x nm x E	OTm / 3600	kWh/mon	nth (see Ta	ables 1b, 1	c, 1d)		_
(45)m= 121.46 106.23 109.62 95.57 91.7	79.13	73.33	84.14	85.15	99.23	108.32	117.63		
What a large and a large and a large at a la			h (40		Total = Su	m(45) ₁₁₂ =		1171.53	(45)
If instantaneous water heating at point of use (no hot wat						1			
(46)m= 18.22 15.93 16.44 14.34 13.76 Water storage loss:	11.87	11	12.62	12.77	14.89	16.25	17.64		(46)
Storage volume (litres) including any solar or	WWHRS	storage	within sa	ame ves	sel		0		(47)
If community heating and no tank in dwelling,		_					<u> </u>		()
Otherwise if no stored hot water (this includes			` '	ers) ente	er '0' in (47)			
Water storage loss:									
a) If manufacturer's declared loss factor is kn	own (kWh	n/day):					0		(48)
Temperature factor from Table 2b							0		(49)
Energy lost from water storage, kWh/year			(48) x (49)) =			0		(50)
 b) If manufacturer's declared cylinder loss factor Hot water storage loss factor from Table 2 (kW) 							•		(51)
If community heating see section 4.3	vii/iiti e/ue	ay <i>)</i>					0		(51)
Volume factor from Table 2a							0		(52)
Temperature factor from Table 2b							0		(53)
Energy lost from water storage, kWh/year			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54) in (55)							0		(55)

Water	storage	loss cal	culated t	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylind	er contains	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	ı ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Prima	ry circuit	loss (an	nual) fro	om Table	e 3							0		(58)
Prima	ry circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(mo	dified by	factor fr	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)
Comb	i loss ca	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	41.74	36.33	38.7	35.99	35.67	33.05	34.15	35.67	35.99	38.7	38.92	41.74		(61)
Total I	neat requ	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=	163.2	142.56	148.32	131.56	127.37	112.18	107.48	119.81	121.13	137.94	147.24	159.37		(62)
Solar D	HW input of	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	'	
(add a	dditiona	l lines if	FGHRS	and/or V	WWHRS	applies	, see Ap	pendix (3)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Outpu	t from w	ater hea	ter	_	-	-	-	-	-		-	-	•	
(64)m=	163.2	142.56	148.32	131.56	127.37	112.18	107.48	119.81	121.13	137.94	147.24	159.37		
								Outp	out from wa	ater heate	r (annual)₁	12	1618.16	(64)
Heat o	ains froi	m water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	_
(65)m=	50.82	44.4	46.12	40.77	39.41	34.57	32.92	36.89	37.31	42.67	45.75	10.55	l ⁻	(65)
					00	1 0	32.32	30.09	37.31	42.07	45.75	49.55		(03)
incli	ude (57)	m in cald	!	ļ	ļ	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	ļ	eating	(00)
	. ,		culation (of (65)m	only if c	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	munity h	eating	(00)
5. In	ternal ga	ains (see	culation of the Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u> </u>	ļ	eating	(03)
5. In	ternal ga	ains (see s (Table	culation of Table 5	of (65)m and 5a	only if o	ylinder i	s in the o	dwelling	or hot w	ater is fr	rom com	munity h	eating	(03)
5. In	ternal ga olic gain Jan	ains (see s (Table Feb	culation of Table 5 (5), Wat Mar	of (65)m and 5a ts Apr	only if c	ylinder is	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. In Metab	olic gain Jan 84.76	s (Table Feb 84.76	e Table 5 5), Wat Mar 84.76	of (65)m 5 and 5a ts Apr 84.76	only if constant only i	Jun 84.76	Jul 84.76	Aug 84.76	or hot w	ater is fr	rom com	munity h	eating	
5. In Metab (66)m= Lightir	olic gain Jan 84.76	s (Table Feb 84.76 (calcular	Example 5 to 2 to 2 to 2 to 2 to 2 to 2 to 2 to	of (65)m and 5a ts Apr 84.76 ppendix	only if constant of the consta	Jun 84.76	Jul 84.76 r L9a), a	Aug 84.76	Sep 84.76	Oct	Nov 84.76	Dec 84.76	eating	(66)
5. In Metab (66)m= Lightir (67)m=	olic gain Jan 84.76 ng gains	s (Table Feb 84.76 (calcula	Table 5 5), Wat Mar 84.76 ted in Ap	of (65)m 6 and 5a tts Apr 84.76 ppendix 7.21	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the c	Jun 84.76 ion L9 o	Jul 84.76 r L9a), a	Aug 84.76 Iso see	Sep 84.76 Table 5	Oct 84.76	om com	munity h	eating	
5. In Metab (66)m= Lightir (67)m= Applia	olic gain Jan 84.76 ng gains 13.18 nces ga	s (Table Feb 84.76 (calcula 11.71	Example 5 ted in Apple of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 Append	only if construction only if c	Jun 84.76 ion L9 o 4.55 uation L	Jul 84.76 r L9a), a 4.92	Aug 84.76 Iso see 6.39 3a), also	Sep 84.76 Table 5 8.58 see Ta	Oct 84.76	Nov 84.76	Dec 84.76	eating	(66) (67)	
5. In Metab (66)m= Lightir (67)m= Applia (68)m=	olic gain Jan 84.76 ng gains 13.18 nces ga	s (Table Feb 84.76 (calcula 11.71 ins (calc	Example 5 to the collection of	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L	Jul 84.76 r L9a), a 4.92 13 or L1 110.48	Aug 84.76 Iso see 6.39 3a), also 108.95	Sep 84.76 Table 5 8.58 see Ta 112.81	Oct 84.76 10.89 ble 5 121.03	Nov 84.76	Dec 84.76	eating	(66)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookii	olic gain Jan 84.76 ng gains 13.18 nces gains 147.68	s (Table Feb 84.76 (calculations (calculations (calculations (calculations)) 149.21 (calculations)	Example 5 (a) Table 5 (b) Wat Mar 84.76 (b) ted in Apr 145.35 (b) ted in Apr 145.35 (c)	of (65)m 6 and 5a tts Apr 84.76 ppendix 7.21 Append 137.13 ppendix	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction of the construction of the construction on the construction of the construction	Jun 84.76 ion L9 of 4.55 uation L 116.99	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a	Aug 84.76 Iso see 6.39 3a), also 108.95	Sep 84.76 Table 5 8.58 See Ta 112.81 ee Table	Oct 84.76 10.89 ble 5 121.03	Nov 84.76 12.71	Dec 84.76	eating	(66) (67)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookii (69)m=	olic gain Jan 84.76 ng gains 13.18 nces gains 147.68 ng gains	s (Table Feb 84.76 (calcula 11.71 ins (calcula 149.21 (calcula 31.48	Evaluation of the color of the	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 n Append 137.13 ppendix 31.48	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L	Jul 84.76 r L9a), a 4.92 13 or L1 110.48	Aug 84.76 Iso see 6.39 3a), also 108.95	Sep 84.76 Table 5 8.58 see Ta 112.81	Oct 84.76 10.89 ble 5 121.03	Nov 84.76	Dec 84.76	eating	(66) (67) (68)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookir (69)m= Pump	olic gain Jan 84.76 ng gains 13.18 nces ga 147.68 ng gains 31.48 s and far	s (Table Feb 84.76 (calcula 11.71 ins (calc 149.21 (calcula 31.48 ns gains	Table 5 2 5), Wat Mar 84.76 ted in Ap 9.52 ulated in 145.35 ted in A 31.48 (Table 5	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13 ppendix 31.48 5a)	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a)	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.58 see Ta 112.81 ee Table 31.48	Oct 84.76 10.89 ble 5 121.03 5 31.48	Nov 84.76 12.71 131.41	Dec 84.76 13.55 141.16 31.48	eating	(66) (67) (68)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookii (69)m= Pump (70)m=	olic gain Jan 84.76 ng gains 13.18 nces gains 147.68 ng gains 31.48 s and far	s (Table Feb 84.76 (calcula 11.71 ins (calc 149.21 (calcula 31.48 ns gains	Evilation of the Evilonment of the Evilonment of the Evilone State of th	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13 ppendix 31.48 5a) 3	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a	Aug 84.76 Iso see 6.39 3a), also 108.95	Sep 84.76 Table 5 8.58 See Ta 112.81 ee Table	Oct 84.76 10.89 ble 5 121.03	Nov 84.76 12.71	Dec 84.76	eating	(66) (67) (68)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookii (69)m= Pump (70)m= Losse	olic gain Jan 84.76 ng gains 13.18 nces ga 147.68 ng gains 31.48 s and far 3 s e.g. ev	s (Table Feb 84.76 (calcular 11.71 ins (calcular 149.21 (calcular 31.48 ns gains 3	ted in Apulated in	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 n Append 137.13 ppendix 31.48 5a) 3 tive value	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.58 See Ta 112.81 ee Table 31.48	Oct 84.76 10.89 ble 5 121.03 5 31.48	Nov 84.76 12.71 131.41 31.48	Dec 84.76 13.55 141.16 31.48	eating	(66) (67) (68) (69) (70)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookir (69)m= Pump (70)m= Losse (71)m=	olic gain Jan 84.76 ng gains 13.18 nces ga 147.68 ng gains 31.48 s and far 3 s e.g. ev	s (Table Feb 84.76 (calcula 11.71 ins (calcula 149.21 (calcula 31.48 ns gains 3 aporatio -67.8	ted in Ap 145.35 ted in	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13 ppendix 31.48 5a) 3	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a)	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.58 see Ta 112.81 ee Table 31.48	Oct 84.76 10.89 ble 5 121.03 5 31.48	Nov 84.76 12.71 131.41	Dec 84.76 13.55 141.16 31.48	eating	(66) (67) (68)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookir (69)m= Pump (70)m= Losse (71)m= Water	olic gain Jan 84.76 ng gains 13.18 nces gains 147.68 ng gains 31.48 s and far 3 s e.g. ev -67.8 heating	s (Table Feb 84.76 (calcula 11.71 ins (calcula 31.48 ns gains 3 aporatio -67.8 gains (T	ted in Ap 9.52 ulated in Ap 31.48 (Table 5 3 an (negarable 5)	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 Appendix 31.48 5a) 3 tive valu -67.8	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.58 See Ta 112.81 ee Table 31.48	Oct 84.76 10.89 ble 5 121.03 5 31.48	Nov 84.76 12.71 131.41 31.48	Dec 84.76 13.55 141.16 31.48 3	eating	(66) (67) (68) (69) (70) (71)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookii (69)m= Pump (70)m= Losse (71)m= Water (72)m=	olic gain Jan 84.76 ng gains 13.18 nces ga 147.68 ng gains 31.48 s and far 3 s e.g. ev -67.8 heating 68.31	s (Table Feb 84.76 (calcular 11.71 ins (calcular 149.21 (calcular 31.48 ns gains 3 aporation -67.8 gains (T	culation of the ted in April 145.35 ted in Apr	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 n Append 137.13 ppendix 31.48 5a) 3 tive value	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48 3 ble 5) -67.8	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.58 See Ta 112.81 ee Table 31.48 3 -67.8	Oct 84.76 10.89 ble 5 121.03 5 31.48 3 -67.8	Nov 84.76 12.71 131.41 31.48 3	Dec 84.76 13.55 141.16 31.48 3 66.59	eating	(66) (67) (68) (69) (70)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookin (69)m= Pump (70)m= Losse (71)m= Water (72)m= Total	olic gain Jan 84.76 ng gains 13.18 nces ga 147.68 ng gains 31.48 s and far 3 s e.g. ev -67.8 heating 68.31	s (Table Feb 84.76 (calcula 11.71 ins (calc 149.21 (calcula 31.48 ns gains 3 aporatio -67.8 gains (T 66.08	culation of Table 5 2 5), Wat Mar 84.76 ted in Ap 9.52 ulated in 145.35 tted in A 31.48 (Table 5 3 on (negation of the context	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 Appendix 137.13 ppendix 31.48 5a) 3 tive valu -67.8	only if constructions only if constructions	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48 3 ole 5) -67.8	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48 3	Sep 84.76 Table 5 8.58 See Ta 112.81 See Table 31.48 3 -67.8 51.82 + (69)m + (Oct 84.76 10.89 ble 5 121.03 5 31.48 3 -67.8	Nov 84.76 12.71 131.41 31.48 3 -67.8 63.54 1)m + (72)	munity h Dec 84.76 13.55 141.16 31.48 3 -67.8	eating	(66) (67) (68) (69) (70) (71)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookii (69)m= Pump (70)m= Losse (71)m= Water (72)m= Total (73)m=	olic gain Jan 84.76 ng gains 13.18 nces ga 147.68 ng gains 31.48 s and far 3 s e.g. ev -67.8 heating 68.31	s (Table Feb 84.76 (calcular 11.71 ins (calcular 149.21 (calcular 31.48 ins gains 3 aporation 66.08 gains = 278.42	culation of the ted in April 145.35 ted in Apr	of (65)m 5 and 5a ts Apr 84.76 ppendix 7.21 Appendix 31.48 5a) 3 tive valu -67.8	only if construction only if c	Jun 84.76 ion L9 of 4.55 uation L 116.99 tion L15 31.48 3 ble 5) -67.8	Jul 84.76 r L9a), a 4.92 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.39 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.58 See Ta 112.81 ee Table 31.48 3 -67.8	Oct 84.76 10.89 ble 5 121.03 5 31.48 3 -67.8	Nov 84.76 12.71 131.41 31.48 3	Dec 84.76 13.55 141.16 31.48 3 66.59	eating	(66) (67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	3.97	x	11.28	x	0.63	x	0.7	=	13.69	(75)
Northeast 0.9x	0.77	x	1.92	x	11.28	x	0.63	x	0.7	=	6.62	(75)
Northeast 0.9x	0.77	X	3.97	x	22.97	x	0.63	x	0.7	=	27.87	(75)
Northeast 0.9x	0.77	x	1.92	x	22.97	x	0.63	x	0.7	=	13.48	(75)
Northeast 0.9x	0.77	x	3.97	x	41.38	x	0.63	x	0.7	=	50.2	(75)
Northeast 0.9x	0.77	x	1.92	x	41.38	x	0.63	x	0.7	=	24.28	(75)
Northeast 0.9x	0.77	x	3.97	x	67.96	x	0.63	x	0.7] =	82.45	(75)
Northeast 0.9x	0.77	x	1.92	x	67.96	x	0.63	x	0.7	=	39.87	(75)
Northeast 0.9x	0.77	x	3.97	x	91.35	x	0.63	x	0.7	=	110.83	(75)
Northeast 0.9x	0.77	x	1.92	x	91.35	x	0.63	x	0.7	=	53.6	(75)
Northeast 0.9x	0.77	x	3.97	x	97.38	x	0.63	x	0.7	=	118.15	(75)
Northeast 0.9x	0.77	x	1.92	x	97.38	x	0.63	x	0.7	=	57.14	(75)
Northeast 0.9x	0.77	x	3.97	x	91.1	x	0.63	X	0.7	=	110.53	(75)
Northeast 0.9x	0.77	x	1.92	x	91.1	x	0.63	x	0.7	=	53.46	(75)
Northeast 0.9x	0.77	X	3.97	x	72.63	x	0.63	X	0.7	=	88.12	(75)
Northeast 0.9x	0.77	X	1.92	x	72.63	X	0.63	X	0.7	=	42.62	(75)
Northeast 0.9x	0.77	X	3.97	x	50.42	x	0.63	X	0.7	=	61.17	(75)
Northeast 0.9x	0.77	x	1.92	x	50.42	x	0.63	x	0.7	=	29.59	(75)
Northeast 0.9x	0.77	x	3.97	x	28.07	x	0.63	x	0.7	=	34.05	(75)
Northeast 0.9x	0.77	X	1.92	x	28.07	x	0.63	X	0.7	=	16.47	(75)
Northeast 0.9x	0.77	x	3.97	x	14.2	x	0.63	x	0.7	=	17.22	(75)
Northeast 0.9x	0.77	x	1.92	x	14.2	x	0.63	x	0.7	=	8.33	(75)
Northeast 0.9x	0.77	x	3.97	x	9.21	x	0.63	x	0.7	=	11.18	(75)
Northeast 0.9x	0.77	x	1.92	x	9.21	x	0.63	x	0.7	=	5.41	(75)
Northwest 0.9x	0.77	X	1.73	x	11.28	X	0.63	X	0.7	=	11.93	(81)
Northwest 0.9x	0.77	x	1.73	x	22.97	x	0.63	X	0.7	=	24.29	(81)
Northwest 0.9x	0.77	X	1.73	x	41.38	X	0.63	X	0.7	=	43.75	(81)
Northwest 0.9x	0.77	x	1.73	x	67.96	X	0.63	X	0.7	=	71.86	(81)
Northwest 0.9x	0.77	x	1.73	x	91.35	x	0.63	X	0.7	=	96.59	(81)
Northwest 0.9x	0.77	x	1.73	x	97.38	x	0.63	x	0.7	=	102.98	(81)
Northwest 0.9x	0.77	x	1.73	x	91.1	X	0.63	X	0.7	=	96.33	(81)
Northwest 0.9x	0.77	X	1.73	x	72.63	x	0.63	x	0.7	=	76.8	(81)
Northwest 0.9x	0.77	x	1.73	x	50.42	x	0.63	x	0.7	=	53.32	(81)
Northwest 0.9x	0.77	x	1.73	x	28.07	x	0.63	x	0.7	=	29.68	(81)
Northwest 0.9x	0.77	x	1.73	x	14.2	x	0.63	x	0.7	=	15.01	(81)
Northwest 0.9x	0.77	X	1.73	x	9.21	x	0.63	x	0.7] =	9.74	(81)
Rooflights 0.9x	1	X	0.44	x	26	x	0.63	x	0.7] =	4.5	(82)
Rooflights 0.9x	1	X	0.74	x	26	×	0.63	x	0.7] =	7.68	(82)
Rooflights 0.9x	1	X	0.44	x	54	×	0.63	x	0.7] =	9.36	(82)
				-		•		•		-		_

Rooflights _{0.9x}	1	×	0.74	4	X	54	1 x	0.63	×	0.7		15.95	(82)
Rooflights 0.9x	<u>·</u> 1	= x	0.44	==	X	96] x	0.63	×	0.7	╡ .	16.63	(82)
Rooflights 0.9x	<u>'</u> 1	= x	0.74		X	96]	0.63	d ×	0.7	╡ .	28.35	(82)
Rooflights 0.9x	<u>'</u> 1	= x	0.44		X	150] x	0.63	۰ ×	0.7	╡ .	25.99	(82)
Rooflights 0.9x	<u>'</u> 1	i x	0.74		X	150] ^] x	0.63	d ×	0.7	╡ .	44.3	(82)
Rooflights 0.9x	<u>'</u> 1	= x	0.44		X	192]	0.63	X	0.7	╡ .	33.26	(82)
Rooflights 0.9x	<u>'</u> 1	i x	0.74		X	192]	0.63	d ^	0.7	╡ .	56.71	(82)
Rooflights 0.9x	<u>'</u> 1	= x	0.44		X	200] x	0.63	d ×	0.7	╡ .	34.65	(82)
Rooflights 0.9x	<u>·</u> 1		0.74		X	200] x	0.63	×	0.7	╡ .	59.07	(82)
Rooflights 0.9x	<u>'</u> 1		0.44		X	189] x	0.63	۰ ×	0.7	╡ .	32.74	(82)
Rooflights 0.9x	<u>·</u> 1	= x	0.74		X	189] x	0.63	×	0.7	╡ -	55.82	(82)
Rooflights 0.9x	<u>'</u> 1		0.44		X	157] x	0.63	×	0.7	╡ -	27.2	(82)
Rooflights 0.9x	<u>'</u> 1		0.74	==	X	157] x	0.63	۰ ×	0.7	╡ .	46.37	(82)
Rooflights 0.9x	<u>·</u> 1		0.44		X	115] x	0.63	= x	0.7	╡ -	19.92	(82)
Rooflights _{0.9x}	<u>·</u>	×	0.74		X	115] x	0.63	×	0.7	╡ .	33.96	(82)
Rooflights 0.9x	<u>·</u> 1	= x	0.4		X	66]]	0.63	ا ×	0.7	╡ -	11.43	(82)
Rooflights _{0.9x}	1	x	0.74		X	66]]	0.63	= x	0.7	= =	19.49	(82)
Rooflights _{0.9x}	1	×	0.4		X	33) X	0.63	×	0.7	= =	5.72	(82)
Rooflights _{0.9x}	1	x	0.74	4	X	33	X	0.63	×	0.7	= =	9.75	(82)
Rooflights 0.9x	1	×	0.4	4	X	21	X	0.63	×	0.7	=	3.64	(82)
Rooflights 0.9x	1	×	0.74	4	X	21	X	0.63	×	0.7	=	6.2	(82)
L							J		_				
Solar gains in	watts, calc	ulated	for each	n montl	h		(83)m	n = Sum(74)m .	(82)m				
(83)m= 44.42	90.93 1	63.22	264.47	350.99	3	71.99 348.88	28	1.1 197.96	111.1	3 56.03	36.17		(83)
Total gains – ir	nternal and	d solar	(84)m =	(73)m	+ (33)m , watts						•	
(84)m= 325.02	369.35	31.51	516.86	587.52	5	92.98 559.95	497	.45 422.59	351.8	315.11	308.9		(84)
7. Mean inter	nal temper	rature (heating	seaso	n)								
Temperature	during hea	ating pe	eriods in	the liv	ing	area from Tal	ole 9	, Th1 (°C)				21	(85)
Utilisation fac	tor for gair	ns for li	ving are	a, h1,r	n (s	ee Table 9a)							
Jan	Feb	Mar	Apr	May		Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 1	0.99	0.99	0.95	0.85		0.68 0.52	0.	6 0.86	0.98	0.99	1		(86)
Mean internal	temperati	ure in li	iving are	ea T1 (follo	w steps 3 to 7	7 in T	able 9c)					
(87)m= 19.46	19.62	19.93	20.37	20.74	2	0.93 20.98	20.	97 20.8	20.32	19.82	19.44		(87)
Temperature	during hea	ating pe	eriods in	rest o	f dw	elling from Ta	able 9	9, Th2 (°C)		-	-		
(88)m= 19.75		19.76	19.77	19.78	$\overline{}$	9.79 19.79	19.		19.78	19.77	19.76		(88)
Utilisation fac	tor for gair	ns for re	est of dv	vellina	h2	m (see Table	9a)	•		•		•	
(89)m= 1		0.98	0.93	0.79	$\overline{}$	0.57 0.39	0.4	16 0.78	0.96	0.99	1		(89)
Mean internal	temnerati	ure in t	he rest (of dwel	lina	T2 (fallow etc	ns 3	to 7 in Tahl	e 9c)			ı	
(90)m= 17.73		18.42	19.05	19.53	Ť	9.74 19.78	19.		18.99	18.27	17.71		(90)
. , [-						L			ving area ÷ (4		0.47	(91)
		"	. 41		منالم	~\ _ fl	. /1	fl A \ v TO				<u> </u>	

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

(92)m= 18	.55 18.75	19.13	19.67	20.1	20.31	20.35	20.34	20.18	19.62	19	18.53		(92)
Apply adj	ustment to	the mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate	ļ			
(93)m= 18	.55 18.75	19.13	19.67	20.1	20.31	20.35	20.34	20.18	19.62	19	18.53		(93)
8. Space	heating req	uirement											
Set Ti to	the mean in	ternal ter	nperatu	e obtain	ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisa	tion factor f	or gains	using Ta	ble 9a									
J	an Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	n factor for o	ains, hm	:										
(94)m= 0.	99 0.99	0.98	0.93	0.81	0.62	0.45	0.53	0.81	0.96	0.99	1		(94)
	ins, hmGm	, W = (94	1)m x (8	4)m									
(95)m= 323	3.29 365.81	421.4	479.8	475.86	367.64	252.85	261.36	342.46	338.65	312.15	307.58		(95)
Monthly a	average ext	ernal 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= 101	0.18 978.97	890.7	749.97	583.32	391.9	257.55	270.16	419.19	626.49	830.74	1004.92		(97)
Space he	ating requir	ement fo	r each n	nonth, k\	Wh/mont	h = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 51°	1.05 412.05	349.16	194.52	79.95	0	0	0	0	214.16	373.39	518.83		
							Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	2653.09	(98)
Space he	ating requir	ement in	kWh/m²	² /year							İ	52.88	(99)
•	/ requireme				vetome i	noludina	mioro (יווט/					
•		nis – mu	ividuai II	ealing s	ysterns i	ricidaling	IIIICIO-C) IF)					
Space he	of space he	at from s	econdar	v/supple	mentary	system					ı	0	(201)
	of space he				····o····ca··y	-	(202) = 1	- (201) =			l I	1	(202)
	•		-					02) × [1 –	(202)] =		ļ		╡`
	of total heat	•	•				(204) - (2	02) ^ [1 - 1	(203)] -		ļ	1	(204)
Efficiency	of main sp	ace heat	ing syste	em 1								93.4	(206)
Efficiency	of seconda	ary/supple	ementar	y heating	g system	າ, %						0	(208)
J	an Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space he	ating requir	ement (c	alculate	d above)			•		•			
51 ⁻	1.05 412.05	349.16	194.52	79.95	0	0	0	0	214.16	373.39	518.83		
(211)m = {	[(98)m x (20	04)] } x 1	00 ÷ (20)6)									(211)
	7.16 441.16	373.83	208.26	85.6	0	0	0	0	229.29	399.77	555.49		
	!				l		ITota	l (kWh/yea	ar) =Sum(2	L	<u></u>	2840.57	(211)
Snace he	eating fuel (s	econdar	ν) k\//h/	month							ı		」 ` '
•	(201)] } x		• , .	month									
• • • • • • • • • • • • • • • • • • • •	0 0	0	0	0	0	0	0	0	0	0	0		
` ′		l			ļ		ITota	l I (kWh/yea	ar) =Sum(2	L 215), _{540, 45}	=	0	(215)
Water hea	tina								,	715,1012	· I	<u> </u>	
	m water hea	ater (calc	ulated a	hove)									
-	3.2 142.56	148.32	131.56	127.37	112.18	107.48	119.81	121.13	137.94	147.24	159.37		
	of water he				I .	_	<u> </u>	L		I		80.3	(216)
	.73 87.57	87.13	86.03	83.92	80.3	80.3	80.3	80.3	86.15	87.29	87.8	00.0	(217)
				03.82	00.3	00.3	00.3	00.3	00.10	01.28	01.0		(411)
	ater heating (64)m x 10												
(219)m = 186		170.23	152.91	151.78	139.7	133.84	149.2	150.85	160.1	168.67	181.5		
			<u> </u>	<u> </u>	l	<u> </u>	l	I = Sum(2	19a) _{1 12} =	<u> </u>		1907.63	(219)
								*	14				(

Annual totals		kWh/year	kWh/year
Space heating fuel used, main system 1		,	2840.57
Water heating fuel used			1907.63
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	a)(230g) =	75 (231)
Electricity for lighting			232.82 (232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	0 ,		
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh	kg CO2/year
	kWh/year	kg CO2/kWh	kg CO2/year 613.56 (261)
Space heating (secondary)	kWh/year (211) x (215) x	kg CO2/kWh 0.216 = 0.519 =	kg CO2/year 613.56 (261) 0 (263)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	kg CO2/kWh 0.216 = 0.519 =	kg CO2/year 613.56 (261) 0 (263) 412.05 (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 0.216 = 0.519 = 0.216 =	kg CO2/year 613.56 (261) 0 (263) 412.05 (264) 1025.61 (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 (232) x	kg CO2/kWh 0.216 = 0.519 = 0.519 =	kg CO2/year 613.56 (261) 0 (263) 412.05 (264) 1025.61 (265) 38.93 (267)

TER =

23.63

(273)

		User D	etails:						
Assessor Name:	Chris Hocknell		Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	_				n: 1.0.4.16	
		Property /	Address	Apartm	ent 2				
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			a(m²)	(4-)		ight(m)] ₍₀₌₎ =	Volume(m³)	_
	a) ((4 h) ((4 a) ((4 d) ((4 a) ((1a) x		2.7	(2a) =	159.98	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(5	9.25	(4))+(3°)+(3°	d)+(3e)+	(3n) =		٦
Dwelling volume				(3a)+(3b)+(30)+(30	л)т(зе)т	.(311) =	159.98	(5)
2. Ventilation rate:	main seconda	erv	other		total			m³ per hou	r
	heating heating	<u> </u>	Other	, –	lotai			in per nou	_
Number of chimneys	0 + 0		0	」 <u> </u>	0		40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	x :	20 =	0	(6b)
Number of intermittent fa	ins				2	X	10 =	20	(7a)
Number of passive vents	•			Γ	0	X ·	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0		40 =	0	(7c)
				_			A: l-		_
							Air ch	anges per ho	ur —
	ys, flues and fans = $(6a)+(6b)+$				20		÷ (5) =	0.13	(8)
Number of storeys in the	peen carried out or is intended, proce he dwelling (ns)	:ea 10 (17), C	otrierwise (onunue ii	om (9) to	(10)		0	(9)
Additional infiltration	(1.5)					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame of	or 0.35 for	masoni	y constr	uction			0	(11)
	resent, use the value corresponding	to the greate	er wall are	a (after			•		_
deducting areas of openia	floor, enter 0.2 (unsealed) or	0.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en	,	(,,					0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic meta	es per ho	our per s	quare m	etre of e	envelope	area	5	(17)
·	lity value, then $(18) = [(17) \div 20]$							0.38	(18)
	es if a pressurisation test has been d	one or a deg	gree air pe	rmeability	is being u	sed	ı		٦
Number of sides sheltere Shelter factor	ea		(20) = 1 -	0.075 x (1	19)] =			3 0.78	(19) (20)
Infiltration rate incorporate	ting shelter factor		(21) = (18	`	- //			0.78	(21)
Infiltration rate modified f	•		(= -) (, (==)				0.29	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7	,		· · · · ·	•	•		•	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (20-) (2	2)m · 4	•				-		•	
Wind Factor $(22a)m = (2(22a)m = 1.27)$ 1.25	2)m ÷ 4 1.23	0.95	0.92	1	1.08	1.12	1.18		
(22α)111 1.23	1.20 1.1 1.00 0.95	0.90	J.32	'	1.00	1.12	1.10		

0.37	0.36	0.36	0.32	0.31	0.28	0.28	0.27	0.29	0.31	0.33	0.34]	
alculate effe		-	rate for t	he appli	cable ca	se	!	!			1	J	
If mechanica												0	(2
If exhaust air h									o) = (23a)			0	(;
If balanced with												0	(
a) If balance			i	i	i	, 	- 	ŕ	, 		' ' ') ÷ 100]	,
-a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(:
b) If balance				ı		 	- ^ ` 	í `	r í i		1	1	
b)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(
c) If whole h if (22b)n				-	•				.5 × (23b)	_	_	
c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(
d) If natural if (22b)n	ventilation				•				0.5]			_	
d)m= 0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56]	(
Effective air	change	rate - er	nter (24a) or (24l	o) or (24	c) or (24	d) in bo	x (25)				_	
)m= 0.57	0.57	0.56	0.55	0.55	0.54	0.54	0.54	0.54	0.55	0.55	0.56]	(
Heat losse	s and he	at loss (paramet	er:									
EMENT	Gros area		Openin m		Net Ar A ,r		U-val W/m2		A X U (W/h	۲)	k-value kJ/m²·		A X k kJ/K
ors					2	X	1	=	2				(
ndows Type	: 1				4.89	x1	/[1/(1.4)+	0.04] =	6.48				(
ndows Type	2				2.49	_X 1	/[1/(1.4)+	0.04] =	3.3				(
ndows Type	3				1.9	x1	/[1/(1.4)+	0.04] =	2.52				(
ndows Type	: 4				2.58	<u></u>	/[1/(1.4)+	0.04] =	3.42				(
oflights					0.95236	603 x1	/[1/(1.7) +	0.04] =	1.619012	<u>=</u>			(
alls Type1	38.9	5	11.8	6	27.09) x	0.18	=	4.88	_ [
alls Type2	45.4	7	2	=	43.47	7 X	0.18	= =	7.82	=		5	(
of	59.2		0.95		58.3	=	0.13		7.58	-		i i	(
tal area of e			0.00		143.6	=	00)` (
rty wall	,				25.95	=	0		0	— [(:
rty floor						=				L		╡ 누	(
-	roof winds	אינ וופם ב	effective wi	ndow H-v	59.25		ı formula 1	/[(1/ ₋ vəl	ue)+∩ ∩41 a	s aiven in	n naranrani		(
r windowe and						aica asing	, ioiiiiaia i	n van	10)+0.0+j a	3 given in	i paragrapi	10.2	
	s, W/K =	= S (A x	U)				(26)(30) + (32) =				39.52	2 (
nclude the area		Δvk)						((28).	(30) + (32	!) + (32a)	(32e) =	16820.	08
r windows and nclude the area bric heat los at capacity		$\Delta \lambda K$						to die a	stive Value	Madium			===
nclude the area bric heat los at capacity	Cm = S(,	⊃ = Cm ÷	+ TFA) ir	า kJ/m²K			indica	ative Value:	wedium		250	[(
nclude the area bric heat los	Cm = S(A paramet Sments whe	ter (TMF ere the de	tails of the	,			recisely the				able 1f	250	(1

Total fabric heat lo	220						(33) +	(36) =		İ	50.82	(37)
Ventilation heat lo		d monthly	V				` ′	•	25)m x (5)		30.62	(07)
	eb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	9.88 29.74	29.09	28.97	28.41	28.41	28.3	28.63	28.97	29.22	29.47		(38)
Heat transfer coef	ficient, W/K		I				(39)m	= (37) + (37)	38)m		l	
(39)m= 80.84 8	0.7 80.57	79.92	79.8	79.23	79.23	79.13	79.45	79.8	80.04	80.3		
Heat loss parame	ter (HLP), W	/m²K	•	•	•	•		Average = = (39)m ÷	Sum(39) _{1.} (4)	12 /12=	79.92	(39)
(40)m= 1.36 1	.36 1.36	1.35	1.35	1.34	1.34	1.34	1.34	1.35	1.35	1.36		
Number of days in	n month (Tab	le 1a)	•	•	•	•	,	Average =	Sum(40) _{1.}	12 /12=	1.35	(40)
	eb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28 31	30	31	30	31	31	30	31	30	31		(41)
<u> </u>			ı								l	
4. Water heating	energy requ	irement:								kWh/ye	ear:	
											ı	
Assumed occupar if TFA > 13.9, N		([1 - exp	(-0 0003	349 x <i>(</i> TF	FA -13 9)2)] + 0 (0013 x (ΓFA -13		96		(42)
if TFA £ 13.9, N		() OAP	(0.000)	71 10.0	<i>,</i> _,] · o) N 0 10 N (•			
Annual average h										.76		(43)
Reduce the annual avenue not more that 125 litres	-			_	_	to acnieve	a water us	se target o	I			
Jan F	eb Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litre							ОСР	001	1407	DCC		
(44)m= 88.83 8	5.6 82.37	79.14	75.91	72.68	72.68	75.91	79.14	82.37	85.6	88.83		
	I	l	<u>I</u>	<u> </u>	<u> </u>	<u> </u>		rotal = Su	m(44) ₁₁₂ =	l	969.1	(44)
Energy content of hot	water used - ca	lculated mo	onthly = 4.	190 x Vd,r	n x nm x E	OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 131.74 11	5.22 118.9	103.66	99.46	85.83	79.53	91.26	92.35	107.63	117.49	127.58		
If instantaneous water	heating at noin	t of use (no	n hot water	r etoraga)	enter () in	hoves (16		Total = Su	m(45) ₁₁₂ =		1270.64	(45)
					1	· · ·	, ,		4= 00			(40)
(46)m= 19.76 17 Water storage los	7.28 17.83 S:	15.55	14.92	12.87	11.93	13.69	13.85	16.14	17.62	19.14		(46)
Storage volume (I		ng any so	olar or W	WHRS	storage	within sa	ame ves	sel		0		(47)
If community heat	ing and no ta	ank in dw	elling, e	nter 110) litres in	(47)					l	
Otherwise if no sto	ored hot wat	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
Water storage los											•	
a) If manufacture			or is kno	wn (kWl	n/day):					0		(48)
Temperature factor										0		(49)
Energy lost from v	_	-		or is not		(48) x (49)) =			0		(50)
b) If manufactureHot water storage		-								0		(51)
If community heat			_ (-,,					0		(0.)
Volume factor from	n Table 2a									0		(52)
Temperature factor	or from Table	2b								0		(53)
Energy lost from v	•	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54)	in (55)									0		(55)

Water	storage	loss cal	culated t	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylind	er contains	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	ı ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Prima	ry circuit	loss (an	nual) fro	om Table	e 3							0		(58)
Prima	ry circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(mo	dified by	factor fr	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)
Comb	i loss ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	45.27	39.4	41.98	39.03	38.68	35.84	37.04	38.68	39.03	41.98	42.22	45.27		(61)
Total I	heat requ	uired for	water he	eating ca	alculated	I for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	177.01	154.62	160.87	142.69	138.15	121.67	116.57	129.95	131.38	149.61	159.7	172.85		(62)
Solar D	HW input of	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add a	additiona	l 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)
Outpu	t from wa	ater hea	ter											
(64)m=	177.01	154.62	160.87	142.69	138.15	121.67	116.57	129.95	131.38	149.61	159.7	172.85		
			•					Outp	out from wa	ater heate	r (annual) ₁	12	1755.06	(64)
Heat (gains froi	m water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m=	55.12	48.16	50.03	44.22	42.74	37.5	35.7	40.00	40.40	40.00	40.00	50.74		(65)
	1		00.00	TT.22	72.77	37.5	35.7	40.02	40.46	46.28	49.62	53.74		(03)
incl	ude (57)ı	ļ.	<u> </u>	<u> </u>	ļ	<u> </u>	<u> </u>	ļ			<u> </u>	ļ	eating	(00)
	ude (57)ı ternal ga	m in cald	culation (of (65)m	only if c	<u> </u>	<u> </u>	ļ			<u> </u>	ļ	eating	(03)
5. In	ternal ga	m in cald ains (see	culation of the Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	ļ			<u> </u>	ļ	eating	(03)
5. In	. , ,	m in cald ains (see	culation of the Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	ļ			<u> </u>	ļ	eating	(03)
5. In	ternal ga	m in calc ains (see s (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. In Metab	ternal ga polic gain Jan	m in cald ains (see s (Table Feb 98.02	e Table 5 e 5), Wat Mar 98.02	of (65)m 5 and 5a ts Apr 98.02	only if constant only i	Jun 98.02	Jul 98.02	Aug 98.02	or hot w Sep 98.02	ater is fr	om com	munity h	eating	
5. In Metab	ternal ga oolic gain Jan 98.02 ng gains	m in cald ains (see s (Table Feb 98.02	e Table 5 e 5), Wat Mar 98.02	of (65)m 5 and 5a ts Apr 98.02	only if constant only i	Jun 98.02	Jul 98.02	Aug 98.02	or hot w Sep 98.02	ater is fr	om com	munity h	eating	
5. In Metab (66)m= Lightir (67)m=	ternal ga oolic gain Jan 98.02 ng gains	m in calc ains (see s (Table Feb 98.02 (calcula	ETable 5 E 5), Wat Mar 98.02 ted in Ap	of (65)m and 5a ts Apr 98.02 ppendix 8.34	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the c	Jun 98.02 ion L9 o	Jul 98.02 r L9a), a	Aug 98.02 Iso see	Sep 98.02 Table 5 9.92	Oct 98.02	Nov 98.02	Dec 98.02	eating	(66)
5. In Metab (66)m= Lightir (67)m=	dernal gain Jan 98.02 ng gains 15.26	m in calc ains (see s (Table Feb 98.02 (calcula	ETable 5 E 5), Wate Mar 98.02 ted in Ap	of (65)m and 5a ts Apr 98.02 ppendix 8.34	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the c	Jun 98.02 ion L9 o	Jul 98.02 r L9a), a	Aug 98.02 Iso see	Sep 98.02 Table 5 9.92	Oct 98.02	Nov 98.02	Dec 98.02	eating	(66)
5. In Metab (66)m= Lightir (67)m= Applia (68)m=	oolic gain Jan 98.02 ng gains 15.26 nnces ga	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calc	Example 5 to 2 to 2 to 2 to 2 to 2 to 2 to 2 to	of (65)m 5 and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83	only if construction only if c	Jun 98.02 ion L9 o 5.26 uation L	Jul 98.02 r L9a), a 5.69 13 or L1	Aug 98.02 lso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5	Nov 98.02	Dec 98.02	eating	(66) (67)
5. In Metab (66)m= Lightir (67)m= Applia (68)m=	Jan 98.02 ng gains 15.26 nnces gains 171.05	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calc	Example 5 to 2 to 2 to 2 to 2 to 2 to 2 to 2 to	of (65)m 5 and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83	only if construction only if c	Jun 98.02 ion L9 o 5.26 uation L	Jul 98.02 r L9a), a 5.69 13 or L1	Aug 98.02 lso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5	Nov 98.02	Dec 98.02	eating	(66) (67)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cooki (69)m=	Jan 98.02 ng gains 15.26 nnces gains 171.05	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calc 172.83 (calcula 32.8	ted in Apulated in	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8	May 98.02 L, equat 6.24 dix L, eq 146.81 L, equat	Jun 98.02 ion L9 o 5.26 uation L 135.51 tion L15	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a	Aug 98.02 Iso see 7.39 3a), also 126.19	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5 140.19	Nov 98.02 14.71	Dec 98.02	eating	(66) (67) (68)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cooki (69)m=	oolic gain Jan 98.02 ng gains 15.26 nnces gains 171.05 ng gains 32.8 s and far	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calc 172.83 (calcula 32.8	ted in Apulated in	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8	May 98.02 L, equat 6.24 dix L, eq 146.81 L, equat	Jun 98.02 ion L9 o 5.26 uation L 135.51 tion L15	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a	Aug 98.02 Iso see 7.39 3a), also 126.19	Sep 98.02 Table 5 9.92 see Ta 130.66	Oct 98.02 12.6 ble 5 140.19	Nov 98.02 14.71	Dec 98.02	eating	(66) (67) (68)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cooki (69)m= Pump (70)m=	oolic gain Jan 98.02 ng gains 15.26 nnces gain 171.05 ng gains 32.8 s and far	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calc 172.83 (calcula 32.8 ns gains 3	ted in Apulated in	of (65)m 5 and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 3	only if construction only if c	Jun 98.02 ion L9 o 5.26 uation L 135.51 tion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a)	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.71 152.21	Dec 98.02 15.68 163.5	eating	(66) (67) (68)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cooki (69)m= Pump (70)m=	oolic gain Jan 98.02 ng gains 15.26 nnces ga 171.05 ng gains 32.8 s and far 3 s e.g. ev	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calc 172.83 (calcula 32.8 ns gains 3	ted in Apulated in	of (65)m 5 and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 3	only if construction only if c	Jun 98.02 ion L9 o 5.26 uation L 135.51 tion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a)	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.71 152.21	Dec 98.02 15.68 163.5	eating	(66) (67) (68)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cooki (69)m= Pump (70)m= Losse (71)m=	oolic gain Jan 98.02 ng gains 15.26 nnces ga 171.05 ng gains 32.8 s and far 3 s e.g. ev	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calc 172.83 (calcula 32.8 ns gains 3 raporatio -78.41	ted in Ap 11.02 ulated in 168.35 ted in A 32.8 (Table §	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 n Append 158.83 ppendix 32.8 5a) 3 tive value	only if construction only if c	Jun 98.02 ion L9 o 5.26 uation L 135.51 tion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.71 152.21 32.8	Dec 98.02 15.68 163.5	eating	(66) (67) (68) (69) (70)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cooki (69)m= Pump (70)m= Losse (71)m=	olic gain Jan 98.02 ng gains 15.26 nnces ga 171.05 ng gains 32.8 s and far s e.g. ev -78.41 heating	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calc 172.83 (calcula 32.8 ns gains 3 raporatio -78.41	ted in Ap 11.02 ulated in 168.35 ted in A 32.8 (Table §	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 n Append 158.83 ppendix 32.8 5a) 3 tive value	only if construction only if c	Jun 98.02 ion L9 o 5.26 uation L 135.51 tion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 5 32.8	Nov 98.02 14.71 152.21 32.8	Dec 98.02 15.68 163.5	eating	(66) (67) (68) (69) (70)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cooki (69)m= Pump (70)m= Losse (71)m= Water (72)m=	olic gain Jan 98.02 ng gains 15.26 nnces ga 171.05 ng gains 32.8 s and far s e.g. ev -78.41 heating	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calcula 32.8 as gains 3 raporatio -78.41 gains (T	ted in Ap 11.02 ulated in 168.35 tted in A 32.8 (Table § 3 on (nega) -78.41 Table 5) 67.24	of (65)m 5 and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 3 tive valu -78.41	only if construction only if c	Jun 98.02 ion L9 o 5.26 uation L 135.51 tion L15 32.8 3 ble 5) -78.41	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8 3	Sep 98.02 Table 5 9.92 See Ta 130.66 See Table 32.8 3 -78.41	Oct 98.02 12.6 ble 5 140.19 5 32.8 3 -78.41	Nov 98.02 14.71 152.21 32.8 3 -78.41 68.91	munity h Dec 98.02 15.68 163.5 32.8 3 -78.41	eating	(66) (67) (68) (69) (70) (71)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cooki (69)m= Pump (70)m= Losse (71)m= Water (72)m=	oolic gain Jan 98.02 ng gains 15.26 nnces ga 171.05 ng gains 32.8 s and far 3 s e.g. ev -78.41 heating 74.09 internal	m in calc ains (see s (Table Feb 98.02 (calcula 13.55 ins (calcula 32.8 as gains 3 raporatio -78.41 gains (T	ted in Ap 11.02 ulated in 168.35 tted in A 32.8 (Table § 3 on (nega) -78.41 Table 5) 67.24	of (65)m 5 and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 3 tive valu -78.41	only if construction only if c	Jun 98.02 ion L9 o 5.26 uation L 135.51 tion L15 32.8 3 ble 5) -78.41	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8 3	Sep 98.02 Table 5 9.92 See Ta 130.66 See Table 32.8 3 -78.41	Oct 98.02 12.6 ble 5 140.19 5 32.8 3 -78.41	Nov 98.02 14.71 152.21 32.8 3 -78.41 68.91	munity h Dec 98.02 15.68 163.5 32.8 3 -78.41	eating	(66) (67) (68) (69) (70) (71)

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

Orientation: Access Fac Table 6d	tor	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	2.49	x	11.28	x	0.63	x	0.7	=	8.59	(75)
Northeast 0.9x 0.77	X	2.49	x	22.97	x	0.63	x	0.7	=	17.48	(75)
Northeast 0.9x 0.77	X	2.49	x	41.38	x	0.63	x	0.7	=	31.49	(75)
Northeast 0.9x 0.77	x	2.49	x	67.96	x	0.63	x	0.7] =	51.71	(75)
Northeast 0.9x 0.77	X	2.49	x	91.35	x	0.63	x	0.7	=	69.51	(75)
Northeast 0.9x 0.77	X	2.49	x	97.38	x	0.63	x	0.7	=	74.11	(75)
Northeast 0.9x 0.77	X	2.49	x	91.1	х	0.63	x	0.7	=	69.33	(75)
Northeast 0.9x 0.77	X	2.49	x	72.63	x	0.63	X	0.7	=	55.27	(75)
Northeast _{0.9x} 0.77	x	2.49	x	50.42	x	0.63	X	0.7	=	38.37	(75)
Northeast 0.9x 0.77	x	2.49	x	28.07	x	0.63	x	0.7	=	21.36	(75)
Northeast _{0.9x} 0.77	X	2.49	x	14.2	x	0.63	x	0.7	=	10.8	(75)
Northeast _{0.9x} 0.77	X	2.49	x	9.21	x	0.63	x	0.7	=	7.01	(75)
Northwest 0.9x 0.77	x	4.89	x	11.28	x	0.63	X	0.7] =	16.86	(81)
Northwest 0.9x 0.77	X	1.9	x	11.28	x	0.63	x	0.7	=	6.55	(81)
Northwest 0.9x 0.77	x	2.58	x	11.28	x	0.63	x	0.7	=	8.9	(81)
Northwest 0.9x 0.77	X	4.89	x	22.97	x	0.63	X	0.7	=	34.32	(81)
Northwest 0.9x 0.77	X	1.9	x	22.97	x	0.63	x	0.7	=	13.34	(81)
Northwest 0.9x 0.77	X	2.58	x	22.97	x	0.63	x	0.7	=	18.11	(81)
Northwest 0.9x 0.77	X	4.89	x	41.38	x	0.63	X	0.7	=	61.84	(81)
Northwest 0.9x 0.77	x	1.9	x	41.38	x	0.63	X	0.7	=	24.03	(81)
Northwest 0.9x 0.77	x	2.58	x	41.38	x	0.63	x	0.7	=	32.63	(81)
Northwest 0.9x 0.77	X	4.89	x	67.96	x	0.63	X	0.7	=	101.56	(81)
Northwest 0.9x 0.77	X	1.9	x	67.96	x	0.63	x	0.7	=	39.46	(81)
Northwest 0.9x 0.77	X	2.58	x	67.96	x	0.63	x	0.7	=	53.58	(81)
Northwest 0.9x 0.77	X	4.89	x	91.35	x	0.63	X	0.7	=	136.51	(81)
Northwest 0.9x 0.77	X	1.9	X	91.35	X	0.63	X	0.7	=	53.04	(81)
Northwest 0.9x 0.77	X	2.58	x	91.35	x	0.63	x	0.7	=	72.02	(81)
Northwest 0.9x 0.77	X	4.89	X	97.38	X	0.63	X	0.7	=	145.54	(81)
Northwest 0.9x 0.77	X	1.9	X	97.38	X	0.63	X	0.7	=	56.55	(81)
Northwest 0.9x 0.77	X	2.58	x	97.38	x	0.63	X	0.7	=	76.79	(81)
Northwest 0.9x 0.77	X	4.89	x	91.1	X	0.63	X	0.7	=	136.15	(81)
Northwest 0.9x 0.77	X	1.9	x	91.1	x	0.63	X	0.7	=	52.9	(81)
Northwest 0.9x 0.77	X	2.58	x	91.1	x	0.63	x	0.7	=	71.83	(81)
Northwest 0.9x 0.77	X	4.89	x	72.63	x	0.63	x	0.7	=	108.54	(81)
Northwest 0.9x 0.77	x	1.9	x	72.63	x	0.63	x	0.7	=	42.17	(81)
Northwest 0.9x 0.77	X	2.58	x	72.63	x	0.63	x	0.7] =	57.26	(81)
Northwest 0.9x 0.77	X	4.89	x	50.42	x	0.63	x	0.7] =	75.35	(81)
Northwest 0.9x 0.77	X	1.9	x	50.42	x	0.63	x	0.7] =	29.28	(81)
Northwest 0.9x 0.77	X	2.58	X	50.42	×	0.63	X	0.7	=	39.76	(81)

	_								_								
Northwe	est _{0.9x}	0.77	X	4.8	39	x	2	8.07	X	0.63	X		0.7		=	41.94	(81)
Northwe	est _{0.9x}	0.77	X	1.	9	X	2	8.07	X	0.63	X		0.7		=	16.3	(81)
Northwe	est _{0.9x}	0.77	X	2.5	58	x	2	8.07	X	0.63	X		0.7		=	22.13	(81)
Northwe	est _{0.9x}	0.77	X	4.8	39	x	1	14.2	x	0.63	X		0.7		=	21.22	(81)
Northwe	est _{0.9x}	0.77	X	1.	9	x	1	14.2	x	0.63	X		0.7		=	8.24	(81)
Northwe	est _{0.9x}	0.77	X	2.5	58	X	1	14.2	X	0.63	X		0.7		=	11.19	(81)
Northwe	est _{0.9x}	0.77	X	4.8	39	x	9	9.21	x	0.63	X		0.7		=	13.77	(81)
Northwe	est _{0.9x}	0.77	X	1.	9	x	9	9.21	x	0.63	X		0.7		=	5.35	(81)
Northwe	est _{0.9x}	0.77	X	2.5	58	X	9	9.21	X	0.63	X		0.7		=	7.27	(81)
Roofligh	nts _{0.9x}	1	X	0.0	95	x		26	x	0.63	X		0.7		=	9.83	(82)
Roofligh	nts _{0.9x}	1	X	0.9	95	x		54	x	0.63	X		0.7		=	20.41	(82)
Roofligh	nts _{0.9x}	1	X	0.9	95	x		96	x	0.63	X		0.7		=	36.29	(82)
Roofligh	nts _{0.9x}	1	X	0.9	95	x		150	x	0.63	x		0.7		=	56.7	(82)
Roofligh	nts _{0.9x}	1	X	0.9	95	x		192	x	0.63	X		0.7		=	72.57	(82)
Roofligh	nts _{0.9x}	1	X	0.0	95	x	2	200	x	0.63	X		0.7		=	75.6	(82)
Roofligh	nts _{0.9x}	1	X	0.9	95	x		189	x	0.63	X		0.7		=	71.44	(82)
Roofligh	nts _{0.9x}	1	X	0.9	95	x		157	x	0.63	X		0.7		=	59.34	(82)
Roofligh	nts _{0.9x}	1	X	0.0	95	x		115	x	0.63	X		0.7		=	43.47	(82)
Roofligh	nts _{0.9x}	1	X	0.0	95	x		66	x	0.63	X		0.7		=	24.95	(82)
Roofligh	nts _{0.9x}	1	X	0.0	95	X		33	X	0.63	X		0.7		=	12.47	(82)
Roofligh	nts _{0.9x}	1	X	0.9	95	x		21	x	0.63	x		0.7		=	7.94	(82)
																	_
Solar g	ains in	watts, ca	lculated	for eac	h mont	:h			(83)m	n = Sum(74)m	n(82)n	า					
(83)m=	50.72	103.66	186.27	303.01	403.66	6 4	28.58	401.64	322	.59 226.22	126.0	68 6	3.93	41	.34		(83)
Total g	ains – ir	nternal a	nd solar	(84)m =	= (73)m	า + (83)m ,	, watts									
(84)m=	366.52	417.11	488.29	587.01	669.57	7 6	76.84	638.69	565	.36 478.42	397.0	08 3	55.17	348	3.15		(84)
7. Me	an inter	nal temp	erature	(heating	seaso	n)											
Temp	erature	during h	eating p	eriods ii	n the liv	/ing	area f	rom Tab	ole 9	Th1 (°C)						21	(85)
Utilisa	ation fac	tor for ga	ains for I	iving are	ea, h1,	m (s	ее Та	ble 9a)									
	Jan	Feb	Mar	Apr	May	/	Jun	Jul	Α	ug Sep	Oc	t	Nov)ес		
(86)m=	1	1	0.99	0.95	0.86		0.68	0.53	0.6	0.87	0.98	3	1		1		(86)
Mean	interna	l tempera	ature in	living ar	ea T1 (follo	w ste	os 3 to 7	in T	able 9c)							
(87)m=	19.5	19.65	19.95	20.38	20.74	_	20.93	20.98	20.		20.3	3	9.84	19	.47		(87)
Temn	erature	during h	eating n	eriods i	rest c	of dw	/ellina	from Ta	hle (9, Th2 (°C)				•			
(88)m=	19.79	19.79	19.79	19.8	19.8	_	19.81	19.81	19.		19.8	3	19.8	19	9.8		(88)
					L Wolling				00/		-!					1	
(89)m=	1	tor for ga	0.98	0.94	0.8	$\overline{}$	0.58	0.39	9a) 0.4	7 0.79	0.97	,	0.99	Ι.	1		(89)
		ļ							<u> </u>	ļ .	<u> </u>					1	· - /
1				the rest	r	Ť			i 	to 7 in Tal		<u>, T</u>	0 24	17	77		(90)
(90)m=	17.81	18.03	18.47	19.08	19.56		19.77	19.81	19	.8 19.64	19.0 fLA = L		8.31 rea ÷ (.77	0.47	(90)
											12/ \ — L	. viily d	· ou · ((1) =		0.47	
Mean	interna	l temners	atura (fo	r the wh	ole dw	طالم	α) = fl	$\Delta \times T1$	+ (1	_ fl Δ\ x T'	2						

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

(92)m=	18.6	18.79	19.16	19.69	20.11	20.31	20.36	20.35	20.18	19.63	19.03	18.57		(92)
Apply	/ adjustn	nent to the	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate		<u>!</u>	l	
(93)m=	18.6	18.79	19.16	19.69	20.11	20.31	20.36	20.35	20.18	19.63	19.03	18.57		(93)
8. Sp	ace hea	ting requ	uirement											
						ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
tne u			or gains			lum	l. d	۸۰۰۰	Con	Oat	Nov	Dag		
Litilio	Jan	Feb	Mar ains, hm	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(94)m=	1	0.99	0.98	0.93	0.82	0.63	0.46	0.53	0.82	0.97	0.99	1		(94)
			W = (94			0.00	0.40	0.00	0.02	0.07	0.00			(= -)
(95)m=	364.91	413.7	478.19	548.08	547.08	424.63	292.27	302.07	392.63	383.9	352.35	346.93		(95)
			rnal tem			l	-							` ,
(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)
	loss rate	for mea	an intern	al tempe	erature.	Lm . W =	-[(39)m :	x [(93)m	 – (96)m	1				
	1155.97		1020.3	862.09	671.17	452.64	297.62	312.35	483.25	720.61	954.7	1153.54		(97)
Spac	e heating	g require	ement fo	r each m	nonth, k\	Mh/mont	h = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m=	588.55	475.23	403.33	226.09	92.32	0	0	0	0	250.51	433.69	600.12		
								Tota	l per year	(kWh/year	·) = Sum(9	8) _{15,912} =	3069.84	(98)
Spac	e heatin	a require	ement in	kWh/m²	/vear							i	51.81	(99)
•		•			•				NID)				01.01	
			nts – Indi	viduai n	eating sy	ystems i	nciuaing	micro-C	MP)					
-	e heating	•	it from se	econdar	v/supple	mentary	system					ı	0	(201)
			it from m	•		momany	-	(202) = 1 -	- (201) =			l I	1	(202)
				•	• •			. ,		(202)] =		ļ		╡゛゛
			ng from i	•				(204) - (2	02) × [1 –	(203)] -		ļ	1	(204)
Efficie	ency of r	nain spa	ace heati	ng syste	em 1							ļ	93.4	(206)
Effici	ency of s	seconda	ry/supple	ementar	y heating	g system	າ, %				_		0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Spac	e heatin	g require	ement (c	alculate	d above)							1	
	588.55	475.23	403.33	226.09	92.32	0	0	0	0	250.51	433.69	600.12		
(211)n	n = {[(98)m x (20	4)] } x 1	00 ÷ (20	6)									(211)
	630.14	508.81	431.84	242.06	98.84	0	0	0	0	268.21	464.34	642.53		
								Tota	I (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3286.77	(211)
Spac	e heatin	g fuel (s	econdar	y), kWh/	month							•		
= {[(98)m x (20	1)]}x1	00 ÷ (20	8)									ı	
(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	l										•		
Output			ter (calc			ı			ı				1	
	177.01	154.62	160.87	142.69	138.15	121.67	116.57	129.95	131.38	149.61	159.7	172.85		_
	ncy of w								<u> </u>		1		80.3	(216)
(217)m=		87.69	87.27	86.2	84.06	80.3	80.3	80.3	80.3	86.34	87.44	87.93		(217)
		•	kWh/mo											
(219)n (219)m=		m x 100 176.32) ÷ (217) 184.34	m 165.52	164.34	151.52	145.17	161.83	163.62	173.28	182.64	196.58		
(= 10)111	00	5.52	.51.57	. 55.52	.51.04	1 .51.02					· 3 <u>-</u> .0-			
								Tota	I = Sum(2	19a) =		[2066.65	(219)

Annual totals		IsWb/sees		lsWb/sees	
Space heating fuel used, main system 1		kWh/year		kWh/year 3286.77	7
Water heating fuel used				2066.65	Ī
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30		(230c)
boiler with a fan-assisted flue		ľ	45		(230e)
Total electricity for the above, kWh/year	sum of (230a	i)(230g) =		75	(231)
Electricity for lighting				269.42	(232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
12a. OOZ cillissions — individual ficating system.	•				
12a. 002 emissions – marvidual ficating systems	Energy kWh/year	Emission fact	tor	Emissions kg CO2/yea	
Space heating (main system 1)	Energy		tor =		
	Energy kWh/year	kg CO2/kWh		kg CO2/yea	ar ¬
Space heating (main system 1)	Energy kWh/year	kg CO2/kWh	=	kg CO2/yea	ar](261)
Space heating (main system 1) Space heating (secondary)	Energy kWh/year (211) x (215) x	0.216 0.519	=	kg CO2/yea	(261) (263)
Space heating (main system 1) Space heating (secondary) Water heating	Energy kWh/year (211) x (215) x (219) x	0.216 0.519	=	kg CO2/yea 709.94 0 446.4	(261) (263) (264)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energy kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	0.216 0.519 0.216	= =	kg CO2/yea 709.94 0 446.4 1156.34	(261) (263) (264) (265)

TER =

22.53

(273)

			User D	otaile:						
A N	Obrida I I a al va all	(- NI			OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	2		Stroma Softwa					016363 on: 1.0.4.16	
Software Hame.	Ottoma 1 O/ ti 201			Address:				VCISIC	71. 1.0.4.10	
Address :			, ,							
1. Overall dwelling dime	ensions:									
Ground floor				a(m²)	(1-)		ight(m)	7(2-) -	Volume(m³	<u>-</u>
	N. (41 N. (4 N. (4 IN. (4	\.			(1a) x		2.7	(2a) =	196.69	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	7:	2.85	(4)					_
Dwelling volume					(3a)+(3b))+(3c)+(3c	l)+(3e)+	.(3n) =	196.69	(5)
2. Ventilation rate:	main se	econdary		other		total			m³ per hou	r
North an of all large and	heating h	eating	_		,			40 -	-	_
Number of chimneys	0 +	0	+ _	0] = [0		40 =	0	(6a)
Number of open flues	0 +	0	+	0]	0		20 =	0	(6b)
Number of intermittent fa					L	3	X '	10 =	30	(7a)
Number of passive vents	;					0	X '	10 =	0	(7b)
Number of flueless gas fi	ires					0	X 4	40 =	0	(7c)
								Air ch	anges per ho	our
Infiltration due to chimne	vs_flues and fans = (6)	a)+(6b)+(7a))+(7b)+(7	7c) =	Г	30		÷ (5) =	0.15	(8)
	peen carried out or is intende				ontinue fr			(0)	0.13	
Number of storeys in the	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0					•	uction			0	(11)
deducting areas of openi	resent, use the value corresp ngs); if equal user 0.35	oonaing to tr	ne greate	er waii are	а (апег					
	floor, enter 0.2 (unseal	ed) or 0.1	(seale	d), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
Percentage of window	s and doors draught st	ripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate				(8) + (10)	. , , ,	, , ,	, ,		0	(16)
Air permeability value,	•		•	•	•	etre of e	envelope	area	5	(17)
If based on air permeabil Air permeability value applie	-					io boing u	and		0.4	(18)
Number of sides sheltere		s been done	or a deg	јгее ан рег	пеаышу	is being u	seu		3	(19)
Shelter factor	-			(20) = 1 -	0.075 x (1	9)] =			0.78	(20)
Infiltration rate incorporate	ting shelter factor			(21) = (18)	x (20) =				0.31	(21)
Infiltration rate modified f	or monthly wind speed									_
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								=	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2\m ÷ 4									
	2)m ÷ 4 1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
(1.00	3.00	0.00	J.02	•		L <u>-</u>	Lo	I	

Adjusted infiltr	0.39	0.38	0.34	0.34	0.3	0.3	0.29	0.31	0.34	0.35	0.37	1	
Calculate effe		_	rate for t	he appli	cable ca	ise							
If mechanica												0	(2
If exhaust air h									o) = (23a)			0	(2
If balanced with		-	-	_								0	(2
a) If balance		i			1	, 	- 	ŕ	, 	- 	<u> </u>) ÷ 100]	40
24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
b) If balance		i			1	 	- ^ ` 	ŕ	- ` `	- 	 	7	(0
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h	ouse ex n < 0.5 ×			•	•				.5 × (23b))		_	
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)r	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		(2
Effective air	change	rate - er	nter (24a	or (24l	b) 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		(2
3. Heat losse	s and he	eat loss _l	paramete	er:									
LEMENT	Gros area	-	Openin m		Net Ar A ,r		U-valı W/m2		A X U (W/I	K)	k-valu kJ/m²·		A X k kJ/K
oors		• •			2	x	1	=	2	,			(2
Vindows Type	e 1				4.25	x1	/[1/(1.4)+	0.04] =	5.63	一			(2
Vindows Type	e 2				5.9	x1	/[1/(1.4)+	0.04] =	7.82	Ħ			(2
Vindows Type	e 3				4.47	x1	/[1/(1.4)+	0.04] =	5.93	=			(2
Vindows Type	e 4				0.91	x1	/[1/(1.4)+	0.04] =	1.21	Ħ			(2
Rooflights					0.6817	503 x1	/[1/(1.7) +	0.04] =	1.15897	5			(2
Valls Type1	40.5	58	15.5	3	25.0	_	0.18		4.51			$\neg \vdash$	(2
Valls Type2	56.9	18	2	=	54.98	3 x	0.18		9.9	=		= =	(2
Roof	72.8	35	0.68	=	72.17	7 X	0.13	= =	9.38	≓ ¦		-	(3
otal area of e					170.4	=							`` (3
arty wall		,			23.2	=	0		0	[$\neg \vdash$	(;
arty floor					72.85	_				 		= =	(;
for windows and	l roof winde	ows, use e	effective wi	ndow U-v			g formula 1	/[(1/U-valu	ле)+0.04] а	l as given in	n paragrap		(
include the area								• `	,		, ,		
abric heat los	ss, W/K =	= S (A x	U)				(26)(30)) + (32) =				47.46	(3
	Cm = S((Axk)						((28).	(30) + (32	2) + (32a)	(32e) =	19233.2	21 (3
eat capacity	narama	ter (TMF	P = Cm ÷	- TFA) ir	า kJ/m²K				tive Value			250	(:
hermal mass	•	ere the de	tails of the	construct	tion are no	t known pi	recisely the	e indicative	e values of	TMP in T	able 1f		
leat capacity hermal mass or design assess an be used inste hermal bridgi	sments wh ad of a dea	tailed calc	ulation.				recisely the	e indicative	e values of	TMP in T	able 1f		

Total fabric he	at loss							(33) +	(36) =		İ	59.63	(37)
Ventilation hea		alculated	l monthl	V				• •	,	(25)m x (5)		39.03	(0,)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 37.59	37.39	37.19	36.28	36.1	35.31	35.31	35.16	35.61	36.1	36.45	36.82		(38)
Heat transfer of	coefficier	nt, W/K		ı	ı			(39)m	= (37) + (37)	38)m		l	
(39)m= 97.21	97.02	96.82	95.9	95.73	94.93	94.93	94.78	95.24	95.73	96.08	96.44		
Heat loss para	meter (H	HLP), W/	m²K	•	•	•	•		Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	95.9	(39)
(40)m= 1.33	1.33	1.33	1.32	1.31	1.3	1.3	1.3	1.31	1.31	1.32	1.32		
Number of day	ys in moi	nth (Tab	le 1a)	•	•	•		,	Average =	Sum(40) ₁	12 /12=	1.32	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
							•					l	
4. Water hea	ting enei	rav regui	irement:								kWh/ye	ear:	
if TFA > 13.9			[1 - exn	(<u>-0 0003</u>	R49 v (TF	-Δ -13 9	1211 + 0 (0013 x (1	ΓFΔ -13		31		(42)
if TFA £ 13.9		· 1.70 X	i cxp	(0.0000	7-10 X (11	7. 10.0	<i>)</i> 2)] · 0.0) X 010 X	1170 10.	.0)			
Annual averag											.14		(43)
Reduce the annua not more that 125	_				-	-	to achieve	a water us	se target o	t			
			i	.	<u> </u>	i		0	0-4	NI			
Jan Hot water usage i	Feb	Mar day for ea	Apr ach month	May Vd.m = fa	Jun	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 98.05	94.49	90.92	87.36	83.79	80.23	80.23	83.79	87.36	90.92	94.49	98.05		
(44)///	04.40	00.02	07.00	00.70	00.20	00.20	00.70			m(44) ₁₁₂ =		1069.69	(44)
Energy content of	f hot water	used - cal	culated me	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600			. ,			` ′
(45)m= 145.41	127.18	131.24	114.42	109.78	94.74	87.79	100.74	101.94	118.8	129.68	140.82		
									Γotal = Su	m(45) ₁₁₂ =		1402.53	(45)
If instantaneous w				not water		enter 0 ın	boxes (46)					l	
(46)m= 21.81 Water storage	19.08	19.69	17.16	16.47	14.21	13.17	15.11	15.29	17.82	19.45	21.12		(46)
Storage volum) includin	ng anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community h	, ,		•			_					<u> </u>		(**)
Otherwise if no	•			_			. ,	ers) ente	er '0' in (47)			
Water storage	loss:												
a) If manufact	turer's de	eclared l	oss facto	or is kno	wn (kWl	n/day):					0		(48)
Temperature f	actor fro	m Table	2b								0		(49)
Energy lost fro		_	-				(48) x (49)) =			0		(50)
b) If manufact Hot water stor			-								•		(E4)
If community h	_			IC Z (KVV	i i/iiii G/uc	ay <i>)</i>					0		(51)
Volume factor	•		011 110								0		(52)
Temperature f	actor fro	m Table	2b								0		(53)
Energy lost fro	m water	· storage	, kWh/ye	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or	(54) in (5	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 cylinde	er contains	dedicated	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primar	y circuit	loss (an	nual) fro	m Table	3							0		(58)
Primar	y circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(mo	dified by	factor fr	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	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m						
(61)m=	49.97	43.49	46.33	43.08	42.7	39.56	40.88	42.7	43.08	46.33	46.6	49.97		(61)
Total h	eat requ	uired for	water he	eating ca	alculated	l for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	195.38	170.67	177.57	157.5	152.48	134.3	128.67	143.44	145.02	165.13	176.28	190.79		(62)
Solar DI	-IW input o	calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add a	dditiona	l lines if	FGHRS	and/or V	WWHRS	applies	, see Ap	pendix (3)		_			
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from w	ater hea	ter											
(64)m=	195.38	170.67	177.57	157.5	152.48	134.3	128.67	143.44	145.02	165.13	176.28	190.79		
		-	-	-	-	-	-	Outp	out from wa	ater heate	r (annual) ₁	12	1937.22	(64)
Heat g	ains froi	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]	
(65)m=	60.84	53.16	55.22	48.81	47.18	44.00	00.44	i				1		(0-)
				70.01	47.10	41.39	39.41	44.17	44.66	51.08	54.77	59.32		(65)
inclu	ıde (57)ı	m in calc	!	ļ.	ļ	<u> </u>	ļ	ļ			ļ	59.32 munity h	eating	(65)
			!	of (65)m	only if c	<u> </u>	ļ	ļ			ļ	ļ	eating	(65)
5. In	ternal ga	ains (see	culation of Table 5	of (65)m and 5a	only if c	<u> </u>	ļ	ļ			ļ	ļ	eating	(65)
5. In	ternal ga	ains (see	culation of	of (65)m and 5a	only if c	<u> </u>	ļ	ļ			ļ	ļ	eating	(65)
5. In	ternal ga	ains (see s (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. In Metab	olic gain Jan 115.66	s (Table Feb 115.66	ETable 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 115.66	only if c): May 115.66	Jun 115.66	s in the o	Aug 115.66	or hot w Sep 115.66	ater is fr Oct	om com	munity h	eating	
5. In Metab	olic gain Jan 115.66	s (Table Feb 115.66	ETable 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 115.66	only if c): May 115.66	Jun 115.66	Jul 115.66	Aug 115.66	or hot w Sep 115.66	ater is fr Oct	om com	munity h	eating	
5. In: Metab (66)m= Lightin (67)m=	olic gain Jan 115.66 g gains 18.17	s (Table Feb 115.66 (calculat	Table 5 5), Wat Mar 115.66 ted in Ap	of (65)m and 5a ts Apr 115.66 ppendix 9.94	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint of the constraints on the constraint of the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on t	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov	Dec	eating	(66)
5. In: Metab (66)m= Lightin (67)m=	olic gain Jan 115.66 g gains 18.17	s (Table Feb 115.66 (calculat	Table 5 5), Wat Mar 115.66 ted in Ap	of (65)m and 5a ts Apr 115.66 ppendix 9.94	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints on the constraint of the constraints on the constraint of the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on the constraint on t	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov	Dec	eating	(66)
5. Interpretation of the second of the secon	olic gain Jan 115.66 g gains 18.17 nces ga	s (Table Feb 115.66 (calcular 16.14 ins (calc	Evaluation of Ev	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29	only if construction only if c	Jun 115.66 ion L9 o 6.27 uation L	Jul 115.66 r L9a), a 6.78	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta	Oct 115.66 15.01 ble 5 167.07	Nov 115.66	Dec 115.66	eating	(66) (67)
5. Interpretation of the second of the secon	olic gain Jan 115.66 g gains 18.17 nces ga	s (Table Feb 115.66 (calcular 16.14 ins (calc	Evaluation of Ev	of (65)m 5 and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29	only if construction only if c	Jun 115.66 ion L9 o 6.27 uation L	Jul 115.66 r L9a), a 6.78 13 or L1 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta	Oct 115.66 15.01 ble 5 167.07	Nov 115.66	Dec 115.66	eating	(66) (67)
5. Interpretation of the second of the secon	olic gain Jan 115.66 g gains 18.17 nces gains 203.86 ng gains 34.57	s (Table Feb 115.66 (calcular 16.14 ins (calc 205.97 (calcular 34.57	ted in Apulated in	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction of the construction on the construction of the construction	Jun 115.66 ion L9 of 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68	eating	(66) (67) (68)
5. Interpretation of the second of the secon	olic gain Jan 115.66 g gains 18.17 nces gains 203.86 ng gains 34.57	s (Table Feb 115.66 (calcular 16.14 ins (calc 205.97 (calcular 34.57	ETable 5 E 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57	only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction of the construction on the construction of the construction	Jun 115.66 ion L9 of 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68	eating	(66) (67) (68)
5. Interpretation of the second of the secon	olic gain Jan 115.66 g gains 18.17 nces gains 203.86 ng gains 34.57 s and far	s (Table Feb 115.66 (calculat 16.14 ins (calc 205.97 (calculat 34.57 ns gains	ted in Apulated in	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 3	only if construction only if c	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a; 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86	eating	(66) (67) (68) (69)
5. Interpretation of the second of the secon	olic gain Jan 115.66 g gains 18.17 nces gains 203.86 ng gains 34.57 s and far	s (Table Feb 115.66 (calculat 16.14 ins (calc 205.97 (calculat 34.57 ns gains	ted in Apulated in	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 3	only if construction only if c	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a; 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86	eating	(66) (67) (68) (69)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m=	olic gain Jan 115.66 g gains 18.17 nces ga 203.86 ng gains 34.57 s and far 3 s e.g. ev	s (Table Feb 115.66 (calculations (calculations (calculations)) (calculations (calculations)) (calculations) 34.57 Insigning apporation -92.53	culation of Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 tted in Ap 34.57 (Table 5 3 on (negation)	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 3 tive value	only if construction only if c	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(66) (67) (68) (69) (70)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m=	olic gain Jan 115.66 g gains 18.17 nces ga 203.86 ng gains 34.57 s and far 3 s e.g. ev	s (Table Feb 115.66 (calculations (calculations (calculations)) (calculations (calculations)) (calculations) 34.57 ns gains 3	culation of Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 tted in Ap 34.57 (Table 5 3 on (negation)	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 3 tive value	only if construction only if c	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(66) (67) (68) (69) (70)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	olic gain Jan 115.66 g gains 18.17 nces ga 203.86 ng gains 34.57 s and far s e.g. ev -92.53 heating 81.78	s (Table Feb 115.66 (calcular 16.14 ins (calcular 34.57 ns gains 3 aporatio -92.53 gains (T 79.11	culation of the Table 5 25), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 ted in Ap 34.57 (Table 5 3 on (negation of the Table 5) 74.22	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 n Append 189.29 ppendix 34.57 5a) 3 tive valu -92.53	only if construction only if c	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57 3	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57 3	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57 3	Oct 115.66 15.01 ble 5 167.07 5 34.57 3 -92.53	Nov 115.66 17.52 181.4 34.57 3	munity h Dec 115.66 18.68 194.86 34.57 3 -92.53	eating	(66) (67) (68) (69) (70) (71)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m= Total i	olic gain Jan 115.66 g gains 18.17 nces ga 203.86 ng gains 34.57 s and far s e.g. ev -92.53 heating 81.78	s (Table Feb 115.66 (calculations (calculations (calculations) 34.57 ns gains 3 aporation -92.53 gains (T	culation of Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 tted in Al 34.57 (Table 5 3 on (negation of 192.53) Table 5) 74.22	of (65)m 5 and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 3 tive valu -92.53	only if construction only if c	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57 3 ole 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57 3	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57 3	Oct 115.66 15.01 ble 5 167.07 5 34.57 3 -92.53	Nov 115.66 17.52 181.4 34.57 3	munity h Dec 115.66 18.68 194.86 34.57 3 -92.53	eating	(66) (67) (68) (69) (70) (71)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m= Total i (73)m=	olic gain Jan 115.66 g gains 18.17 nces ga 203.86 ng gains 34.57 s and far 3 s e.g. ev -92.53 heating 81.78	s (Table Feb 115.66 (calcular 16.14 ins (calcular 34.57 ns gains 3 aporatio -92.53 gains (T 79.11 gains = 361.92	culation of the Table 5 25), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 ted in Ap 34.57 (Table 5 3 on (negation of the Table 5) 74.22	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 n Append 189.29 ppendix 34.57 5a) 3 tive valu -92.53	only if construction only if c	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57 3 ole 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57 3 -92.53	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57 3 -92.53	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57 3	Oct 115.66 15.01 ble 5 167.07 5 34.57 3 -92.53	Nov 115.66 17.52 181.4 34.57 3 -92.53	munity h Dec 115.66 18.68 194.86 34.57 3 -92.53 79.73	eating	(66) (67) (68) (69) (70) (71)

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

Orientation: Access Fac Table 6d	ctor	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	0.91	x	11.28	x	0.63	x	0.7	=	3.14	(75)
Northeast 0.9x 0.77	x	0.91	x	22.97	x	0.63	x	0.7	=	6.39	(75)
Northeast 0.9x 0.77	x	0.91	x	41.38	x	0.63	x	0.7	=	11.51	(75)
Northeast 0.9x 0.77	x	0.91	x	67.96	x	0.63	x	0.7	=	18.9	(75)
Northeast 0.9x 0.77	x	0.91	x	91.35	x	0.63	x	0.7	=	25.4	(75)
Northeast 0.9x 0.77	x	0.91	x	97.38	x	0.63	x	0.7	=	27.08	(75)
Northeast 0.9x 0.77	x	0.91	x	91.1	X	0.63	X	0.7	=	25.34	(75)
Northeast 0.9x 0.77	x	0.91	X	72.63	x	0.63	X	0.7	=	20.2	(75)
Northeast 0.9x 0.77	x	0.91	X	50.42	x	0.63	x	0.7] =	14.02	(75)
Northeast 0.9x 0.77	x	0.91	x	28.07	x	0.63	x	0.7	=	7.81	(75)
Northeast 0.9x 0.77	x	0.91	x	14.2	x	0.63	x	0.7	=	3.95	(75)
Northeast 0.9x 0.77	x	0.91	x	9.21	x	0.63	x	0.7	=	2.56	(75)
Southeast 0.9x 0.77	x	4.25	X	36.79	x	0.63	X	0.7	=	47.79	(77)
Southeast 0.9x 0.77	x	5.9	x	36.79	x	0.63	x	0.7	=	66.34	(77)
Southeast 0.9x 0.77	x	4.47	x	36.79	x	0.63	x	0.7	=	50.26	(77)
Southeast 0.9x 0.77	x	4.25	x	62.67	x	0.63	X	0.7	=	81.4	(77)
Southeast 0.9x 0.77	x	5.9	x	62.67	x	0.63	x	0.7	=	113.01	(77)
Southeast 0.9x 0.77	x	4.47	x	62.67	x	0.63	x	0.7	=	85.62	(77)
Southeast 0.9x 0.77	x	4.25	x	85.75	x	0.63	X	0.7	=	111.38	(77)
Southeast 0.9x 0.77	x	5.9	X	85.75	x	0.63	X	0.7] =	154.62	(77)
Southeast 0.9x 0.77	x	4.47	X	85.75	x	0.63	x	0.7] =	117.15	(77)
Southeast 0.9x 0.77	x	4.25	x	106.25	x	0.63	X	0.7	=	138.01	(77)
Southeast 0.9x 0.77	x	5.9	x	106.25	x	0.63	x	0.7	=	191.58	(77)
Southeast 0.9x 0.77	x	4.47	x	106.25	x	0.63	x	0.7	=	145.15	(77)
Southeast 0.9x 0.77	X	4.25	X	119.01	X	0.63	X	0.7	=	154.58	(77)
Southeast 0.9x 0.77	x	5.9	x	119.01	X	0.63	X	0.7	=	214.59	(77)
Southeast 0.9x 0.77	x	4.47	x	119.01	X	0.63	x	0.7	=	162.58	(77)
Southeast 0.9x 0.77	x	4.25	X	118.15	X	0.63	X	0.7	=	153.46	(77)
Southeast 0.9x 0.77	x	5.9	X	118.15	X	0.63	X	0.7	=	213.04	(77)
Southeast 0.9x 0.77	x	4.47	X	118.15	X	0.63	X	0.7	=	161.4	(77)
Southeast 0.9x 0.77	X	4.25	X	113.91	X	0.63	X	0.7	=	147.95	(77)
Southeast 0.9x 0.77	x	5.9	x	113.91	X	0.63	X	0.7	=	205.39	(77)
Southeast 0.9x 0.77	x	4.47	x	113.91	x	0.63	x	0.7	=	155.61	(77)
Southeast 0.9x 0.77	x	4.25	x	104.39	x	0.63	x	0.7	=	135.59	(77)
Southeast 0.9x 0.77	x	5.9	x	104.39	x	0.63	x	0.7] =	188.23	(77)
Southeast 0.9x 0.77	x	4.47	x	104.39	x	0.63	x	0.7	=	142.61	(77)
Southeast 0.9x 0.77	x	4.25	x	92.85	x	0.63	x	0.7	=	120.6	(77)
Southeast 0.9x 0.77	x	5.9	x	92.85	x	0.63	x	0.7	=	167.42	(77)
Southeast 0.9x 0.77	x	4.47	X	92.85	×	0.63	x	0.7] =	126.84	(77)

Southeast 0.9x	0.77	X	4.2	5	X	69.27	x	0.63	X	0.7	=	89.97	(77)
Southeast _{0.9x}	0.77	X	5.9)	x	69.27	x	0.63	x	0.7	=	124.9	(77)
Southeast _{0.9x}	0.77	x	4.4	7	x	69.27	x	0.63	x	0.7	=	94.63	(77)
Southeast _{0.9x}	0.77	X	4.2	5	X	44.07	x	0.63	x	0.7	=	57.24	(77)
Southeast _{0.9x}	0.77	x	5.9)	x	44.07	x	0.63	x	0.7	=	79.46	(77)
Southeast 0.9x	0.77	X	4.4	7	x	44.07	x	0.63	×	0.7	=	60.2	(77)
Southeast 0.9x	0.77	X	4.2	5	x	31.49	x	0.63	×	0.7	=	40.9	(77)
Southeast 0.9x	0.77	X	5.9	,	x	31.49	x	0.63	×	0.7	=	56.78	(77)
Southeast _{0.9x}	0.77	X	4.4	7	X	31.49	X	0.63	x	0.7	=	43.02	(77)
Rooflights 0.9x	1	X	0.68	8	X	26	x	0.63	x	0.7	=	7.04	(82)
Rooflights _{0.9x}	1	x	0.68	8	x	54	x	0.63	×	0.7	=	14.61	(82)
Rooflights 0.9x	1	X	0.68	8	x	96	x	0.63	×	0.7	=	25.98	(82)
Rooflights 0.9x	1	x	0.68	8	x	150	x	0.63	×	0.7	=	40.59	(82)
Rooflights 0.9x	1	x	0.68	8	x	192	x	0.63	×	0.7	=	51.95	(82)
Rooflights 0.9x	1	X	0.68	8	x	200	x	0.63	x	0.7	=	54.12	(82)
Rooflights _{0.9x}	1	X	0.68	8	x	189	x	0.63	x	0.7	=	51.14	(82)
Rooflights _{0.9x}	1	X	0.68	8	x	157	x	0.63	×	0.7	=	42.48	(82)
Rooflights _{0.9x}	1	X	0.68	8	x	115	x	0.63	X	0.7	=	31.12	(82)
Rooflights _{0.9x}	1	X	0.6	8	x	66	x	0.63	X	0.7	=	17.86	(82)
Rooflights _{0.9x}	1	X	0.68	8	x	33	x	0.63	X	0.7	=	8.93	(82)
Rooflights _{0.9x}	1	X	0.68	8	x	21	x	0.63	X	0.7	=	5.68	(82)
Solar gains in wa	atts, calcul	ated	for each	month)		(83)m	= Sum(74)m .	(82)m				
` ').63	534.23	609.1		09.1 585.43	529	9.1 460.01	335.1	209.79	148.93		(83)
Total gains – inte	ernal and s	solar	(84)m =	(73)m	+ (8	33)m , watts						•	
(84)m= 539.07 6	662.94 769).32	861.95	915.61	89	95.06 858.38	808	.37 750.29	646.6	545.47	502.9		(84)
7. Mean interna	ıl tempera	ture ((heating	seasor	1)								
Temperature du	uring heati	ng pe	eriods in	the livi	ng	area from Tal	ole 9	Th1 (°C)				21	(85)
Utilisation facto	r for gains	for li	iving are	a, h1,n) (s	ee Table 9a)							
Jan	Feb M	1ar	Apr	May		Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 1	0.99 0.	97	0.92	0.81	(0.48	0.5	0.76	0.95	0.99	1		(86)
Mean internal to	emperatur	e in I	iving are	a T1 (f	ollo	w steps 3 to 7	7 in T	able 9c)					
(87)m= 19.64	19.87 20	.18	20.54	20.81	2	0.95 20.99	20.	98 20.89	20.52	20	19.6		(87)
Temperature du	uring heati	ng pe	eriods in	rest of	dw	elling from Ta	able 9), Th2 (°C)				•	
· — —		.82	19.83	19.83	_	9.84 19.84	19.	 	19.83	19.83	19.82		(88)
Utilisation facto	r for gaine	for n	est of dv	velling	h2	m (see Tahle	9a1					ı	
		96	0.89	0.75	$\overline{}$	0.36	0.	4 0.67	0.92	0.99	1		(89)
` '	ļ .		!			ļ.							
Mean internal to		e in t	19.31	19.66	Ť	9.81 19.84	19.		e 9c) 19.3	18.57	17.98		(90)
10.04	10.00 10		10.01	19.00	<u> </u>	0.01 19.04	19.			ring area ÷ (4		0.45	(91)
										3 00 (′	0.45	(31)

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

(92)m=	18.76	19.04	19.42	19.86	20.17	20.32	20.35	20.35	20.27	19.85	19.21	18.71		(92)
Apply	adjustn	nent to the	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate	!	<u> </u>		
(93)m=	18.76	19.04	19.42	19.86	20.17	20.32	20.35	20.35	20.27	19.85	19.21	18.71		(93)
8. Spa	ace hea	ting requ	uirement											
				nperatur	e obtain	ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
			or gains i							, ,	,			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisa	ition fac	tor for g	ains, hm	:										
(94)m=	0.99	0.98	0.95	0.89	0.77	0.58	0.41	0.46	0.71	0.92	0.98	0.99		(94)
Usefu	I gains,	hmGm ,	W = (94	l)m x (84	4)m	_		-	_		_			
(95)m=	534.46	649.47	733.32	766.78	701.46	519.67	352.33	368.2	530.72	595.47	535.82	499.65		(95)
Month	nly avera	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 I	oss rate	for mea	an intern	al tempe	erature,	Lm , W =	=[(39)m :	x [(93)m	– (96)m]			'	
(97)m=	1405.37	1371.43	1250.97	1051.05	811.13	543.09	356.15	374.29	587.16	885.12	1163.74	1398.98		(97)
Space	heating	g require	ement fo	r each m	nonth, k\	Wh/mont	h = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m=	647.95	485.16	385.13	204.68	81.6	0	0	0	0	215.51	452.1	669.1		
•						•		Tota	l per year	(kWh/year	·) = Sum(9	8) _{15,912} =	3141.22	(98)
Space	e heating	a require	ement in	kWh/m²	² /vear							i	43.12	(99)
·							a a la callaca		NID)			l		
			nts – Indi	viduai n	eating sy	ystems I	ncluaing	micro-C	HP)					
•	e heatin	•	it from se	econdan	v/supple	mentary	evetem					ı	0	(201)
				•		illelitai y	-	(202) - 4	(204) -			l	0	╡ `
			it from m	•				(202) = 1	, ,			ļ	1	(202)
Fracti	on of to	al heatii	ng from i	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficie	ency of r	nain spa	ace heati	ng syste	em 1								93.4	(206)
Efficie	ency of s	econda	ry/supple	ementar	y heating	g system	າ, %					Ī	0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	– ∘ar
Space			ement (c				oui	_ /tug	ССР	001	1101		KVVIII y C	·ui
Ориос	647.95	485.16	385.13	204.68	81.6	0	0	0	0	215.51	452.1	669.1		
(244)									<u> </u>		ļ			(244)
(211)11	693.74	519.44	4)] } x 1	219.14	87.36	0	0	0	0	230.73	484.05	716.38		(211)
	093.74	313.44	412.54	213.14	07.50		U		l (kWh/yea				2202.0	(211)
								1010	ii (KVVIII y CC	ar) Curri(2	- ' ' / 15,1012	·	3363.2	(211)
•		•	econdar	, ,	month									
$= \{[(98)]$		0 (1)] } X 1	00 ÷ (20	0	0	0	0	0	0	0	0	0		
(215)111=	U	0	U	0	0	U	U		l (kWh/yea		_	-	_	7(045)
								TOla	ii (KVVII/yea	ar) –Surri(2	213) _{15,1012}	_	0	(215)
	heating													
Output			ter (calc			124.2	120.67	142 44	145.02	165 12	176 20	100.70		
Lttie; =	195.38	170.67	177.57	157.5	152.48	134.3	128.67	143.44	145.02	165.13	176.28	190.79	20.5	7/040
		ater hea		<u> </u>								0= -	80.3	(216)
(217)m=		87.53	86.95	85.71	83.55	80.3	80.3	80.3	80.3	85.72	87.32	87.95		(217)
		•	kWh/mo											
(219)m=		n x 100 194.97) ÷ (217) 204.22	m 183.75	182.5	167.25	160.23	178.62	180.6	192.64	201.88	216.94		
(213)111=	۷۷۷.43	184.87	∠∪ 4 .∠∠	100.70	102.0	107.20	100.23	l	I = Sum(2		201.00	£ 10.84	0000.00	7,040
								TOTA	ıı – Suili(2	13a) ₁₁₂ =			2286.03	(219)

Annual totals		kWh/yea	_	kWh/year	
Space heating fuel used, main system 1		KWII/yea	•	3363.2	7
Water heating fuel used				2286.03	Ŧ .
Electricity for pumps, fans and electric keep-hot					_
central heating pump:			30]	(230c)
boiler with a fan-assisted flue			45	j	(230e)
Total electricity for the above, kWh/year	sum of (230a)(230g) =		75	(231)
Electricity for lighting				320.92	(232)
12a. CO2 emissions – Individual heating system	s including micro-CHP				
	Energy kWh/year	Emission factors in the Emissi	etor	Emissions kg CO2/yea	
Space heating (main system 1)	(211) x		_		
		0.216	_	726.45	(261)
Space heating (secondary)	(215) x	0.216	=	726.45 0	(261)
Space heating (secondary) Water heating	(215) x (219) x				
		0.519	=	0	(263)
Water heating	(219) x	0.519	=	0 493.78	(263)
Water heating Space and water heating	(219) x (261) + (262) + (263) + (264) =	0.519	=	0 493.78 1220.23	(263) (264) (265)

TER =

19.57

(273)

			User D	otaila:						
A N	Obrida I I a alva all				- NI			OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	2		Stroma Softwa	_				016363 on: 1.0.4.16	
Software Hame.	Ottoma 1 O/ ti 201			Address:				VCISIO	71. 1.0.4.10	
Address :										
1. Overall dwelling dime	ensions:									
Ground floor				a(m²)	(1-)		ight(m)] ₍₀₌₎ =	Volume(m³	<u>-</u>
	N. (41 N. (4 N. (4 IN. (4	\. (4 \			(1a) x		2.7	(2a) =	165.78	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	6	61.4	(4)					_
Dwelling volume					(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	165.78	(5)
2. Ventilation rate:	main se	econdary	•	other		total			m³ per hou	r
North and Salekan and	heating h	eating			, ₋ -			40 - 1	-	_
Number of chimneys	0 +	0]	0] = [0		40 =	0	(6a)
Number of open flues	0 +	0] + _	0] = [0		20 =	0	(6b)
Number of intermittent fa					L	2	X '	10 =	20	(7a)
Number of passive vents	3				L	0	X ·	10 =	0	(7b)
Number of flueless gas fi	ires					0	X 4	40 =	0	(7c)
								Δir ch	anges per ho	nur
Infiltration due to chimne	vs_flues and fans = (6)	a)+(6b)+(7a)+(7b)+(7	7c) =	Г	20		÷ (5) =	0.12	(8)
If a pressurisation test has b	•				ontinue fr			. (5) –	0.12	
Number of storeys in the	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0					•	uction			0	(11)
deducting areas of openii	resent, use the value corresp ngs); if equal user 0.35	oonaing to t	ne greau	er wan are	a (aner					
If suspended wooden t	floor, enter 0.2 (unseal	ed) or 0.1	(seale	ed), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
Percentage of windows	s and doors draught st	ripped							0	(14)
Window infiltration				0.25 - [0.2			(4-)		0	(15)
Infiltration rate	50			(8) + (10)		, , ,			0	(16)
Air permeability value, If based on air permeabil	•		•	-	•	etre of e	envelope	area	5	(17)
Air permeability value applie	-					is heina u	sed		0.37	(18)
Number of sides sheltere		20011 40110	o, a aog	,. 00 a po.	v	.o 2011.g u			2	(19)
Shelter factor				(20) = 1 -	0.075 x (1	19)] =			0.85	(20)
Infiltration rate incorporat	ting shelter factor			(21) = (18)	x (20) =				0.32	(21)
Infiltration rate modified f	or monthly wind speed									
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	eed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
` ', '					•		L <u>-</u>		J	

Adjusted infiltra	ation rate	(allowi	ng for sh	nelter an	id wind s	speed) =	: (21a) x	(22a)m					
0.4	0.39	0.39	0.35	0.34	0.3	0.3	0.29	0.32	0.34	0.35	0.37]	
Calculate effec		_	rate for t	he appli	cable ca	ise							
If mechanica			andiv N. (O	2h) = (22a	a) v Emy (oguation (NEW other	nuina (22h	·\ = (22a\			0	(23a)
If exhaust air he)) = (23a)			0	(23b)
If balanced with		-	-	_					OL)	001)	4 (00.)	0	(23c)
a) If balance					1	- 	' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' 	ŕ	 		- ` ` `) ÷ 100] 1	(24a)
(24a)m= 0	0	0	0	0	0	0	0	0	0 2h\m + (1	0	0	J	(2 4 a)
b) If balance	0	0	0	0	0	0	0	0	0	0	0	1	(24b)
c) If whole he		ļ	<u> </u>		<u> </u>	<u> </u>		<u> </u>				J	()
•	า < 0.5 × (-					.5 × (23b))			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24c)
d) If natural v	ventilatior	າ or wh	ole hous	e positiv	ve input	ventilati	on from l	oft	!			•	
if (22b)m	n = 1, ther	า (24d)เ	m = (22l	o)m othe	erwise (2	24d)m =	0.5 + [(2	2b)m² x	0.5]		•	,	
(24d)m= 0.58	0.58	0.57	0.56	0.56	0.54	0.54	0.54	0.55	0.56	0.56	0.57		(24d)
Effective air			nter (24a) or (24k	´`	c) or (24	ld) in box	(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 losses	s and hea	it loss r	paramete	er:									
ELEMENT	Gross area (r		Openin m		Net Ar 1, A		U-valı W/m2		A X U (W/ł	〈)	k-value kJ/m²·		A X k kJ/K
Doors					2	x	1	=	2				(26)
Windows Type	: 1				1.69	x1	/[1/(1.4)+	0.04] =	2.24				(27)
Windows Type	2					= ,							
Windows Type	. 3				0.42	. X.I	/[1/(1.4)+	0.04] =	0.56				(27)
Windows Turns					2.87	= .	/[1/(1.4)+ /[1/(1.4)+		0.56				(27) (27)
Windows Type						x1		0.04] =					
Windows Type Windows Type	4				2.87	x1	/[1/(1.4)+	0.04] = 0.04] =	3.8				(27)
•	4	\neg	13.30	5 T	3.82	x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+	0.04] = 0.04] =	3.8 5.06			-	(27) (27)
Windows Type	5	_	13.30	3	2.87 3.82 2.87	x1 x1 x1 x1 x1 x1 x1	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 	0.04] = 0.04] = 0.04] =	3.8 5.06 3.8 6.85				(27) (27) (27) (29)
Windows Type Walls Type1	51.43	_	2	6	2.87 3.82 2.87 38.07 33.99	x1 x1 x1 7 x x 5 x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18	0.04] = 0.04] = 0.04] = = = =	3.8 5.06 3.8 6.85 6.11				(27) (27) (27) (29) (29)
Windows Type Walls Type1 Walls Type2 Roof	51.43 35.95 61.4			6	2.87 3.82 2.87 38.07 33.99 61.4	x1 x1 x1 7 x x x x x x x x x x x x x x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.8 5.06 3.8 6.85				(27) (27) (27) (29) (29) (30)
Windows Type Walls Type1 Walls Type2 Roof Total area of el	51.43 35.95 61.4		2	6	2.87 3.82 2.87 38.07 33.99 61.4	x1 x1 x1 7 x 15 x x 18	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.18	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.8 5.06 3.8 6.85 6.11 7.98				(27) (27) (27) (29) (29) (30) (31)
Windows Type Walls Type1 Walls Type2 Roof Total area of el Party wall	51.43 35.95 61.4		2	6	2.87 3.82 2.87 38.07 33.99 61.4 148.7	x1 x1 x1 7 x 5 x x 78 x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18	0.04] = 0.04] = 0.04] = = = = = = =	3.8 5.06 3.8 6.85 6.11				(27) (27) (27) (29) (29) (30) (31) (32)
Windows Type Walls Type1 Walls Type2 Roof Total area of el	51.43 35.95 61.4	m²	0		2.87 3.82 2.87 38.07 33.99 61.4 148.7 17.92	x1 x1 x1 7 x x 5 x x x 2 x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.13	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.8 5.06 3.8 6.85 6.11 7.98	is given in	paragrapl		(27) (27) (27) (29) (29) (30) (31)
Windows Type Walls Type1 Walls Type2 Roof Total area of el Party wall Party floor	51.43 35.95 61.4 1ements, 1	m² vs, use e	0 0	ndow U-va	2.87 3.82 2.87 38.07 33.99 61.4 148.7 17.92 61.4 alue calcul	x1 x1 x1 7 x x 5 x x x 2 x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.13	0.04] = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = =	3.8 5.06 3.8 6.85 6.11 7.98] [paragraph		(27) (27) (27) (29) (29) (30) (31) (32)
Windows Type Walls Type1 Walls Type2 Roof Total area of el Party wall Party floor * for windows and	51.43 35.95 61.4 lements, I	m² ws, use e ides of in	0 effective winternal wall	ndow U-va	2.87 3.82 2.87 38.07 33.99 61.4 148.7 17.92 61.4 alue calcul	x1 x1 x1 7 x x 5 x x x 2 x x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.13	0.04] = 0.04] = 0.04] = = = =	3.8 5.06 3.8 6.85 6.11 7.98]]] [] [] []	paragrapl	h 3.2	(27) (27) (27) (29) (29) (30) (31) (32) (32a)
Windows Type Walls Type1 Walls Type2 Roof Total area of ele Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity (51.43 35.95 61.4 aroof window as on both si as, W/K = Cm = S(A	m² ws, use e ides of in S (A x	0 offective winternal walk	ndow U-va	2.87 3.82 2.87 38.07 33.99 61.4 148.7 17.92 61.4 alue calculatitions	x1 x1 x1 x1 x1 xx x1 xx xx xx xx xx xx x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.13 0 g formula 1.	0.04] = 0.04] = 0.04] = = = = =	3.8 5.06 3.8 6.85 6.11 7.98 0 0 ue)+0.04] a	2) + (32a).			(27) (27) (27) (29) (29) (30) (31) (32) (32a)
Windows Type Walls Type1 Walls Type2 Roof Total area of ele Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity (Thermal mass	51.43 35.95 61.4 roof window as on both sites, W/K = Cm = S(A)	m² ws, use e ides of in S (A x A x k) er (TMF	2 0 offective winternal wall U) $P = Cm \div$	ndow U-va Is and pan	2.87 3.82 2.87 38.07 33.99 61.4 148.7 17.92 61.4 alue calculatitions	x1 x1 x1 7 x 5 x 2 x 8 2 x lated using	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.13 0 g formula 1. (26)(30)	0.04] = 0.04] = 0.04] = = = = =	3.8 5.06 3.8 6.85 6.11 7.98 0 ue)+0.04] a	2) + (32a). : Medium	(32e) =	40.66	(27) (27) (27) (29) (29) (30) (31) (32) (32a)
Windows Type Walls Type1 Walls Type2 Roof Total area of elements Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity of Thermal mass For design assess	51.43 35.95 61.4 roof window as on both sies, W/K = Cm = S(A parameter where	m² ws, use e ides of in S (A x A x k) er (TMF	2 0 offective with ternal walk U) $P = Cm \div tails of the$	ndow U-va Is and pan	2.87 3.82 2.87 38.07 33.99 61.4 148.7 17.92 61.4 alue calculatitions	x1 x1 x1 7 x 5 x 2 x 8 2 x lated using	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.13 0 g formula 1. (26)(30)	0.04] = 0.04] = 0.04] = = = = =	3.8 5.06 3.8 6.85 6.11 7.98 0 ue)+0.04] a	2) + (32a). : Medium	(32e) =	40.66	(27) (27) (29) (29) (30) (31) (32) (32a) (33) 8 (34)
Windows Type Walls Type1 Walls Type2 Roof Total area of ele Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity (Thermal mass For design assess can be used instead	51.43 35.95 61.4 aroof window as on both since S, W/K = Cm = S(A) parameter system and of a detail	m² s, use e ides of in S (A x x k) er (TMF) re the det illed calcu	offective winternal walk U) P = Cm ÷ tails of the tails of the	ndow U-vals and part	2.87 3.82 2.87 38.07 33.99 61.4 148.7 17.92 61.4 alue calculatitions	x1 x1 x1 x1 x1 xx x1 xx xx xx xx xx xx x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.13 0 g formula 1. (26)(30)	0.04] = 0.04] = 0.04] = = = = =	3.8 5.06 3.8 6.85 6.11 7.98 0 ue)+0.04] a	2) + (32a). : Medium	(32e) =	40.66 17050 250	(27) (27) (29) (29) (30) (31) (32) (32a) (33) 8 (34) (35)
Windows Type Walls Type1 Walls Type2 Roof Total area of elements Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity of Thermal mass For design assess	51.43 35.95 61.4 aroof window as on both sies, W/K = Cm = S(A parameter and of a detailer sies; S (L x	m² ws, use e ides of in S (A x A x k) er (TMF re the det iled calcu	offective winternal walk U) P = Cm = tails of the ulation. culated to	ndow U-valls and pand	2.87 3.82 2.87 38.07 33.99 61.4 148.7 17.92 61.4 alue calculatitions n kJ/m²k tion are no	x1 x1 x1 x1 x1 xx x1 xx xx xx xx xx xx x	/[1/(1.4)+ /[1/(1.4)+ /[1/(1.4)+ 0.18 0.13 0 g formula 1. (26)(30)	0.04] = 0.04] = 0.04] = = = = =	3.8 5.06 3.8 6.85 6.11 7.98 0 ue)+0.04] a	2) + (32a). : Medium	(32e) =	40.66	(27) (27) (29) (29) (30) (31) (32) (32a) (33) 8 (34) (35)

Total fabric heat los	· Q						(33) +	(36) =		İ	53.18	(37)
Ventilation heat los		d monthl	V				` ′	= 0.33 × (25)m x (5)		55.16	(07)
Jan Fe		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 31.77 31.	_	30.64	30.49	29.8	29.8	29.68	30.07	30.49	30.79	31.1		(38)
Heat transfer coeffi	cient, W/K	Į.	!	Į	!	<u>!</u>	(39)m	= (37) + (37)		<u> </u>		
(39)m= 84.95 84.		83.82	83.67	82.98	82.98	82.85	83.25	83.67	83.97	84.28		
Heat loss paramete	r (HLP), W	/m²K				•		Average = = (39)m ÷		12 /12=	83.82	(39)
(40)m= 1.38 1.3	8 1.38	1.37	1.36	1.35	1.35	1.35	1.36	1.36	1.37	1.37		
Number of days in	month (Tab	ole 1a)	•	•	•		,	Average =	Sum(40) _{1.}	12 /12=	1.37	(40)
Jan Fe	<u> </u>	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28	31	30	31	30	31	31	30	31	30	31		(41)
	•	•	•		•	•		•			!	
4. Water heating e	nergy requ	irement:								kWh/ye	ear:	
A	NI									-	1	
Assumed occupant if TFA > 13.9, N		([1 - exp	(-0.0003	349 x (TF	FA -13.9)2)1 + 0.0	0013 x (⁻	ΓFA -13.		02		(42)
if TFA £ 13.9, N		. [(0.000			/_/]	/		• ,			
Annual average ho										2.2		(43)
Reduce the annual aver not more that 125 litres	-			_	-	to acnieve	a water us	se target o	T			
Jan Fe	- 	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres	-	<u> </u>					Seb	Oct	INOV	Dec		
(44)m= 90.42 87.	3 83.84	80.55	77.27	73.98	73.98	77.27	80.55	83.84	87.13	90.42		
`			l .			l	-	rotal = Su	m(44) ₁₁₂ =		986.36	(44)
Energy content of hot w	ater used - ca	lculated m	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600	kWh/mor	nth (see Ta	bles 1b, 1	c, 1d)		
(45)m= 134.09 117	27 121.01	105.5	101.23	87.36	80.95	92.89	94	109.55	119.58	129.85		
Windowski and a start		1 - 1 /-				h (40		Total = Su	m(45) ₁₁₂ =		1293.28	(45)
If instantaneous water h		· ·	not water	r storage), r	enter U in) to (61)				l	
(46)m= 20.11 17.5 Water storage loss	1	15.83	15.18	13.1	12.14	13.93	14.1	16.43	17.94	19.48		(46)
Storage volume (lite		ng anv s	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community heatir	•				_					0		()
Otherwise if no stor	•		_			. ,	ers) ente	er '0' in (47)			
Water storage loss												
a) If manufacturer's	declared	loss fact	or is kno	wn (kWł	n/day):					0		(48)
Temperature factor	from Table	2b								0		(49)
Energy lost from wa	_	-				(48) x (49)) =			0		(50)
b) If manufacturer'sHot water storage I		-								0		(51)
If community heating			10 2 (1111	11/110/00	4y /					U		(31)
Volume factor from	_									0		(52)
Temperature factor	from Table	e 2b								0		(53)
Energy lost from wa	ater storage	e, kWh/y	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or (54) i	า (55)									0		(55)

Water	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contains	dedicated	d solar sto	rage, (57)ı	n = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ı ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primar	y circuit	loss (an	nual) fro	m Table	3							0		(58)
Primar	y circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(mod	dified by	factor fr	om Tabl	e 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 cal	culated	for each	month (61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	46.08	40.1	42.72	39.72	39.37	36.48	37.7	39.37	39.72	42.72	42.97	46.08		(61)
Total h	neat requ	uired for	water he	eating ca	alculated	for eac	n month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	180.16	157.38	163.74	145.23	140.61	123.84	118.65	132.26	133.72	152.27	162.55	175.93		(62)
Solar Di	HW input o	alculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contributi	ion to wate	er heating)	'	
(add a	dditional	lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	t from wa	ater hea	ter			-					-	-		
(64)m=	180.16	157.38	163.74	145.23	140.61	123.84	118.65	132.26	133.72	152.27	162.55	175.93		
								Outp	out from wa	ater heater	r (annual)₁	12	1786.33	(64)
Heat g	ains fror	n water	heating,	kWh/mo	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	([(46)m	+ (57)m	+ (59)m]	_
(65)m=	56.1	49.02	50.92	45.01	43.5	38.17	36.34	40.73	41.19	47.11	50.5	54.7		(65)
inclu	ude (57)r	n in calc	culation of	of (65)m	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
	ternal ga					•						•		
	olic gain	•			, -									
Wictab	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	101.05	101.05	101.05	101.05	101.05	101.05	101.05	101.05	101.05	101.05	101.05	101.05		(66)
Liahtin	ىـــــــا ig gains	(calculat	ted in Ar	nendix	eguat	ion I 9 o	r I 9a) a	lso see	Lable 5				l	
(67)m=	15.74	13.98	11.37	8.61	6.44	5.43	5.87	7.63	10.24	13.01	15.18	16.18		(67)
	nces gai				liv I en	Luation I	13 or I 1	(a) also						
(68)m=	176.46	178.29	173.68	163.86	151.46	139.8	132.02	130.18	134.8	144.62	157.02	168.68		(68)
	ng gains					l				<u> </u>		.00.00		` ,
(69)m=			icu iii A						e rabie					(69)
	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1		(03)
					33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1		(09)
Pumps	33.1 s and far				33.1	33.1	33.1	33.1	33.1	33.1	33.1	33.1		(70)
Pumps (70)m=	and far	ns gains 3	(Table 5	5a) 3	3	3								, ,
Pumps (70)m=	and far	ns gains 3	(Table 5	5a) 3	3	3								, ,
Pumps (70)m= Losses (71)m=	3 s e.g. ev	ns gains 3 aporatio -80.84	(Table 5 3 n (negat	5a) 3 ive valu	3 es) (Tab	3 le 5)	3	3	3	3	3	3		(70)
Pumps (70)m= Losses (71)m=	and far 3 s e.g. ev	ns gains 3 aporatio -80.84	(Table 5 3 n (negat	5a) 3 ive valu	3 es) (Tab	3 le 5)	3	3	3	3	3	3		(70)
Pumps (70)m= Losses (71)m= Water (72)m=	s and far 3 s e.g. ev -80.84 heating	aporatio -80.84 gains (T	(Table 5 3 n (negat -80.84 able 5) 68.44	3 tive valu -80.84	3 es) (Tab -80.84	3 le 5) -80.84	-80.84 48.84	3 -80.84 54.74	3 -80.84 57.2	3 -80.84	3 -80.84 70.14	3 -80.84 73.52		(70) (71)
Pumps (70)m= Losses (71)m= Water (72)m=	and far 3 s e.g. ev -80.84 heating 75.41	aporatio -80.84 gains (T	(Table 5 3 n (negat -80.84 able 5) 68.44	3 tive valu -80.84	3 es) (Tab -80.84	3 le 5) -80.84	-80.84 48.84	3 -80.84 54.74	3 -80.84 57.2	-80.84 63.31	3 -80.84 70.14	3 -80.84 73.52		(70) (71)

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

Orientation:	Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southwest _{0.9}	0.77	x	3.82	x	36.79]	0.63	x	0.7	=	42.95	(79)
Southwest _{0.9}	0.77	x	2.87	x	36.79]	0.63	x	0.7	=	32.27	(79)
Southwest _{0.9}	0.77	X	3.82	x	62.67]	0.63	x	0.7	=	73.17	(79)
Southwest _{0.9}	0.77	x	2.87	x	62.67	Ī	0.63	x	0.7] =	54.97	(79)
Southwest _{0.9}	0.77	x	3.82	x	85.75]	0.63	x	0.7	=	100.11	(79)
Southwest _{0.9}	0.77	X	2.87	x	85.75]	0.63	x	0.7	=	75.21	(79)
Southwest _{0.9}	0.77	X	3.82	x	106.25]	0.63	x	0.7	=	124.04	(79)
Southwest _{0.9}	0.77	x	2.87	x	106.25]	0.63	x	0.7	=	93.19	(79)
Southwest _{0.9}	0.77	X	3.82	x	119.01]	0.63	x	0.7	=	138.94	(79)
Southwest _{0.9}	0.77	X	2.87	x	119.01]	0.63	x	0.7	=	104.39	(79)
Southwest _{0.9}	0.77	x	3.82	x	118.15]	0.63	x	0.7	=	137.93	(79)
Southwest _{0.9}	0.77	x	2.87	x	118.15]	0.63	x	0.7	=	103.63	(79)
Southwest _{0.9}	0.77	x	3.82	x	113.91]	0.63	x	0.7	=	132.98	(79)
Southwest _{0.9}	0.77	x	2.87	x	113.91]	0.63	x	0.7	=	99.91	(79)
Southwest _{0.9}	0.77	X	3.82	x	104.39]	0.63	x	0.7	=	121.87	(79)
Southwest _{0.9}	0.77	x	2.87	x	104.39]	0.63	x	0.7	=	91.56	(79)
Southwest _{0.9}	0.77	x	3.82	x	92.85]	0.63	x	0.7	=	108.4	(79)
Southwest _{0.9}	0.77	x	2.87	x	92.85]	0.63	x	0.7	=	81.44	(79)
Southwest _{0.9}	0.77	x	3.82	x	69.27]	0.63	x	0.7	=	80.87	(79)
Southwest _{0.9}	0.77	x	2.87	x	69.27]	0.63	x	0.7	=	60.76	(79)
Southwest _{0.9}	0.77	x	3.82	x	44.07]	0.63	x	0.7	=	51.45	(79)
Southwest _{0.9}	0.77	x	2.87	x	44.07]	0.63	x	0.7	=	38.65	(79)
Southwest _{0.9}	0.77	X	3.82	x	31.49]	0.63	X	0.7	=	36.76	(79)
Southwest _{0.9}	0.77	X	2.87	x	31.49]	0.63	X	0.7	=	27.62	(79)
Northwest 0.9	0.77	X	1.69	X	11.28	x	0.63	X	0.7	=	11.65	(81)
Northwest 0.9	0.77	X	0.42	x	11.28	x	0.63	X	0.7	=	1.45	(81)
Northwest 0.9	0.77	X	2.87	x	11.28	X	0.63	X	0.7	=	9.9	(81)
Northwest 0.9	0.77	X	1.69	x	22.97	x	0.63	X	0.7	=	23.72	(81)
Northwest 0.9	0.77	X	0.42	X	22.97	X	0.63	X	0.7	=	2.95	(81)
Northwest 0.9	0.77	X	2.87	x	22.97	x	0.63	X	0.7	=	20.14	(81)
Northwest 0.9	0.77	X	1.69	x	41.38	x	0.63	x	0.7	=	42.74	(81)
Northwest 0.9		X	0.42	X	41.38	X	0.63	X	0.7	=	5.31	(81)
Northwest 0.9	0.77	X	2.87	x	41.38	x	0.63	x	0.7	=	36.29	(81)
Northwest 0.9	0.77	X	1.69	x	67.96	x	0.63	X	0.7	=	70.2	(81)
Northwest 0.9	0.77	X	0.42	x	67.96	X	0.63	X	0.7	=	8.72	(81)
Northwest 0.9	0.77	X	2.87	x	67.96	x	0.63	X	0.7	=	59.6	(81)
Northwest 0.9	0.77	X	1.69	x	91.35	x	0.63	x	0.7] =	94.36	(81)
Northwest 0.9		X	0.42	x	91.35	x	0.63	x	0.7] =	11.72	(81)
Northwest 0.9	0.77	X	2.87	×	91.35	x	0.63	x	0.7] =	80.12	(81)

Northwest 0.9x	0.77	×	1.69	٦ ×	97.	38	x	0.63	×	0.7		100.6	(81)
Northwest 0.9x	0.77	= x	0.42] ×	97.		x	0.63	x	0.7		12.5	(81)
Northwest 0.9x	0.77	$=$ $\frac{1}{x}$	2.87	」^ 」×	97.		x	0.63		0.7	=	85.42	(81)
Northwest _{0.9x}	0.77	×	1.69] ×	91		x	0.63	= x	0.7	= -	94.1	(81)
Northwest _{0.9x}	0.77	ا ×	0.42	i x	91		x	0.63	ا ×	0.7	_ =	11.69	(81)
Northwest _{0.9x}	0.77	= x	2.87	۲ ۲	91		x	0.63	= x	0.7	=	79.91	(81)
Northwest 0.9x	0.77	= x	1.69	۲ x	72.		x	0.63	×	0.7		75.02	(81)
Northwest 0.9x	0.77	×	0.42	i x	72.		x	0.63	= x	0.7	= =	9.32	(81)
Northwest _{0.9x}	0.77	×	2.87	i x	72.	.63	x	0.63	×	0.7	=	63.7	(81)
Northwest 0.9x	0.77	x	1.69	i ×	50.	.42	x	0.63	×	0.7		52.08	(81)
Northwest _{0.9x}	0.77	x	0.42	Ī×	50.	.42	x	0.63	×	0.7	<u> </u>	6.47	(81)
Northwest _{0.9x}	0.77	×	2.87	X	50.	.42	x	0.63	×	0.7	=	44.22	(81)
Northwest _{0.9x}	0.77	×	1.69	x	28.	.07	x	0.63	×	0.7	=	28.99	(81)
Northwest _{0.9x}	0.77	X	0.42	×	28.	.07	x	0.63	x	0.7		3.6	(81)
Northwest _{0.9x}	0.77	X	2.87	×	28.	.07	x	0.63	X	0.7	=	24.62	(81)
Northwest _{0.9x}	0.77	X	1.69	x	14	1.2	x	0.63	X	0.7	=	14.66	(81)
Northwest _{0.9x}	0.77	X	0.42	X	14	1.2	x	0.63	x	0.7	=	1.82	(81)
Northwest _{0.9x}	0.77	X	2.87	×	14	1.2	x	0.63	x	0.7	=	12.45	(81)
Northwest _{0.9x}	0.77	X	1.69	X	9.2	21	x	0.63	X	0.7	=	9.52	(81)
Northwest _{0.9x}	0.77	X	0.42	×	9.2	21	x	0.63	X	0.7	=	1.18	(81)
Northwest _{0.9x}	0.77	X	2.87	X	9.2	21	x	0.63	X	0.7	=	8.08	(81)
Solar gains in		ı	1		1	1		= Sum(74)m .				1	(00)
(83)m= 98.23		59.67	355.76 429.		440.08	418.6	361	.48 292.62	198.83	3 119.04	83.16		(83)
Total gains – i			` ' 		` 		0.10	05 554 40	470.00		007.05	l	(0.4)
(84)m= 422.15		69.48	647.06 702		694.63	661.64	610	.35 551.18	476.09	9 417.7	397.85		(84)
7. Mean inter			Ĭ										_
Temperature	•	• .		_			ole 9,	Th1 (°C)				21	(85)
Utilisation fac				Ť								1	
Jan	 	Mar	Apr Ma	- +	Jun	Jul		ug Sep	Oct	+	Dec		
(86)m= 1	0.99	0.98	0.94 0.8	5	0.69	0.53	0.5	9 0.83	0.97	0.99	1		(86)
Mean interna			ving area T1	(foll	ow steps	s 3 to 7	in T	able 9c)				•	
(87)m= 19.54	19.72 2	20.02	20.41 20.7	4	20.93	20.98	20.	97 20.83	20.4	19.89	19.5		(87)
Temperature	during hea	ating pe	eriods in rest	of d	welling f	rom Ta	ble 9	9, Th2 (°C)					
(88)m= 19.78	19.78 1	19.78	19.79 19.7	9	19.8	19.8	19.	.8 19.8	19.79	19.79	19.78		(88)
Utilisation fac	tor for gain	ns for re	est of dwellin	g, h2	2,m (see	Table	9a)						
(89)m= 1	0.99	0.97	0.92 0.8		0.59	0.4	0.4	5 0.75	0.95	0.99	1		(89)
Mean interna	I temperatu	ure in t	he rest of dw	ellin	T2 (fol	low ste	ps 3	to 7 in Tabl	e 9c)			-	
(90)m= 17.85		18.56	19.11 19.5		19.75	19.79	19.		19.11	18.38	17.81		(90)
	·							f	LA = Liv	ring area ÷ (4	4) =	0.5	(91)
													_

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

(92)m= 18.6	9 18.92	19.28	19.76	20.14	20.34	20.39	20.38	20.24	19.75	19.13	18.65		(92)
Apply adjus	stment to t	he mear	internal	tempera	ature fro	m Table	4e, whe	re appro	priate	•			
(93)m= 18.6	9 18.92	19.28	19.76	20.14	20.34	20.39	20.38	20.24	19.75	19.13	18.65		(93)
8. Space h	eating req	uirement	i										
Set Ti to th	e mean in	ternal ter	mperatui	re obtain	ed at ste	ep 11 of	Table 9	o, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisati	on factor fo	or gains	using Ta	ble 9a									
Jar	n Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation f	actor for g	ains, hm	1:										
(94)m= 0.99	0.99	0.97	0.92	0.82	0.64	0.47	0.52	0.78	0.95	0.99	0.99		(94)
Useful gair	s, hmGm	, W = (94	4)m x (84	4)m									
(95)m= 419.4	2 489.96	552.48	597.31	573.62	443.82	307.92	319.41	431.92	451.93	412.57	395.83		(95)
Monthly av	erage exte	ernal 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 r	ate for me	an intern	al tempe	erature, I	Lm , W =	=[(39)m :	x [(93)m	– (96)m]	_			
(97)m= 1222.	44 1188.32	1081.61	909.93	705.94	476.13	314.13	329.66	511.5	765.55	1010.54	1218.02		(97)
Space hea	ting 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= 597.4	5 469.3	393.67	225.08	98.45	0	0	0	0	233.33	430.54	611.7		
			-	-		-	Tota	l per year	(kWh/year) = Sum(9	8)15,912 =	3059.52	(98)
Space hea	tina reauir	ement in	kWh/m²	²/vear								49.83	(99)
						a a la callación		VIID)			<u>l</u>		`
9a. Energy i		ils – ina	ividuai n	eating sy	ystems i	ncluaing	micro-C	,ПР)					
Space hea Fraction of	_	at from s	econdar	v/sunnle	mentary	evetem					ſ	0	(201)
		at 110111 3	Cooridar	y/ Suppic	montary	3 7 3 () 111						U	1(201)
			! 4	(-)		-	(202) - 1	(201) -			l		(000)
	space hea		-	, ,			(202) = 1 -	` /				1	(202)
Fraction of Fraction of	•		-	, ,			` /	- (201) = 02) × [1 -	(203)] =		[1	(202)
	total heati	ng from	main sys	stem 1			` /	` /	(203)] =		[[[= ' '
Fraction of	total heati of main spa	ng from ace heat	main syste	stem 1 em 1	g systen		` /	` /	(203)] =			1	(204)
Fraction of Efficiency of	total heati	ng from ace heat ry/suppl	main syste	stem 1 em 1 y heating		1, %	(204) = (2	02) × [1 –	` '*	Nov	Dec l	93.4	(204) (206) (208)
Fraction of Efficiency of Efficiency of	total heati of main spoof of seconda	ng from ace heat ry/suppl Mar	main system ing system ementar	stem 1 em 1 y heating May	Jun		` /	` /	(203)] =	Nov	Dec	1 93.4	(204) (206) (208)
Fraction of Efficiency of	total heati of main spoof of seconda n Feb ting require	ng from ace heat ry/suppl Mar	main system ing system ementar	stem 1 em 1 y heating May	Jun	1, %	(204) = (2	02) × [1 –	` '*	Nov 430.54	Dec 611.7	93.4	(204) (206) (208)
Efficiency of Efficiency of User Space head 597.4	total heati of main span of seconda n Feb ting require 5 469.3	ng from ace heat ry/supple Mar ement (c) 393.67	main systementar Apr calculated 225.08	stem 1 em 1 y heating May d above) 98.45	Jun	ı, % Jul	(204) = (2) Aug	02) × [1 – 1	Oct			93.4	(204) (206) (208) ear
Fraction of Efficiency of Efficiency of Jar Space hea 597.4 (211)m = {[(total heating from the following the followi	ng from ace heat ry/supple Mar ement (c 393.67	main systementar Apr calculatee 225.08	stem 1 em 1 y heating May d above) 98.45	Jun) 0	n, % Jul 0	(204) = (2) Aug	02) × [1 – 1	Oct 233.33	430.54	611.7	93.4	(204) (206) (208)
Efficiency of Efficiency of User Space head 597.4	total heating from the following the followi	ng from ace heat ry/supple Mar ement (c) 393.67	main systementar Apr calculated 225.08	stem 1 em 1 y heating May d above) 98.45	Jun	ı, % Jul	(204) = (2 Aug 0	02) × [1 - Sep 0	Oct 233.33	430.54	611.7	1 93.4 0 kWh/ye	(204) (206) (208) ear
Fraction of Efficiency of Efficiency of Jar Space hea 597.4 (211)m = {[(639.6)]	total heati of main span of secondar n Feb ting require 5 469.3 98)m x (20	ng from ace heat ary/supplement (compared as 393.67 acc) 393.67 acc) 3421.49	main systementar Apr calculated 225.08 00 ÷ (20 240.99	stem 1 em 1 y heating May d above) 98.45 06) 105.4	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 – 1	Oct 233.33	430.54	611.7	93.4	(204) (206) (208) ear
Fraction of Efficiency of Efficiency of Jar Space hea 597.4 (211)m = {[(639.6)	total heating from the secondary of secondary from February from the secondary from February from Fe	ng from ace heat ary/supplement (compared ary)] } x 1 421.49	main systementar Apr calculated 225.08 100 ÷ (20 240.99) y), kWh/	stem 1 em 1 y heating May d above) 98.45 06) 105.4	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 - Sep 0	Oct 233.33	430.54	611.7	1 93.4 0 kWh/ye	(204) (206) (208) ear
Fraction of Efficiency of Efficiency of Space hea 597.4 (211)m = {[(639.6) Space hea = {[(98)m x (total heating from the second and th	ng from ace heat ary/supplement (compared as 393.67 accordance) A 21.49 accordance on the condar on	main systementar Apr calculated 225.08 00 ÷ (20 240.99 y), kWh/	stem 1 em 1 y heating May d above) 98.45 06) 105.4	Jun 0 0	n, % Jul 0	(204) = (2) Aug 0 Tota	02) × [1 – Sep 0 0 1 (kWh/yea	Oct 233.33 249.82 ar) =Sum(2	430.54 460.96 211) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) ear
Fraction of Efficiency of Efficiency of Jar Space hea 597.4 (211)m = {[(639.6)	total heating from the secondary of secondary from February from the secondary from February from Fe	ng from ace heat ary/supplement (compared ary)] } x 1 421.49	main systementar Apr calculated 225.08 100 ÷ (20 240.99) y), kWh/	stem 1 em 1 y heating May d above) 98.45 06) 105.4	Jun) 0	n, % Jul 0	(204) = (204)	02) × [1 - Sep 0 0 I (kWh/yea	Oct 233.33 249.82 ar) =Sum(2	430.54 460.96 211) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) (208) (211) (211)
Fraction of Efficiency of Efficiency of Jar Space hea 597.4 (211)m = {[(639.6) Space hea = {[(98)m x ((215)m=0]	total heati of main span of secondar n Feb ting require 5 469.3 98)m x (20 6 502.46 ting fuel (secondary)] } x 1	ng from ace heat ary/supplement (compared as 393.67 accordance) A 21.49 accordance on the condar on	main systementar Apr calculated 225.08 00 ÷ (20 240.99 y), kWh/	stem 1 em 1 y heating May d above) 98.45 06) 105.4	Jun 0 0	n, % Jul 0	(204) = (204)	02) × [1 – Sep 0 0 1 (kWh/yea	Oct 233.33 249.82 ar) =Sum(2	430.54 460.96 211) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) ear
Fraction of Efficiency of Efficiency of Jar Space hea 597.4 (211)m = {[(639.6 Space hea = {[(98)m x ((215)m= 0 Water heati	total heati of main span of secondar n Feb ting require 5 469.3 98)m x (20 6 502.46 ting fuel (s 201)] } x 1	ng from ace heat ary/supplement (compared as a secondar on the	main systementar Apr calculatect 225.08 00 ÷ (20 240.99 y), kWh/ 8) 0	stem 1 em 1 y heating May d above) 98.45 06) 105.4 month	Jun 0 0	n, % Jul 0	(204) = (204)	02) × [1 - Sep 0 0 I (kWh/yea	Oct 233.33 249.82 ar) =Sum(2	430.54 460.96 211) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) (208) (211) (211)
Fraction of Efficiency of Efficiency of Jar Space hea 597.4 (211)m = {[(639.6) Space hea = {[(98)m x ((215)m= 0) Water heati Output from	total heating free free free free free free free fre	ng from ace heat ry/supplement (color 393.67 04)] } x 1 421.49 econdar 00 ÷ (20 0	main systementar Apr calculated 225.08 00 ÷ (20 240.99 y), kWh/ 08) 0	stem 1 em 1 y heating May d above) 98.45 06) 105.4 month 0	Jun 0 0	o 0	(204) = (204)	02) × [1 – Sep 0 0 1 (kWh/yea	Oct 233.33 249.82 ar) =Sum(2	430.54 460.96 211) _{15,1012} 0 215) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) (208) (211) (211)
Fraction of Efficiency of Efficiency of Jar Space hea 597.4 (211)m = {[(639.6) Space hea = {[(98)m x ((215)m= 0 Water heati Output from 180.1	total heati of main span of secondar n Feb ting require 5 469.3 98)m x (20 6 502.46 ting fuel (s 201)] } x 1 0 ng water heating total secondar water heating fuel (s 157.38	ng from ace heat ary/supplement (color of the supplement) Mar	main systementar Apr calculatect 225.08 00 ÷ (20 240.99 y), kWh/ 8) 0	stem 1 em 1 y heating May d above) 98.45 06) 105.4 month	Jun 0 0	n, % Jul 0	(204) = (204)	02) × [1 - Sep 0 0 I (kWh/yea	Oct 233.33 249.82 ar) =Sum(2	430.54 460.96 211) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) (208) ear (211) (211)
Fraction of Efficiency of Efficiency of Space hea 597.4 (211)m = {[(639.6) Space hea = {[(98)m x ((215)m=0 Water heati Output from 180.4 Efficiency of	total heating frequire fr	mg from ace heat ary/supplement (color as a secondar of the condar of th	main systementar Apr calculated 225.08 00 ÷ (20 240.99 y), kWh/ 8) 0 ulated al 145.23	stem 1 em 1 y heating May d above) 98.45 06) 105.4 month 0	Jun 0 0 0 123.84	o 0 118.65	(204) = (2) Aug 0 Tota 132.26	02) × [1 – 1 Sep 0 0 1 (kWh/yea 133.72	Oct 233.33 249.82 ar) =Sum(2 0 ar) =Sum(2	430.54 460.96 211) _{15,1012} 0 215) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) (208) ear (211) (211)
Fraction of Efficiency of Efficiency of Space head [597.4] (211)m = {[(639.6] Space head = {[(98)m x ((215)m= 0 Water heati Output from [180.7] Efficiency of (217)m= [87.8]	total heati of main span of secondar n Feb ting require 5 469.3 98)m x (20 6 502.46 ting fuel (s 201)] } x 1 0 ng water heati 6 157.38 water heati	ng from ace heat ary/supplement (color of the street street) Mar	main systementar Apr calculated 225.08 00 ÷ (20 240.99) y), kWh/ 08) 0 ulated al 145.23	stem 1 em 1 y heating May d above) 98.45 06) 105.4 month 0	Jun 0 0	o 0	(204) = (204)	02) × [1 – Sep 0 0 1 (kWh/yea	Oct 233.33 249.82 ar) =Sum(2	430.54 460.96 211) _{15,1012} 0 215) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) (208) ear (211) (211)
Fraction of Efficiency of Efficiency of Space head 597.4 (211)m = {[(639.6 Space head = {[(98)m x ((215)m= 0 Water heati Output from 180.7 Efficiency of (217)m= 87.8 Fuel for water	total heating main spans of secondar se	ng from ace heat ary/supplement (color of the standard of the	main systementar Apr calculated 225.08 00 ÷ (20 240.99 y), kWh/ 08) 0 ulated at 145.23 86.15 onth	stem 1 em 1 y heating May d above) 98.45 06) 105.4 month 0	Jun 0 0 0 123.84	o 0 118.65	(204) = (2) Aug 0 Tota 132.26	02) × [1 – 1 Sep 0 0 1 (kWh/yea 133.72	Oct 233.33 249.82 ar) =Sum(2 0 ar) =Sum(2	430.54 460.96 211) _{15,1012} 0 215) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) (208) ear (211) (211)
Fraction of Efficiency of Efficiency of Space hea 597.4 (211)m = {[(639.6) Space hea = {[(98)m x ((215)m= 0 Water heati Output from 180.4 Efficiency of (217)m= 87.8 Fuel for wate (219)m = (6	total heating fractions from the second and the sec	mg from ace heat ary/supplement (color of ter (calcolor 163.74 ater ary (217)	main systementar Apr calculated 225.08 00 ÷ (20 240.99 y), kWh/ 8) 0 ulated al 145.23 86.15 onth	stem 1 em 1 y heating May d above) 98.45 06) 105.4 month 0 bove) 140.61	Jun 0 0 0 123.84 80.3	o 0 118.65 80.3	(204) = (2) Aug 0 Tota 132.26	02) × [1 – 100] Sep 0 0 1 (kWh/yea 133.72 80.3	Oct 233.33 249.82 ar) =Sum(2 0 ar) =Sum(2 152.27	430.54 460.96 211) _{15,1012} 0 215) _{15,1012} 162.55	611.7 654.93 = 0 = 175.93	1 93.4 0 kWh/ye	(204) (206) (208) (208) ear (211) (211)
Fraction of Efficiency of Efficiency of Space head 597.4 (211)m = {[(639.6 Space head = {[(98)m x ((215)m= 0 Water heati Output from 180.7 Efficiency of (217)m= 87.8 Fuel for water	total heating fractions from the second and the sec	ng from ace heat ary/supplement (color of the standard of the	main systementar Apr calculated 225.08 00 ÷ (20 240.99 y), kWh/ 08) 0 ulated at 145.23 86.15 onth	stem 1 em 1 y heating May d above) 98.45 06) 105.4 month 0	Jun 0 0 0 123.84	o 0 118.65	(204) = (2) Aug 0 Tota 132.26 80.3	02) × [1 – 1 Sep 0 0 1 (kWh/yea 133.72	Oct 233.33 249.82 ar) =Sum(2 0 ar) =Sum(2 152.27 86.12	430.54 460.96 211) _{15,1012} 0 215) _{15,1012}	611.7	1 93.4 0 kWh/ye	(204) (206) (208) (208) ear (211) (211)

Annual totals		kWh/yea	ır	kWh/yea	r
Space heating fuel used, main system 1		•		3275.71	
Water heating fuel used				2104.23	$\bar{1}$
Electricity for pumps, fans and electric keep-hot					
central heating pump:			30]	(230c)
boiler with a fan-assisted flue			45	Ī	(230e)
Total electricity for the above, kWh/year	sum of (230a)(230g) =		75	(231)
Cloatricity for lighting				278.04	(232)
Electricity for lighting					
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	s including micro-CHP Energy kWh/year	Emission fac		Emissions kg CO2/ye	
	Energy				
12a. CO2 emissions – Individual heating systems	Energy kWh/year	kg CO2/kWh		kg CO2/ye	ar
12a. CO2 emissions – Individual heating systems Space heating (main system 1)	Energy kWh/year	kg CO2/kWh	=	kg CO2/ye	ar (261)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary)	Energy kWh/year (211) x (215) x	kg CO2/kWh 0.216 0.519	=	kg CO2/ye	ar (261) (263)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary) Water heating	Energy kWh/year (211) x (215) x (219) x	kg CO2/kWh 0.216 0.519	=	kg CO2/ye 707.55 0 454.51	(261) (263) (264)
12a. CO2 emissions – Individual heating systems Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energy kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	kg CO2/kWh 0.216 0.519 0.216	= =	kg CO2/ye 707.55 0 454.51 1162.07	(261) (263) (264) (265)

TER =

21.91

(273)

			User D	otaila:						
A N	Obrida I I a alva all	(- NI			OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	2		Stroma Softwa					016363 on: 1.0.4.16	
Software Hame.	Ottoma 1 O/ ti 201			Address:				VCISIO	71. 1.0.4.10	
Address :			, ,							
1. Overall dwelling dime	ensions:									
Ground floor				a(m²)	(1-)		ight(m)] ₍₀₌₎ =	Volume(m³	_
	N. (41 N. (4 N. (4 IN. (4	\.			(1a) x		2.7	(2a) =	203.58	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1n)	7	75.4	(4)					_
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	203.58	(5)
2. Ventilation rate:	main se	econdary		other		total			m³ per hou	r
North an of all large are	heating h	eating	_		, ₋ -			40 - 1	-	_
Number of chimneys	0 +	0	+ _	0] = [0		40 =	0	(6a)
Number of open flues	0 +	0	+	0]	0		20 =	0	(6b)
Number of intermittent fa					L	3	X '	10 =	30	(7a)
Number of passive vents	3				L	0	X ·	10 =	0	(7b)
Number of flueless gas f	ires					0	X 4	40 =	0	(7c)
								Δir ch	nanges per ho	niir
Infiltration due to chimne	vs_flues and fans = (6)	a)+(6b)+(7a))+(7b)+(7	7c) =	Г	30		÷ (5) =	0.15	(8)
	peen carried out or is intende				ontinue fr			. (3) =	0.15	(0)
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber f				•	uction			0	(11)
if both types of wall are p deducting areas of openi	resent, use the value corresp ngs); if equal user 0.35	ponaing to tr	ne greate	er wall are	a (aπer					
	floor, enter 0.2 (unseal	ed) or 0.1	(seale	d), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
Percentage of window	s and doors draught st	ripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate				(8) + (10)	. , , ,	, , ,	. ,		0	(16)
Air permeability value,	•		•	•	•	etre of e	envelope	area	5	(17)
If based on air permeabil	-					in haina			0.4	(18)
Air permeability value applie Number of sides sheltere		s been done	or a deg	jree air pei	пеавшу	is being u	sea		1	(19)
Shelter factor	,			(20) = 1 -	0.075 x (1	9)] =			0.92	(20)
Infiltration rate incorpora	ting shelter factor			(21) = (18)	x (20) =				0.37	(21)
Infiltration rate modified f	or monthly wind speed									
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7	•							•	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
	2)m ÷ 4 1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18	1	
(1.00	3.00	0.00	J.02	•		L <u>-</u>		J	

Adjusted infiltra	ation rate	(allowi	ng for sh	nelter an	nd wind s	peed) =	(21a) x	(22a)m				-	
0.47	0.46	0.45	0.4	0.4	0.35	0.35	0.34	0.37	0.4	0.41	0.43		
<i>Calcul<mark>ate effed</mark></i> If mechanica		_	rate for ti	пе арріі	cable ca	se						0	(23
If exhaust air he			endix N, (2	3b) = (23a	a) × Fmv (e	quation (I	N5)) , othe	rwise (23b) = (23a)			0	(23
If balanced with	heat recov	ery: effic	iency in %	allowing f	for in-use fa	actor (fron	n Table 4h) =				0	(23
a) If balance	d mechai	nical ve	entilation	with he	at recove	ery (MVI	HR) (24a	a)m = (22	2b)m + (2	23b) × [1 – (23c)	÷ 100]	`
(24a)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
b) If balance	d mechai	nical ve	entilation	without	heat rec	overy (I	ИV) (24b)m = (22	2b)m + (2	23b)	•	•	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h	ouse extr	act ver	itilation c	r positiv	ve input v	entilatio	on from o	outside	<u>-</u>				
if (22b)m	า < 0.5 ×	(23b), t	hen (240	c) = (23b	o); otherv	vise (24	c) = (22h	o) m + 0.	5 × (23b)	1	1	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural v if (22b)m	ventilation n = 1, the			•	•				0.5]				
(24d)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(24
Effective air	change r	ate - er	nter (24a) or (24l	b) or (24d	c) or (24	d) in bo	(25)				_	
(25)m= 0.61	0.61	0.6	0.58	0.58	0.56	0.56	0.56	0.57	0.58	0.59	0.59		(25
3. Heat losses	s and hea	at loss r	paramete	ār.									
ELEMENT	Gross	•	Openin		Net Ar	ea	U-val	ue	AXU		k-value	9	AXk
	area (m²)	m		A ,n	n²	W/m2	:Κ	(W/ł	<)	kJ/m²·l	K	kJ/K
Doors					2	X	1	= [2				(26
Windows Type	: 1				0.93	x1	/[1/(1.4)+	0.04] =	1.23				(27
Windows Type	2				1.98	x1	/[1/(1.4)+	0.04] =	2.62				(27
Windows Type	: 3				1.63	x1	/[1/(1.4)+	0.04] =	2.16				(27
Windows Type	4				2.04	x1	/[1/(1.4)+	0.04] =	2.7				(27
Windows Type	: 5				5.69	x1	/[1/(1.4)+	0.04] =	7.54				(27
Vindows Type	6				0.87	x1	/[1/(1.4)+	0.04] =	1.15				(27
Windows Type	7				1.47	x1	/[1/(1.4)+	0.04] =	1.95				(27
Rooflights					0.77057	92 x1	/[1/(1.7) +	0.04] =	1.30998	5			(27
Nalls Type1	68.45	;	16.08	3	52.37	×	0.18	=	9.43				(29
Walls Type2	4.03		2		2.03	x	0.18	<u> </u>	0.37			\exists \sqsubset	(29
Roof	75.4		0.77		74.63	X	0.13	<u> </u>	9.7			\exists \sqsubset	(30
Total area of e	lements,	m²			147.88	3							(31
Party wall					42.95	X	0		0			$\neg \sqcap$	(32
Party floor					75.4							i i	(32
for windows and						ated using	formula 1	/[(1/U-valu	ıe)+0.04] a	s given in	paragraph	1 3.2	
				s and par	titions		(26) (20)) + (30) =				Γ	 1.
	_ \^!!!	5 (A X	U)				(26)(30)) + (32) =				44.04	. (33
** include the area Fabric heat los		•	,					((00)	(20) + (00	N L (20-1	(20-)		
	Cm = S(A	Axk)	ŕ	TEA\!	م ار ا ارام عالم ا				(30) + (32 tive Value:	, , ,	(32e) =	14882.6 250	(34)

herma	al bridge	55 . S (L	X I) Call	culated	using Ap	pendix i	•						14.96	
			are not kn	own (36) =	= 0.15 x (3	1)								_
	abric he								• ,	(36) =			59	(3
entila I			alculated				.		` ′		25)m x (5)		1	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
8)m=	40.97	40.68	40.4	39.08	38.84	37.69	37.69	37.47	38.13	38.84	39.33	39.86		(3
- 1		oefficier							· ,	= (37) + (1	
9)m=	99.96	99.68	99.4	98.08	97.83	96.68	96.68	96.47	97.12	97.83	98.33	98.85		— ,
eat lo	ss para	meter (F	ILP), W/	m²K						Average = = (39)m ÷	Sum(39) ₁ .	12 /12=	98.08	(
))m=	1.33	1.32	1.32	1.3	1.3	1.28	1.28	1.28	1.29	1.3	1.3	1.31		
umbe	er of day	rs in mor	nth (Tabl	le 1a)					,	Average =	Sum(40) _{1.}	12 /12=	1.3	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec]	
)m=	31	28	31	30	31	30	31	31	30	31	30	31		(
. Wa	ter heat	ing ener	gy requi	rement:								kWh/y	ear:	
				- 4			- 4 4 4 4 4			4 4 4		.37	4	
if TF.	A > 13.9 A £ 13.9	9, N = 1 9, N = 1	+ 1.76 x	-	•)2)] + 0.0	·	ΓFA -13.			1	
if TF. if TF. inual	A > 13.9 A £ 13.9 averag	9, N = 1 9, N = 1 e hot wa	+ 1.76 x ater usag	ge in litre	es per da	ay Vd,av	erage =)2)] + 0.0 (25 x N) to achieve	+ 36		90).48]	(
if TF. if TF. nnual	A > 13.9 A £ 13.9 averag the annua	9, N = 1 9, N = 1 e hot wa al average	+ 1.76 x ater usag	ge in litre	es per da	ay Vd,av Iwelling is	erage =	(25 x N)	+ 36		90]	(
if TF, if TF, nnual duce t more	A > 13.9 A £ 13.9 averag the annua that 125 Jan	O, N = 1 O, N = 1 e hot want average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w	es per da 5% if the d vater use, l	ay Vd,av lwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36		90]]	(
if TF, if TF, nnual duce t more	A > 13.9 A £ 13.9 averag the annua that 125 Jan	O, N = 1 O, N = 1 e hot want average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w	es per da 5% if the d vater use, l	ay Vd,av lwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us	se target o	90	0.48]	(
if TF. inual	A > 13.9 A £ 13.9 averag the annua that 125 Jan	O, N = 1 O, N = 1 e hot want average litres per p	+ 1.76 x ater usag hot water person per Mar	ge in litre usage by day (all w	es per da 5% if the d vater use, l	ay Vd,av lwelling is hot and co	erage = designed i ld) Jul	(25 x N) to achieve	+ 36 a water us Sep	Oct	90 Nov 95.91	Dec 99.53]	
if TF, if TF, innual duce t more t wate	A > 13.9 A £ 13.9 averag the annua that 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 88.67	es per da 5% if the d vater use, I May Vd,m = fa 85.05	ay Vd,av lwelling is not and co Jun ctor from	erage = designed (d) Jul Table 1c x 81.43	(25 x N) to achieve Aug	+ 36 a water us Sep 88.67	Oct 92.29 Total = Su	90 Nov 95.91 m(44) ₁₁₂ =	Dec 99.53	1085.79	
if TF, innual duce t more t wate)m=	A > 13.9 A £ 13.9 averag the annua that 125 Jan er usage in	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea	ge in litre usage by day (all w Apr ach month 88.67	es per da 5% if the d vater use, I May Vd,m = fa 85.05	ay Vd,av lwelling is not and co Jun ctor from	erage = designed (d) Jul Table 1c x 81.43	(25 x N) to achieve Aug (43) 85.05	+ 36 a water us Sep 88.67	Oct 92.29 Total = Su	90 Nov 95.91 m(44)112 =	Dec 99.53	1085.79	
if TF, if TF, innual induce it more it wate i)m= ergy con	A > 13.9 A £ 13.9 averag the annual that 125 Jan er usage in 99.53	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 92.29 used - cale	ge in litre usage by day (all w Apr ach month 88.67	es per da 5% if the d vater use, l May Vd,m = fa 85.05	ay Vd,av lwelling is not and co Jun ctor from 81.43	erage = designed (d) Jul Table 1c x 81.43	(25 x N) to achieve Aug (43) 85.05	+ 36 a water us Sep 88.67 0 kWh/mor 103.47	Oct 92.29 Total = Su 120.59	90 Nov 95.91 m(44) ₁₁₂ =	99.53 c, 1d)	1085.79	((
if TF, if TF, nnual duce t more t wate	A > 13.9 A £ 13.9 averag the annual that 125 Jan er usage in 99.53 content of	P, N = 1 P, N = 1 P, N = 1 P hot was A average A litres per p Peb A litres per P5.91 A litres per P5.91 A litres per P5.91	+ 1.76 x ater usag hot water person per Mar day for ea 92.29 used - calc 133.21	ge in litre usage by day (all w Apr ach month 88.67 culated mo	es per da 5% if the day atter use, l May Vd,m = fa 85.05 onthly = 4.	ay Vd,av lwelling is not and co Jun ctor from 81.43 190 x Vd,r	erage = designed (d) Jul Table 1c x 81.43 m x nm x E 89.11	(25 x N) to achieve Aug (43) 85.05	+ 36 a water us Sep 88.67 0 kWh/mor 103.47	Oct 92.29 Total = Su 120.59	90 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63	99.53 c, 1d)		
if TF, if	A > 13.9 A £ 13.9 averag the annual that 125 Jan er usage in 99.53 content of 147.6 aneous w	P, N = 1 P,	+ 1.76 x ater usag hot water person per Mar day for ea 92.29 used - calc 133.21	ge in litre usage by day (all w Apr ach month 88.67 culated mo	es per da 5% if the day atter use, l May Vd,m = fa 85.05 onthly = 4.	ay Vd,av lwelling is not and co Jun ctor from 81.43 190 x Vd,r	erage = designed (d) Jul Table 1c x 81.43 m x nm x E 89.11	(25 x N) to achieve Aug (43) 85.05 27m / 3600 102.25	+ 36 a water us Sep 88.67 0 kWh/mor 103.47	Oct 92.29 Total = Su 120.59	90 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63	99.53 c, 1d)		
if TF, if TF, nnual duce t more t wate ergy c enstant nstant ater:	A > 13.9 A £ 13.9 averag the annual that 125 Jan er usage in 99.53 content of 147.6 aneous w 22.14 storage	P, N = 1 P,	ter usage hot water person per Mar day for ea 92.29 used - calce 133.21 ag at point 19.98	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no	es per da 5% if the day atter use, I May Vd,m = fa 85.05	ay Vd,av lwelling is not and co Jun ctor from 1 81.43 190 x Vd,r 96.16	erage = designed id) Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 13.37	(25 x N) to achieve Aug (43) 85.05 DTm / 3600 102.25 boxes (46) 15.34	+ 36 a water us Sep 88.67 0 kWh/mor 103.47 0 to (61) 15.52	Oct 92.29 Total = Su 120.59 Total = Su 18.09	90 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	99.53 = c, 1d) 142.94 =		
if TF. if TF. if TF. innual duce t more t t water ergy c ergy c innual innual mstant innual	A > 13.9 A £ 13.9 averag the annual that 125 Jan er usage in 99.53 content of 147.6 aneous w 22.14 storage e volum	P, N = 1 P,	ter usage hot water person per Mar day for ear 92.29 used - calc 133.21 ng at point 19.98 including	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no 17.42	es per da 5% if the da 5% if th	ay Vd,av lwelling is not and co Jun ctor from 81.43 190 x Vd,r 96.16 storage),	erage = designed (d) Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 13.37	(25 x N) to achieve Aug (43) 85.05 7Tm / 3600 102.25 boxes (46) 15.34 within sa	+ 36 a water us Sep 88.67 0 kWh/mor 103.47 0 to (61) 15.52	Oct 92.29 Total = Su 120.59 Total = Su 18.09	90 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	99.53 		
if TF, if	A > 13.9 A £ 13.9 averag the annual that 125 Jan er usage ir 99.53 content of 147.6 aneous w 22.14 storage e volum nunity h	P, N = 1 P, N = 1 P, N = 1 P hot was al average litres per p Peb P litres per P	ter usage hot water person per Mar day for ear 92.29 used - calcular 19.98 including nd no tal	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no 17.42 ng any so nk in dw	es per da 5% if the d vater use, I May Vd,m = fa 85.05 onthly = 4. 111.44 o hot water 16.72 olar or W velling, e	ay Vd,av welling is not and co Jun ctor from 1 81.43 190 x Vd,r 96.16 storage), 14.42 /WHRS nter 110	erage = designed id) Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 13.37 storage) litres in	(25 x N) to achieve Aug (43) 85.05 7Tm / 3600 102.25 boxes (46) 15.34 within sa	+ 36 a water us Sep 88.67 0 kWh/mor 103.47 15.52 ame ves	Oct 92.29 Total = Su 120.59 Total = Su 18.09 Sel	900 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	99.53 = c, 1d) 142.94 =		
if TF. if TF. if TF. innual duce t more t water ergy c ergy c orage committee herw ater:	A > 13.9 A £ 13.9 averag the annual that 125 Jan 99.53 content of 147.6 aneous w 22.14 storage e volum nunity h vise if no	P, N = 1 P,	ter usage hot water person per Mar day for ear 92.29 used - calca 133.21 ng at point 19.98 including the market water the	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no 17.42 ag any so nk in dw er (this in	es per da 5% if the d vater use, l May Vd,m = fa 85.05 onthly = 4. 111.44 o hot water 16.72 olar or W velling, e	ay Vd,av lwelling is not and co Jun ctor from 81.43 190 x Vd,r 96.16 storage), 14.42 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 13.37 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 85.05 27m / 3600 102.25 boxes (46) 15.34 within sa (47)	+ 36 a water us Sep 88.67 0 kWh/mor 103.47 15.52 ame ves	Oct 92.29 Total = Su 120.59 Total = Su 18.09 Sel	900 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	99.53 = c, 1d) 142.94 =		
if TF, if TF, innual duce t water t water ergy c innual innua	A > 13.9 A £ 13.9 averag the annual that 125 Jan 99.53 content of 147.6 aneous w 22.14 storage e volum nunity h vise if no storage anufact	P, N = 1 P,	ter usage hot water person per day for ear 92.29 used - calc 133.21 ng at point 19.98 including that water eclared letter to the color of the color	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no 17.42 ag any so ank in dw er (this in	es per da 5% if the d vater use, I May Vd,m = fa 85.05 onthly = 4. 111.44 o hot water 16.72 olar or W velling, e	ay Vd,av lwelling is not and co Jun ctor from 81.43 190 x Vd,r 96.16 storage), 14.42 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 13.37 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 85.05 27m / 3600 102.25 boxes (46) 15.34 within sa (47)	+ 36 a water us Sep 88.67 0 kWh/mor 103.47 15.52 ame ves	Oct 92.29 Total = Su 120.59 Total = Su 18.09 Sel	90 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ = 19.74	99.53 = c, 1d) 142.94 =		
if TF. if	A > 13.9 A £ 13.9 average the annual that 125 Jan 99.53 content of 147.6 aneous w 22.14 storage e volum nunity he vise if no storage anufact rature fa	Pop N = 1 Pop N	ter usage hot water person per day for ear 92.29 used - calc 133.21 ag at point 19.98 including nd no talc hot water eclared lem Table	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no 17.42 ag any so ank in dw er (this in oss facto 2b	es per da 5% if the d vater use, I May Vd,m = fa 85.05 onthly = 4. 111.44 o hot water 16.72 olar or W velling, e ncludes i	ay Vd,av lwelling is not and co Jun ctor from 81.43 190 x Vd,r 96.16 storage), 14.42 /WHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 13.37 storage 0 litres in neous co	(25 x N) to achieve Aug (43) 85.05 77m / 3600 102.25 boxes (46) 15.34 within sa (47) ombi boil	+ 36 a water us Sep 88.67 103.47 15.52 ame vess ers) ente	Oct 92.29 Total = Su 120.59 Total = Su 18.09 Sel	90 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ = 19.74	Dec 99.53 c, 1d) 142.94 21.44		
if TF, if TF, nnual duce t water t water ergy c ergy c orage commister herwater: orage commister herwater: orage commister herwater: hermater	A > 13.9 A £ 13.9 average the annual that 125 Jan 99.53 content of 147.6 aneous w 22.14 storage e volum nunity h vise if no storage anufact rature far lost fro	P, N = 1 P,	ter usage hot water person per Mar day for ear 92.29 used - calc 133.21 19.98 including and no talc hot water eclared lem Table storage	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no 17.42 ag any so nk in dw er (this in oss facto 2b , kWh/ye	es per da 5% if the a vater use, I May $Vd,m = fa$ 85.05 onthly = 4. 111.44 o hot water 16.72 olar or Welling, encludes i or is known ear	ay Vd,av Iwelling is not and co Jun 81.43 190 x Vd,r 96.16 storage), 14.42 IWHRS nter 110 nstantar	erage = designed (d) Jul Table 1c x 81.43 89.11 enter 0 in 13.37 storage 0 litres in neous con/day):	(25 x N) to achieve Aug (43) 85.05 27m / 3600 102.25 boxes (46) 15.34 within sa (47)	+ 36 a water us Sep 88.67 103.47 15.52 ame vess ers) ente	Oct 92.29 Total = Su 120.59 Total = Su 18.09 Sel	900 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ = 19.74	Dec 99.53 = c, 1d) 142.94 = 21.44		
if TF. if TF. innual duce t more t water if more innual duce t more innual duce t more innual duce t more innual duce t more innual duce t more innual duce t more innual duce t	A > 13.9 A £ 13.9 average the annual of that 125 Jan 99.53 content of 147.6 aneous w 22.14 storage e volume of the anufact of the anufact of the anufact of anufact of anufact of anufact of anufact of the anufact of	P, N = 1 P,	ter usage hot water person per Mar day for ear 92.29 used - calc 133.21 19.98 includin and no tal hot water hot water storage eclared to the storage eclared	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no 17.42 ag any so ank in dw er (this in oss facto 2b , kWh/ye cylinder l	es per da 5% if the d vater use, I May Vd,m = fa 85.05 onthly = 4. 111.44 o hot water 16.72 olar or W velling, e ncludes i	ay Vd,av lwelling is not and co Jun ctor from 81.43 190 x Vd,r 96.16 storage), 14.42 /WHRS nter 110 nstantar wn (kWh	erage = designed (d) Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 13.37 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 85.05 77m / 3600 102.25 boxes (46) 15.34 within sa (47) ombi boil	+ 36 a water us Sep 88.67 103.47 15.52 ame vess ers) ente	Oct 92.29 Total = Su 120.59 Total = Su 18.09 Sel	90 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	.48 Dec 99.53		
if TF. innual educe t more of wate 1)m= instant fater: corage therw fater:) If m empe nergy)) If m of wate comr	A > 13.9 A £ 13.9 average the annual that 125 Jan 99.53 content of 147.6 aneous w 22.14 storage e volum nunity h vise if no storage anufact rature far lost fro anufact ter stora	P, N = 1 P,	ter usage hot water person per Mar day for ear 92.29 used - calcular 133.21 19.98 including at point abot water eclared less torage eclared of factor free sections.	ge in litre usage by day (all w Apr ach month 88.67 culated mo 116.14 of use (no 17.42 ag any so ink in dw er (this in oss facto 2b , kWh/ye cylinder l com Tabl	es per da 5% if the d vater use, I May Vd,m = fa 85.05 onthly = 4. 111.44 o hot water 16.72 olar or W velling, e ncludes i or is kno ear loss fact	ay Vd,av lwelling is not and co Jun ctor from 81.43 190 x Vd,r 96.16 storage), 14.42 /WHRS nter 110 nstantar wn (kWh	erage = designed (d) Jul Table 1c x 81.43 m x nm x E 89.11 enter 0 in 13.37 storage 0 litres in neous con/day): known:	(25 x N) to achieve Aug (43) 85.05 77m / 3600 102.25 boxes (46) 15.34 within sa (47) ombi boil	+ 36 a water us Sep 88.67 103.47 15.52 ame vess ers) ente	Oct 92.29 Total = Su 120.59 Total = Su 18.09 Sel	90 Nov 95.91 m(44) ₁₁₂ = ables 1b, 1 131.63 m(45) ₁₁₂ =	Dec 99.53 = c, 1d) 142.94 = 21.44 0		

Energy lost from		ge, kWh/y	ear			(47) x (51)) x (52) x (53) =		0		(54)
Enter (50) or (54	, ,									0		(55)
Water storage los	s calculate	d for each	month			((56)m = (55) × (41)r	n				
(56)m= 0	0 0	0	0	0	0	0	0	0	0	0		(56)
If cylinder contains de	dicated 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 los	s (annual)	from Table	e 3							0		(58)
Primary circuit los					. ,	, ,						
(modified by fa	<u> </u>	1	1								l	(=a)
(59)m= 0	0 0	0	0	0	0	0	0	0	0	0		(59)
Combi loss calcul	ated for ea	ch month	(61)m =	(60) ÷ 36	65 × (41))m						
(61)m= 50.72 4	4.15 47.0	3 43.73	43.34	40.16	41.5	43.34	43.73	47.03	47.3	50.72		(61)
Total heat require	d for water	heating c	alculated	for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 198.32 17	3.24 180.2	4 159.87	154.78	136.32	130.61	145.6	147.2	167.62	178.93	193.66		(62)
Solar DHW input calc	ulated using A	ppendix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)	•	
(add additional lin	es if FGHF	RS 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 wate	r heater											
(64)m= 198.32 17	3.24 180.2	4 159.87	154.78	136.32	130.61	145.6	147.2	167.62	178.93	193.66		
	•	•	•		•	Outp	out from wa	ater heate	r (annual) ₁	12	1966.39	(64)
Haat malma francis	4 1 40.	134/1/										
Heat gains from v	vater neatii	ig, kvvn/m	onth 0.28	5 [0.85	× (45)m	+ (61)m	า] + 0.8 x	(46)m	+ (57)m	+ (59)m]	
	3.96 56.0	-	onth 0.28	42.01	× (45)m 40	+ (61)m 44.83	1] + 0.8 x 45.34	51.85	+ (57)m 55.59	+ (59)m 60.21]	(65)
	3.96 56.0	5 49.55	47.89	42.01	40	44.83	45.34	51.85	55.59	60.21		(65)
(65)m= 61.76 5 include (57)m i	3.96 56.0 n calculatio	49.55 n of (65)m	47.89 only if c	42.01	40	44.83	45.34	51.85	55.59	60.21		(65)
include (57)m in	3.96 56.0 n calculations (see Table	49.55 n of (65)m s 5 and 5a	47.89 only if c	42.01	40	44.83	45.34	51.85	55.59	60.21		(65)
include (57)m in	3.96 56.0 n calculations (see Table 5), W	49.55 n of (65)m s 5 and 5a /atts	47.89 only if c	42.01 ylinder i	40	44.83 dwelling	45.34 or hot w	51.85	55.59	60.21		(65)
include (57)m in	3.96 56.0 n calculations (see Table	49.55 n of (65)m s 5 and 5a /atts r Apr	47.89 only if c	42.01	40 s in the o	44.83	45.34	51.85 ater is fr	55.59 om com	60.21 munity h		(65)
(65)m= 61.76 5 include (57)m in 5. Internal gains Metabolic gains (Jan (66)m= 118.49 17	3.96 56.0 s calculation (see Table 5), Where the Market 118.4	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49	47.89 only if c): May 118.49	42.01 ylinder is Jun 118.49	40 s in the c Jul 118.49	44.83 dwelling Aug 118.49	45.34 or hot w Sep 118.49	51.85 ater is fr	55.59 om com	60.21 munity h		
include (57)m in	3.96 56.0 s calculation (see Table 5), Where Market 118.4 lculated in	49.55 n of (65)m 5 and 5a 7 atts r Apr 9 118.49 Appendix	47.89 conly if c display may 118.49 L, equati	Jun 118.49	40 s in the c Jul 118.49 r L9a), a	44.83 dwelling Aug 118.49 lso see	45.34 or hot w Sep 118.49 Table 5	51.85 ater is fr Oct 118.49	55.59 om com	60.21 munity h		
(65)m= 61.76 5 include (57)m i	3.96 56.0 s calculation (see Table 5), Where Market 118.4 lculated in 6.59 13.4	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21	47.89 only if c): May 118.49 L, equati 7.64	42.01 ylinder is Jun 118.49 ion L9 of	Jul 118.49 r L9a), a	Aug 118.49 lso see 9.05	45.34 or hot w Sep 118.49 Table 5	51.85 ater is fr Oct 118.49	55.59 om com Nov 118.49	60.21 munity h		(66)
include (57)m in	3.96 56.0 s calculation (see Table 5), Where Market 118.4 lculated in 6.59 13.4 (calculated	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Append	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ	Jun 118.49 ion L9 of 6.45 uation L	Jul 118.49 r L9a), a 6.97	Aug 118.49 lso see 9.05 3a), also	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal	51.85 ater is fr Oct 118.49 15.43 ble 5	55.59 om com Nov 118.49	60.21 munity h		(66) (67)
(65)m= 61.76 5 include (57)m in 5. Internal gains Metabolic gains (Jan (66)m= 118.49 1 Lighting gains (ca (67)m= 18.68 1 Appliances gains (68)m= 209.56 2	3.96 56.0 s (see Table 5), Where Market 118.4 lculated in 6.59 13.4 (calculated 1.73 206.2	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Appendix 15 194.59	47.89 only if c): May 118.49 L, equati 7.64 dix L, eq 179.86	Jun 118.49 ion L9 of 6.45 uation L	Jul 118.49 r L9a), a 6.97 13 or L1:	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08	51.85 ater is fr Oct 118.49 15.43 ble 5 171.75	55.59 om com Nov 118.49	60.21 munity h		(66)
include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m include (58)m include (57)m include (58)m include (57)m include (58)m include (57)m in	3.96 56.0 calculation (see Table 5), Where Market Market 118.4 lculated in 6.59 13.4 (calculated in 1.73 206.2 lculated in 1.73 206.2 lculated in 1.73 206.2	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Appendix 5 194.59 Appendix	47.89 only if c): May 118.49 L, equati 7.64 dix L, equati 179.86 L, equat	Jun 118.49 ion L9 of 6.45 uation L 166.02	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a)	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table	51.85 ater is fr Oct 118.49 15.43 ole 5 171.75 5	55.59 om com Nov 118.49 18.01	Dec 118.49		(66) (67) (68)
(65)m= 61.76 5 include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m= 118.49 1.7 Lighting gains (ca (67)m= 18.68 1 Appliances gains (68)m= 209.56 2.7 Cooking gains (ca (69)m= 34.85 3	3.96 56.0 calculation (see Table 5), Where Market 118.4 calculated in 1.73 206.2 calculated in 1.73 34.8 34.8	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Appen 5 194.59 Appendix 5 34.85	47.89 only if c): May 118.49 L, equati 7.64 dix L, eq 179.86	Jun 118.49 ion L9 of 6.45 uation L	Jul 118.49 r L9a), a 6.97 13 or L1:	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08	51.85 ater is fr Oct 118.49 15.43 ble 5 171.75	55.59 om com Nov 118.49	60.21 munity h		(66) (67)
(65)m= 61.76 5 include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m include (58)m include (57)m include (58)m include (57)m include (58)m i	3.96 56.0 calculation (see Table 5), Where Market 118.4 calculated in 1.73 206.2 calculated in 1.73 206.2 calculated in 1.85 34.8 calculated in 1.85 3	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Appendix 15 194.59 Appendix 34.85 e 5a)	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1: 156.78 or L15a) 34.85	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	51.85 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	55.59 om com Nov 118.49 18.01 186.47	Dec 118.49 19.2 200.31		(66) (67) (68) (69)
(65)m= 61.76 5 include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m i	3.96 56.0 s (see Table 5), Where Market 118.4 lculated in 6.59 13.4 (calculated in 4.85 34.8 gains (Table 3 3	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Appendix 5 194.59 Appendix 5 34.85 e 5a) 3	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a)	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table	51.85 ater is fr Oct 118.49 15.43 ole 5 171.75 5	55.59 om com Nov 118.49 18.01	Dec 118.49		(66) (67) (68)
include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m in	3.96 56.0 s (see Table 5), Where Market 118.4 s (calculated in 6.59 13.4 s	49.55 n of (65)m s 5 and 5a /atts r Apr 9 118.49 Appendix 9 10.21 I in Appendix 5 194.59 Appendix 6 34.85 e 5a) gative value	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equati 34.85	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1: 156.78 or L15a) 34.85	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	51.85 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	55.59 om com Nov 118.49 18.01 186.47 34.85	60.21 munity h Dec 118.49 19.2 200.31		(66) (67) (68) (69) (70)
(65)m= 61.76 5 include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m include (58)m i	3.96 56.0 s (see Table 5), Where Market 18.49 118.4 s (calculated in 4.85 34.8 s (calculated in 4.85 3	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Appendix 5 194.59 Appendix 6 34.85 e 5a) gative value 9 -94.79	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85	Jul 118.49 r L9a), a 6.97 13 or L1: 156.78 or L15a) 34.85	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	51.85 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	55.59 om com Nov 118.49 18.01 186.47	Dec 118.49 19.2 200.31		(66) (67) (68) (69)
(65)m= 61.76 5 include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m include (58)m include (57)m include (58)m include (57)m i	3.96 56.0 s (see Table 5), Where Market 118.4 s (calculated in 4.85 34.8 s	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Appendix 5 194.59 Appendix 6 34.85 e 5a) 3 gative valu 9 -94.79 5)	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 3 es) (Tab	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85 3 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tall 160.08 ee Table 34.85 3	51.85 ater is fr Oct 118.49 15.43 ole 5 171.75 5 34.85	55.59 om com Nov 118.49 18.01 186.47 34.85	60.21 munity h Dec 118.49 19.2 200.31 34.85		(66) (67) (68) (69) (70)
(65)m= 61.76 5 include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m include (58)m include (57)m include (58)m include (57)m i	3.96 56.0 s (see Table 5), Where Market 18.49 118.4 s (calculated in 4.85 34.8 s (calculated in 4.85 3	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 0 10.21 I in Appendix 5 194.59 Appendix 6 34.85 e 5a) 3 gative valu 9 -94.79 5)	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equati 34.85	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85 3 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1: 156.78 or L15a) 34.85	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85 3 -94.79	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 3 -94.79	51.85 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 3 -94.79	55.59 om com Nov 118.49 18.01 186.47 34.85 3 -94.79	Dec 118.49 19.2 200.31 34.85 3		(66) (67) (68) (69) (70)
(65)m= 61.76 5 include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m include (58)m include (57)m include (58)m include (57)m i	3.96 56.0 56	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 9 10.21 I in Appendix 5 194.59 Appendix 6 34.85 e 5a) 3 gative value 9 -94.79 5) 4 68.82	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 3 es) (Tab	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85 3 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1: 156.78 or L15a) 34.85 3 -94.79	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85 3 -94.79	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tall 160.08 ee Table 34.85 3	51.85 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 3 -94.79	55.59 om com Nov 118.49 18.01 186.47 34.85 3 -94.79	Dec 118.49 19.2 200.31 34.85 3		(66) (67) (68) (69) (70)
(65)m= 61.76 5 include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (57)m include (58)m include (57)m include (58)m include (57)m include (58)m include (57)m i	3.96 56.0 s (see Table 5), Where Market 118.4 s (calculated in 6.59 13.4 s (calculated in 4.85 34.8 s (Table 3 3 3 s (Table 3 3 3 s (Table 3 5) s (Table 3 5) s (Table 3 75.3 s (Table 3 75.3 5) s (Table 3 75.3 s (Table 3 75	49.55 n of (65)m e 5 and 5a /atts r Apr 9 118.49 Appendix 9 10.21 I in Appendix 5 194.59 Appendix 6 34.85 e 5a) 3 gative valu 9 -94.79 5) 4 68.82	47.89 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 3 es) (Tab	Jun 118.49 ion L9 of 6.45 uation L 166.02 ion L15 34.85 3 le 5) -94.79	Jul 118.49 r L9a), a 6.97 13 or L1: 156.78 or L15a) 34.85	44.83 dwelling Aug 118.49 lso see 9.05 3a), also 154.6), also se 34.85 3 -94.79	45.34 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 3 -94.79	51.85 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 3 -94.79	55.59 om com Nov 118.49 18.01 186.47 34.85 3 -94.79	Dec 118.49 19.2 200.31 34.85 3		(66) (67) (68) (69) (70)

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

Orientation: Access Fact Table 6d	or	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	5.69	x	11.28	x	0.63	x	0.7	=	19.62	(75)
Northeast 0.9x 0.77	X	0.87	x	11.28	x	0.63	х	0.7	=	3	(75)
Northeast 0.9x 0.77	X	5.69	x	22.97	x	0.63	х	0.7	=	39.94	(75)
Northeast 0.9x 0.77	X	0.87	x	22.97	x	0.63	x	0.7] =	6.11	(75)
Northeast 0.9x 0.77	X	5.69	x	41.38	x	0.63	х	0.7	=	71.96	(75)
Northeast 0.9x 0.77	X	0.87	x	41.38	x	0.63	х	0.7	=	11	(75)
Northeast 0.9x 0.77	X	5.69	x	67.96	x	0.63	х	0.7	=	118.17	(75)
Northeast 0.9x 0.77	X	0.87	X	67.96	X	0.63	x	0.7	=	18.07	(75)
Northeast 0.9x 0.77	X	5.69	x	91.35	x	0.63	x	0.7	=	158.84	(75)
Northeast 0.9x 0.77	X	0.87	x	91.35	x	0.63	x	0.7	=	24.29	(75)
Northeast 0.9x 0.77	X	5.69	X	97.38	x	0.63	x	0.7	=	169.35	(75)
Northeast 0.9x 0.77	X	0.87	x	97.38	x	0.63	x	0.7	=	25.89	(75)
Northeast 0.9x 0.77	X	5.69	x	91.1	x	0.63	x	0.7	=	158.42	(75)
Northeast 0.9x 0.77	X	0.87	x	91.1	x	0.63	X	0.7	=	24.22	(75)
Northeast 0.9x 0.77	X	5.69	X	72.63	x	0.63	x	0.7	=	126.29	(75)
Northeast 0.9x 0.77	X	0.87	X	72.63	X	0.63	X	0.7	=	19.31	(75)
Northeast 0.9x 0.77	X	5.69	x	50.42	x	0.63	X	0.7	=	87.68	(75)
Northeast 0.9x 0.77	X	0.87	x	50.42	x	0.63	x	0.7	=	13.41	(75)
Northeast 0.9x 0.77	X	5.69	X	28.07	X	0.63	X	0.7	=	48.81	(75)
Northeast 0.9x 0.77	X	0.87	x	28.07	x	0.63	x	0.7	=	7.46	(75)
Northeast 0.9x 0.77	X	5.69	x	14.2	x	0.63	x	0.7	=	24.69	(75)
Northeast 0.9x 0.77	X	0.87	X	14.2	X	0.63	X	0.7	=	3.77	(75)
Northeast 0.9x 0.77	X	5.69	X	9.21	X	0.63	X	0.7	=	16.02	(75)
Northeast _{0.9x} 0.77	X	0.87	x	9.21	x	0.63	X	0.7	=	2.45	(75)
Southeast 0.9x 0.77	X	1.47	X	36.79	X	0.63	X	0.7	=	33.06	(77)
Southeast 0.9x 0.77	X	1.47	X	62.67	X	0.63	X	0.7	=	56.31	(77)
Southeast 0.9x 0.77	X	1.47	X	85.75	X	0.63	X	0.7	=	77.05	(77)
Southeast 0.9x 0.77	X	1.47	X	106.25	X	0.63	X	0.7	=	95.47	(77)
Southeast 0.9x 0.77	X	1.47	X	119.01	X	0.63	X	0.7	=	106.93	(77)
Southeast 0.9x 0.77	X	1.47	X	118.15	X	0.63	X	0.7	=	106.16	(77)
Southeast 0.9x 0.77	X	1.47	X	113.91	X	0.63	X	0.7	=	102.35	(77)
Southeast 0.9x 0.77	X	1.47	X	104.39	X	0.63	x	0.7	=	93.8	(77)
Southeast 0.9x 0.77	X	1.47	X	92.85	X	0.63	X	0.7	=	83.43	(77)
Southeast 0.9x 0.77	X	1.47	X	69.27	X	0.63	X	0.7	=	62.24	(77)
Southeast 0.9x 0.77	X	1.47	x	44.07	x	0.63	x	0.7	=	39.6	(77)
Southeast 0.9x 0.77	X	1.47	x	31.49	x	0.63	x	0.7	=	28.29	(77)
Southwest _{0.9x} 0.77	X	0.93	x	36.79]	0.63	x	0.7	=	10.46	(79)
Southwest _{0.9x} 0.77	X	1.98	×	36.79]	0.63	x	0.7	=	22.26	(79)
Southwest _{0.9x} 0.77	X	1.63	×	36.79]	0.63	X	0.7	=	18.33	(79)

Southwest _{0.9x}	0.77	1	0.04	1 .,	00.70	0.00	l "	0.7	1 =	00.04	(79)
Southwest _{0.9x}	0.77] X]	2.04	X I	36.79	0.63	X	0.7]	22.94	=
Southwest _{0.9x}	0.77	X	0.93	X I	62.67	0.63	X	0.7] = 1 _	17.81	(79)
Southwest _{0.9x}	0.77] X] .,	1.98	l X l	62.67	0.63	X	0.7] = 1 _	37.92	(79)
Southwest _{0.9x}	0.77	X	1.63	X	62.67	0.63	X	0.7] = 1	31.22	(79)
Southwest _{0.9x}	0.77	X	2.04	X	62.67	0.63	X	0.7] = 1	39.07	(79)
Southwesto.9x Southwesto.9x	0.77] X]	0.93	X 	85.75	0.63	X	0.7] = 1 _	24.37	(79)
Southwest _{0.9x}	0.77	X	1.98	X	85.75	0.63	X	0.7] = 1	51.89	(79)
<u> </u>	0.77	X	1.63	X	85.75	0.63	X	0.7] = 1	42.72	(79)
Southwesto.9x	0.77	X	2.04	X	85.75	0.63	X	0.7] = 1	53.46	(79)
Southwesto.9x	0.77	X	0.93	X	106.25	0.63	X	0.7] = 1	30.2	(79)
Southwest _{0.9x}	0.77	X	1.98	X	106.25	0.63	X	0.7] = 1	64.29	(79)
Southwest _{0.9x}	0.77	X	1.63	X	106.25	0.63	X	0.7] =	52.93	<u> </u> (79)
Southwest _{0.9x}	0.77	X	2.04	X	106.25	0.63	X	0.7	=	66.24	(79)
Southwest _{0.9x}	0.77	X	0.93	X	119.01	0.63	X	0.7	=	33.83	(79)
Southwest _{0.9x}	0.77	X	1.98	X	119.01	0.63	X	0.7] =	72.01	(79)
Southwest _{0.9x}	0.77	X	1.63	X	119.01	0.63	X	0.7] =	59.29	(79)
Southwest _{0.9x}	0.77	X	2.04	X	119.01	0.63	X	0.7	=	74.2	(79)
Southwest _{0.9x}	0.77	X	0.93	X	118.15	0.63	X	0.7	=	33.58	(79)
Southwest _{0.9x}	0.77	X	1.98	x	118.15	0.63	X	0.7	=	71.49	(79)
Southwest _{0.9x}	0.77	X	1.63	x	118.15	0.63	X	0.7	=	58.86	(79)
Southwest _{0.9x}	0.77	X	2.04	X	118.15	0.63	X	0.7	=	73.66	(79)
Southwest _{0.9x}	0.77	X	0.93	x	113.91	0.63	X	0.7	=	32.38	(79)
Southwest _{0.9x}	0.77	X	1.98	X	113.91	0.63	X	0.7	=	68.93	(79)
Southwest _{0.9x}	0.77	X	1.63	X	113.91	0.63	X	0.7	=	56.74	(79)
Southwest _{0.9x}	0.77	X	2.04	x	113.91	0.63	X	0.7	=	71.02	(79)
Southwest _{0.9x}	0.77	X	0.93	x	104.39	0.63	X	0.7	=	29.67	(79)
Southwest _{0.9x}	0.77	X	1.98	x	104.39	0.63	X	0.7	=	63.17	(79)
Southwest _{0.9x}	0.77	X	1.63	X	104.39	0.63	X	0.7	=	52	(79)
Southwest _{0.9x}	0.77	X	2.04	X	104.39	0.63	X	0.7	=	65.08	(79)
Southwest _{0.9x}	0.77	X	0.93	x	92.85	0.63	X	0.7	=	26.39	(79)
Southwest _{0.9x}	0.77	x	1.98	x	92.85	0.63	x	0.7	=	56.19	(79)
Southwest _{0.9x}	0.77	X	1.63	x	92.85	0.63	X	0.7	=	46.25	(79)
Southwest _{0.9x}	0.77	X	2.04	x	92.85	0.63	x	0.7	=	57.89	(79)
Southwest _{0.9x}	0.77	x	0.93	x	69.27	0.63	x	0.7] =	19.69	(79)
Southwest _{0.9x}	0.77	X	1.98	x	69.27	0.63	X	0.7	=	41.91	(79)
Southwest _{0.9x}	0.77	x	1.63	x	69.27	0.63	x	0.7] =	34.51	(79)
Southwest _{0.9x}	0.77	x	2.04	x	69.27	0.63	x	0.7] =	43.18	(79)
Southwest _{0.9x}	0.77	x	0.93	x	44.07	0.63	x	0.7] =	12.53	(79)
Southwest _{0.9x}	0.77	x	1.98	x	44.07	0.63	x	0.7] =	26.67	(79)
Southwest _{0.9x}	0.77	x	1.63	x	44.07	0.63	x	0.7] =	21.95	(79)
Southwest _{0.9x}	0.77	x	2.04	x	44.07	0.63	x	0.7] =	27.48	(79)
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Southwest _{0.9x}	0.77	X	0.9	93	x	31.49		0.63	X	0.7	=	8.95	(79)
Southwest _{0.9x}	0.77	X	1.9	98	x	31.49	$\overline{1}$	0.63	X	0.7	=	19.05	(79)
Southwest _{0.9x}	0.77	X	1.6	33	X	31.49		0.63	X	0.7	=	15.69	(79)
Southwest _{0.9x}	0.77	X	2.0)4	X	31.49		0.63	X	0.7	=	19.63	(79)
Rooflights 0.9x	1	X	0.7	77	X	26	×	0.63	x	0.7	=	7.95	(82)
Rooflights 0.9x	1	X	0.7	77	X	54	×	0.63	x	0.7	-	16.52	(82)
Rooflights 0.9x	1	X	0.7	77	X	96	×	0.63	x	0.7	=	29.36	(82)
Rooflights 0.9x	1	x	0.7	77	X	150	= x	0.63	x	0.7		45.88	(82)
Rooflights 0.9x	1	X	0.7	77	X	192	×	0.63	x	0.7	=	58.72	(82)
Rooflights 0.9x	1	X	0.7	77	X	200	×	0.63	x	0.7	=	61.17	(82)
Rooflights 0.9x	1	X	0.7	77	X	189	×	0.63	x	0.7	=	57.8	(82)
Rooflights 0.9x	1	X	0.7	77	X	157	×	0.63	X	0.7	=	48.02	(82)
Rooflights 0.9x	1	X	0.7	77	X	115	×	0.63	x	0.7	=	35.17	(82)
Rooflights 0.9x	1	X	0.7	77	X	66	×	0.63	X	0.7	=	20.19	(82)
Rooflights 0.9x	1	X	0.7	77	X	33	×	0.63	x	0.7	=	10.09	(82)
Rooflights 0.9x	1	X	0.7	77	X	21	×	0.63	x	0.7	=	6.42	(82)
							_						
Solar gains ir	n watts, ca	lculated	for eac	h montl	า		(83)n	n = Sum(74)m .	(82)m				
(83)m= 137.62		361.81	491.25	588.11	$\overline{}$	00.16 571.86	497	.34 406.4	277.98	166.78	116.51]	(83)
Total gains –	internal ar	nd solar	(84)m =	(73)m	+ (8	33)m , watts		•		•		_	
(84)m= 510.41	615.07	718.44	826.41	901.52	8	92.52 850.91	782	2.8 703.15	596.4	510.02	478.49]	(84)
7 Mean inte	ernal tempe	erature ((heating	seaso	n)	-						_	
7. Mean inte	•		`			area from Ta	able 9	. Th1 (°C)				21	(85)
Temperature	e during he	eating p	eriods ir	n the liv	ing			, Th1 (°C)				21	(85)
Temperature Utilisation fa	e during he	eating pains for li	eriods ir iving are	n the liv	ing n (s	ee Table 9a)	1	, ,	Oct	Nov	Dec	21	(85)
Temperature Utilisation fa	e during he	eating points for the Mar	eriods ir	n the liv	ing n (s		A	ug Sep	Oct	Nov 0.99	Dec 1	21	(85)
Temperature Utilisation fa Jan (86)m= 1	e during he actor for ga	eating pains for li Mar 0.98	eriods ir iving are Apr 0.93	n the livea, h1,r May	ing n (s	ee Table 9a) Jun Jul 0.65 0.49	A 0.8	ug Sep 55 0.8		+		21	
Temperature Utilisation fa Jan (86)m= 1 Mean intern	e during he dictor for gate Feb 0.99	eating positions for limited Mar 0.98 atture in l	eriods ir iving are Apr 0.93 iving are	n the livea, h1,r May 0.82	ing n (s	Jun Jul 0.65 0.49 w steps 3 to	0.5 7 in 1	ug Sep 55 0.8	0.96	0.99	1	21	(86)
Temperature Utilisation fa Jan (86)m= 1	e during he actor for ga	eating pains for li Mar 0.98	eriods ir iving are Apr 0.93	n the livea, h1,r May	ing n (s	ee Table 9a) Jun Jul 0.65 0.49	A 0.8	ug Sep 55 0.8		0.99		21	
Temperature Utilisation fa Jan (86)m= 1 Mean intern	e during he dictor for gate Feb 0.99 al tempera 19.8	eating positions for line Mar 0.98 ature in l	eriods ir iving are Apr 0.93 iving are 20.5	n the livea, h1,r May 0.82 ea T1 (t	ing n (s follo	ee Table 9a) Jun Jul 0.65 0.49 w steps 3 to 0.95 20.99	7 in 7	ug Sep 55 0.8 able 9c) 98 20.87	0.96	0.99	1	21	(86)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6	e during he court for gate for for gate for for gate for for gate for for gate for for for for for for for for for for	eating positions for line Mar 0.98 ature in l	eriods ir iving are Apr 0.93 iving are 20.5	n the livea, h1,r May 0.82 ea T1 (t	ing n (s follo	ee Table 9a) Jun Jul 0.65 0.49 w steps 3 to 0.95 20.99	7 in 7	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C)	0.96	0.99	1	21	(86)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature	re during he during he during he during he during he 19.82	eating points for line Mar 0.98 ature in line 20.11 eating points 19.83	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest of	ing (s) (s) (s) (s) (s) (s) (s) (s) (s) (s)	y steps 3 to 0.95 20.99 relling from T 9.85 19.85	7 in 7 20.	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C)	0.96 20.46	0.99	19.57	21	(86)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82	re during he during he during he during he during he 19.82	eating points for line Mar 0.98 ature in line 20.11 eating points 19.83	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest of	ing (s) (s) (s) (s) (s) (s) (s) (s) (s) (s)	y steps 3 to 0.95 20.99 relling from T 9.85 19.85	7 in 7 20.	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85	0.96 20.46	0.99	19.57	21	(86)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa (89)m= 1	re during he during he during he during he during he ductor for gar 0.99	eating positive in I 20.11 eating positive 19.83 eight of 19.83 eight of 19.87 eight of 19.83 ei	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 est of do	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest or 19.84 welling, 0.77	ing (s) (s) (s) (s) (s) (s) (s) (s) (s) (s)	Jun	7 in 7 20. Table 9a) 0.4	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85	0.96 20.46 19.84 0.94	0.99 19.96	19.57	21	(86) (87) (88)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa	re during he dur	eating positive in I 20.11 eating positive 19.83 eight of 19.83 eight of 19.87 eight of 19.83 ei	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 rest of do	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest or 19.84 welling, 0.77	follo follo	Jun	7 in 7 20. Table 9a) 0.4	ug Sep 0.8 able 9c) 98 20.87 9, Th2 (°C) 86 19.85 12 0.72 to 7 in Table	0.96 20.46 19.84 0.94	0.99 19.96 19.84 0.99	19.57		(86) (87) (88)
Temperature Utilisation far Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation far (89)m= 1 Mean intern	re during he dur	eating points for 10 10 10 10 10 10 10 10 10 10 10 10 10	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 rest of de 0.91 the rest	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest or 19.84 welling, 0.77 of dwel	follo follo	y steps 3 to 0.95 20.99 20.85 19.85 19.85 20.37 T2 (follow s	7 in 1 20. 7 able 9 19. 19. 10.4 19. 10.4	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85 12 0.72 10 7 in Table 85 19.75	0.96 20.46 19.84 0.94 e 9c) 19.24	0.99 19.96 19.84 0.99	1 19.57 19.83 1	21	(86) (87) (88) (89)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa (89)m= 1 Mean intern (90)m= 17.98	re during he actor for gar 19.8 re during he 19.82 rector for gar 18.27	eating positive in 1 20.11 eating positive in 1 19.83 eight of 19.	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 rest of de 0.91 the rest 19.27	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest or 19.84 welling, 0.77 of dwel 19.65	follo follo follo follo 1 h2,	y steps 3 to 0.95 20.99 elling from T 9.85 19.85 m (see Tabl 0.55 0.37 T2 (follow s 9.82 19.85	A 0.9 7 in 1 20.5 7 able 9 19.6 19.6 19.7 19.8 19.9 19.9 19.9	ug Sep 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85 12 0.72 10 7 in Table 85 19.75	0.96 20.46 19.84 0.94 e 9c) 19.24	0.99 19.96 19.84 0.99	1 19.57 19.83 1		(86) (87) (88) (89)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa (89)m= 1 Mean intern (90)m= 17.98	re during he distance he during he distance he during he distance he dis	eating positive in I 20.11 eating positive in I 19.83 eature in I 19.83 eature in I 18.72 eature in I 18.72 eature (for I 18.7	eriods in iving are 0.93 iving are 20.5 eriods in 19.84 rest of drought 19.27 rest who where the whole in the	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest o 19.84 welling, 0.77 of dwel 19.65	follo fo	ee Table 9a) Jun Jul 0.65 0.49 w steps 3 to 0.95 20.99 relling from T 9.85 19.85 m (see Tabl 0.55 0.37 T2 (follow s 9.82 19.85	A 0.9 7 in 7 20. Table 9 19. 1 e 9a) 1 - 1 + (1	ug Sep 55 0.8 able 9c) 98 20.87 9, Th2 (°C) 86 19.85 42 0.72 4 to 7 in Table 85 19.75	0.96 20.46 19.84 0.94 e 9c) 19.24 LA = Liv	0.99 19.96 19.84 0.99 18.51 ring area ÷ (4	1 19.57 19.83 1 17.94 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa (89)m= 1 Mean intern (90)m= 17.98 Mean intern (92)m= 18.55	re during here dur	eating positive in 1 20.11 eating positive in 1 19.83 eight ature in 1 18.72 eature in 1 18.72 eature in 1 18.72 eature (for 19.21	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 rest of de 0.91 the rest 19.27 r the wh	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest or 19.84 welling, 0.77 of dwel 19.65	follo follo	ee Table 9a) Jun Jul 0.65 0.49 w steps 3 to 0.95 20.99 elling from T 9.85 19.85 m (see Tabl 0.55 0.37 T2 (follow s 9.82 19.85 g) = fLA × T 0.22 20.26	A 0.9 7 in 1 20. 7 able 9 19. 1 + (1 20.	ug Sep 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85 12 0.72 10 7 in Tabl 85 19.75 1 - fLA) × T2 25 20.15	0.96 20.46 19.84 0.94 e 9c) 19.24 LA = Liv	0.99 19.96 19.84 0.99 18.51 ring area ÷ (4)	1 19.57 19.83 1		(86) (87) (88) (89)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa (89)m= 1 Mean intern (90)m= 17.98 Mean intern (92)m= 18.55 Apply adjust	re during he dictor for gas all temperas seed of the distribution	eating positive in I 20.11 eating positive in I 19.83 eature in I 18.72 eature in I 18.72 eature in I 18.72 eature in I 18.72 eature in I 19.21 eature in I	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 est of dr 0.91 the rest 19.27 r the wh 19.7 internal	n the livea, h1,r May 0.82 ea T1 (i 20.8 n rest o 19.84 welling, 0.77 of dwel 19.65	follo follo	See Table 9a Jun	A 0.9 7 in 7 20. Table 9 19. teps 3 19. 1 + (1 20. e 4e,	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85 12 0.72 15 7 in Table 85 19.75 - fLA) × T2 25 20.15 where approximation in the second sec	0.96 20.46 19.84 0.94 e 9c) 19.24 LA = Liv	0.99 19.96 19.84 0.99 18.51 ring area ÷ (4)	1 19.57 19.83 1 17.94 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa (89)m= 1 Mean intern (90)m= 17.98 Mean intern (92)m= 18.55 Apply adjust (93)m= 18.55	re during here actor for gas al tempera al t	eating positive in I and	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 rest of de 0.91 the rest 19.27 r the wh	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest or 19.84 welling, 0.77 of dwel 19.65	follo follo	ee Table 9a) Jun Jul 0.65 0.49 w steps 3 to 0.95 20.99 elling from T 9.85 19.85 m (see Tabl 0.55 0.37 T2 (follow s 9.82 19.85 g) = fLA × T 0.22 20.26	A 0.9 7 in 1 20. 7 able 9 19. 1 + (1 20.	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85 12 0.72 15 7 in Table 85 19.75 - fLA) × T2 25 20.15 where approximation in the second sec	0.96 20.46 19.84 0.94 e 9c) 19.24 LA = Liv	0.99 19.96 19.84 0.99 18.51 ring area ÷ (4)	1 19.57 19.83 1 17.94 4) =		(86) (87) (88) (89) (90) (91)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa (89)m= 1 Mean intern (90)m= 17.98 Mean intern (92)m= 18.55 Apply adjust (93)m= 18.55 8. Space he	re during here actor for gas all temperas al	eating positive in I 20.11 eating positive in I 20.11 eating positive in I 19.83 eature in I 18.72 eature (for 19.21 eature in I I 19.21 eature in I I I I I I I I I I I I I I I I I I	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 est of dr 0.91 the rest 19.27 r the wh 19.7 interna 19.7	n the livea, h1,r May 0.82 ea T1 (1 20.8 n rest of 19.84 welling, 0.77 of dwel 19.65 nole dwel 20.06 tempe 20.06	ing m (s follo 2 f dw h2, c lling 1 ratu 2	ee Table 9a) Jun Jul 0.65 0.49 w steps 3 to 0.95 20.99 relling from T 9.85 19.85 m (see Tabl 0.55 0.37 T2 (follow s 9.82 19.85 g) = fLA × T 0.22 20.26 re from Tabl 0.22 20.26	A 0.9 7 in 7 20. Table 9 19. 1 + (1 20. 1 + (1 20. 1 + (20.	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85 42 0.72 4 to 7 in Table 85 19.75 — fLA) × T2 25 20.15 where approx 25 20.15	0.96 20.46 19.84 0.94 e 9c) 19.24 LA = Liv 19.67 ppriate 19.67	0.99 19.96 19.84 0.99 18.51 ring area ÷ (4) 19.02	1 19.57 19.83 1 17.94 4) =	0.35	(86) (87) (88) (89) (90) (91)
Temperature Utilisation fa Jan (86)m= 1 Mean intern (87)m= 19.6 Temperature (88)m= 19.82 Utilisation fa (89)m= 1 Mean intern (90)m= 17.98 Mean intern (92)m= 18.55 Apply adjust (93)m= 18.55	re during here actor for gas all temperas al	eating positive in I ature in I ature in I ature in I ature in I ature in I ature in I ature in I ature in I ature (for I ature in I	eriods ir iving are Apr 0.93 iving are 20.5 eriods ir 19.84 est of d 0.91 the rest 19.27 r the wh 19.7 internal 19.7	n the livea, h1,r May 0.82 ea T1 (i 20.8 n rest or 19.84 welling, 0.77 of dwel 19.65 nole dwe 20.06 tempe 20.06 re obtai	ing m (s follo 2 f dw h2, c lling 1 ratu 2	ee Table 9a) Jun Jul 0.65 0.49 w steps 3 to 0.95 20.99 relling from T 9.85 19.85 m (see Tabl 0.55 0.37 T2 (follow s 9.82 19.85 g) = fLA × T 0.22 20.26 re from Tabl 0.22 20.26	A 0.9 7 in 7 20. Table 9 19. 1 + (1 20. 1 + (1 20. 1 + (20.	ug Sep 55 0.8 Table 9c) 98 20.87 9, Th2 (°C) 86 19.85 42 0.72 4 to 7 in Table 85 19.75 — fLA) × T2 25 20.15 where approx 25 20.15	0.96 20.46 19.84 0.94 e 9c) 19.24 LA = Liv 19.67 ppriate 19.67	0.99 19.96 19.84 0.99 18.51 ring area ÷ (4) 19.02	1 19.57 19.83 1 17.94 4) =	0.35	(86) (87) (88) (89) (90) (91)

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Utilisa	ation factor	r for a	ains. hm	:										
(94)m=		0.99	0.96	0.91	0.78	0.58	0.41	0.47	0.74	0.94	0.99	1		(94)
Usefu	ul gains, hr	mGm ,	W = (94	1)m x (84	4)m			l			l			
(95)m=	507.15 6	606.16	693.03	748.22	701.68	520.71	349.76	365.25	520.75	560.66	503.42	476.16		(95)
Mont	hly averag	e 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								- 	-				
(97)m=		386.64	1263.27		817.9	543.77	353.38	371.6	587.5	887.43	1172.53	1415.25		(97)
	e heating r							 	i `	í 	 			
(98)m=	682.66 5	524.48	424.26	224.22	86.47	0	0	0	0	243.12	481.75	698.68		٦,,,,,
								Tota	ıl per year	(kWh/year	r) = Sum(9	8)15,912 =	3365.65	(98)
Spac	e heating r	require	ment in	kWh/m²	² /year								44.64	(99)
9a. En	ergy requi	iremen	ts – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
•	e heating													,
Fract	ion of spac	ce hea	t from se	econdar	y/supple	mentary	system						0	(201)
Fract	ion of spac	ce hea	t from m	ain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fract	ion of total	l heatir	ng from i	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficie	ency of ma	ain spa	ce heati	ing syste	em 1							Ī	93.4	(206)
Efficie	ency of sec	condaı	y/supple	ementar	y heating	g systen	າ, %					İ	0	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/yea	ar ar
Spac	e heating r	require	ment (c	alculate	d above))			·	!	l		·	
	682.66 5	524.48	424.26	224.22	86.47	0	0	0	0	243.12	481.75	698.68		
(211)m	n = {[(98)m	n x (20	4)] } x 1	00 ÷ (20	06)		-	-	-	-	-			(211)
	730.9 5	61.55	454.24	240.06	92.58	0	0	0	0	260.3	515.8	748.05		
								Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	3603.48	(211)
Spac	e heating f	fuel (se	econdar	y), kWh/	month							•		-
= {[(98)m x (201))] } x 1(00 ÷ (20	8)			•							
(215)m=	0	0	0	0	0	0	0	0	0	0	0	0		_
								Tota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
	heating													
Output	t from wate	er heat 173.24	er (calci	ulated a	oove) 154.78	136.32	130.61	145.6	147.2	167.62	178.93	193.66		
Efficie	ncy of wate			139.07	134.70	130.32	130.01	143.0	147.2	107.02	170.93	193.00	80.3	(216)
		87.66	87.13	85.9	83.65	80.3	80.3	80.3	80.3	85.99	87.42	88	00.3	(217)
	1 8/01 I S		07.13	05.5	00.00	00.5	00.5	00.0	00.5	00.99	07.42	00		(=11)
(217)m=	L		k\N/b/mc	nth										
(217)m= Fuel fo	or water he	eating,												
(217)m= Fuel fo (219)m	or water he n = (64)m	eating,			185.03	169.76	162.65	181.31	183.32	194.94	204.68	220.08		
(217)m= Fuel fo (219)m	or water he	eating,	÷ (217)	m	185.03	169.76	162.65		183.32 al = Sum(2		204.68	220.08	2317.95	(219)
(217)m= Fuel fo (219)m= (219)m=	or water hen = (64)m = 225.59 1	eating, x 100	÷ (217) 206.86	m 186.1		169.76	162.65			19a) ₁₁₂ =	204.68 Wh/yea i		2317.95 kWh/year	(219)
(217)m= Fuel fo (219)m= (219)m=	or water he n = (64)m = 225.59 1	eating, x 100	÷ (217) 206.86	m 186.1		169.76	162.65			19a) ₁₁₂ =				(219)
(217)m= Fuel for (219)m (219)m= Annua Space	or water hen = (64)m = 225.59 1	eating, x 100 197.62	÷ (217) 206.86 d, main	m 186.1		169.76	162.65			19a) ₁₁₂ =			kWh/year	(219)

central heating pump:		30	(230c)
boiler with a fan-assisted flue		45	(230e)
Total electricity for the above, kWh/year	sum of (230a	a)(230g) =	75 (231)
Electricity for lighting			329.88 (232)
12a. CO2 emissions – Individual heating system	ns including micro-CHP		
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating (main system 1)	(211) x	0.216	778.35 (261)
Space heating (secondary)	(215) x	0.519 =	0 (263)
Water heating	(219) x	0.216 =	500.68 (264)
Space and water heating	(261) + (262) + (263) + (264) =		1279.03 (265)
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	38.93 (267)
Electricity for lighting	(232) x	0.519 =	171.21 (268)
Total CO2, kg/year	sum	of (265)(271) =	1489.16 (272)

TER =

(273)

19.75

eight associates

SAP Worksheets Energy Statement 34A-36 Kilburn High Road

SAP Worksheets

Lean DER Worksheets

		l lsor F	Details:						
Assessor Name:	Chris Hocknell	– <u> </u>	Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	are Ve	rsion:		Versio	n: 1.0.4.16	
	F	Property	Address	: Apartm	ent 1				
Address: 1. Overall dwelling dime	ansions:								
1. Overall awelling aime	, i i i i i i i i i i i i i i i i i i i	Are	a(m²)		Av. He	ight(m)		Volume(m ³	³)
Ground floor				(1a) x		2.7	(2a) =	135.46	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	50.17	(4)			-		_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	135.46	(5)
2. Ventilation rate:									
	main seconda heating heating	ry	other		total			m³ per hou	ır
Number of chimneys	0 + 0	+	0	= [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+ [0	= [0	x 2	20 =	0	(6b)
Number of intermittent fa	ins				0	x '	10 =	0	(7a)
Number of passive vents	3			Ī	0	x '	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	X 4	40 =	0	(7c)
				_			A in a b	ongoo nor he	
Infiltration due to chimen	fl and fano - (60)±(6b)±(7a)+/7b)+	(70) =	_				nanges per ho	_
	ys, flues and fans = (6a)+(6b)+(eeen carried out or is intended, procee			continue fr	0 rom (9) to		÷ (5) =	0	(8)
Number of storeys in the		(//				,		0	(9)
Additional infiltration						[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame or resent, use the value corresponding to			•	ruction			0	(11)
deducting areas of openi		o ine grea	iei wali ale	a (anei					
•	floor, enter 0.2 (unsealed) or 0	.1 (seale	ed), else	enter 0				0	(12)
If no draught lobby, en								0	(13)
Window infiltration	s and doors draught stripped		0.25 - [0.2	2 x (14) ÷ 1	1001 =			0	(14)
Infiltration rate			(8) + (10)	. ,	_	+ (15) =		0	(16)
	q50, expressed in cubic metro	es per ho	our per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	lity value, then $(18) = [(17) \div 20] +$	(8), otherw	vise (18) = ((16)		·		0.15	(18)
	es if a pressurisation test has been do	ne or a de	gree air pe	rmeability	is being u	sed			_
Number of sides sheltere Shelter factor	ed		(20) = 1 -	[0 075 x (1	19)1 =			1	(19)
Infiltration rate incorporate	ting shelter factor		(21) = (18	•	.0/]			0.92	(20)
Infiltration rate modified f	•		() (-	, (- ,				0.14	(21)
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7							•	
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 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]	
							1	J	

Adjusted infiltr	ration rate	(allowi	ng for sh	nelter an	d wind s	peed) =	(21a) x	(22a)m					
0.18	0.17	0.17	0.15	0.15	0.13	0.13	0.13	0.14	0.15	0.16	0.16]	
Calculate effe		_	rate for t	he appli	cable ca	se	•	•			•	,	
If mechanic If exhaust air h			andiv N. (2	2h) = (22a	a) v Emy (c	auation (NEN otho	nuina (22h) = (220)			0.5	(238
If balanced wit) = (23a)			0.5	(23h
		-		_					2h.) (6	20h) [4 (00-)	75.65	(230
a) If balance (24a)m= 0.3	ed mechan	0.29	0.27	0.27	at recove	0.25	HR) (248	0.26	2b)m + (2 0.27	0.28 × (3D)	1 – (23c) 0.28) ÷ 100] 1	(24a
` '	<u> </u>					<u> </u>	ļ.	ļ	ļ ļ		0.20	J	(240
b) If balance (24b)m= 0	ed mechan	o lical ve	ntilation	without	neat rec	overy (r	VIV) (240 1 0	o)m = (22 0	20)m + (2 0 1	0	0	1	(241
c) If whole h	<u> </u>								0	0		J	(24)
•	m < 0.5 × (-	•				5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	Ō	0	0]	(240
d) If natural	ventilation	or wh	ole hous	e positiv	ve input	ventilati	on from	oft				_	
if (22b)r	m = 1, then	າ (24d)	m = (22k	o)m othe	erwise (2	4d)m =	0.5 + [(2	2b)m² x	0.5]			_	
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	change ra	ate - er	iter (24a) or (24b	o) or (24	c) or (24	d) in bo	x (25)				_	
(25)m= 0.3	0.3	0.29	0.27	0.27	0.25	0.25	0.25	0.26	0.27	0.28	0.28		(25)
3. Heat losse	es and hea	t loss r	paramete	er:									
ELEMENT	Gross area (n		Openin m		Net Ar A ,r		U-val W/m2		A X U (W/k	()	k-value kJ/m²·		A X k kJ/K
Doors					2	X	1.3	=	2.6				(26)
Windows Type	e 1				9.56	x1	/[1/(1.3)+	0.04] =	11.81				(27)
Windows Type	e 2				4.62	x1	/[1/(1.3)+	0.04] =	5.71				(27
Windows Type	e 3				4.17	x1	/[1/(1.3)+	0.04] =	5.15				(27)
Rooflights Typ	oe 1				1.05	x1	/[1/(1.6) +	0.04] =	1.68	7			(27
Rooflights Typ	oe 2				1.79	= x1	/[1/(1.6) +	0.04] =	2.864	Ħ			(27)
Walls Type1	35.48		22.52	2	12.96	x	0.15	─	1.94	7 ((29)
Walls Type2	30.48	=	2		28.48	x	0.13	=	3.8	=			(29)
Roof	50.17	=	2.84		47.33	=	0.1	≓ <u>-</u> i	4.73	≓		=	(30)
Total area of e		—J m²			116.1	_							\`(31)
	, .				26.97	=	0		0	— г			(32)
Partv wall					_0.07								_
•					50 17	,							1(32)
Party floor	d roof window	's, use e	ffective wil	ndow U-va	50.17		g formula 1	/[(1/U-valu	ie)+0.04] as	L s given in	paragrapl		(32)
Party floor for windows and					alue calcul		g formula 1	/[(1/U-valu	ie)+0.04] as	L s given in	paragrapl		(32)
Party floor * for windows and ** include the are Fabric heat lo	eas on both sid ss, W/K = \$	ides of in S (A x	nternal wall		alue calcul	ated using	g formula 1 (26)(30	-	re)+0.04] as	L s given in	paragrapl	h 3.2 45.18	
Party floor * for windows and ** include the are Fabric heat los Heat capacity	eas on both sides, W/K = S Cm = S(A	ides of in S (A x x k)	nternal wali U)	ls and par	alue calcul titions	ated using) + (32) =	.(30) + (32				(33)
Party wall Party floor * for windows and ** include the are Fabric heat loo Heat capacity Thermal mass	eas on both sides, W/K = \$ Cm = S(A s paramete	ides of in S (A x x k) er (TMF	nternal wall U) P = Cm ÷	ls and pan	alue calcul titions n kJ/m²K	ated using	(26)(30	((28) Indica	.(30) + (32 tive Value:) + (32a). Medium	(32e) =	45.18	(322
Party floor * for windows and ** include the are Fabric heat los Heat capacity Thermal mass For design asses	eas on both sides, W/K = \$ Cm = S(A) s paramete ssments where	ides of in S (A x x k) er (TMF re the de	nternal wall U) P = Cm ÷ tails of the	ls and pan	alue calcul titions n kJ/m²K	ated using	(26)(30	((28) Indica	.(30) + (32 tive Value:) + (32a). Medium	(32e) =	45.18 10845.77	(33)
Party floor * for windows and ** include the are Fabric heat loa Heat capacity Thermal mass	eas on both sides, W/K = \$\frac{1}{2} Cm = \$\frac{1} Cm = \$\frac{1}{2} Cm = \$\frac{1}{2} Cm = \$1	ides of in S (A x x k) er (TMF re the det iled calcu	oternal wall U) P = Cm ÷ tails of the	s and pan	alue calcul titions n kJ/m²K tion are not	ated using	(26)(30	((28) Indica	.(30) + (32 tive Value:) + (32a). Medium	(32e) =	45.18 10845.77	(33)

Total fabric heat loss	(33) + (36) =	50.07 (27)
Ventilation heat loss calculated monthly	$(38) \text{m} = 0.33 \times (25) \text{m} \times (5)$	59.37 (37)
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct Nov Dec	
(38)m= 13.35 13.2 13.04 12.26 12.11 11.33 11.33	11.18	(38)
Heat transfer coefficient, W/K	(39)m = (37) + (38)m	
(39)m= 72.72 72.57 72.41 71.64 71.48 70.71 70.71	70.55 71.02 71.48 71.79 72.1	
	Average = Sum(39) ₁₁₂ /12=	71.6 (39)
Heat loss parameter (HLP), W/m²K	(40)m = (39) m ÷ (4)	
(40)m= 1.45 1.45 1.44 1.43 1.42 1.41 1.41	1.41 1.42 1.42 1.43 1.44	(40)
Number of days in month (Table 1a)	Average = Sum(40) ₁₁₂ /12=	1.43 (40)
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct Nov Dec	
(41)m= 31 28 31 30 31 30 31	31 30 31 30 31	(41)
4. Water heating energy requirement:	kWh/ye	ar:
Assumed occupancy, N	17	(42)
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9	9)2)] + 0.0013 x (TFA -13.9)	(42)
if TFA £ 13.9, N = 1	(05 N) + 00	
Annual average hot water usage in litres per day Vd,average = Reduce the annual average hot water usage by 5% if the dwelling is designed	, , ,	(43)
not more that 125 litres per person per day (all water use, hot and cold)		
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct Nov Dec	
Hot water usage in litres per day for each month Vd,m = factor from Table 1c	(43)	
(44)m= 81.9 78.93 75.95 72.97 69.99 67.01 67.01	69.99 72.97 75.95 78.93 81.9	
Energy content of hot water used coloulated monthly – 4.100 v Vd m v nm v	Total = Sum(44) ₁₁₂ =	893.51 (44)
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x		
(45)m= 121.46 106.23 109.62 95.57 91.7 79.13 73.33	84.14 85.15 99.23 108.32 117.63	1171.53 (45)
If instantaneous water heating at point of use (no hot water storage), enter 0 in	Total = Sum(45) ₁₁₂ = a boxes (46) to (61)	1171.55
(46)m= 18.22 15.93 16.44 14.34 13.76 11.87 11	12.62 12.77 14.89 16.25 17.64	(46)
Water storage loss:		
Storage volume (litres) including any solar or WWHRS storage		(47)
If community heating and no tank in dwelling, enter 110 litres in	,	
Otherwise if no stored hot water (this includes instantaneous c Water storage loss:	ombi boilers) enter 'U' in (47)	
a) If manufacturer's declared loss factor is known (kWh/day):	0	(48)
Temperature factor from Table 2b	0	(49)
Energy lost from water storage, kWh/year	(48) x (49) = 0	(50)
b) If manufacturer's declared cylinder loss factor is not known:		, ,
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
If community heating see section 4.3 Volume factor from Table 2a		(52)
Temperature factor from Table 2b	0	(52) (53)
Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) = 0	(54)
Enter (50) or (54) in (55)	0	(55)

Water	storage	loss cal	culated 1	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contains	dedicate	d solar sto	rage, (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)
Primar	v circuit	loss (an	nual) fro	om Table	e 3							0		(58)
	-	•	•			59)m = ((58) ÷ 36	65 × (41)	m				•	
(mod	dified by	factor fr	om Tab	le H5 if t	here is s	solar wat	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 ca	lculated	for each	month ((61)m =	(60) ÷ 36	65 × (41)m				-	•	
(61)m=	41.74	36.33	38.7	35.99	35.67	33.05	34.15	35.67	35.99	38.7	38.92	41.74		(61)
Total h	neat requ	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=	163.2	142.56	148.32	131.56	127.37	112.18	107.48	119.81	121.13	137.94	147.24	159.37		(62)
Solar Di	HW input of	calculated	using App	endix G or	· Appendix	ι κ Η (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditiona	l 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	t from w	ater hea	ter		•	•	•	•	•	•		•	•	
(64)m=	163.2	142.56	148.32	131.56	127.37	112.18	107.48	119.81	121.13	137.94	147.24	159.37		
				ļ.		!	!	Outp	out from w	ater heate	r (annual) ₁	112	1618.16	(64)
Heat g	ains fro	m water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	ı + (61)m	า] + 0.8 ว	د [(46)m	+ (57)m	+ (59)m	1	_
(65)m=	50.82	44.4	46.12	40.77	39.41	34.57	32.92	36.89	37.31	42.67	45.75	49.55	1	(65)
inclu	ude (57)	m in cald	culation (of (65)m	only if c	vlinder i	s in the ເ	dwellina	or hot w	ater is fr	om com	munity h	ı ıeating	
	. , ,	ains (see		. ,	-	,		5				,	3	
	Ĭ	·			<i>)</i> •									
Metab	Jan	s (Table Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=	84.76	84.76	84.76	84.76	84.76	84.76	84.76	84.76	84.76	84.76	84.76	84.76		(66)
` '				<u> </u>		ion L9 o	<u> </u>	<u> </u>	<u> </u>	010	010	010		(/
(67)m=	13.17	11.69	9.51	7.2	5.38	4.54	4.91	6.38	8.57	10.88	12.69	13.53	l	(67)
				<u> </u>	l	<u> </u>	L	l		<u> </u>	12.03	13.33		(01)
		<u> </u>	145.35	137.13	126.75	uation L	13 OF L1	3a), aisc 108.95			101 11	141.16	1	(68)
(68)m=	147.68	149.21		<u> </u>	<u> </u>		ļ.	<u> </u>	112.81	121.03	131.41	141.16		(00)
		<u> </u>		ppendix 31.48	 	tion L15	·				24.40	T 24 40	1	(69)
(69)m=	31.48	31.48	31.48		31.48	31.48	31.48	31.48	31.48	31.48	31.48	31.48		(09)
•		ns gains	<u> </u>	 		<u> </u>	Ι ,						1	(70)
(70)m=	3	3	3	3	3	3	3	3	3	3	3	3		(70)
		aporatio			- 								Ī	(74)
(71)m=	-67.8	-67.8	-67.8	-67.8	-67.8	-67.8	-67.8	-67.8	-67.8	-67.8	-67.8	-67.8		(71)
		gains (T											Ī	
(72)m=	68.31	66.08	62	56.63	52.97	48.02	44.25	49.59	51.82	57.35	63.54	66.59		(72)
Total i		gains =				(66))m + (67)m	n + (68)m -	+ (69)m +	(70)m + (7	1)m + (72))m	•	
	1 000 5-		l	l a-a aa	1 000 50	1 000 00	1	l	1	I		1	i	(70)
(73)m=	280.57	278.41	268.28	252.38	236.52	220.98	211.06	216.34	224.62	240.68	259.06	272.71		(73)

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

Orientation: Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	X	9.56	x	11.28	x	0.55	x	0.7	=	28.78	(75)
Northeast 0.9x 0.77	X	4.62	x	11.28	x	0.55	x	0.7	=	13.91	(75)
Northeast 0.9x 0.77	X	9.56	x	22.97	x	0.55	x	0.7] =	58.58	(75)
Northeast 0.9x 0.77	X	4.62	x	22.97	x	0.55	x	0.7] =	28.31	(75)
Northeast 0.9x 0.77	X	9.56	x	41.38	x	0.55	x	0.7	=	105.54	(75)
Northeast 0.9x 0.77	X	4.62	x	41.38	x	0.55	x	0.7] =	51.01	(75)
Northeast 0.9x 0.77	X	9.56	x	67.96	x	0.55	x	0.7	=	173.33	(75)
Northeast _{0.9x} 0.77	X	4.62	x	67.96	X	0.55	x	0.7] =	83.77	(75)
Northeast _{0.9x} 0.77	X	9.56	x	91.35	x	0.55	x	0.7] =	232.99	(75)
Northeast _{0.9x} 0.77	X	4.62	X	91.35	X	0.55	x	0.7	=	112.6	(75)
Northeast _{0.9x} 0.77	X	9.56	x	97.38	x	0.55	X	0.7] =	248.39	(75)
Northeast _{0.9x} 0.77	X	4.62	x	97.38	x	0.55	x	0.7] =	120.04	(75)
Northeast _{0.9x} 0.77	X	9.56	x	91.1	X	0.55	x	0.7] =	232.37	(75)
Northeast _{0.9x} 0.77	X	4.62	X	91.1	X	0.55	X	0.7] =	112.29	(75)
Northeast 0.9x 0.77	X	9.56	x	72.63	x	0.55	x	0.7	=	185.25	(75)
Northeast 0.9x 0.77	X	4.62	x	72.63	x	0.55	x	0.7	=	89.52	(75)
Northeast _{0.9x} 0.77	X	9.56	X	50.42	x	0.55	x	0.7] =	128.61	(75)
Northeast 0.9x 0.77	X	4.62	x	50.42	x	0.55	x	0.7	=	62.15	(75)
Northeast _{0.9x} 0.77	X	9.56	x	28.07	x	0.55	x	0.7	=	71.59	(75)
Northeast 0.9x 0.77	X	4.62	x	28.07	x	0.55	x	0.7	=	34.6	(75)
Northeast 0.9x 0.77	X	9.56	x	14.2	x	0.55	x	0.7] =	36.21	(75)
Northeast _{0.9x} 0.77	X	4.62	x	14.2	x	0.55	x	0.7	=	17.5	(75)
Northeast _{0.9x} 0.77	X	9.56	x	9.21	x	0.55	x	0.7] =	23.5	(75)
Northeast _{0.9x} 0.77	X	4.62	X	9.21	X	0.55	x	0.7	=	11.36	(75)
Northwest 0.9x 0.77	X	4.17	X	11.28	X	0.55	X	0.7	=	25.11	(81)
Northwest 0.9x 0.77	X	4.17	x	22.97	x	0.55	x	0.7] =	51.1	(81)
Northwest 0.9x 0.77	X	4.17	x	41.38	x	0.55	x	0.7] =	92.07	(81)
Northwest 0.9x 0.77	X	4.17	x	67.96	x	0.55	x	0.7	=	151.21	(81)
Northwest 0.9x 0.77	X	4.17	x	91.35	x	0.55	x	0.7	=	203.26	(81)
Northwest 0.9x 0.77	X	4.17	x	97.38	x	0.55	x	0.7	=	216.7	(81)
Northwest 0.9x 0.77	X	4.17	x	91.1	x	0.55	x	0.7	=	202.71	(81)
Northwest 0.9x 0.77	X	4.17	x	72.63	x	0.55	x	0.7] =	161.61	(81)
Northwest 0.9x 0.77	X	4.17	X	50.42	X	0.55	X	0.7	=	112.19	(81)
Northwest 0.9x 0.77	X	4.17	X	28.07	X	0.55	X	0.7	=	62.45	(81)
Northwest 0.9x 0.77	X	4.17	x	14.2	x	0.55	x	0.7] =	31.59	(81)
Northwest 0.9x 0.77	X	4.17	x	9.21	x	0.55	x	0.7] =	20.5	(81)
Rooflights 0.9x 1	x	1.05	x	26	x	0.55	x	0.8] =	10.81	(82)
Rooflights 0.9x 1	x	1.79	x	26	x	0.55	x	0.8] =	18.43	(82)
Rooflights 0.9x 1	X	1.05	x	54	×	0.55	х	0.8	=	22.45	(82)

Rooflights 0.9x	1	x	1.7	9	X	54	X	0.55	x	0.8	=	38.28	(82)
Rooflights 0.9x	1	x	1.0	5	X	96	X	0.55	x	0.8		39.92	(82)
Rooflights 0.9x	1	x	1.7	9	X	96	X	0.55	х	0.8	=	68.05	(82)
Rooflights 0.9x	1	x	1.0	5	X	150	X	0.55	x	0.8	=	62.37	(82)
Rooflights 0.9x	1	x	1.7	9	X	150	X	0.55	x	0.8		106.33	(82)
Rooflights 0.9x	1	x	1.0	5	X	192	X	0.55	x	0.8	=	79.83	(82)
Rooflights 0.9x	1	X	1.7	9	X	192	X	0.55	X	0.8	=	136.1	(82)
Rooflights 0.9x	1	x	1.0	5	X	200	X	0.55	x	0.8	=	83.16	(82)
Rooflights 0.9x	1	x	1.7	9	X	200	X	0.55	x	0.8	=	141.77	(82)
Rooflights 0.9x	1	X	1.0	5	X	189	X	0.55	x	0.8	=	78.59	(82)
Rooflights 0.9x	1	X	1.7	9	X	189	X	0.55	x	0.8	=	133.97	(82)
Rooflights 0.9x	1	X	1.0	5	X	157	X	0.55	X	0.8	=	65.28	(82)
Rooflights 0.9x	1	X	1.7	9	X	157	X	0.55	X	0.8	=	111.29	(82)
Rooflights 0.9x	1	X	1.0	5	X	115	X	0.55	X	0.8	=	47.82	(82)
Rooflights 0.9x	1	X	1.7	9	X	115	X	0.55	X	0.8	=	81.52	(82)
Rooflights 0.9x	1	X	1.0	5	X	66	X	0.55	X	0.8	=	27.44	(82)
Rooflights 0.9x	1	X	1.7	9	X	66	X	0.55	X	0.8	=	46.78	(82)
Rooflights 0.9x	1	X	1.0	5	X	33	X	0.55	X	0.8	=	13.72	(82)
Rooflights 0.9x	1	X	1.7	9	X	33	X	0.55	X	0.8	=	23.39	(82)
Rooflights 0.9x	1	X	1.0	5	X	21	X	0.55	X	0.8	=	8.73	(82)
Rooflights 0.9x	1	X	1.7	9	X	21	X	0.55	X	0.8	=	14.89	(82)
Solar gains ir	watts, calc	culated	for each		$\overline{}$		(83)m	n = Sum(74)m	(82)m		1	1	
(83)m= 97.03		356.59	577.01	764.78		10.06 759.93	612	.94 432.28	242.8	7 122.41	78.98		(83)
Total gains –			<u>`</u>		-	<u> </u>						1	
(84)m= 377.61	477.13	624.87	829.39	1001.3	10	31.04 970.99	829	.29 656.9	483.5	381.48	351.69		(84)
7. Mean inte	ernal tempe	rature (heating	seasor	າ)								
Temperatur	e during hea	ating pe	eriods in	the liv	ing	area from Tal	ble 9	, Th1 (°C)				21	(85)
Utilisation fa	ctor for gain	ns for li	ving are	a, h1,n	n (s	ee Table 9a)					,	1	
Jan	Feb	Mar	Apr	May		Jun Jul	A	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.99	0.95	0.83	0.62	(0.43 0.32	0.3	0.68	0.94	0.99	1		(86)
Mean intern	al temperat	ure in li	iving are	ea T1 (f	ollo	w steps 3 to 7	7 in T	able 9c)				_	
(87)m= 19.51	19.76	20.19	20.68	20.92	2	0.99 21	20.	99 20.92	20.48	19.9	19.47		(87)
Temperatur	e during hea	ating pe	eriods in	rest of	fdw	elling from Ta	able 9	9, Th2 (°C)					
(88)m= 19.73	19.73	19.73	19.74	19.74	1	9.76 19.76	19.	76 19.75	19.74	19.74	19.73		(88)
Utilisation fa	ctor for gai	ns for re	est of dy	welling,	h2,	m (see Table	9a)		-		-		
(89)m= 0.99	0.98	0.94	0.78	0.55	$\overline{}$	0.35 0.23	0.2	28 0.58	0.91	0.99	0.99		(89)
Mean intern	al temperat	ure in t	he rest	of dwel	lina	T2 (follow ste	eps 3	to 7 in Tah	le 9c)	•	•	•	
(90)m= 17.78		18.76	19.41	19.68	Ť	9.75 19.76	19.		19.19	18.35	17.73]	(90)
. ,									l .	/ing area ÷ (0.47	(91)
		,,				\	,,	(1.A.) TO					

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

(92)m= 18.6 1	8.91	19.44	20.01	20.27	20.33	20.34	20.34	20.28	19.8	19.08	18.55		(92)
Apply adjustmer	it to the	e mean	internal	tempera	ature fro	m Table	4e, whe	ere appro	priate	!			
(93)m= 18.45 1	8.76	19.29	19.86	20.12	20.18	20.19	20.19	20.13	19.65	18.93	18.4		(93)
8. Space heating	g requir	rement											
Set Ti to the mea					ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor	for gai	ns, hm	:										
(94)m= 0.99 (.98	0.93	0.79	0.57	0.38	0.26	0.32	0.61	0.91	0.98	0.99		(94)
Useful gains, hn	nGm , V	N = (94	l)m x (84	1)m									
(95)m= 374.02 46	55.96	580.26	652.19	572.06	390.84	253.43	266.1	401.2	438.26	374.29	349.15		(95)
Monthly average	extern	nal 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						- ` 		- 		1			
` ′		925.83	785	601.68	394.85	254.03	267.51	427.91	646.84	849.47	1023.95		(97)
Space heating re								`	<u>`</u>	r –			
(98)m= 487.37 36	32.77	257.1	95.62	22.04	0	0	0	0	155.18	342.13	502.05		_
							Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2224.27	(98)
Space heating re	equiren	nent in	kWh/m²	/year								44.33	(99)
9a. Energy requir	ements	s – Indi	vidual h	eating sy	ystems i	ncluding	micro-C	CHP)					
Space heating:								, i					
Fraction of spac	e heat t	from se	econdary	y/supple	mentary	system						0	(201)
Fraction of spac	e heat t	from m	ain syst	em(s)			(202) = 1 -	- (201) =			İ	1	(202)
Fraction of total	heating	g from r	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficiency of ma	n spac	e heati	ng syste	em 1							İ	90.3	(206)
Efficiency of sec	ondary	/supple	ementar	y heating	g system	າ, %						0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heating re	equiren	nent (ca	alculated	d above))			•		•			
487.37 36	32.77	257.1	95.62	22.04	0	0	0	0	155.18	342.13	502.05		
(211)m = {[(98)m	x (204))] } x 1	00 ÷ (20	6)	-			-		-	-		(211)
539.72 40	1.74	284.72	105.89	24.4	0	0	0	0	171.85	378.89	555.98		
	•						Tota	l (kWh/yea	ır) =Sum(2	211),5,1012	=	2463.2	(211)
Space heating for	uel (sec	condary	y), kWh/	month									_
= {[(98)m x (201)]	} x 100	0 ÷ (208	8)										
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		
-	•	·					Tota	l (kWh/yea	r) =Sum(2	215),5,1012	=	0	(215)
Water heating											'		_
Output from wate	r heate	r (calcu	ulated a	oove)									
163.2 14	2.56	148.32	131.56	127.37	112.18	107.48	119.81	121.13	137.94	147.24	159.37		
Efficiency of water	r heate	er								_		81	(216)
(217)m= 87.77 8	7.47	86.66	84.67	82.25	81	81	81	81	85.67	87.28	87.87		(217)
													` ′
Fuel for water hea	•									ı			, ,
(219)m = (64)m	x 100 ÷	÷ (217)ı	m	454.00	400.40	400.00	447.00	440.55	404.04	400.00			` '
(219)m = (64)m	x 100 ÷			154.86	138.49	132.69	147.92	149.55	161.01	168.69	181.37	1910.02	(219)

Annual totals Space heating fuel used, main system 1		kWh/year	ı	kWh/year 2463.2	ĺ
Water heating fuel used				1910.02	
Electricity for pumps, fans and electric keep-hot					
mechanical ventilation - balanced, extract or pos	itive input from outside		109.48		(230a)
central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (2	30a)(230g) =		184.48	(231)
Electricity for lighting				232.5	(232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	Energy	Emission fact	or	Emissions	
	Energy kWh/year	Emission factors kg CO2/kWh	or	Emissions kg CO2/yea	ſ
Space heating (main system 1)	••		or =		(261)
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh	•	kg CO2/yea	
	kWh/year	kg CO2/kWh	=	kg CO2/year	(261)
Space heating (secondary)	kWh/year (211) x (215) x	0.216 0.519 0.216	=	kg CO2/year	(261) (263)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	0.216 0.519 0.216	=	kg CO2/year 532.05 0 412.57	(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 0.216 0.519 0.216	= = =	532.05 0 412.57 944.62	(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 (232) x	kg CO2/kWh 0.216 0.519 0.216	= = = = =	kg CO2/year 532.05 0 412.57 944.62 95.75	(261) (263) (264) (265) (267)

El rating (section 14)

(274)

Stroma Number: STRO016363 Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.16
Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.16 Property Address: Apartment 2 Address: 1. Overall dwelling dimensions: Area(m²) Av. Height(m) Volume(m³) Ground floor 59.25 (1a) Volume(m³) (3a) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 59.25 (4) Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 159.98 (5) 2. Ventilation rate: Mumber of chimneys O
Address: 1. Overall dwelling dimensions: Area(m²)
1. Overall dwelling dimensions: Area(m²)
Area(m²)
Ground floor Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 159.98 (5) 2. Ventilation rate: main heating heating heating Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of open flues 0 x 10 = 0 (7a) Number of passive vents
Dwelling volume $ (3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 159.98 $
2. Ventilation rate: main heating heating secondary heating heating Number of chimneys 0
2. Ventilation rate: main heating secondary heating other total m³ per hour Number of chimneys 0 + 0 + 0 = 0 × 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 (6b) Number of intermittent fans 0 × 10 = 0 (7a) Number of passive vents 0 × 10 = 0 (7b)
Mumber of chimneys 0 + 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 x 20 = 0 (6b) Number of intermittent fans 0 x 10 = 0 (7a) Number of passive vents 0 x 10 = 0 (7b)
Number of chimneys 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 - 0 (6a) Number of open flues 0 + 0 + 0 0 (6b) Number of intermittent fans 0 0 0 0 (7a) Number of passive vents 0 0 0 0 0
Number of intermittent fans $ \begin{array}{cccccccccccccccccccccccccccccccccc$
Number of passive vents $ 0 $
Trainise of passive value
Number of flueless gas fires $0 \times 40 = 0 $ (7c)
Air changes per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$ (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)
Additional infiltration $[(9)-1] \times 0.1 = 0 $ (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction o (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
If no draught lobby, enter 0.05, else enter 0
Percentage of windows and doors draught stripped $0.25 - [0.2 \times (14) \div 100] = 0 \tag{14}$ Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0 \tag{15}$
Vindow infiltration $0.25 - [0.2 \times (14) + 100] = 0$ (15) Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used
Number of sides sheltered 3 (19) Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.78$ (20)
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ $0.12 \times (21)$
Infiltration rate modified for monthly wind speed
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Monthly average wind speed from Table 7
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7
Wind Factor (22a)m = (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

0.15	ation rat	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effe		_	rate for t	he appli	cable ca	ise		<u> </u>		<u> </u>	!	_	
If mechanica												0.5	(2
If exhaust air h									o) = (23a)			0.5	(2
If balanced with		-	•	_								75.65	(2
a) If balance			1			- ` ` 	- 	í `	- 		- ` ` ') ÷ 100]	
24a)m= 0.27	0.27	0.26	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.25	0.26		(2
b) If balance			1	1	1	 	, 	í `	 		ı	7	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole h	n < 0.5 ×			•	•				.5 × (23b))		_	
24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
d) If natural if (22b)r	ventilation			•	•				0.5]			_	
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
Effective air	change	rate - er	nter (24 <i>a</i>) or (24l	b) or (24	c) or (24	ld) in bo	x (25)					
25)m= 0.27	0.27	0.26	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.25	0.26		(2
3. Heat losse	s and he	eat loss	paramet	er:									
LEMENT	Gros area		Openin		Net Ar A ,r		U-val W/m2		A X U (W/I	〈)	k-value kJ/m²·		A X k kJ/K
oors					2	x	1.3	=	2.6				(2
Vindows Type	e 1				8.26	<u></u>	/[1/(1.3)+	0.04] =	10.21	\equiv			(2
Vindows Type	2 2				4.21	<u></u>	/[1/(1.3)+	0.04] =	5.2				(2
Vindows Type	e 3				3.21	<u></u>	/[1/(1.3)+	0.04] =	3.97				(2
Vindows Type	e 4				4.37	x1	/[1/(1.3)+	0.04] =	5.4				(2
Rooflights					1.61	x1	/[1/(1.6) +	0.04] =	2.576	=			(2
Valls Type1	38.9)5	20.0	5	18.9	X	0.15	─ = i	2.84				(2
Valls Type2	45.4	17	2		43.47	7 X	0.13	-	5.81	F i			(2
Roof	59.2	25	1.61		57.64	1 x	0.1	= :	5.76	F i		= =	(3
otal area of e					143.6	=							`` (3
Party wall		,			25.95	_	0		0	[(3
-					59.25	_							(3
anv noor	l roof wind	ows. use e	effective w	indow U-v			a formula 1	1/[(1/U-valu	ue)+0.041 a	l as aiven in	paragrapi		(`
•							,	2(, ,	J	7		
for windows and	as on both						(26)(30) + (32) =				44.2	(3
for windows and include the area		= S (A x	U)										
for windows and include the area abric heat los	ss, W/K =	,	U)					((28).	(30) + (32	2) + (32a).	(32e) =	15258.06	(3
earty floor for windows and include the area abric heat los leat capacity hermal mass	ss, W/K = Cm = S((A x k)	ŕ	÷ TFA) iı	n kJ/m²K	,		., ,	(30) + (32 itive Value	, , ,	(32e) =	15258.06 250	===
for windows and include the area abric heat los leat capacity	ss, W/K = Cm = S(parame sments wh	(A x k) eter (TMF	P = Cm -	,			recisely the	Indica	itive Value	Medium	, ,		(3

Total affork neat loss calculated monthly Volume 1.03	Total fabric heat loss					(33) ±	(36) -		ı	50.77	7(27)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		onthly				` '	,	25)m x (5)		58.77	(37)
(38) Heat transfer coefficient, W/K (39)me (37) + (38)m (40)me (38)me (4) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (40)me (38)me (40) (41)me (38)me (40) (42) me (38)me (40) (41)me (38)me (40) (42) me (38)me (40) (42) me (38)me (40) (43) me (40)me (40)me (40)me (40)me (40) (41)me (40)me (40)me (40)me (40)me (40)me (40) (42) me (40)me (40		í i	Jun	.lul	Aug			, , ,	Dec		
(39)m=					Ť	-					(38)
(39)m=	Heat transfer coefficient. W/K	1		<u> </u>	<u> </u>	(39)m	= (37) + (3	88)m			
Heat loss parameter (HLP), W/m²K		71.94 71.79	71.02	71.02	70.87				72.4		
(40)ms 123 123 123 121 121 12 12				!		,	Average =	Sum(39) _{1.}	.12 /12=	71.91	(39)
Average Sum(40) z 12 1.21 (40)						· ,				l	
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m= 1.23 1.23 1.23	1.21 1.21	1.2	1.2	1.2					4.04	7(40)
4. Water heating energy requirement: **Reduce the annual average hot water usage in litres per day Vd. average = (25 x N) + 36 **Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per per day Vd. average = (25 x N) + 36 **Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 125 litres per per per day III and III and III are speed to achieve a water use target or not more that 125 litres per per per day III and III and III are speed to achieve a water use target or not more that 125 litres per per per day III and III are speed to achieve a water use target or not more that 125 litres per per per day III are speed to achieve a water use target or not more that 125 litres per per day III are speed to achieve a water use target or not more that 125 litres per per day III are speed to achieve a water use target or not more that 125 litres per per day III are speed to achieve a water use target or not more that 125 litres per per day III are speed to achieve a water use target or not more that 125 litres per day III are speed to achieve a water use target or not more that 125 litres per day III are speed to achieve a water use target or not more that 125 litres per day III are speed to achieve a water use target or not more that 125 litres per day III are speed to achieve a water use target or not speed to achieve a water use target or not speed to achieve a water use target or not speed to achieve a water use target or not speed to achieve a water use target or not be target or litres per day III and III are speed or litres per day III and III are speed or litres per day III and III are speed or litres per day III and III are speed or litres per day III are speed or litres per day III are speed or litres per day III are speed or litres per day III are speed or litres per day III are speed or litres per day III are speed or litres per day III are speed or litres per	Number of days in month (Table	1a)				,	Average =	Sum(40) _{1.}	. _{.12} /12=	1.21	(40)
### A. Water heating energy requirement: ### Assumed occupancy, N If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA£ 13.9, N = 1 Annual average hot water usage in litres per day Vd_average = (25 x N) + 36 ### Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) ### Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec ### Hot water usage in litres per day for each month Vd.m = factor from Table To x (43) ### (44)m= 88.83 85.6 82.37 79.14 75.91 72.68 72.68 75.91 79.14 82.37 85.6 88.83 ### Total = Sum(44) = 989.1 44) ### Energy content of hot water used - calculated monthily = 4.190 x Vd.m x nm x DTm /3600 kWh/month (see Tables 1b, 1c, 1d) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage) water 0 in boxes (46) to (61) ### Instantaneous water heating at point of use (no hot water storage) water 0 in bo	Jan Feb Mar	Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
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Reduce the annual average hot water usage by 5% if the divelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	if TFA £ 13.9, N = 1				, . <u>-</u>	·					
Note Mar Apr May Jun Jul Aug Sep Oct Nov Dec	· · · · · · · · · · · · · · · · · · ·	•		_	` ,		o taraat a		.76		(43)
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Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m=	(44)m= 88.83 85.6 82.37 7	79.14 75.91	72.68	72.68	75.91	79.14	82.37	85.6	88.83		
(45)m= 131.74 115.22 118.9 103.66 99.46 85.83 79.53 91.26 92.35 107.63 117.49 127.58 Total = Sum(45)								` '		969.1	(44)
Total = Sum(45) ₁₂ = 1270.64 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m=	Energy content of hot water used - calcula	ated monthly = 4.	190 x Vd,r	n x nm x E	OTm / 3600	kWh/mor	th (see Ta	bles 1b, 1	c, 1d)		
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Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) o (51) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54)							16 14	17 62	19 14		(46)
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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): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) o (51) If community heating see section 4.3 Volume factor from Table 2a Temperature factor from Table 2b Energy lost from water storage, kWh/year (47) × (51) × (52) × (53) = 0 (54)	Storage volume (litres) including a	any solar or W	/WHRS	storage	within sa	me ves	sel)		(47)
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Energy lost from water storage, kWh/year $ (47) \times (51) \times (52) \times (53) = 0 $ (54)		_									
							>)		. ,
	••	vvn/year			(47) x (51)	x (52) x (53) =	-			
									J		(55)

Water	storage	loss cal	culated t	for each	month			((56)m = (55) × (41)	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylinde	er contains	dedicated	d solar sto	rage, (57)ı	m = (56)m	x [(50) – (H11)] ÷ (5	0), else (5	7)m = (56)	m where (H11) is fro	m Append	ix H	
(57)m=	0	0	0	0	0	0	0	0	0	0	0	0		(57)
Primar	y circuit	loss (an	nual) fro	m Table	3							0		(58)
	-	•	•			59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor fr	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 cal	culated	for each	month ((61)m =	(60) ÷ 36	65 × (41))m						
(61)m=	45.27	39.4	41.98	39.03	38.68	35.84	37.04	38.68	39.03	41.98	42.22	45.27		(61)
Total h	eat requ	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 ×	(45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	177.01	154.62	160.87	142.69	138.15	121.67	116.57	129.95	131.38	149.61	159.7	172.85		(62)
Solar Dh	-IW input o	alculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add a	dditiona	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 wa	ater hea	ter			-	_	-	-		-	-		
(64)m=	177.01	154.62	160.87	142.69	138.15	121.67	116.57	129.95	131.38	149.61	159.7	172.85		
								Outp	out from w	ater heate	r (annual) ₁	12	1755.06	(64)
Heat g	ains froi	n water	heating,	kWh/mo	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	x [(46)m	+ (57)m	+ (59)m]	_
(65)m=	55.12	40.40								,			-	
. ,	00.12	48.16	50.03	44.22	42.74	37.5	35.7	40.02	40.46	46.28	49.62	53.74		(65)
, ,						<u> </u>		<u> </u>	<u> </u>	ļ		53.74 munity h	eating	(65)
inclu	ıde (57)ı	n in calc	culation of	of (65)m	only if c	<u> </u>		<u> </u>	<u> </u>	ļ		<u> </u>	eating	(65)
inclu 5. Int	ide (57)i ternal ga	m in calc	culation of the Table 5	of (65)m and 5a	only if c	<u> </u>		<u> </u>	<u> </u>	ļ		<u> </u>	eating	(65)
inclu 5. Int	ide (57)i ernal ga olic gain	m in calc iins (see s (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the d	dwelling	or hot w	rater is fr	om com	munity h	eating	(65)
inclu 5. Int	ide (57)i ternal ga	m in calc	culation of the Table 5	of (65)m and 5a	only if c	<u> </u>		<u> </u>	<u> </u>	ļ		<u> </u>	eating	(65)
5. Int Metabo	ernal gaolic gain Jan 98.02	n in calc ins (see s (Table Feb 98.02	e Table 5 5), Wat Mar 98.02	of (65)m 5 and 5a ts Apr 98.02	only if constant of the consta	ylinder is Jun 98.02	Jul 98.02	Aug 98.02	or hot w	vater is fr	om com	munity h	eating	
inclu 5. Int Metabo (66)m= Lightin	ernal ga olic gain Jan 98.02 g gains	m in calc	Example 5 to 2 to 2 to 2 to 2 to 2 to 2 to 2 to	of (65)m and 5a ts Apr 98.02 ppendix	only if constant of the consta	Jun 98.02	Jul 98.02 r L9a), a	Aug 98.02	Sep 98.02	Oct 98.02	Nov 98.02	Dec 98.02	eating	(66)
inclu 5. Int Metabo (66)m= Lightin (67)m=	ernal garolic gain Jan 98.02 g gains	m in calcular ins (see	Table 5 5), Wat Mar 98.02 ted in Ap	of (65)m and 5a ts Apr 98.02 ppendix 8.34	only if constant of the consta	Jun 98.02 ion L9 o	Jul 98.02 r L9a), a	Aug 98.02 Iso see	Sep 98.02 Table 5 9.92	Oct 98.02	om com	munity h	eating	
inclu 5. Int Metabo (66)m= Lightin (67)m= Appliar	de (57)i ernal ga olic gain Jan 98.02 g gains 15.25	m in calc	Example 5 to 2 to 2 to 2 to 2 to 2 to 2 to 2 to	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Append	May 98.02 L, equat 6.23	Jun 98.02 ion L9 of 5.26 uation L	Jul 98.02 r L9a), a 5.69	Aug 98.02 Iso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta	Oct 98.02	Nov 98.02	Dec 98.02	eating	(66) (67)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m=	polic gain Jan 98.02 g gains 15.25 nces gain	m in calc	Evaluation of Ev	of (65)m 5 and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L	Jul 98.02 r L9a), a 5.69 13 or L1	Aug 98.02 lso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta	Oct 98.02 12.6 ble 5 140.19	Nov 98.02	Dec 98.02	eating	(66)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m=	polic gain Jan 98.02 g gains 15.25 nces gain	m in calc	Evaluation of Ev	of (65)m 5 and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83	only if constraints only if constraints only if constraints on the constraint on the constraints on the constraint on the constraints on the constraint on the constraints of the constraints on the constraint	Jun 98.02 ion L9 of 5.26 uation L	Jul 98.02 r L9a), a 5.69 13 or L1	Aug 98.02 lso see 7.39 3a), also	Sep 98.02 Table 5 9.92 see Ta	Oct 98.02 12.6 ble 5 140.19	Nov 98.02	Dec 98.02	eating	(66) (67)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookir (69)m=	g gains 15.25 nces gain 171.05 ng gains 32.8	m in calcular (calcular 172.83) (calcular 32.8	ted in Apulated in 168.35	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15	Jul 98.02 r L9a), a 5.69 13 or L1: 127.97 or L15a)	Aug 98.02 Iso see 7.39 3a), also 126.19	Sep 98.02 Table 5 9.92 See Ta 130.66	Oct 98.02 12.6 ble 5 140.19	Nov 98.02 14.7	Dec 98.02	eating	(66) (67) (68)
inclu 5. Inf Metabo (66)m= Lightin (67)m= Applian (68)m= Cookir (69)m= Pumps	g gains 15.25 nces gain 171.05 ng gains 32.8	m in calcular (calcular 172.83) (calcular 32.8	e Table 5 e 5), Wat Mar 98.02 ted in Ap 11.02 ulated in 168.35	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8	May 98.02 L, equat 6.23 dix L, eq 146.81 L, equat	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15	Jul 98.02 r L9a), a 5.69 13 or L1: 127.97 or L15a)	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19	Nov 98.02 14.7 152.21	Dec 98.02 15.67 163.5	eating	(66) (67) (68) (69)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookir (69)m= Pumps (70)m=	g gains 171.05 172.8 173.8 174.05 175.25 175	m in calcular (calcular 172.83) (calcular 32.8) as gains 3	ted in Apulated in	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 3	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19	Sep 98.02 Table 5 9.92 See Ta 130.66	Oct 98.02 12.6 ble 5 140.19 2.5 32.8	Nov 98.02 14.7	Dec 98.02	eating	(66) (67) (68)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookir (69)m= Pumps (70)m=	g gains 171.05 172.8 173.8 174.05 175.25 175	m in calcular (calcular 172.83) (calcular 32.8) as gains 3	ted in Apulated in	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 see Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 2.5 32.8	Nov 98.02 14.7 152.21	Dec 98.02 15.67 163.5	eating	(66) (67) (68) (69)
inclu 5. Inf Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	g gains 15.25 nces gai 171.05 ng gains 32.8 s and far 3 s e.g. ev	m in calces (Table Feb 98.02) (calculated 13.54) ms (calculated 32.8) ms gains 3 aporatio -78.41	ted in Ap 168.35 ted in Ap 168.35 ted in Ap 168.35 ted in Ap 32.8 (Table 5	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8 5a) 3 tive value	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 See Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 2.5 32.8	Nov 98.02 14.7 152.21 32.8	Dec 98.02 15.67 163.5	eating	(66) (67) (68) (69) (70)
inclu 5. Inf Metabo (66)m= Lightin (67)m= Applian (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	g gains 15.25 nces gai 171.05 ng gains 32.8 s and far 3 s e.g. ev	m in calces (Table Feb 98.02) (calcular 13.54) ms (calcular 32.8) ms gains 3	ted in Ap 168.35 ted in Ap 168.35 ted in Ap 168.35 ted in Ap 32.8 (Table 5	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8 5a) 3 tive value	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8	Sep 98.02 Table 5 9.92 See Ta 130.66 ee Table 32.8	Oct 98.02 12.6 ble 5 140.19 2.5 32.8	Nov 98.02 14.7 152.21 32.8	Dec 98.02 15.67 163.5	eating	(66) (67) (68) (69) (70)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	g gains 15.25 nces gain 171.05 ng gains 32.8 and far s e.g. ev -78.41 heating 74.09	m in calces (Table Feb 98.02) (calculated 13.54) (calculated 32.8)	ted in Ap 168.35 ted in Ap 168.35 ted in Ap 168.35 ted in Ap 32.8 (Table 5 3 on (negation of the context) above 178.41 Table 5) 67.24	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 3 tive valu -78.41	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8 3 le 5) -78.41	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8 3	Sep 98.02 Table 5 9.92 See Ta 130.66 ee Table 32.8 3 -78.41	Oct 98.02 12.6 ble 5 140.19 2.5 32.8	Nov 98.02 14.7 152.21 32.8 3 -78.41 68.91	Dec 98.02 15.67 163.5 32.8 3 -78.41	eating	(66) (67) (68) (69) (70)
inclu 5. Int Metabo (66)m= Lightin (67)m= Applian (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	g gains 15.25 nces gain 171.05 ng gains 32.8 and far s e.g. ev -78.41 heating 74.09	m in calces (Table Feb 98.02) (calcular 13.54) ns (calcular 32.8) ns gains 3 aporatio -78.41 gains (Table 71.67)	ted in Ap 168.35 ted in Ap 168.35 ted in Ap 168.35 ted in Ap 32.8 (Table 5 3 on (negation of the context) above 178.41 Table 5) 67.24	of (65)m s and 5a ts Apr 98.02 ppendix 8.34 Appendix 158.83 ppendix 32.8 5a) 3 tive valu -78.41	only if construction only if c	Jun 98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8 3 le 5) -78.41	Jul 98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	Aug 98.02 Iso see 7.39 3a), also 126.19), also se 32.8 3	Sep 98.02 Table 5 9.92 See Ta 130.66 ee Table 32.8 3 -78.41	Oct 98.02 12.6 ble 5 140.19 2 5 32.8 3 -78.41	Nov 98.02 14.7 152.21 32.8 3 -78.41 68.91	Dec 98.02 15.67 163.5 32.8 3 -78.41	eating	(66) (67) (68) (69) (70)

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

Orientation: Access Fact Table 6d	tor	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast _{0.9x} 0.77	x	4.21	x	11.28	x	0.55	x	0.7	=	12.67	(75)
Northeast _{0.9x} 0.77	×	4.21	x	22.97	x	0.55	x	0.7	=	25.8	(75)
Northeast 0.9x 0.77	×	4.21	x	41.38	x	0.55	x	0.7] =	46.48	(75)
Northeast 0.9x 0.77	×	4.21	x	67.96	x	0.55	x	0.7] =	76.33	(75)
Northeast 0.9x 0.77	×	4.21	x	91.35	x	0.55	x	0.7	=	102.6	(75)
Northeast 0.9x 0.77	×	4.21	x	97.38	x	0.55	x	0.7] =	109.39	(75)
Northeast _{0.9x} 0.77	×	4.21	x	91.1	x	0.55	x	0.7] =	102.33	(75)
Northeast 0.9x 0.77	×	4.21	x	72.63	x	0.55	x	0.7	=	81.58	(75)
Northeast _{0.9x} 0.77	×	4.21	x	50.42	x	0.55	x	0.7] =	56.63	(75)
Northeast 0.9x 0.77	×	4.21	x	28.07	x	0.55	x	0.7	=	31.53	(75)
Northeast _{0.9x} 0.77	x	4.21	x	14.2	x	0.55	x	0.7	=	15.95	(75)
Northeast 0.9x 0.77	×	4.21	x	9.21	x	0.55	x	0.7] =	10.35	(75)
Northwest 0.9x 0.77	×	8.26	x	11.28	x	0.55	x	0.7	=	24.87	(81)
Northwest 0.9x 0.77	x	3.21	x	11.28	x	0.55	x	0.7	=	9.66	(81)
Northwest 0.9x 0.77	×	4.37	x	11.28	x	0.55	x	0.7	=	13.16	(81)
Northwest 0.9x 0.77	x	8.26	x	22.97	x	0.55	x	0.7	=	50.61	(81)
Northwest 0.9x 0.77	x	3.21	x	22.97	x	0.55	x	0.7	=	19.67	(81)
Northwest 0.9x 0.77	x	4.37	x	22.97	x	0.55	x	0.7	=	26.78	(81)
Northwest 0.9x 0.77	×	8.26	x	41.38	x	0.55	X	0.7	=	91.19	(81)
Northwest 0.9x 0.77	×	3.21	x	41.38	x	0.55	x	0.7] =	35.44	(81)
Northwest 0.9x 0.77	×	4.37	x	41.38	x	0.55	x	0.7] =	48.25	(81)
Northwest 0.9x 0.77	X	8.26	x	67.96	x	0.55	x	0.7	=	149.76	(81)
Northwest 0.9x 0.77	×	3.21	x	67.96	x	0.55	x	0.7	=	58.2	(81)
Northwest 0.9x 0.77	x	4.37	x	67.96	x	0.55	x	0.7	=	79.23	(81)
Northwest 0.9x 0.77	X	8.26	x	91.35	x	0.55	X	0.7	=	201.31	(81)
Northwest 0.9x 0.77	×	3.21	x	91.35	X	0.55	X	0.7	=	78.23	(81)
Northwest 0.9x 0.77	×	4.37	x	91.35	x	0.55	x	0.7	=	106.5	(81)
Northwest 0.9x 0.77	×	8.26	X	97.38	X	0.55	X	0.7	=	214.62	(81)
Northwest 0.9x 0.77	X	3.21	x	97.38	X	0.55	X	0.7	=	83.4	(81)
Northwest 0.9x 0.77	X	4.37	X	97.38	X	0.55	X	0.7	=	113.54	(81)
Northwest 0.9x 0.77	X	8.26	X	91.1	X	0.55	X	0.7	=	200.77	(81)
Northwest 0.9x 0.77	X	3.21	x	91.1	x	0.55	X	0.7	=	78.02	(81)
Northwest 0.9x 0.77	×	4.37	X	91.1	X	0.55	X	0.7	=	106.22	(81)
Northwest 0.9x 0.77	X	8.26	x	72.63	X	0.55	X	0.7	=	160.06	(81)
Northwest 0.9x 0.77	×	3.21	x	72.63	x	0.55	x	0.7	=	62.2	(81)
Northwest 0.9x 0.77	X	4.37	x	72.63	x	0.55	x	0.7	=	84.68	(81)
Northwest 0.9x 0.77	X	8.26	x	50.42	x	0.55	x	0.7	=	111.12	(81)
Northwest 0.9x 0.77	X	3.21	x	50.42	x	0.55	x	0.7] =	43.18	(81)
Northwest 0.9x 0.77	X	4.37	×	50.42	X	0.55	X	0.7	=	58.79	(81)

Northwest	0.9x	.77	X	8.2	26	x	2	8.07	x	0.55)	· [0.7		=	61.85	(81)
Northwest	0.9x	.77	X	3.2	21	x	2	8.07	х	0.55	,	<u> </u>	0.7		=	24.04	(81)
Northwest	0.9x	.77	X	4.3	37	x	2	8.07	х	0.55)	<u> </u>	0.7		=	32.72	(81)
Northwest	0.9x	.77	X	8.2	26	x	1	14.2	x	0.55)	<u> </u>	0.7		=	31.29	(81)
Northwest	0.9x	.77	X	3.2	21	x	1	14.2	х	0.55	,	〈 [0.7		=	12.16	(81)
Northwest	0.9x	.77	X	4.3	37	x	1	14.2	х	0.55)	<u> </u>	0.7		=	16.55	(81)
Northwest	0.9x	.77	X	8.2	26	x	9	9.21	х	0.55	,	, [0.7		=	20.31	(81)
Northwest	0.9x	.77	X	3.2	21	x	9	9.21	x	0.55	,	〈 [0.7		=	7.89	(81)
Northwest	0.9x	.77	X	4.3	37	x	9	9.21	x	0.55)	<u> </u>	0.7		=	10.74	(81)
Rooflights	0.9x	1	X	1.6	61	x		26	X	0.55	,	٠ [0.8		=	16.58	(82)
Rooflights	0.9x	1	X	1.6	61	X		54	X	0.55)	٠ [0.8		=	34.43	(82)
Rooflights	0.9x	1	X	1.6	61	X		96	x	0.55)	· [0.8		=	61.21	(82)
Rooflights	0.9x	1	X	1.6	61	X		150	x	0.55)	٠ [0.8		=	95.63	(82)
Rooflights	0.9x	1	X	1.6	61	X		192	x	0.55)	· [0.8		=	122.41	(82)
Rooflights	0.9x	1	X	1.6	61	X	2	200	x	0.55)	· [0.8		=	127.51	(82)
Rooflights	0.9x	1	X	1.6	51	X		189	x	0.55)	· [0.8		=	120.5	(82)
Rooflights	0.9x	1	X	1.6	61	X		157	x	0.55)	· [0.8		=	100.1	(82)
Rooflights	0.9x	1	X	1.6	51	X		115	x	0.55)	· [0.8		=	73.32	(82)
Rooflights	0.9x	1	X	1.6	51	x		66	x	0.55)	· [0.8		=	42.08	(82)
Rooflights	0.9x	1	X	1.6	51	x		33	x	0.55)	· [0.8		=	21.04	(82)
Rooflights	0.9x	1	X	1.6	61	x		21	X	0.55)	· [0.8		=	13.39	(82)
Solar gair	s in watts	, calcu	lated	for eacl	h mont	h_			(83)m	= Sum(74)	m(82)	m	_			•	
` '	5.93 157.		2.56	459.16	611.06		48.46	607.84	488	.61 343.0	4 192	.22	96.98	62.	68		(83)
Total gain	i		solar	(84)m =	= (73)m	-		, watts					,			ı	
(84)m= 39	2.73 470.	73 58	4.57	743.16	876.96	8	96.73	844.89	731	.38 595.2	3 462	.62	388.21	369	.49		(84)
7. Mean	internal te	mpera	ture ((heating	seaso	n)											
Tempera	iture durin	g heat	ing pe	eriods ir	n the liv	/ing	area f	rom Tab	ole 9	Th1 (°C)						21	(85)
Utilisatio	n factor fo	r gains	for li	iving are	ea, h1,r	n (s	ее Та	ble 9a)			_		_			1	_
_ \	lan Fe	b N	Лar	Apr	May	<u>/ </u>	Jun	Jul	Α	ug Se _l	p O	ct	Nov	D	ес		
(86)m=	1 0.99	0.	.97	0.89	0.7		0.5	0.37	0.4	4 0.74	0.0	96	0.99	1			(86)
Mean int	ernal tem	eratur	e in I	iving are	ea T1 (follo	w ste	ps 3 to 7	' in T	able 9c)							
(87)m= 1	9.71 19.9	20).24	20.67	20.92	2	20.99	21	20.	99 20.92	2 20.	53	20.03	19.	67		(87)
Tempera	ture durin	g heat	ing pe	eriods ir	rest o	f dw	elling/	from Ta	ble 9	9, Th2 (°C	;)						
(88)m= 1	9.89 19.9) 19	9.9	19.91	19.91	1	19.92	19.92	19.	92 19.92	2 19.	91	19.91	19	.9		(88)
Utilisatio	n factor fo	r gains	for r	est of d	wellina	. h2	.m (se	e Table	9a)	•	•		•			•	
(89)m=	1 0.99	-	.96	0.85	0.64	\neg	0.42	0.28	0.3	0.66	0.9	94	0.99	1			(89)
— Mean int	ernal tem	eratur	e in t	he rest	of dwe	llina	T2 (f	ollow ste	ns 3	to 7 in Ta	able 9c)				I	
	3.18 18.4	$\overline{}$	3.96	19.55	19.84	Ť	12 (10	19.92	19.			_	18.67	18.	14		(90)
` /			!	-									ing area ÷ (4	L		0.47	(91)
															ı		

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

(92)m= 18.9	19.13	19.56	20.07	20.34	20.42	20.42	20.42	20.36	19.91	19.31	18.86		(92)
Apply adjustr	nent to t	he mean	interna	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.75	18.98	19.41	19.92	20.19	20.27	20.27	20.27	20.21	19.76	19.16	18.71		(93)
8. Space hea	ting requ	uirement											
Set Ti to the			•		ed at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
the utilisation	1		using Ta	ble 9a					1				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac		r	1						i	1			
(94)m= 0.99	0.99	0.96	0.85	0.65	0.44	0.31	0.37	0.68	0.94	0.99	1		(94)
Useful gains,	i e	· ·	<u> </u>							1			
(95)m= 390.48	464.44	559.95	634.38	573.03	397.82	260.34	273.02	404.87	433.75	383.71	367.88		(95)
Monthly aver									<u> </u>				
(96)m= 4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate			<u>.</u>			-``	- ` ´ ´ 	<u> </u>	ī —				
` '	1026.14	938.49	792.88	609.64	402.37	260.93	274.47	435.52	657.83	869.4	1050.42		(97)
Space heatin	ř					th = 0.02		i `	ŕ				
(98)m= 494.29	377.46	281.63	114.12	27.24	0	0	0	0	166.72	349.7	507.81		_
							Tota	ıl per year	(kWh/yea	r) = Sum(9	8)15,912 =	2318.96	(98)
Space heating	g require	ement in	kWh/m²	/year								39.14	(99)
9a. Energy red	nuiremer	nts – Indi	vidual h	eating sy	vstems i	ncludina	micro-C	CHP)					
Space heating					,			, ,					
Fraction of sp	•	at from s	econdar	y/supple	mentary	system						0	(201)
Fraction of sp	pace hea	at from m	nain svst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of to			-	• •			` '	02) × [1 –	(203)] =		[(204)
		•	•				(204) (2	02) 11	(200)]		[1	╡` `
Efficiency of	maın spa	ace heat	ing syste	em 1							ļ	90.3	(206)
Efficiency of	seconda	ry/suppl	ementar	y heating	g systen	າ, %						0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ear
Space heating	g require	ement (c	alculate	d above))	•	•		•	•	<u> </u>		
494.29	377.46	281.63	114.12	27.24	0	0	0	0	166.72	349.7	507.81		
(211)m = {[(98	3)m x (20	(4)] } x 1	00 ÷ (20	06)		•	•						(211)
547.38	418.01	311.89	126.38	30.17	0	0	0	0	184.62	387.26	562.36		
							Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}	=	2568.06	(211)
Space heating	a fuel (s	econdar	v) kWh/	month							L		
$= \{[(98)m \times (200)]\}$	•		• •										
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		
	!	l				l	Tota	ıl (kWh/yea	ı ar) =Sum(2	1 215) _{1 510 12}	<u>-</u> =	0	(215)
Water heating	7									,	L	-	_
Output from w		ter (calc	ulated a	hove)									
177.01	154.62	160.87	142.69	138.15	121.67	116.57	129.95	131.38	149.61	159.7	172.85		
Efficiency of w	ater hea	iter				I	I	I	I	1	'	81	(216)
(217)m= 87.65	87.38	86.68	84.88	82.4	81	81	81	81	85.65	87.16	87.74		(217)
Fuel for water	l				L				1	L			` '
(219)m = (64)	•												
(219)m= 201.96		185.59	168.09	167.66	150.21	143.91	160.43	162.2	174.67	183.22	197		
	•					•	Tota	ıl = Sum(2	19a) ₁₁₂ =	•	•	2071.89	(219)
											L		」 ` '

Annual totals		kWh/year	Г	kWh/year	1
Space heating fuel used, main system 1			Ļ	2568.06]
Water heating fuel used			L	2071.89	
Electricity for pumps, fans and electric keep-hot					
mechanical ventilation - balanced, extract or pos	tive input from outside		129.3		(230a)
central heating pump:			30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (2	30a)(230g) =		204.3	(231)
Electricity for lighting				269.31	(232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP				
	Energy	Emission facto	or	Emissions	
	Energy kWh/year	Emission facto kg CO2/kWh	or	Emissions kg CO2/yea	r
Space heating (main system 1)	••	kg CO2/kWh	or = [r](261)
Space heating (main system 1) Space heating (secondary)	kWh/year	kg CO2/kWh	_	kg CO2/yea	-
	kWh/year	kg CO2/kWh 0.216 0.519	= [kg CO2/yea	(261)
Space heating (secondary)	kWh/year (211) x (215) x	0.216 0.519 0.216	= [= [kg CO2/yea	(261)
Space heating (secondary) Water heating	kWh/year (211) x (215) x (219) x	kg CO2/kWh 0.216 0.519 0.216	= [= [kg CO2/yea 554.7 0 447.53	(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 0.216 0.519 0.216	= [= [= [kg CO2/yea 554.7 0 447.53 1002.23	(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 (232) x	kg CO2/kWh 0.216 0.519 0.216	= [= [= [= [kg CO2/yea 554.7 0 447.53 1002.23 106.03](261)](263)](264)](265)](267)

El rating (section 14)

(274)

		User [Details:						
Assessor Name:	Chris Hocknell		Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	-				n: 1.0.4.16	
		Property	Address	: Apartm	ent 3				
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			a(m²)	(40) v		ight(m)	7(20) -	Volume(m³)	_
	N. (41 N. (4			(1a) x		2.7	(2a) =	196.69	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(1n)	72.85	(4)					_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	196.69	(5)
2. Ventilation rate:	main accord		a Alba y		total			ma3 may bay	
	main second heating heating		other		total			m³ per hou	<u> </u>
Number of chimneys	0 + 0	+	0	_ = [0	X	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	X :	20 =	0	(6b)
Number of intermittent fa	ins				0	X	10 =	0	(7a)
Number of passive vents	3			Ī	0	x '	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	x -	40 =	0	(7c)
				<u> </u>					
							Air ch	anges per ho	ur
	ys, flues and fans = (6a)+(6b)-				0		÷ (5) =	0	(8)
If a pressurisation test has be Number of storeys in the	peen carried out or is intended, proc he dwelling (ns)	eed to (17),	otherwise (continue fr	om (9) to	(16)		0	(9)
Additional infiltration	ne aweiling (113)					[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame	or 0.35 fo	r masoni	ry constr	uction	L(°)	•	0	(11)
	resent, use the value corresponding	to the grea	ter wall are	a (after					
deducting areas of openii	_{ngs); if equal user 0.35} floor, enter 0.2 (unsealed) or	0.1 (seale	ed) else	enter 0				0	(12)
If no draught lobby, en	,	0.1 (00an	ou), 0.00	Officer o				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
•	q50, expressed in cubic met	•	•	•	etre of e	envelope	area	3	(17)
·	lity value, then $(18) = [(17) \div 20]$							0.15	(18)
Number of sides sheltere	es if a pressurisation test has been o	one or a de	gree air pe	rmeability	is being u	sed		3	(19)
Shelter factor	,u		(20) = 1 -	[0.075 x (19)] =			0.78	(20)
Infiltration rate incorporate	ting shelter factor		(21) = (18) x (20) =				0.12	(21)
Infiltration rate modified f	or monthly wind speed								_
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
,	1 1111 9.00		1	<u> </u>			1	I	

Adjusted infiltr	ration rate (a	allowi	ng for sh	nelter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15		0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14		
Calculate effe		-	ate for t	he appli	cable ca	se	•	•			•	•	_
	al ventilation		l' N (0		(•	NEV (1	. (00)	\ (00 \			0.5	(23a
	neat pump usin								o) = (23a)			0.5	(23b
	h heat recover	-	-	_								75.65	(230
a) If balance				.	1	- ` ` 	- 	í `	r `		- ` 	i ÷ 100] I	(0.4
(24a)m= 0.27		0.26	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.25	0.26		(24a
b) If balance			1	ı	1	, , `	, 	, ` `	, 		T	1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24)
c) If whole h if (22b)r	nouse extrac m < 0.5 × (2			-	•				.5 × (23b)			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)r	ventilation of m = 1, then			•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
Effective air	r change rat	e - en	iter (24a) or (24h	o) or (24	c) or (24	ld) in bo	x (25)			•		
(25)m= 0.27	0.27	0.26	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.25	0.26		(25)
3. Heat losse	es and heat	loss p	paramete	er:	•		•	•			•		
ELEMENT	Gross area (m	²)	Openin m		Net Ar A ,r		U-val W/m2		A X U (W/h	()	k-value kJ/m²·l		A X k :J/K
Doors					2	X	1.3	= [2.6				(26)
Windows Type	e 1				7.1	x1	/[1/(1.3)+	0.04] =	8.77				(27)
Windows Type	e 2				9.86	x1	/[1/(1.3)+	0.04] =	12.18	\equiv			(27)
Windows Type	e 3				7.48	x1	/[1/(1.3)+	0.04] =	9.24	Ħ			(27)
Windows Type	e 4				1.53	= x1	/[1/(1.3)+	0.04] =	1.89	Ħ			(27)
Rooflights					1.14	= x1	/[1/(1.6) +	0.04] =	1.824	=			(27)
Walls Type1	40.58	7	25.97	7	14.61	_	0.15	— - i	2.19	Ħ r		–	(29)
Walls Type2	56.98	╡	2	=	54.98	=	0.13	╡┇	7.34	-		╡┝	(29)
Roof	72.85	╡	1.14	=	71.71	=	0.1	╡┇	7.17	북 ¦		╡	(30)
Total area of e			1.14			=	0.1		7.17				(31)
					170.4	_		— _ i	0			–	``
	,				22.0								(32)
Party wall	,				23.2	=	0	= [0				/00
Party wall Party floor		W00 0	ffactive wi	ndow II w	72.85	5					naragrank		(32
Party wall Party floor * for windows and	d roof windows				72.85	5				s given in	paragraph	3.2	(32
Party wall Party floor * for windows and ** include the are	d roof windows eas on both side	es of in	nternal wall		72.85	5				s given in	paragraph	53.11	
Party wall Party floor * for windows and ** include the are Fabric heat los	d roof windows as on both side SS, W/K = S	es of in	nternal wall		72.85	5	g formula 1	/[(1/U-valu) + (32) =					(33)
Party wall Party floor * for windows and ** include the are Fabric heat los Heat capacity	d roof windows as on both side ss, W/K = S Cm = S(A x	es of in (A x (k)	iternal wali U)	ls and pari	72.85 alue calcul titions	ated using	g formula 1) + (32) = ((28)	ue)+0.04] a) + (32a).		53.11	(33)
Party wall Party floor * for windows and ** include the are. Fabric heat los Heat capacity Thermal mass For design asses	d roof windows as on both side ss, W/K = S Cm = S(A x s parameter asments where	es of in (A x (k) (TMP the det	ternal wall U) P = Cm ÷ tails of the	ls and pari ÷ TFA) ir	72.85 alue calcul titions	5 lated using	g formula 1 (26)(30	/[(1/U-valu) + (32) = ((28) Indica	(30) + (32 tive Value:) + (32a). Medium	(32e) =	53.11 17245.49	(33)
Party wall Party floor * for windows and ** include the are. Fabric heat los Heat capacity Thermal mass For design asses can be used inste	d roof windows has on both side ss, W/K = S Cm = S(A x s parameter hisments where head of a detaile	es of in (A x (k) (TMF the det	eternal wall U) P = Cm ÷ tails of the	ls and pan → TFA) ir → construct	72.85 alue calcul titions n kJ/m²K tion are not	lated using	g formula 1 (26)(30	/[(1/U-valu) + (32) = ((28) Indica	(30) + (32 tive Value:) + (32a). Medium	(32e) =	53.11 17245.49	(32a (33) (34) (35)

Total fabric he	at loss							(33) +	(36) =		Γ	00.40	(37)
Ventilation hea		alculated	h monthl	v				` '		25)m x (5)		69.42	(37)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.52	17.33	17.15	16.2	16.01	15.07	15.07	14.88	15.45	16.01	16.39	16.77		(38)
Heat transfer of	<u> </u>						1		= (37) + (37)	<u> </u>			, ,
(39)m= 86.94	86.76	86.57	85.62	85.43	84.49	84.49	84.3	84.87	85.43	85.81	86.19		
	<u> </u>	<u> </u>		<u> </u>		<u> </u>				Sum(39) ₁ .	12 /12=	85.58	(39)
Heat loss para	meter (H	HLP), W	/m²K					(40)m	= (39)m ÷	(4)			
(40)m= 1.19	1.19	1.19	1.18	1.17	1.16	1.16	1.16	1.16	1.17	1.18	1.18		_
Number of day	/s in mo	nth (Tab	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.17	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water hea	ting ene	rav reau	irement [.]								kWh/ye	ear.	
i. Water floa	ang ono	igy roqu									itt viii y c	our.	
Assumed occu			F4	/ 0 0000	140 (TI	- 400	\0\1 · 0 (2040 /	FFA 40		31		(42)
if TFA > 13.9 if TFA £ 13.9		+ 1.76 X	([1 - exp	0.0003	349 X (11	-A -13.9)2)] + 0.0	JU13 X (IFA -13.	.9)			
Annual average	,	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		89	.14		(43)
Reduce the annua	_				_	_	to achieve	a water us	se target o				` '
not more that 125	litres per _l	person pei	r day (all и •	ater use, l	not and co	ld) •							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage i	n litres pei	r day for ea	ach month	Vd,m = fa	ctor from		(43)						
(44)m= 98.05	94.49	90.92	87.36	83.79	80.23	80.23	83.79	87.36	90.92	94.49	98.05		-
Energy content of	hot water	used - cal	lculated me	onthly $= 4$.	190 x Vd,r	m x nm x L	OTm / 3600			m(44) ₁₁₂ = ables 1b, 1	L	1069.69	(44)
(45)m= 145.41	127.18	131.24	114.42	109.78	94.74	87.79	100.74	101.94	118.8	129.68	140.82		
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	!		-	Γotal = Su	I m(45) ₁₁₂ =	-	1402.53	(45)
If instantaneous w	ater heati	ng at point	t of use (no	o hot water	storage),	enter 0 in	boxes (46)				L		
(46)m= 21.81	19.08	19.69	17.16	16.47	14.21	13.17	15.11	15.29	17.82	19.45	21.12		(46)
Water storage			-										
Storage volum	• •					_		ame ves	sel		0		(47)
If community h	_			_			. ,		(0) ! (47)			
Otherwise if no Water storage		not wate	er (tnis ir	ıcıuaes ı	nstantar	neous co	ilod Idmo	ers) ente	er o in (47)			
a) If manufact		eclared I	oss fact	or is kno	wn (kWł	n/day):					0		(48)
Temperature f					(, ,.					0		(49)
Energy lost fro				ear			(48) x (49)	· =			0		(50)
b) If manufact		-	-		or is not	known:	(10) 11 (10)				<u> </u>		(00)
Hot water stor			-								0		(51)
If community h	•		on 4.3										
Volume factor											0		(52)
Temperature f											0		(53)
Energy lost fro		_	e, kWh/y	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or	(54) in (5	5)									0		(55)

Water Storage	loss cal	culated f	or 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)ı	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	t loss (ar	nual) fro	m Table	3							0		(58)
Primary circuit	t loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified by	y factor fi	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	lculated	for each	month (61)m =	(60) ÷ 36	65 × (41)m						
(61)m= 49.97	43.49	46.33	43.08	42.7	39.56	40.88	42.7	43.08	46.33	46.6	49.97		(61)
Total heat req	uired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 195.38	170.67	177.57	157.5	152.48	134.3	128.67	143.44	145.02	165.13	176.28	190.79		(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	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= 195.38	170.67	177.57	157.5	152.48	134.3	128.67	143.44	145.02	165.13	176.28	190.79		
							Outp	out from wa	ater heate	r (annual) ₁	12	1937.22	(64)
Heat gains fro	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]	_
(65)m= 60.84	53.16	55.22	48.81	47.18	41.39	39.41	44.17	44.66	51.08	54.77	59.32		(65)
include (57)	m in cal	culation o	of (65)m		·	<u> </u>						l	
` '			ווו(כט) וכ	only if c	ylınder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal g	ains (see		` '	-	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal game	·	e Table 5	and 5a	-	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	
5. Internal gair Metabolic gair Jan	·	e Table 5	and 5a	-	Jun	s in the o	dwelling		ater is fr	om com	munity h	eating	
Metabolic gair	ns (Table	Table 5	and 5a):		ı		Sep			ı	eating	(66)
Metabolic gair Jan (66)m= 115.66	rs (Table Feb	2 5), Wat Mar 115.66	and 5a ts Apr 115.66	May	Jun 115.66	Jul 115.66	Aug 115.66	Sep 115.66	Oct	Nov	Dec	eating	(66)
Metabolic gair	rs (Table Feb	2 5), Wat Mar 115.66	and 5a ts Apr 115.66	May	Jun 115.66	Jul 115.66	Aug 115.66	Sep 115.66	Oct	Nov	Dec	eating	(66)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17	reb Feb 115.66 (calcula	2 Table 5 2 5), Wat Mar 115.66 ted in Ap	ts Apr 115.66 ppendix 9.94	May 115.66 L, equati	Jun 115.66 ion L9 oi 6.27	Jul 115.66 r L9a), a 6.78	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov 115.66	Dec 115.66	eating	, ,
Metabolic gair Jan (66)m= 115.66 Lighting gains	res (Table Feb 115.66 (calcula 16.14 tins (calc	2 Table 5 2 5), Wat Mar 115.66 ted in Ap	ts Apr 115.66 ppendix 9.94	May 115.66 L, equati	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a 6.78	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov 115.66	Dec 115.66	eating	, ,
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86	res (Table Feb 115.66 (calcula 16.14 tins (calcula 205.97	E Table 5 E 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64	Apr 115.66 ppendix 9.94 Appendix 189.29	May 115.66 L, equati 7.43 dix L, equati 174.97	Jun 115.66 ion L9 o 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta 155.72	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66	eating	(67)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga	res (Table Feb 115.66 (calcula 16.14 tins (calcula 205.97	E Table 5 E 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64	Apr 115.66 ppendix 9.94 Appendix 189.29	May 115.66 L, equati 7.43 dix L, equati 174.97	Jun 115.66 ion L9 o 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta 155.72	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66	eating	(67)
Metabolic gairs Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57	reb 115.66 (calcula 16.14 tins (calcula 205.97 s (calcula 34.57	Mar 115.66 ted in Ap 13.13 ulated in 200.64 tted in A 34.57	ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equat	Jun 115.66 ion L9 o 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68 194.86	eating	(67) (68)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains	reb 115.66 (calcula 16.14 tins (calcula 205.97 s (calcula 34.57	Mar 115.66 ted in Ap 13.13 ulated in 200.64 tted in A 34.57	ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equat	Jun 115.66 ion L9 o 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68 194.86	eating	(67) (68)
Metabolic gairs Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 3	res (Table Feb 115.66 (calcula 16.14 lins (calcula 205.97 s (calcula 34.57 ns gains	200.64 ted in Ap 200.64 ted in Ap 200.64 ted in Ap 34.57 (Table 5	Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57	May 115.66 L, equati 7.43 dix L, equat 174.97 L, equat 34.57	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(67) (68) (69)
Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa	res (Table Feb 115.66 (calcula 16.14 lins (calcula 205.97 s (calcula 34.57 ns gains	200.64 ted in Ap 200.64 ted in Ap 200.64 ted in Ap 34.57 (Table 5	Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57	May 115.66 L, equati 7.43 dix L, equat 174.97 L, equat 34.57	Jun 115.66 ion L9 of 6.27 uation L 161.5 tion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 34.57	eating	(67) (68) (69)
Metabolic gair Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -92.53	reb (Calcula 16.14 16.14 16.15 (Calcula 34.57 16 16 16 16 16 16 16 16 16 16 16 16 16	E Table 5 E 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 ted in A 34.57 (Table 5 3 on (negat	ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 3 tive value	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equati 34.57 3 es) (Tab	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4 34.57	Dec 115.66 18.68 194.86 34.57	eating	(67) (68) (69) (70)
Metabolic gain Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 3 Losses e.g. ev	reb (Calcula 16.14 16.14 16.15 (Calcula 34.57 16 16 16 16 16 16 16 16 16 16 16 16 16	E Table 5 E 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 ted in A 34.57 (Table 5 3 on (negat	ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 3 tive value	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equati 34.57 3 es) (Tab	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4 34.57	Dec 115.66 18.68 194.86 34.57	eating	(67) (68) (69) (70)
Metabolic gairs Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -92.53 Water heating	res (Table Feb 115.66 (calcula 16.14 tims (calcula 205.97 s (calcula 34.57 ns gains 3 vaporatio -92.53 gains (T 79.11	E Table 5 E 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 ted in Ap 34.57 (Table 5 3 on (negation) -92.53 Table 5) 74.22	s and 5a ts Apr 115.66 opendix 9.94 Appendix 189.29 opendix 34.57 5a) 3 tive valu	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equati 34.57 3 es) (Tab	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 3 lle 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57 3	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57 3	Oct 115.66 15.01 ble 5 167.07 5 34.57 3 -92.53	Nov 115.66 17.52 181.4 34.57 3 -92.53	Dec 115.66 18.68 194.86 34.57 3	eating	(67) (68) (69) (70) (71)
Metabolic gairs Jan (66)m= 115.66 Lighting gains (67)m= 18.17 Appliances ga (68)m= 203.86 Cooking gains (69)m= 34.57 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -92.53 Water heating (72)m= 81.78	res (Table Feb 115.66 (calcula 16.14 tims (calcula 205.97 s (calcula 34.57 ns gains 3 vaporatio -92.53 gains (T 79.11	E Table 5 E 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 ted in Ap 34.57 (Table 5 3 on (negation) -92.53 Table 5) 74.22	s and 5a ts Apr 115.66 opendix 9.94 Appendix 189.29 opendix 34.57 5a) 3 tive valu	May 115.66 L, equati 7.43 dix L, equati 174.97 L, equati 34.57 3 es) (Tab	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 3 lle 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39 0, also se 34.57 3	Sep 115.66 Table 5 11.82 see Tal 155.72 ee Table 34.57 3	Oct 115.66 15.01 ble 5 167.07 5 34.57 3 -92.53	Nov 115.66 17.52 181.4 34.57 3 -92.53	Dec 115.66 18.68 194.86 34.57 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.

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	1.53	x	11.28	x	0.55	x	0.7	=	4.61	(75)
Northeast 0.9x	0.77	x	1.53	x	22.97	X	0.55	x	0.7	=	9.38	(75)
Northeast 0.9x	0.77	x	1.53	x	41.38	x	0.55	x	0.7	=	16.89	(75)
Northeast 0.9x	0.77	x	1.53	x	67.96	x	0.55	x	0.7	=	27.74	(75)
Northeast 0.9x	0.77	x	1.53	x	91.35	X	0.55	x	0.7	=	37.29	(75)
Northeast 0.9x	0.77	x	1.53	x	97.38	x	0.55	x	0.7	=	39.75	(75)
Northeast 0.9x	0.77	x	1.53	x	91.1	x	0.55	x	0.7] =	37.19	(75)
Northeast 0.9x	0.77	x	1.53	x	72.63	X	0.55	x	0.7	=	29.65	(75)
Northeast 0.9x	0.77	x	1.53	x	50.42	x	0.55	x	0.7	=	20.58	(75)
Northeast 0.9x	0.77	x	1.53	x	28.07	x	0.55	x	0.7	=	11.46	(75)
Northeast 0.9x	0.77	X	1.53	X	14.2	X	0.55	X	0.7	=	5.8	(75)
Northeast 0.9x	0.77	x	1.53	x	9.21	x	0.55	x	0.7	=	3.76	(75)
Southeast 0.9x	0.77	x	7.1	x	36.79	x	0.55	x	0.7	=	69.7	(77)
Southeast 0.9x	0.77	x	9.86	x	36.79	x	0.55	x	0.7	=	96.79	(77)
Southeast 0.9x	0.77	x	7.48	x	36.79	x	0.55	x	0.7] =	73.43	(77)
Southeast 0.9x	0.77	x	7.1	x	62.67	x	0.55	X	0.7	=	118.72	(77)
Southeast 0.9x	0.77	x	9.86	x	62.67	X	0.55	x	0.7	=	164.87	(77)
Southeast 0.9x	0.77	x	7.48	x	62.67	x	0.55	x	0.7	=	125.08	(77)
Southeast 0.9x	0.77	x	7.1	x	85.75	X	0.55	X	0.7	=	162.44	(77)
Southeast 0.9x	0.77	x	9.86	x	85.75	X	0.55	x	0.7	=	225.59	(77)
Southeast 0.9x	0.77	x	7.48	x	85.75	x	0.55	x	0.7	=	171.14	(77)
Southeast 0.9x	0.77	x	7.1	x	106.25	x	0.55	X	0.7	=	201.27	(77)
Southeast 0.9x	0.77	x	9.86	x	106.25	x	0.55	x	0.7	=	279.52	(77)
Southeast 0.9x	0.77	x	7.48	x	106.25	x	0.55	x	0.7] =	212.05	(77)
Southeast 0.9x	0.77	x	7.1	x	119.01	x	0.55	X	0.7	=	225.44	(77)
Southeast 0.9x	0.77	x	9.86	x	119.01	x	0.55	x	0.7	=	313.08	(77)
Southeast 0.9x	0.77	x	7.48	x	119.01	x	0.55	x	0.7] =	237.51	(77)
Southeast 0.9x	0.77	x	7.1	x	118.15	X	0.55	x	0.7	=	223.81	(77)
Southeast 0.9x	0.77	x	9.86	x	118.15	x	0.55	x	0.7] =	310.82	(77)
Southeast 0.9x	0.77	x	7.48	x	118.15	x	0.55	x	0.7	=	235.79	(77)
Southeast 0.9x	0.77	x	7.1	x	113.91	x	0.55	X	0.7	=	215.78	(77)
Southeast 0.9x	0.77	x	9.86	x	113.91	x	0.55	x	0.7	=	299.66	(77)
Southeast 0.9x	0.77	x	7.48	x	113.91	x	0.55	x	0.7	=	227.33	(77)
Southeast 0.9x	0.77	x	7.1	x	104.39	x	0.55	x	0.7	=	197.75	(77)
Southeast 0.9x	0.77	x	9.86	x	104.39	x	0.55	x	0.7	=	274.62	(77)
Southeast 0.9x	0.77	X	7.48	x	104.39	x	0.55	x	0.7] =	208.33	(77)
Southeast 0.9x	0.77	X	7.1	x	92.85	x	0.55	x	0.7] =	175.89	(77)
Southeast 0.9x	0.77	X	9.86	x	92.85	x	0.55	х	0.7] =	244.27	(77)
Southeast 0.9x	0.77	X	7.48	×	92.85	x	0.55	x	0.7] =	185.3	(77)
				-		-		•		-		_

Southeast _{0.9x}	0.77	X	7.1		x	69.27	X	0.55	X	0.7	=	131.21	(77)
Southeast _{0.9x}	0.77	X	9.86	3	x	69.27	x	0.55	x	0.7	=	182.22	(77)
Southeast _{0.9x}	0.77	X	7.48	3	x	69.27	x	0.55	x	0.7	=	138.24	(77)
Southeast _{0.9x}	0.77	X	7.1		x	44.07	x	0.55	x	0.7	=	83.48	(77)
Southeast _{0.9x}	0.77	x	9.86	6	x	44.07	x	0.55	x	0.7	=	115.94	(77)
Southeast _{0.9x}	0.77	x	7.48	3	x	44.07	x	0.55	x	0.7	=	87.95	(77)
Southeast 0.9x	0.77	x	7.1		x	31.49	x	0.55	×	0.7	=	59.65	(77)
Southeast _{0.9x}	0.77	×	9.86	3	x	31.49	x	0.55	×	0.7	=	82.83	(77)
Southeast _{0.9x}	0.77	x	7.48	3	x	31.49	x	0.55	x	0.7	=	62.84	(77)
Rooflights 0.9x	1	x	1.14	1	x	26	x	0.55	x	0.8	=	11.74	(82)
Rooflights 0.9x	1	x	1.14	1	x	54	x	0.55	×	0.8	=	24.38	(82)
Rooflights 0.9x	1	x	1.14	1	x	96	x	0.55	×	0.8	=	43.34	(82)
Rooflights _{0.9x}	1	x	1.14	4	x	150	x	0.55	x	0.8	=	67.72	(82)
Rooflights 0.9x	1	×	1.14	1	x	192	x	0.55	×	0.8	=	86.68	(82)
Rooflights 0.9x	1	x	1.14	1	x	200	x	0.55	×	0.8	=	90.29	(82)
Rooflights 0.9x	1	x	1.14	1	x	189	x	0.55	×	0.8	-	85.32	(82)
Rooflights 0.9x	1	×	1.14	1	x	157	x	0.55	×	0.8	=	70.88	(82)
Rooflights 0.9x	1	x	1.14	1	x	115	x	0.55	×	0.8	=	51.92	(82)
Rooflights 0.9x	1	×	1.14	1	x	66	x	0.55	×	0.8	-	29.8	(82)
Rooflights 0.9x	1	x	1.14	4	x	33	x	0.55	×	0.8	<u> </u>	14.9	(82)
Rooflights 0.9x	1	x	1.14	4	x	21	x	0.55	x	0.8	<u> </u>	9.48	(82)
_					•		•						
Solar gains in	watts, calc	culated	for each	month			(83)m	n = Sum(74)m .	(82)m				
(83)m= 256.27	T	619.4	788.29	900	Т	00.46 865.28	781	<u> </u>	492.9	3 308.06	218.56		(83)
Total gains – i	nternal and	d solar	(84)m =	(73)m	+ (8	33)m , watts		•		•	•		
(84)m= 620.77	804.35 9	968.08	1116.02	1206.51	11	86.42 1138.23	1060).49 968.24	804.3	7 643.75	572.53		(84)
7. Mean inter	nal temper	rature (heating	season)								
Temperature						area from Tal	ole 9	, Th1 (°C)				21	(85)
Utilisation fac	ctor for gair	ns for li	ving are	a, h1,m	(S	ee Table 9a)							
Jan	Feb	Mar	Apr	May	Ù	Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.97	0.92	0.8	0.63	(0.45 0.33	0.3	0.58	0.87	0.98	0.99		(86)
Mean interna	l temperati	ure in li	iving are	a T1 (fo	ollo	w steps 3 to 7	in T	able 9c)		•		•	
(87)m= 19.93		20.53	20.82	20.95	_	0.99 21	2	<u> </u>	20.76	20.28	19.87		(87)
Temperature	during her	ating ne	ariode in	rest of	۳.	elling from Ta	hla (Th2 (°C)					
(88)m= 19.93		19.93	19.94	19.94	_	9.95 19.95	19.	· · · ·	19.94	19.94	19.93		(88)
` '	<u> </u>					ļ.	Q-\						. ,
Utilisation fac	0.96	0.9	0.76	0.57	_).38 0.25	9a) 0.2	28 0.5	0.83	0.97	0.99		(89)
` '	<u> </u>				_	Į.				0.31	0.99		(55)
Mean interna		r	r		Ť	<u>`</u>	-			1	,	Ī	(00)
(90)m= 18.53	18.93	19.38	19.75	19.9	<u> </u>	9.95 19.95	19.		19.69		18.45		(90)
								I	LA = LI\	ving area ÷ (4	+) -	0.45	(91)
		15				\ CLA T4	. /4	(I A) TO					

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

(92)m= 19.16	19.51	19.89	20.23	20.37	20.42	20.42	20.42	20.4	20.17	19.59	19.09		(92)
Apply adjustr	nent to t	he mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 19.01	19.36	19.74	20.08	20.22	20.27	20.27	20.27	20.25	20.02	19.44	18.94		(93)
8. Space hea	ting requ	uirement											
Set Ti to the			•		ed at ste	ep 11 of	Table 9	b, so tha	t Ti,m=(76)m an	d re-calc	culate	
the utilisation	i			ble 9a	-	·		1		1	1	I	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fac	·	1										1	
(94)m= 0.98	0.96	0.89	0.76	0.58	0.4	0.27	0.31	0.53	0.83	0.96	0.99		(94)
Useful gains,		<u> </u>	<u> </u>		ı .	T						1	(0.7)
(95)m= 611.23	768.84	863.79	850.35	703.1	475.59	309.77	325.71	510.39	669.32	620.88	566.21		(95)
Monthly aver												Ī	(0.0)
(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					i			<u> </u>				1	
` ′		1146.44	956.93	728.05	478.68	310.12	326.33	521.78	804.83	1059.25	1270.36		(97)
Space heatin	ř							i `		 		1	
(98)m= 496.51	326.08	210.29	76.74	18.57	0	0	0	0	100.82	315.63	523.89		_
							Tota	l per year	(kWh/yeaı	r) = Sum(9	8) _{15,912} =	2068.53	(98)
Space heatin	g require	ement in	kWh/m²	² /year								28.39	(99)
9a. Energy red	nuiremer	nts – Indi	vidual h	eating sy	vstems i	ncludina	micro-C	CHP)					
Space heating					, 0.0			, ,					
Fraction of sp	•	at from se	econdar	y/supple	mentary	system						0	(201)
Fraction of sp					•	-	(202) = 1	- (201) =				1	(202)
Fraction of to			-	• •				02) × [1 –	(203)] =			1	(204)
		•	-				(=0.) (=	o=) [.	(=00)]				╡```
Efficiency of	•		0 ,									90.3	(206)
Efficiency of	seconda 	ry/supple	ementar	y heating	g systen	า, % 						0	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space heatin	g require	ement (c	alculate	d above))					_			
496.51	326.08	210.29	76.74	18.57	0	0	0	0	100.82	315.63	523.89		
(211)m = {[(98)m x (20	(4)] } x 1	00 ÷ (20	06)									(211)
549.85	361.11	232.88	84.98	20.56	0	0	0	0	111.65	349.53	580.17		
	•	•					Tota	ıl (kWh/yea	ar) =Sum(2	211),5,1012	=	2290.73	(211)
Space heatin	g fuel (s	econdar	y), kWh/	month									_
= {[(98)m x (20	• ,		• •										
(215)m= 0	0	0	0	0	0	0	0	0	0	0	0		
							Tota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	=	0	(215)
Water heating	נ												
Output from w		ter (calc	ulated al	bove)									
195.38	170.67	177.57	157.5	152.48	134.3	128.67	143.44	145.02	165.13	176.28	190.79		
Efficiency of w	ater hea	iter			-	-	-	-		_	-	81	(216)
(217)m= 87.46	86.87	85.79	83.83	81.92	81	81	81	81	84.29	86.73	87.61		(217)
Fuel for water	heating.	kWh/ma	onth				I		<u> </u>	<u> </u>	ı	1	
(219)m = (64)	•		m									•	
(219)m= 223.38	196.46	206.98	187.88	186.15	165.8	158.85	177.08	179.04	195.91	203.24	217.76		
							Tota	al = Sum(2	19a) ₁₁₂ =			2298.53	(219)

Annual totals		kWh/year		kWh/year	1
Space heating fuel used, main system 1				2290.73	
Water heating fuel used				2298.53	
Electricity for pumps, fans and electric keep-hot					
mechanical ventilation - balanced, extract or pos	itive input from outside		158.98		(230a)
central heating pump:		[30		(230c)
boiler with a fan-assisted flue			45		(230e)
Total electricity for the above, kWh/year	sum of (2	230a)(230g) =		233.98	(231)
Electricity for lighting				320.96	(232)
12a. CO2 emissions – Individual heating system	s including micro-CHP				
12a. 3 22 Similosions marriada mading dystern	5515.G				
TEA. 002 Official individual floating cycloth	Energy kWh/year	Emission fact kg CO2/kWh	tor	Emissions kg CO2/yea	r
Space heating (main system 1)	Energy		tor =		r](261)
, , , , , , , , , , , , , , , , , , ,	Energy kWh/year	kg CO2/kWh		kg CO2/yea	
Space heating (main system 1)	Energy kWh/year	kg CO2/kWh	=	kg CO2/yea	(261)
Space heating (main system 1) Space heating (secondary)	Energy kWh/year (211) x (215) x	0.216 0.519 0.216	=	kg CO2/yea	(261)
Space heating (main system 1) Space heating (secondary) Water heating	Energy kWh/year (211) x (215) x (219) x	0.216 0.519 0.216	=	kg CO2/yea 494.8 0 496.48	(261) (263) (264)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energy kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264)	kg CO2/kWh 0.216 0.519 0.216	= = =	kg CO2/yea 494.8 0 496.48 991.28	(261) (263) (264) (265)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	Energy kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) (231) x (232) x	kg CO2/kWh 0.216 0.519 0.216 0.519	= = = =	kg CO2/yea 494.8 0 496.48 991.28 121.43	(261) (263) (264) (265) (267)

El rating (section 14)

(274)

User Details:	
Assessor Name: Chris Hocknell Stroma Number: STR00	16363
	: 1.0.4.16
Property Address: Apartment 4	
Address:	
1. Overall dwelling dimensions: Area(m²) Av. Height(m)	Volume(m³)
Ground floor 61.4 (1a) x 2.7 (2a) =	165.78 (3a)
Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 61.4 (4)	
Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = $	165.78 (5)
2. Ventilation rate:	
main secondary other total heating heating	m³ per hour
Number of chimneys $0 + 0 = 0 \times 40 =$	0 (6a)
Number of open flues $0 + 0 + 0 = 0 \times 20 =$	0 (6b)
Number of intermittent fans 0 × 10 =	0 (7a)
Number of passive vents 0 × 10 =	0 (7b)
Number of flueless gas fires 0 × 40 =	0 (7c)
	nges per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$ If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16)	0 (8)
Number of storeys in the dwelling (ns)	0 (9)
Additional infiltration [(9)-1]x0.1 =	0 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction if both types of wall are present, use the value corresponding to the greater wall area (after	0 (11)
deducting areas of openings); if equal user 0.35	
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0	0 (12)
If no draught lobby, enter 0.05, else enter 0 Percentage of windows and doors draught stripped	0 (13)
Window infiltration 0.25 - [0.2 x (14) ÷ 100] =	0 (14)
Infiltration rate (8) + (10) + (11) + (12) + (13) + (15) =	0 (16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area	3 (17)
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$	0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used Number of sides sheltered	2 (19)
Shelter factor (20) = 1 - [0.075 x (19)] =	2 (19) 0.85 (20)
Infiltration rate incorporating shelter factor (21) = (18) x (20) =	0.13 (21)
Infiltration rate modified for monthly wind speed	
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	
Monthly average wind speed from Table 7	
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7	
Wind Factor $(22a)m = (22)m \div 4$	

Adjusted infilt	ration rat	e (allowi	ng for sh	nelter an	nd wind s	speed) =	: (21a) x	(22a)m					
0.16	0.16	0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15]	
Calculate effe		_	rate for t	he appli	cable ca	se			!	l			_
If mechanic				al.) (aa				. (00)	\ (00 \)			0.5	(23a
If exhaust air h		0		, ,	,	. `	,, .	•) = (23a)			0.5	(23b
If balanced wit		-	-	_								75.65	(230
a) If balance	1					- ` ` 	- ^ ` -	í `	- 		- ` `) ÷ 100]	
(24a)m= 0.28	0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27		(24a
b) If balance	1	anical ve	entilation		1	covery (I	MV) (24k	o)m = (22	2b)m + (23b)		1	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24h
c) If whole h if (22b)ı	nouse ex m < 0.5 >			•	•				.5 × (23b))			
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(240
d) If natural if (22b)	ventilation			•	•				0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(240
Effective air	change	rate - er	nter (24a) or (24b	b) or (24	c) or (24	ld) in bo	x (25)	-	-	-	-	
(25)m= 0.28	0.28	0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27]	(25)
3. Heat losse	e and he	nat loce i	aramote	or:	•							-	
ELEMENT	Gros area	SS	Openin m	gs	Net Ar A ,r		U-val W/m2		A X U (W/l	K)	k-value		X k
Doors	urcu	())		•	2	 x	1.3		2.6		NO/III	it ito	(26)
Windows Type	e 1				3.7		/[1/(1.3)+		4.57	=			(27)
Windows Typ					0.91	= .	/[1/(1.3)+			=			(27)
Windows Typ						=	/[1/(1.3)+		1.12	᠆			, ,
• •					6.29	=			7.77	=			(27)
Windows Typ					8.37	=	/[1/(1.3)+		10.34	=			(27)
Windows Typ					6.29	x¹	/[1/(1.3)+	0.04] =	7.77	ᆿ ,			(27) —
Walls Type1	51.4	13	29.20	6	22.17	7 X	0.15	= !	3.33	_		_	(29)
Walls Type2	35.9	95	2		33.9	5 X	0.13	=	4.53				(29)
Roof	61.	4	0		61.4	X	0.1	=	6.14				(30)
Total area of	elements	, m²			148.7	8							(31)
Party wall					17.92	<u>x</u>	0	=	0				(32)
Party floor					61.4					ſ			(32
* for windows and ** include the are						lated using	g formula 1	1/[(1/U-valı	ıe)+0.04] a	as given in	paragrapl	1 3.2	_
Fabric heat lo	ss, W/K	= S (A x	U)				(26)(30) + (32) =				52.76	(33)
Heat capacity	Cm = S	(A x k)						((28).	(30) + (32	2) + (32a).	(32e) =	14029.8	(34)
Thermal mass	s parame	ter (TMF	P = Cm ÷	- TFA) ir	n kJ/m²K			Indica	itive Value	: Medium		250	(35)
For design asses can be used inste				construct	tion are no	t known p	recisely the	e indicative	e values of	TMP in T	able 1f		
Thermal bridg	es : S (L	x Y) cal	culated i	ısina Ar	pendix	K						15.8	(36)
	(=	,, , , , , , , , , , , , , , , , , , ,	oalatoa t	g								13.0	(00,

													_
Total fabric hea								` '	(36) =			68.55	(37)
Ventilation hea	t loss ca		l monthl	у		ı	1	. ,	= 0.33 × (25)m x (5)			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(00)
(38)m= 15.55	15.38	15.21	14.33	14.16	13.29	13.29	13.11	13.64	14.16	14.51	14.86		(38)
Heat transfer co	oefficier	nt, W/K	•			•		(39)m	= (37) + (38)m			
(39)m= 84.11	83.93	83.76	82.89	82.71	81.84	81.84	81.67	82.19	82.71	83.06	83.41		¬
Heat loss parar	meter (H	HP) W/	m²K						= (39)m ÷	Sum(39) _{1.}	12 /12=	82.84	(39)
(40)m= 1.37	1.37	1.36	1.35	1.35	1.33	1.33	1.33	1.34	1.35	1.35	1.36		
` /						<u> </u>			L Average =	Sum(40) _{1.}	12 /12=	1.35	(40)
Number of day	s in mor	nth (Tab	le 1a)							, ,			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
4. Water heati	ing ener	gy requi	irement:								kWh/ye	ear:	
Assumed occur	nancy I	NI.									00		(42)
if TFA > 13.9			[1 - exp	(-0.0003	349 x (TF	A -13.9)2)] + 0.0	0013 x (TFA -13		02		(42)
if TFA £ 13.9	•						, , -						
Annual average Reduce the annual									se taraet o		2.2		(43)
not more that 125							io acriicve	a water ut	sc larger o	ı			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in													
(44)m= 90.42	87.13	83.84	80.55	77.27	73.98	73.98	77.27	80.55	83.84	87.13	90.42		
									Total = Su	m(44) ₁₁₂ =		986.36	(44)
Energy content of I	hot water	used - cal	culated m	onthly = 4.	190 x Vd,r	n x nm x C	OTm / 3600	kWh/mor	nth (see Ta	ables 1b, 1	c, 1d)		
(45)m= 134.09	117.27	121.01	105.5	101.23	87.36	80.95	92.89	94	109.55	119.58	129.85		_
If instantaneous wa	atar haatii	na at noint	of use (n	n hot water	etoraga)	enter () in	hoves (16		Total = Su	m(45) ₁₁₂ =		1293.28	(45)
									10.40	47.04	40.40		(46)
(46)m= 20.11 Water storage	17.59 loss:	18.15	15.83	15.18	13.1	12.14	13.93	14.1	16.43	17.94	19.48		(46)
Storage volume		includin	ng any s	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community he	• •		•			•					_		` ,
Otherwise if no	•			_			` '	ers) ente	er '0' in (47)			
Water storage													
a) If manufactu				or is kno	wn (kWł	n/day):					0		(48)
Temperature fa	actor fro	m Table	2b								0		(49)
Energy lost from		_	-				(48) x (49)	=			0		(50)
b) If manufactu Hot water stora			-								2		(51)
If community he	-			IC 2 (KVV)	iiiiiii Ciac	· y /					0		(51)
Volume factor f	_										0		(52)
Temperature fa	actor fro	m Table	2b								0		(53)
Energy lost from	m water	storage	, kWh/y	ear			(47) x (51)	x (52) x (53) =		0		(54)
Enter (50) or (54) in (5	55)									0		(55)

	storage	loss cal	culated f	or each	month			((56)m = (55) × (41)ı	m				
(56)m=	0	0	0	0	0	0	0	0	0	0	0	0		(56)
If cylind	er contains	dedicated	d solar sto	rage, (57)ı	n = (56)m	x [(50) – (H11)] ÷ (50	3), else (57	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)
Prima	ry circuit	loss (an	nual) fro	m Table	3							0		(58)
Prima	ry circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	5 × (41)	m					
(mo	dified by	factor fr	om Tab	le H5 if t	here is s	olar 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)
Comb	i loss cal	culated	for each	month (61)m =	(60) ÷ 36	35 × (41))m						
(61)m=	46.08	40.1	42.72	39.72	39.37	36.48	37.7	39.37	39.72	42.72	42.97	46.08		(61)
Total h	heat requ	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=	180.16	157.38	163.74	145.23	140.61	123.84	118.65	132.26	133.72	152.27	162.55	175.93	1	(62)
Solar D	HW input o	alculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0'	' if no sola	r contribut	on to wate	er heating)	ı	
(add a	additional	l lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (3)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Outpu	t from wa	ater hea	ter										•	
(64)m=	180.16	157.38	163.74	145.23	140.61	123.84	118.65	132.26	133.72	152.27	162.55	175.93		
								Outp	out from wa	ater heate	r (annual)₁	12	1786.33	(64)
Heat ç	gains fror	n water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	κ [(46)m	+ (57)m	+ (59)m]	_
(65)m=	56.1	49.02	50.92	45.01	43.5	38.17	36.34	40.73	41.19	47.11	50.5	54.7	<u> </u>	(65)
inclu	ude (57)r	m in calc	culation of	of (65)m	only if c	ylinder i	s in the ເ	dwelling	or hot w	ater is fr	om com	munity h	neating	
	ternal ga				-	-						•		
	olic gain	·												
MCtab	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m=		101.05	101.05	101.05	101.05	101.05	101.05			-				
Liahtir	na aains	(calculat	ted in Ar	nendiy			101.05	101.05	101.05	101.05	101.05	101.05		(66)
(67)m=		13.97			L. eguati	on L9 or				101.05	101.05	101.05		(66)
Annlia			11.36	8.6	_, equat 6.43	ion L9 oi 5.43	r L9a), a			101.05	101.05	101.05	 	(66) (67)
	nces gai			8.6	6.43	5.43	r L9a), a 5.87	lso see	Table 5	13		l		` '
	nces gai	ns (calc	ulated in	8.6 Append	6.43 lix L, eq	5.43 uation L	r L9a), a 5.87 13 or L1	lso see ⁷ .63 3a), also	Table 5 10.23 see Ta	13 ble 5	15.17	16.17] 	` '
(68)m=	176.46	ns (calc 178.29	ulated in	8.6 Append 163.86	6.43 dix L, eq 151.46	5.43 uation L ²	5.87 13 or L1:	7.63 3a), also	Table 5 10.23 see Ta 134.8	13 ble 5		l]	(67)
(68)m= Cookir	176.46 ng gains	ns (calc 178.29	ulated in	8.6 Append 163.86	6.43 dix L, eq 151.46	5.43 uation L ²	5.87 13 or L1:	7.63 3a), also	Table 5 10.23 see Ta 134.8	13 ble 5	15.17	16.17		(67)
(68)m= Cookir (69)m=	176.46 ng gains 33.1	ns (calc 178.29 (calcula 33.1	ulated in 173.68 ted in A 33.1	8.6 Append 163.86 opendix 33.1	6.43 lix L, equator 151.46 L, equator 151.46	5.43 uation L ² 139.8 tion L15	r L9a), a 5.87 13 or L1: 132.02 or L15a)	so see	Table 5 10.23 see Ta 134.8 ee Table	13 ble 5 144.62	15.17 157.02	16.17] 	(67) (68)
(68)m= Cookir (69)m= Pumps	176.46 ng gains 33.1 s and far	ns (calcula 178.29 (calcula 33.1	ulated in 173.68 ted in A 33.1 (Table 5	8.6 Append 163.86 opendix 33.1	6.43 dix L, equ 151.46 L, equat 33.1	5.43 uation L ² 139.8 ion L15 33.1	r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1	7.63 3a), also 130.18), also se 33.1	Table 5 10.23 see Ta 134.8 ee Table 33.1	13 ble 5 144.62 5 33.1	15.17 157.02 33.1	16.17 168.68 33.1] 	(67) (68) (69)
(68)m= Cookir (69)m= Pumps (70)m=	176.46 ng gains 33.1 s and far	ns (calc 178.29 (calcula 33.1 ns gains	ulated in 173.68 ted in A 33.1 (Table 5	8.6 Append 163.86 opendix 33.1 5a)	6.43 dix L, equat 151.46 L, equat 33.1	5.43 uation L ² 139.8 tion L15 33.1	r L9a), a 5.87 13 or L1: 132.02 or L15a)	so see	Table 5 10.23 see Ta 134.8 ee Table	13 ble 5 144.62	15.17 157.02	16.17] 	(67) (68)
(68)m= Cookir (69)m= Pumps (70)m= Losses	176.46 ng gains 33.1 s and far 3 s e.g. ev	ins (calcula 178.29 (calcula 33.1 ns gains 3 aporatio	ulated in 173.68 ted in A 33.1 (Table 5 3 n (negat	8.6 Appendix 163.86 Dependix 33.1 Sa) 3	6.43 dix L, equal 151.46 L, equal 33.1	5.43 uation L ² 139.8 tion L15 33.1 3 le 5)	r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1	130.18 130.18 33.1	Table 5 10.23 see Ta 134.8 ee Table 33.1	13 ble 5 144.62 5 33.1	15.17 157.02 33.1	16.17 168.68 33.1] 	(67) (68) (69) (70)
(68)m= Cookir (69)m= Pumps (70)m= Losses (71)m=	176.46 ng gains 33.1 s and far 3 s e.g. ev -80.84	ns (calc 178.29 (calcula 33.1 ns gains 3 aporatio -80.84	ulated in 173.68 ted in A 33.1 (Table 5 3 n (negate	8.6 Append 163.86 opendix 33.1 5a)	6.43 dix L, equat 151.46 L, equat 33.1	5.43 uation L ² 139.8 tion L15 33.1	r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1	7.63 3a), also 130.18), also se 33.1	Table 5 10.23 see Ta 134.8 ee Table 33.1	13 ble 5 144.62 5 33.1	15.17 157.02 33.1	16.17 168.68 33.1	 	(67) (68) (69)
(68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water	176.46 ng gains 33.1 s and far 3 s e.g. ev -80.84 heating	ns (calc 178.29 (calcula 33.1 ns gains 3 aporatio -80.84 gains (T	ulated in 173.68 ted in A 33.1 (Table 5 3 n (negative -80.84 fable 5)	8.6 Append 163.86 Appendix 33.1 5a) 3 tive valu -80.84	6.43 dix L, equat 151.46 L, equat 33.1 3 es) (Tab	5.43 uation L ² 139.8 tion L15 33.1 3 le 5) -80.84	r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1	130.18 3a), also 130.18), also se 33.1 3	Table 5 10.23 see Ta 134.8 ee Table 33.1 3	13 ble 5 144.62 5 33.1 3	15.17 157.02 33.1 3	16.17 168.68 33.1 3]] 	(67) (68) (69) (70) (71)
(68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	176.46 ng gains 33.1 s and far 3 s e.g. ev -80.84 heating 75.41	ins (calcula 178.29) (calcula 33.1) ins gains 3 aporatio -80.84 gains (T	ulated in 173.68 ted in A 33.1 (Table 5 3 n (negarable 5) 68.44	8.6 Appendix 163.86 Dependix 33.1 Sa) 3	6.43 dix L, equal 151.46 L, equal 33.1	5.43 uation L 139.8 tion L15 33.1 3 le 5) -80.84	r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1 3	130.18 3a), also 130.18), also se 33.1 3	Table 5 10.23 see Ta 134.8 ee Table 33.1 3 -80.84	13 ble 5 144.62 5 33.1 3 -80.84	15.17 157.02 33.1 3 -80.84	16.17 168.68 33.1 3 -80.84		(67) (68) (69) (70)
(68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	176.46 ng gains 33.1 s and far 3 s e.g. ev -80.84 heating 75.41 internal	ins (calcula 178.29) (calcula 33.1) ins gains 3 aporatio -80.84 gains (T	ulated in 173.68 ted in A 33.1 (Table 5 3 n (negarable 5) 68.44	8.6 Append 163.86 Appendix 33.1 5a) 3 tive valu -80.84	6.43 dix L, equat 151.46 L, equat 33.1 3 es) (Tab	5.43 uation L 139.8 tion L15 33.1 3 le 5) -80.84	r L9a), a 5.87 13 or L1: 132.02 or L15a) 33.1	130.18 3a), also 130.18), also se 33.1 3	Table 5 10.23 see Ta 134.8 ee Table 33.1 3 -80.84	13 ble 5 144.62 5 33.1 3 -80.84	15.17 157.02 33.1 3 -80.84	16.17 168.68 33.1 3 -80.84		(67) (68) (69) (70) (71)

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

	Access Factor Fable 6d	•	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southwest _{0.9x}	0.77	X	8.37	x	36.79		0.55	x	0.7	=	82.17	(79)
Southwest _{0.9x}	0.77	X	6.29	x	36.79		0.55	x	0.7	=	61.75	(79)
Southwest _{0.9x}	0.77	X	8.37	х	62.67		0.55	x	0.7	=	139.96	(79)
Southwest _{0.9x}	0.77	X	6.29	x	62.67		0.55	x	0.7] =	105.18	(79)
Southwest _{0.9x}	0.77	X	8.37	x	85.75		0.55	x	0.7	=	191.5	(79)
Southwest _{0.9x}	0.77	X	6.29	x	85.75		0.55	x	0.7	=	143.91	(79)
Southwest _{0.9x}	0.77	X	8.37	X	106.25		0.55	x	0.7	=	237.28	(79)
Southwest _{0.9x}	0.77	X	6.29	x	106.25		0.55	x	0.7	=	178.31	(79)
Southwest _{0.9x}	0.77	X	8.37	x	119.01		0.55	x	0.7	=	265.77	(79)
Southwest _{0.9x}	0.77	X	6.29	x	119.01		0.55	x	0.7	=	199.72	(79)
Southwest _{0.9x}	0.77	X	8.37	x	118.15		0.55	x	0.7	=	263.85	(79)
Southwest _{0.9x}	0.77	X	6.29	x	118.15		0.55	x	0.7	=	198.28	(79)
Southwest _{0.9x}	0.77	X	8.37	x	113.91		0.55	x	0.7	=	254.38	(79)
Southwest _{0.9x}	0.77	X	6.29	x	113.91		0.55	x	0.7	=	191.16	(79)
Southwest _{0.9x}	0.77	X	8.37	x	104.39		0.55	x	0.7	=	233.12	(79)
Southwest _{0.9x}	0.77	X	6.29	x	104.39		0.55	x	0.7	=	175.19	(79)
Southwest _{0.9x}	0.77	X	8.37	x	92.85		0.55	x	0.7	=	207.35	(79)
Southwest _{0.9x}	0.77	X	6.29	x	92.85		0.55	x	0.7	=	155.82	(79)
Southwest _{0.9x}	0.77	X	8.37	x	69.27		0.55	x	0.7	=	154.69	(79)
Southwest _{0.9x}	0.77	X	6.29	x	69.27		0.55	x	0.7	=	116.25	(79)
Southwest _{0.9x}	0.77	X	8.37	x	44.07		0.55	x	0.7	=	98.42	(79)
Southwest _{0.9x}	0.77	X	6.29	X	44.07		0.55	x	0.7	=	73.96	(79)
Southwest _{0.9x}	0.77	X	8.37	X	31.49		0.55	X	0.7	=	70.32	(79)
Southwest _{0.9x}	0.77	X	6.29	X	31.49		0.55	X	0.7	=	52.84	(79)
Northwest _{0.9x}	0.77	X	3.7	X	11.28	X	0.55	X	0.7	=	22.28	(81)
Northwest _{0.9x}	0.77	X	0.91	x	11.28	X	0.55	X	0.7	=	2.74	(81)
Northwest _{0.9x}	0.77	X	6.29	x	11.28	X	0.55	X	0.7	=	18.94	(81)
Northwest 0.9x	0.77	X	3.7	X	22.97	X	0.55	X	0.7	=	45.34	(81)
Northwest 0.9x	0.77	X	0.91	X	22.97	x	0.55	X	0.7	=	5.58	(81)
Northwest 0.9x	0.77	X	6.29	X	22.97	X	0.55	X	0.7	=	38.54	(81)
Northwest 0.9x	0.77	X	3.7	X	41.38	X	0.55	X	0.7	=	81.7	(81)
Northwest 0.9x	0.77	X	0.91	x	41.38	X	0.55	X	0.7	=	10.05	(81)
Northwest _{0.9x}	0.77	X	6.29	X	41.38	X	0.55	X	0.7	=	69.44	(81)
Northwest _{0.9x}	0.77	X	3.7	X	67.96	X	0.55	X	0.7	=	134.17	(81)
Northwest _{0.9x}	0.77	X	0.91	x	67.96	x	0.55	x	0.7	=	16.5	(81)
Northwest 0.9x	0.77	X	6.29	x	67.96	x	0.55	x	0.7	=	114.04	(81)
Northwest 0.9x	0.77	X	3.7	x	91.35	x	0.55	x	0.7	=	180.35	(81)
Northwest 0.9x	0.77	X	0.91	x	91.35	x	0.55	x	0.7	=	22.18	(81)
Northwest _{0.9x}	0.77	X	6.29	X	91.35	x	0.55	X	0.7	=	153.3	(81)

Northwe	est _{0.9x}	0.77	X	3.	7	X	9	7.38	X		0.55	X	0.7		- [192.27	(81)
Northwe	est _{0.9x}	0.77	x	0.9	91	X	9	7.38	x		0.55	x	0.7		= [23.64	(81)
Northwe	est _{0.9x}	0.77	x	6.2	29	X	9	7.38	x		0.55	x	0.7		= [163.43	(81)
Northwe	est _{0.9x}	0.77	x	3.	7	X	,	91.1	x		0.55	x	0.7		= [179.87	(81)
Northwe	est _{0.9x}	0.77	x	0.9	91	X	,	91.1	x		0.55	x	0.7		= [22.12	(81)
Northwe	est _{0.9x}	0.77	x	6.2	29	X	,	91.1	x		0.55	x	0.7		= [152.89	(81)
Northwe	est 0.9x	0.77	X	3.	7	X	7	2.63	x		0.55	X	0.7		- [143.39	(81)
Northwe	est _{0.9x}	0.77	X	0.9	91	X	7	2.63	x		0.55	x	0.7		= [17.63	(81)
Northwe	est _{0.9x}	0.77	x	6.2	29	X	7	2.63	x		0.55	X	0.7		= [121.88	(81)
Northwe	est 0.9x	0.77	X	3.	7	X	5	50.42	x		0.55	x	0.7		= [99.55	(81)
Northwe	est _{0.9x}	0.77	x	0.9	91	X	5	50.42	x		0.55	x	0.7		= [12.24	(81)
Northwe	est _{0.9x}	0.77	X	6.2	29	X	5	50.42	x		0.55	x	0.7		= [84.62	(81)
Northwe	est _{0.9x}	0.77	X	3.	7	X	2	28.07	x		0.55	X	0.7		= [55.41	(81)
Northwe	est _{0.9x}	0.77	X	0.9	91	X	2	28.07	X		0.55	X	0.7		= [6.81	(81)
Northwe	est _{0.9x}	0.77	X	6.2	29	X	2	28.07	x		0.55	X	0.7		= [47.1	(81)
Northwe	est _{0.9x}	0.77	X	3.	7	X		14.2	x		0.55	x	0.7		= [28.03	(81)
Northwe	est _{0.9x}	0.77	X	0.9	91	X		14.2	X		0.55	X	0.7		= [3.45	(81)
Northwe	est _{0.9x}	0.77	X	6.2	29	X		14.2	X		0.55	X	0.7		= [23.83	(81)
Northwe	est _{0.9x}	0.77	X	3.	7	X	,	9.21	X		0.55	X	0.7		= [18.19	(81)
Northwe	est _{0.9x}	0.77	X	0.9	91	X	,	9.21	X		0.55	X	0.7		= [2.24	(81)
Northwe	est _{0.9x}	0.77	X	6.2	29	X	,	9.21	X		0.55	X	0.7		= [15.46	(81)
Ť	I	watts, calc			ı	\neg		r	<u> </u>		m(74)m	(82)m			_		
(83)m=	187.86		496.59	680.3	821.32		41.47	800.41	691	.22	559.58	380.26	227.68	159.0)5		(83)
Ī		nternal and	-	` '	·	_					-			i	_		
(84)m=	511.78	656.13	306.39	971.59	1093.99	9 10	096.03	1043.45	940	.08	818.13	657.5	526.32	473.7	′3		(84)
7. Mea	an inter	nal tempe	rature ((heating	seaso	n)											
Tempe	erature	during hea	ating pe	eriods ir	n the liv	ing	area	from Tab	ole 9,	, Th1	(°C)					21	(85)
Utilisa	tion fac	tor for gai	ns for li	iving are	ea, h1,r	n (s	ee Ta	ble 9a)						1			
ļ	Jan	Feb	Mar	Apr	May	<u> </u>	Jun	Jul	A	ug	Sep	Oct	Nov	De	С		
(86)m=	0.99	0.98	0.94	0.83	0.65		0.47	0.34	0.4	4	0.65	0.91	0.98	0.99)		(86)
Mean	internal	temperat	ure in I	iving are	ea T1 (follo	w ste	ps 3 to 7	' in T	able	9c)						
(87)m=	19.68	19.96	20.33	20.71	20.92	2	20.98	21	20.	99	20.94	20.61	20.06	19.63	3		(87)
Temp	erature	during hea	ating pe	eriods ir	n rest o	f dw	elling/	from Ta	ble 9	9, Th	2 (°C)						
(88)m=	19.79	19.79	19.79	19.8	19.8	1	19.82	19.82	19.	82	19.81	19.8	19.8	19.8	3		(88)
Utilisa	tion fac	tor for gai	ns for r	est of d	welling	. h2	.m (se	ee Table	9a)	•	•		•				
(89)m=	0.99	0.97	0.92	0.79	0.58	\neg	0.39	0.25	0.3	3	0.55	0.87	0.98	0.99			(89)
Mean	internal	temperat	ure in t	he rest	of dwe	lling	T2 (f	ollow ste	ne a	to 7	in Tahle	9c)					
(90)m=	18.07		18.99	19.5	19.74	Ť	12 (1)	19.81	19.		19.77	19.4	18.63	18	\neg		(90)
(-0)					ı '	- 1 '		ı	ı				1 .5.55	ı	- 1		` '
	•	•				•					fL	A = Liv	ing area ÷ (4	4) =	╗	0.5	(91)

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

(92)m= 18.87	19.21	19.65	20.1	20.32	20.39	20.4	20.4	20.35	20	19.34	18.81		(92)
Apply adjustm	ent to th	ne mean	internal	temper	ature fro	m Table	4e, whe	ere appro	priate				
(93)m= 18.72	19.06	19.5	19.95	20.17	20.24	20.25	20.25	20.2	19.85	19.19	18.66		(93)
8. Space heat	ing requ	iirement											
Set Ti to the n					ned at ste	ep 11 of	Table 9l	b, so tha	t Ti,m=(76)m an	d re-calc	ulate	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation fact	or for ga	ains, hm	:					•					
(94)m= 0.99	0.97	0.91	0.79	0.61	0.42	0.29	0.33	0.58	0.87	0.97	0.99		(94)
Useful gains,	hmGm ,	W = (94)	1)m x (84	4)m									
(95)m= 504.96	633.5	736.74	768.49	662.54	456.2	298.17	313.05	478.17	573.42	511.5	469.03		(95)
Monthly avera	ige 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 mea	an intern	al tempe	erature,	Lm , W =	=[(39)m	x [(93)m	– (96)m]				
(97)m= 1213.09	1188.4	1089.18	915.9	700.88	461.84	298.96	314.61	501.74	765.11	1004.41	1206.31		(97)
Space heating	require		r each m	nonth, k\	Wh/mont	th = 0.02	4 x [(97)m – (95)m] x (4	1)m	•		
(98)m= 526.85	372.89	262.22	106.14	28.52	0	0	0	0	142.62	354.89	548.54		_
							Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2342.67	(98)
Space heating	g require	ement in	kWh/m²	/year								38.15	(99)
9a. Energy req	uiremen	ts – Indi	vidual h	eating s	vstems i	ncludina	micro-C	CHP)					
Space heatin					,			,					
Fraction of spa	_	t from se	econdary	y/supple	mentary	system						0	(201)
Fraction of spa	ace hea												
	ace nea	t from m	ain syst	em(s)			(202) = 1	- (201) =				1	(202)
Fraction of tot			•	• ,				- (201) = 02) × [1 - ((203)] =				╡`
Fraction of tot	al heatir	ng from r	main sys	stem 1				, ,	(203)] =			1	(204)
Efficiency of n	al heatir nain spa	ng from r ice heati	main sys	stem 1 em 1	a system			, ,	(203)] =			90.3	(204)
Efficiency of n	al heatir nain spa econdai	ng from r ice heati ry/supple	main sys	stem 1 em 1 y heating		1, %	(204) = (2	02) × [1 –			_	90.3	(204) (206) (208)
Efficiency of n Efficiency of s Jan	al heatir nain spa econda Feb	ng from r ace heati ry/supple Mar	main sys ing syste ementary Apr	stem 1 em 1 y heating May	Jun			, ,	(203)] =	Nov	Dec	90.3	(204) (206) (208)
Efficiency of n Efficiency of s Jan Space heating	al heatir nain spa econdar Feb g require	ng from r ice heati ry/supple Mar ement (c	main systementary Apr alculated	etem 1 em 1 y heating May d above	Jun	ı, % Jul	(204) = (2 Aug	02) × [1 –	Oct			90.3	(204) (206) (208)
Efficiency of n Efficiency of s Jan Space heating 526.85	al heatir nain spa econdar Feb g require 372.89	ng from race heating/supplement (co. 262.22	main systementary Apr Alculated	em 1 em 1 y heating May d above 28.52	Jun	1, %	(204) = (2	02) × [1 –		Nov 354.89	Dec 548.54	90.3	(204) (206) (208) ar
Efficiency of n Efficiency of s Jan Space heating 526.85 (211)m = {[(98)]	al heatir nain spa econdar Feb g require 372.89 m x (20	ng from rice heating/supplement (co. 262.22	main systementary Apr alculated 106.14 00 ÷ (20	stem 1 em 1 y heating May d above 28.52	Jun) 0	n, % Jul 0	(204) = (2 Aug	02) × [1 -	Oct 142.62	354.89	548.54	90.3	(204) (206) (208)
Efficiency of n Efficiency of s Jan Space heating 526.85	al heatir nain spa econdar Feb g require 372.89	ng from race heating/supplement (co. 262.22	main systementary Apr Alculated	em 1 em 1 y heating May d above 28.52	Jun	ı, % Jul	(204) = (2 Aug 0	02) × [1 -	Oct 142.62 157.94	354.89 393.02	548.54 607.46	1 90.3 0 kWh/ye	(204) (206) (208) ar (211)
Efficiency of n Efficiency of s Jan Space heating 526.85 (211)m = {[(98)] 583.44	al heatin nain spa econdal Feb g require 372.89 m x (20 412.95	mg from race heating/supplement (conten	main systementary Apr alculated 106.14 00 ÷ (20 117.54	stem 1 em 1 y heating May d above 28.52 6) 31.59	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 -	Oct 142.62 157.94	354.89 393.02	548.54 607.46	90.3	(204) (206) (208) ar
Efficiency of m Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating	al heatin nain spa econdar Feb grequire 372.89 m x (20 412.95	mg from race heating/supplement (caree) 3 x 1 290.38	main systementary Apr alculated 106.14 00 ÷ (20 117.54	stem 1 em 1 y heating May d above 28.52 6) 31.59	Jun) 0	n, % Jul 0	(204) = (2 Aug 0	02) × [1 -	Oct 142.62 157.94	354.89 393.02	548.54 607.46	1 90.3 0 kWh/ye	(204) (206) (208) ar
Efficiency of n Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44} Space heating = {[(98)m x (20)	al heatin nain spa econdal Feb g require 372.89 m x (20 412.95	mg from race heating/supplement (compared 262.22 4)] } x 1 290.38 econdary 00 ÷ (200	main systementary Apr alculated 106.14 00 ÷ (20 117.54	stem 1 em 1 y heating May d above 28.52 6) 31.59 month	Jun) 0	o 0	(204) = (2 Aug 0 Tota	02) × [1 – 1	Oct 142.62 157.94 ar) =Sum(2	354.89 393.02 211) _{15,1012}	548.54 607.46	1 90.3 0 kWh/ye	(204) (206) (208) ar
Efficiency of m Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating	al heatin nain spa econdar Feb grequire 372.89 m x (20 412.95	mg from race heating/supplement (caree) 3 x 1 290.38	main systementary Apr alculated 106.14 00 ÷ (20 117.54	stem 1 em 1 y heating May d above 28.52 6) 31.59	Jun) 0	n, % Jul 0	(204) = (2 Aug 0 Tota	02) × [1 -	Oct 142.62 157.94 ar) = Sum(2)	354.89 393.02 211) _{15,1012}	548.54 607.46 =	1 90.3 0 kWh/ye	(204) (206) (208) (208) ar (211)
Efficiency of m Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m= 0	reduire 372.89 m x (20412.95 display 1)] } x 10	mg from race heating/supplement (compared 262.22 4)] } x 1 290.38 econdary 00 ÷ (200	main systementary Apr alculated 106.14 00 ÷ (20 117.54	stem 1 em 1 y heating May d above 28.52 6) 31.59 month	Jun) 0	o 0	(204) = (2 Aug 0 Tota	02) × [1 – 1	Oct 142.62 157.94 ar) = Sum(2)	354.89 393.02 211) _{15,1012}	548.54 607.46 =	1 90.3 0 kWh/ye	(204) (206) (208) ar
Efficiency of m Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m=0 Water heating	al heatin nain spa econdar Feb grequire 372.89 m x (20 412.95	mg from race heating/supplement (caree) 3 x 1 290.38 econdary 00 ÷ (200.00 from 100.00 fro	main systementary Apr alculated 106.14 00 ÷ (20 117.54 y), kWh/8	stem 1 em 1 y heating May d above; 28.52 66) 31.59 month	Jun) 0	o 0	(204) = (2 Aug 0 Tota	02) × [1 -	Oct 142.62 157.94 ar) = Sum(2)	354.89 393.02 211) _{15,1012}	548.54 607.46 =	1 90.3 0 kWh/ye	(204) (206) (208) (208) ar (211)
Efficiency of n Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m=0 Water heating Output from wa	al heatin sparecondar Feb grequire 372.89 m x (20412.95 green fuel (settle fuel fuel fuel fuel fuel fuel fuel fu	mg from race heating/supplement (content decordary) 290.38 econdary 00 ÷ (200 decordary) 0 ter (calculated)	main systementary Apr alculated 106.14 00 ÷ (20 117.54 y), kWh/ 8) 0	stem 1 em 1 y heating May d above 28.52 6) 31.59 month 0	Jun) 0 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – 1	Oct 142.62 157.94 ir) =Sum(2	354.89 393.02 211) _{15,1012} 0 215) _{15,1012}	548.54 607.46 = 0	1 90.3 0 kWh/ye	(204) (206) (208) (208) ar (211)
Efficiency of m Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m=0 Water heating Output from wa 180.16	reduire 372.89 m x (20412.95 duel (set 1)] } x 10 duel ter heat 157.38	mg from race heating/supplement (concentrated and concentrated n systementary Apr alculated 106.14 00 ÷ (20 117.54 y), kWh/8	stem 1 em 1 y heating May d above; 28.52 66) 31.59 month	Jun) 0	o 0	(204) = (2 Aug 0 Tota	02) × [1 -	Oct 142.62 157.94 ar) = Sum(2)	354.89 393.02 211) _{15,1012}	548.54 607.46 =	1 90.3 0 kWh/ye	(204) (206) (208) ar (211) (211)	
Efficiency of m Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m= 0 Water heating Output from water heating Efficiency of water heating	al heatin sparecondar Feb grequire 372.89 m x (20412.95 green fuel (settle 1)] } x 1 0 green fuel (settle 1) atter heat 157.38 green heat 157.38	Mar mement (calculater (calcul	main systementary Apr alculated 106.14 00 ÷ (20 117.54 y), kWh// 8) 0	stem 1 em 1 y heating May d above 28.52 6) 31.59 month 0	Jun) 0 0	o 0 118.65	(204) = (2 Aug 0 Tota 132.26	02) × [1 – 1	Oct 142.62 157.94 ar) =Sum(2 0 ar) =Sum(2	354.89 393.02 211) _{15,1012} 0 215) _{15,1012}	548.54 607.46 = 0 =	1 90.3 0 kWh/ye	(204) (206) (208) (208) ar (211) (211)
Efficiency of n Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m= 0 Water heating Output from wa 180.16 Efficiency of wa (217)m= 87.73	al heatin sparecondar Feb grequire 372.89 m x (20412.95 green full (set 1)] } x 1 0 green full (set 1)	mg from race heating/supplement (ca 262.22 4)] } x 1 290.38 econdary 00 ÷ (200 0 0 eter (calcuter 86.48	main systementary Apr alculated 106.14 00 ÷ (20 117.54 y), kWh/8 0	stem 1 em 1 y heating May d above 28.52 6) 31.59 month 0	Jun) 0 0 0	o 0	(204) = (2 Aug 0 Tota 0 Tota	02) × [1 – 1	Oct 142.62 157.94 ir) =Sum(2	354.89 393.02 211) _{15,1012} 0 215) _{15,1012}	548.54 607.46 = 0	1 90.3 0 kWh/ye	(204) (206) (208) ar (211) (211)
Efficiency of n Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m= 0 Water heating Output from water heating (217)m= 87.73 Fuel for water h	al heatin sparecondar Feb grequire 372.89 m x (20412.95 gfuel (set) 1)] } x 10 gfuel find a ter heat 157.38 ater heat 87.32 heating,	mg from race heating/supplement (caree) X 1 290.38 Caree (calculater 86.48 KWh/mc	main systementary Apr alculated 106.14 00 ÷ (20 117.54 y), kWh/8 0 ulated al 145.23 84.68 onth	stem 1 em 1 y heating May d above 28.52 6) 31.59 month 0	Jun) 0 0	o 0 118.65	(204) = (2 Aug 0 Tota 132.26	02) × [1 – 1	Oct 142.62 157.94 ar) =Sum(2 0 ar) =Sum(2	354.89 393.02 211) _{15,1012} 0 215) _{15,1012}	548.54 607.46 = 0 =	1 90.3 0 kWh/ye	(204) (206) (208) (208) ar (211) (211)
Efficiency of m Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m= 0 Water heating Output from wa 180.16 Efficiency of wa (217)m= 87.73	al heatin sparecondar Feb grequire 372.89 m x (20412.95 gfuel (set) 1)] } x 10 gfuel find a ter heat 157.38 ater heat 87.32 heating,	mg from race heating/supplement (caree) X 1 290.38 Caree (calculater 86.48 KWh/mc	main systementary Apr alculated 106.14 00 ÷ (20 117.54 y), kWh/8 0 ulated al 145.23 84.68 onth	stem 1 em 1 y heating May d above 28.52 6) 31.59 month 0	Jun) 0 0	o 0 118.65	(204) = (2 Aug 0 Tota 132.26	02) × [1 – 1	Oct 142.62 157.94 ar) =Sum(2 0 ar) =Sum(2	354.89 393.02 211) _{15,1012} 0 215) _{15,1012}	548.54 607.46 = 0 =	1 90.3 0 kWh/ye	(204) (206) (208) (208) ar (211) (211)
Efficiency of m Efficiency of s Jan Space heating 526.85 (211)m = {[(98) 583.44 Space heating = {[(98)m x (20) (215)m= 0 Water heating Output from water from wat	al heatin spanecondar Feb grequire 372.89 m x (20412.95) green full (settle for the settle for t	mg from race heating/supplement (calcaled and parts of the calcaled an	main systementary Apr alculated 106.14 00 ÷ (20 117.54 y), kWh//8) 0 ulated al 145.23 84.68 onth m	stem 1 em 1 y heating May d above 28.52 6) 31.59 month 0 0 00000 140.61	Jun) 0 0 123.84	o 0 118.65	O Tota 132.26 81	02) × [1 - Sep 0 0 0 I (kWh/yea 133.72	Oct 142.62 157.94 178.63	354.89 393.02 211) _{15,1012} 0 215) _{15,1012} 162.55	548.54 607.46 = 0 = 175.93	1 90.3 0 kWh/ye	(204) (206) (208) (208) ar (211) (211)

Annual totals Space heating fuel used, main system 1		kWh/year	Г	kWh/year	1
			اِ	2594.32	_
Water heating fuel used			L	2110.1	
Electricity for pumps, fans and electric keep-hot					
mechanical ventilation - balanced, extract or pos	itive input from outside		133.99		(230a)
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) =	[208.99	(231)
Electricity for lighting			[277.83	(232)
12a. CO2 emissions – Individual heating systems	s including micro-CHP		_		
	Energy kWh/year	Emission factor	or	Emissions kg CO2/yea	r
Space heating (main system 1)	Energy	kg CO2/kWh	or = [r (261)
, and the second second second second second second second second second second second second second second se	Energy kWh/year	kg CO2/kWh	- -	kg CO2/yea	,
Space heating (main system 1)	Energy kWh/year	kg CO2/kWh 0.216 0.519	= [kg CO2/yea	(261)
Space heating (main system 1) Space heating (secondary)	Energy kWh/year (211) x (215) x	kg CO2/kWh 0.216 0.519	= [kg CO2/yea	(261) (263)
Space heating (main system 1) Space heating (secondary) Water heating	Energy kWh/year (211) x (215) x (219) x	0.216 0.519 0.216	= [kg CO2/yea 560.37 0 455.78	(261) (263) (264)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating	Energy kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) =	0.216 0.519 0.519	= [= [= [kg CO2/yea 560.37 0 455.78	(261) (263) (264) (265)
Space heating (main system 1) Space heating (secondary) Water heating Space and water heating Electricity for pumps, fans and electric keep-hot	Energy kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = (231) x (232) x	0.216 0.519 0.216	= [= [= [kg CO2/yea 560.37 0 455.78 1016.15 108.47	(261) (263) (264) (265) (267)

El rating (section 14)

			User D	otaile:						
A N	Obrita I I a alva all				- NI			OTDO	040000	
Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	2		Stroma Softwa	_				016363 on: 1.0.4.16	
Software Hame.	Ottoma i Orti 201			Address:				VCISIO	JII. 1.0.4.10	
Address :										
1. Overall dwelling dime	ensions:									
Ground floor				a(m²)	(4-)		ight(m)] ₍₀₌₎ =	Volume(m³)	_
	N. (41 N. (4 N. (4 N. (4)			(1a) x		2.7	(2a) =	203.58	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e	e)+(1N)	7	75.4	(4)					_
Dwelling volume					(3a)+(3b))+(3c)+(3c	d)+(3e)+	.(3n) =	203.58	(5)
2. Ventilation rate:	main se	econdary	•	other		total			m³ per hou	r
North an of all large and	heating h	eating			,			40 - 1	-	_
Number of chimneys	0 +	0]	0] = [0		40 =	0	(6a)
Number of open flues	0 +	0] + _	0]	0		20 =	0	(6b)
Number of intermittent fa						0	X '	10 =	0	(7a)
Number of passive vents	3					0	X	10 =	0	(7b)
Number of flueless gas fi	ires					0	X 4	40 =	0	(7c)
								Δir ch	anges per ho	ur
Infiltration due to chimne	vs. flues and fans = (6)	a)+(6b)+(7a)+(7b)+(7	7c) =	Г	0		÷ (5) =	0	(8)
If a pressurisation test has b	•				ontinue fr			. (5) –	U	
Number of storeys in the	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber to resent, use the value corres				•	uction			0	(11)
deducting areas of openi		portaing to the	ne greau	er wan are	a (aner					
If suspended wooden	floor, enter 0.2 (unseal	ed) or 0.1	(seale	d), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
Percentage of window	s and doors draught st	ripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate				(8) + (10)	, , ,	, , ,	. ,		0	(16)
Air permeability value,	•		•	•	•	etre of e	envelope	area	3	(17)
If based on air permeabil Air permeability value applie	-					is heina u	sed		0.15	(18)
Number of sides sheltere		been done	or a deg	jice un pei	meability	io being a	oca		1	(19)
Shelter factor				(20) = 1 -	0.075 x (1	19)] =			0.92	(20)
Infiltration rate incorporate	ting shelter factor			(21) = (18)	x (20) =				0.14	(21)
Infiltration rate modified f	or monthly wind speed	i						'		_
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7									
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
	1.23 1.1 1.08	0.95	0.95	0.92	1	1.08	1.12	1.18		
` ''					-				J	

djusted infiltra	<u>`</u>			1	·	(21a) x	`´				1	
0.18 Calculate effec	0.17 0.1		0.15	0.13	0.13	0.13	0.14	0.15	0.16	0.16	J	
	al ventilation:	-	пе аррп	cable ca	36						0.5	(23
If exhaust air he	eat pump using /	Appendix N, (2	23b) = (23a	a) × Fmv (e	quation (l	N5)) , othe	rwise (23b) = (23a)			0.5	(2:
If balanced with	heat recovery:	efficiency in %	allowing f	for in-use fa	actor (fron	n Table 4h) =				74.8	(23
a) If balance	d mechanica	l ventilation	with he	at recove	ery (MV	HR) (24a	a)m = (22	2b)m + (2	23b) × [1	1 – (23c)	÷ 100]	
24a)m= 0.3	0.3 0.3	0.28	0.28	0.26	0.26	0.25	0.26	0.28	0.28	0.29		(24
b) If balance	d mechanica	I ventilation	without	heat rec	overy (ľ	MV) (24b)m = (22	2b)m + (2	23b)	_		
24b)m= 0	0 0	0	0	0	0	0	0	0	0	0		(2
c) If whole he			•	•								
, i i	1 < 0.5 × (23k		í``	^		´`	ŕ	· ` ·	•		1	(0
24c)m= 0	0 0		0	0	0	0	0	0	0	0	J	(24
d) If natural v if (22b)m	ventilation or n = 1, then (2							0.5]				
24d)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24
Effective air	change rate	- enter (24a	a) or (24h	b) or (24d	c) or (24	d) in box	x (25)				_	
25)m= 0.3	0.3 0.3	3 0.28	0.28	0.26	0.26	0.25	0.26	0.28	0.28	0.29		(2
3. Heat losses	s and heat lo	ss paramet	er:									
LEMENT	Gross area (m²)	Openir		Net Ar		U-valı W/m2		A X U (W/h	()	k-value kJ/m²·l		A X k kJ/K
oors (urou ()			2	 x	1.3	 	2.6	<u>''</u>	110/111	•	(2
Vindows Type	<u>:</u> 1			1.27		/[1/(1.3)+	0.04] =	1.57	=			(2
Vindows Type				2.7	=	/[1/(1.3)+	L	3.34	=			(2
Vindows Type				2.22	_	/[1/(1.3)+	L	2.74	╡			(2
Vindows Type				2.78	=	/[1/(1.3)+	L	3.44	\exists			(2
Vindows Type				7.75	_	/[1/(1.3)+	L	9.58	=			(2
Vindows Type				1.19	=	/[1/(1.3)+	L	1.47	\dashv			(2
Vindows Type				2	_	/[1/(1.3)+	L	2.47	\exists			(2
Rooflights	•			1.05		/[1/(1.6) +		1.68	\exists			(2
Valls Type1	68.45	21.9	1	46.54	=	0.15		6.98	=			(2
Valls Type2	4.03	21.8		2.03	$=$ \hat{x}	0.13	╣╸╠	0.90	<u> </u>			(2
Roof	75.4	1.09		74.35	=	0.13		7.44	-			(3
otal area of e		1.0		147.88	=	0.1		7.44				(3
	icinicinto, in				=				— r			(3
artv wall				42.95	×	0	[0			亅 늗	
arty wall				75.4	ated using	r formula 1	/[(1/	م 041 مراها	e diven in	naraarank		(3
arty floor	roof windows	se effective w	indow H.w	ייי יחופה בו וופ		, ioiiiiuia I	IL ITO-Valu	0)+0.04j a	s giv e ii III	ραιαγιαρι	1 0.2	
Party wall Party floor for windows and * include the area												
arty floor for windows and	as on both sides	of internal wa				(26)(30)) + (32) =				45.94	4 (3
arty floor for windows and include the area	as on both sides ss, W/K = S (/	of internal wa A x U)				(26)(30)		.(30) + (32	?) + (32a).	(32e) =	45.94 13772.	

can be used incident of a deciliaridic calculated using Appendix K ### decision of the main brokings are not known (86) = 0.15 x (31) **Total fabric heat loss calculated monthly **Ventilation heat loss calculated monthly **Usings = 0.33 x (25)mx (5) **Ventilation heat loss calculated monthly **Usings = 0.33 x (25)mx (5) **Ventilation heat loss calculated monthly **Usings = 0.33 x (25)mx (5) **Ventilation heat loss calculated monthly **Usings = 0.33 x (25)mx (5) **Ventilation heat loss calculated monthly **Usings = 0.33 x (25)mx (5) **Ventilation heat loss calculated monthly **Usings = 0.33 x (25)mx (5) **Ventilation heat loss calculated monthly **Usings = 0.33 x (25)mx (5) **Ventilation heat loss calculated monthly **Ventilation heat loss cal	can ha i	read inetar	ad of a de	tailed calc	ulation										
Internal bridging are not known (36) = 0.15 x (31) (33) + (36) =						usina An	pendix I	<						17 49	(36)
Total fabric heat loss calculated monthly		Ū	,	,			•							17.40	(00)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec										(33) +	(36) =			63.43	(37)
(38) (38) (38) (38) (38) (30) (20) (20) (19) (88) (18,72) (18,48) (17,32) (17,32) (17,78) (17,78) (18,48) (18,95) (19,42) (38) (39) (39) (39) (37) (39) (37) (39) (39) (39) (39) (39) (39) (39) (39	Ventila	ition hea	it loss ca	alculated	monthl	y				(38)m	= 0.33 × ((25)m x (5))		
Heat transfer coefficient, W/K (39)m = (37) + (38)m 83,78 83,55 83,32 82,15 81,92 80,75 80,75 80,52 81,22 81,92 82,38 82,85 82,85 Average \(\sum \) (39)m = (37) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (39)m = (31) + (38)m Average \(\sum \) (40) Average \(\sum \) (40) Average \(\sum \) (40) Average \(\sum \) (40) Average \(\sum \) (40) Average \(\sum \) (40) Average \(\sum \) (40) Average \(\sum \) (41) Average \(\sum \) (42) Average \(\sum \) (41) Average \(\sum \) (42) Average \(\sum \) (42) Average \(\sum \) (42) Average \(\sum \) (42) Average \(\sum \) (Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Sayme 83.78 83.55 83.32 82.15 81.92 80.75 80.75 80.52 81.22 81.92 82.38 82.85	(38)m=	20.35	20.12	19.88	18.72	18.49	17.32	17.32	17.09	17.79	18.49	18.95	19.42		(38)
Heat loss parameter (HLP), W/m²K	Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m		_	
Heat loss parameter (HLP), W/m*K (40)m= 1.11	(39)m=	83.78	83.55	83.32	82.15	81.92	80.75	80.75	80.52	81.22	81.92	82.38	82.85		
Average = Sum(40)/12= 1.09 (40)	Heat Id	oss para	meter (H	HLP), W/	m²K						_		12 /12=	82.09	(39)
Number of days in month (Table 1a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(40)m=	1.11	1.11	1.1	1.09	1.09	1.07	1.07	1.07	1.08	1.09	1.09	1.1		
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Numbe	ar of day	e in moi	nth (Tah	le 1a)						Average =	Sum(40) ₁	12 /12=	1.09	(40)
4. Water heating energy requirement: KWh/year.	rvanibo				- 	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44)	(41)m=	31	28	31	30	31	30	31	31	<u> </u>	31	30	31	1	(41)
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44)		!		!		!	!	!		l.		!		4	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1	4. Wa	iter heat	ing ener	rgy requi	irement:								kWh/y	ear:	
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1	A = =			A.I										1	(10)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36	if TF	A > 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (TFA -13		.37]	(42)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			•	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		90).48	1	(43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			_				_	_	to achieve	a water us	se target o	r		_	
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44)_12 = 1085.79 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 147.6 129.09 133.21 116.14 111.44 96.16 89.11 102.25 103.47 120.59 131.63 142.94 Total = Sum(45)_12 = 1423.64 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (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 (49) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52)	not more	= IIIal 125			<u> </u>	<u> </u>							I _	1	
(44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44)	Hot wate									Sep	Oct	Nov	Dec		
Total = Sum(44) = 1085.79 (44)					1				·	00.07	00.00	T 05 04	00.50	1	
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m=	(44)m=	99.53	95.91	92.29	88.07	85.05	81.43	81.43	85.05					1085.70	(44)
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52)	Energy o	content of	hot water	used - cal	culated m	onthly $= 4$.	190 x Vd,r	n x nm x E	OTm / 3600					1005.79	()
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) × (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52)	(45)m=	147.6	129.09	133.21	116.14	111.44	96.16	89.11	102.25	103.47	120.59	131.63	142.94]	
(46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel O (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): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a O (52)											Total = Su	m(45) ₁₁₂ =	•	1423.64	(45)
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 0 (52)				ng at point		not water	r storage), r	enter 0 in) to (61)				7	
Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) o (51) If community heating see section 4.3 Volume factor from Table 2a o (52)	` '			19.98	17.42	16.72	14.42	13.37	15.34	15.52	18.09	19.74	21.44]	(46)
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): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a O (52)		_) includin	ng any so	olar or W	/WHRS	storage	within sa	ame ves	sel		0	1	(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): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 0 (48) × (49) = 0 0 (50) 0 (51)	•		, ,		•			_						1	,
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a (48) × (49) = 0 (50) (51)		•	•			•			` ,	ers) ente	er '0' in ((47)			
Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 0 (49) 0 (50) 0 (51)		-												-	
Energy lost from water storage, kWh/year (48) x (49) = 0 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0 (51) If community heating see section 4.3 Volume factor from Table 2a 0 (52)	,					or is kno	wn (kWl	n/day):					0	<u> </u>	(48)
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 0 (52)	•												0	<u>]</u>	(49)
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 0 (52)				_	-		or is not	known:	(48) x (49)) =			0	J	(50)
If community heating see section 4.3 Volume factor from Table 2a 0 (52)	•				-								0	1	(51)
			_			`		- /						_	` '
Temperature factor from Table 2b 0 (53)					0.1								0]	
	Tempe	erature fa	actor fro	m Table	2b								0	J	(53)

Enter (50) or (54) in (55) - (41) m (41) - ((47) x (51)	x (52) x (53) =		0		(54)
Companie Companie					0		(55)
Fragment Fragment	water storage loss calculated for each month	((56)m = (5	55) × (41)m	,		1	
CF7 mar D	` '						(56)
Primary circuit Ioss (anumal) from Table 3 Primary circuit Ioss calculated for each month (59)m = (58) + 365 × (41)m (mondfied by factor from Table H3 if there is solar water heating and a cylinder thermostat) (g)me 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	If cylinder contains dedicated solar storage, (57)m = (56)m x [(50) – (H11	1)] ÷ (50), else (57	7)m = (56)m where (H11) is fro	m Append	ix H	
Primary circul	(57)m= 0 0 0 0 0 0	0 0	0 0	0	0		(57)
Composition Composition	Primary circuit loss (annual) from Table 3				0		(58)
Combi Comb		, , ,					
Combi loss calculated for each month (61)m = (60) + 365 × (41)m (61)m = 50.72				'		l	(50)
(61)me	(59)m= 0 0 0 0 0 0	0 0	0 0	0	0		(59)
Total heat required for water heating calculated for each month (62)m = 0.85 × (45)m + (46)m + (57)m + (59)m + (61)m (62)m = 198.32 173.24 180.24 159.87 154.78 136.32 130.61 145.6 147.2 167.62 178.93 193.66 (62) Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter "0" if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63)m= 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Combi loss calculated for each month (61)m = (60) ÷ 365	× (41)m					
198.32 173.24 180.24 159.87 154.78 136.32 130.61 145.6 147.2 167.62 178.93 193.66 (62)	(61)m= 50.72 44.15 47.03 43.73 43.34 40.16 4	41.5 43.34	43.73 47.03	47.3	50.72		(61)
Solar DHW input calculated using Appendix G or Appendix H (negative quantity) (enter '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63)me 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total heat required for water heating calculated for each m	nonth (62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(63)me	(62)m= 198.32 173.24 180.24 159.87 154.78 136.32 13	30.61 145.6	147.2 167.62	178.93	193.66		(62)
(63)me	Solar DHW input calculated using Appendix G or Appendix H (negative of	quantity) (enter '0'	if no solar contribut	ion to wate	er heating)	•	
Output from water heater (64)m= 198.32 173.24 180.24 159.87 154.78 136.32 130.61 145.6 147.2 167.62 178.93 193.66 Coutput from water heater (annual)	(add additional lines if FGHRS and/or WWHRS applies, se	ee Appendix G	6)				
Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Dec May 118.49 118.	(63)m= 0 0 0 0 0 0	0 0	0 0	0	0		(63)
Computation Computation	Output from water heater		-	-	-		
Heat gains from water heating, kWh/month 0.25 ' [0.85 × (45)m + (61)m] + 0.8 × [(46)m + (57)m + (59)m] (65)m = 61.76 53.96 56.05 49.55 47.89 42.01 40 44.83 45.34 51.85 55.59 60.21 (65)m include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating S. Internal gains (see Table 5 and 5a):	(64)m= 198.32 173.24 180.24 159.87 154.78 136.32 13	30.61 145.6	147.2 167.62	178.93	193.66		
(65)me 61.76 53.96 56.05 49.55 47.89 42.01 40 44.83 45.34 51.85 55.59 60.21 (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 118.49		Outp	ut from water heate	r (annual) ₁	12	1966.39	(64)
(65)me 61.76 53.96 56.05 49.55 47.89 42.01 40 44.83 45.34 51.85 55.59 60.21 (65) include (57)m in calculation of (65)m only if cylinder is in the dwelling or hot water is from community heating 5. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 118.49	Heat gains from water heating, kWh/month 0.25 ´ [0.85 × ((45)m + (61)m] + 0.8 x [(46)m	+ (57)m	+ (59)m]	
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	(65)m= 61.76 53.96 56.05 49.55 47.89 42.01	40 44.83	45.34 51.85	55.59	60.21		(65)
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	include (57)m in calculation of (65)m only if cylinder is in	n the dwelling	or hot water is f	om com	munity h	eating	
Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec		J			-		
Sep							
(66)m= 118.49 (66) Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6.97 9.06 12.15 15.43 18.01 19.2 (67) Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 156.78 154.6 160.08 171.75 186.47 200.31 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		Jul Aug	Sen Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m=				1 1101			
(67)m=				118.49			(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 156.78 154.6 160.08 171.75 186.47 200.31 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Lighting gains (calculated in Appendix L. equation I Q or I C		I	118.49			(66)
(68)m= 209.56 211.73 206.25 194.59 179.86 166.02 156.78 154.6 160.08 171.75 186.47 200.31 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		 			118.49		` '
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6	6.97 9.06	12.15 15.43		118.49		` '
(69)m= 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 34.85 (69) Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13	6.97 9.06 or L13a), also	12.15 15.43 see Table 5	18.01	118.49		(67)
Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 15	6.97 9.06 or L13a), also 56.78 154.6	12.15 15.43 see Table 5 160.08 171.75	18.01	118.49		(67)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 18 Cooking gains (calculated in Appendix L, equation L15 or	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se	12.15 15.43 see Table 5 160.08 171.75 ee Table 5	18.01	118.49		(67) (68)
Losses e.g. evaporation (negative values) (Table 5) $ (71)m = \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 15 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.85 34	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se	12.15 15.43 see Table 5 160.08 171.75 ee Table 5	18.01	118.49		(67) (68)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 15 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.85 34	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se 34.85 34.85	12.15 15.43 see Table 5 160.08 171.75 te Table 5 34.85 34.85	18.01 186.47 34.85	118.49 19.2 200.31 34.85		(67) (68) (69)
Water heating gains (Table 5) (72)m= 83.01 80.3 75.34 68.82 64.37 58.35 53.77 60.26 62.97 69.7 77.21 80.93 (72) Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m (73)m= 372.8 370.17 356.63 335.17 313.41 292.37 279.06 285.46 296.75 318.42 343.24 361.99 (73)	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 18 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.85 34.85 34.85 34.85 34.85 34.85 34.85 3 Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se 34.85 34.85	12.15 15.43 see Table 5 160.08 171.75 te Table 5 34.85 34.85	18.01 186.47 34.85	118.49 19.2 200.31 34.85		(67) (68) (69)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 18 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.85 34.85 34.85 34.85 34.85 34.85 34.85 3 Pumps and fans gains (Table 5a) (70)m= 3 3 3 3 3 3 3	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se 34.85 34.85	12.15 15.43 see Table 5 160.08 171.75 te Table 5 34.85 34.85	18.01 186.47 34.85	118.49 19.2 200.31 34.85		(67) (68) (69)
Total internal gains = $ (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m $ $ (73)m = 372.8 370.17 356.63 335.17 313.41 292.37 279.06 285.46 296.75 318.42 343.24 361.99 $ $ (73)m = 372.8 370.17 356.63 335.17 313.41 292.37 279.06 285.46 296.75 318.42 343.24 361.99 $	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 15 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.85 34	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se 34.85 34.85	12.15 15.43 see Table 5 160.08 171.75 te Table 5 34.85 34.85 3 3	18.01 186.47 34.85	118.49 19.2 200.31 34.85		(67) (68) (69) (70)
(73)m= 372.8 370.17 356.63 335.17 313.41 292.37 279.06 285.46 296.75 318.42 343.24 361.99 (73)	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 15 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.85 34	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se 34.85 34.85	12.15 15.43 see Table 5 160.08 171.75 te Table 5 34.85 34.85 3 3	18.01 186.47 34.85	118.49 19.2 200.31 34.85		(67) (68) (69) (70)
	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 18 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.85 34	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se 34.85 34.85 34.79 -94.79	12.15 15.43 see Table 5 160.08 171.75 te Table 5 34.85 34.85 3 3 -94.79 -94.79	18.01 186.47 34.85 3	118.49 19.2 200.31 34.85		(67) (68) (69) (70) (71)
O Odlandia	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 15 Cooking gains (calculated in Appendix L, equation L15 or (69)m= 34.85 34	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se 34.85 34.85 34.79 -94.79 53.77 60.26	12.15 15.43 see Table 5 160.08 171.75 ee Table 5 34.85 34.85 3 3 -94.79 -94.79 62.97 69.7	18.01 186.47 34.85 3 -94.79	118.49 19.2 200.31 34.85 3 -94.79		(67) (68) (69) (70) (71)
6. Solar gains:	(67)m= 18.68 16.59 13.49 10.22 7.64 6.45 6 Appliances gains (calculated in Appendix L, equation L13 (68)m= 209.56 211.73 206.25 194.59 179.86 166.02 18 Cooking gains (calculated in Appendix L, equation L15 or 169)m= 34.85 34	6.97 9.06 or L13a), also 56.78 154.6 L15a), also se 34.85 34.85 34.79 -94.79 53.77 60.26 + (67)m + (68)m +	12.15 15.43 see Table 5 160.08 171.75 ee Table 5 34.85 34.85 3 3 -94.79 -94.79 62.97 69.7 (69)m + (70)m + (7	18.01 186.47 34.85 3 -94.79 77.21	118.49 19.2 200.31 34.85 3 -94.79 80.93		(67) (68) (69) (70) (71) (72)

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

Orientation: Access Factor Table 6d	or	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	7.75	x	11.28	x	0.55	x	0.7	=	23.33	(75)
Northeast 0.9x 0.77	x	1.19	x	11.28	x	0.55	x	0.7	=	3.58	(75)
Northeast 0.9x 0.77	x	7.75	x	22.97	x	0.55	x	0.7	=	47.49	(75)
Northeast 0.9x 0.77	x	1.19	x	22.97	x	0.55	x	0.7] =	7.29	(75)
Northeast 0.9x 0.77	х	7.75	x	41.38	x	0.55	x	0.7	=	85.56	(75)
Northeast 0.9x 0.77	х	1.19	x	41.38	x	0.55	x	0.7	=	13.14	(75)
Northeast 0.9x 0.77	х	7.75	x	67.96	x	0.55	x	0.7	=	140.51	(75)
Northeast 0.9x 0.77	x	1.19	x	67.96	X	0.55	x	0.7	=	21.58	(75)
Northeast 0.9x 0.77	X	7.75	x	91.35	x	0.55	x	0.7	=	188.88	(75)
Northeast 0.9x 0.77	X	1.19	x	91.35	X	0.55	x	0.7	=	29	(75)
Northeast 0.9x 0.77	x	7.75	x	97.38	x	0.55	x	0.7	=	201.37	(75)
Northeast _{0.9x} 0.77	x	1.19	x	97.38	x	0.55	x	0.7	=	30.92	(75)
Northeast 0.9x 0.77	x	7.75	x	91.1	x	0.55	x	0.7] =	188.37	(75)
Northeast 0.9x 0.77	x	1.19	x	91.1	x	0.55	x	0.7	=	28.92	(75)
Northeast 0.9x 0.77	x	7.75	x	72.63	x	0.55	x	0.7	=	150.17	(75)
Northeast 0.9x 0.77	X	1.19	x	72.63	x	0.55	x	0.7	=	23.06	(75)
Northeast 0.9x 0.77	x	7.75	x	50.42	x	0.55	x	0.7	=	104.26	(75)
Northeast 0.9x 0.77	X	1.19	x	50.42	x	0.55	x	0.7	=	16.01	(75)
Northeast 0.9x 0.77	x	7.75	x	28.07	X	0.55	X	0.7	=	58.04	(75)
Northeast 0.9x 0.77	x	1.19	x	28.07	X	0.55	x	0.7	=	8.91	(75)
Northeast 0.9x 0.77	x	7.75	x	14.2	x	0.55	x	0.7	=	29.36	(75)
Northeast 0.9x 0.77	X	1.19	x	14.2	x	0.55	x	0.7	=	4.51	(75)
Northeast _{0.9x} 0.77	X	7.75	x	9.21	x	0.55	x	0.7	=	19.05	(75)
Northeast 0.9x 0.77	X	1.19	x	9.21	x	0.55	x	0.7	=	2.93	(75)
Southeast 0.9x 0.77	X	2	x	36.79	X	0.55	X	0.7	=	39.27	(77)
Southeast 0.9x 0.77	X	2	x	62.67	X	0.55	X	0.7	=	66.89	(77)
Southeast 0.9x 0.77	X	2	x	85.75	x	0.55	x	0.7	=	91.52	(77)
Southeast 0.9x 0.77	X	2	x	106.25	X	0.55	X	0.7	=	113.39	(77)
Southeast 0.9x 0.77	X	2	x	119.01	X	0.55	X	0.7	=	127.01	(77)
Southeast 0.9x 0.77	X	2	x	118.15	x	0.55	X	0.7	=	126.09	(77)
Southeast 0.9x 0.77	X	2	X	113.91	X	0.55	X	0.7	=	121.57	(77)
Southeast 0.9x 0.77	X	2	x	104.39	X	0.55	X	0.7	=	111.41	(77)
Southeast 0.9x 0.77	X	2	x	92.85	X	0.55	X	0.7	=	99.09	(77)
Southeast 0.9x 0.77	X	2	X	69.27	X	0.55	X	0.7	=	73.92	(77)
Southeast 0.9x 0.77	X	2	x	44.07	x	0.55	x	0.7	=	47.03	(77)
Southeast 0.9x 0.77	x	2	x	31.49	x	0.55	x	0.7	=	33.6	(77)
Southwest _{0.9x} 0.77	x	1.27	x	36.79]	0.55	x	0.7	=	12.47	(79)
Southwest _{0.9x} 0.77	x	2.7	x	36.79]	0.55	x	0.7	=	26.51	(79)
Southwest _{0.9x} 0.77	X	2.22	x	36.79]	0.55	X	0.7	=	21.79	(79)

Southwest0.9x 0.77 x 2.78 x 36.79 0.55 x 0.7 = 27.29 Southwest0.9x 0.77 x 1.27 x 62.67 0.55 x 0.7 = 21.24 Southwest0.9x 0.77 x 2.7 x 62.67 0.55 x 0.7 = 45.15 Southwest0.9x 0.77 x 2.22 x 62.67 0.55 x 0.7 = 37.12 Southwest0.9x 0.77 x 2.78 x 62.67 0.55 x 0.7 = 46.49 Southwest0.9x 0.77 x 1.27 x 85.75 0.55 x 0.7 = 61.77 Southwest0.9x 0.77 x 2.22 x 85.75 0.55 x 0.7 = 63.6 Southwest0.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 =	(79) (79) (79) (79) (79) (79) (79) (79)
Southwesto.9x 0.77 x 2.7 x 62.67 0.55 x 0.7 = 45.15 Southwesto.9x 0.77 x 2.22 x 62.67 0.55 x 0.7 = 37.12 Southwesto.9x 0.77 x 2.78 x 62.67 0.55 x 0.7 = 46.49 Southwesto.9x 0.77 x 1.27 x 85.75 0.55 x 0.7 = 29.06 Southwesto.9x 0.77 x 2.7 x 85.75 0.55 x 0.7 = 61.77 Southwesto.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 = 50.79 Southwesto.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 = 63.6 Southwesto.9x 0.77 x 2.7 x 106.25 0.55 x 0.7 =	(79) (79) (79) (79) (79) (79) (79) (79)
Southwest0.9x 0.77 x 2.22 x 62.67 0.55 x 0.7 = 37.12 Southwest0.9x 0.77 x 2.78 x 62.67 0.55 x 0.7 = 46.49 Southwest0.9x 0.77 x 1.27 x 85.75 0.55 x 0.7 = 29.06 Southwest0.9x 0.77 x 2.7 x 85.75 0.55 x 0.7 = 61.77 Southwest0.9x 0.77 x 2.22 x 85.75 0.55 x 0.7 = 50.79 Southwest0.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 = 63.6 Southwest0.9x 0.77 x 1.27 x 106.25 0.55 x 0.7 = 76.54 Southwest0.9x 0.77 x 2.22 x 106.25 0.55 x 0.7 =	(79) (79) (79) (79) (79) (79) (79) (79)
Southwesto.9x 0.77 x 2.78 x 62.67 0.55 x 0.7 = 46.49 Southwesto.9x 0.77 x 1.27 x 85.75 0.55 x 0.7 = 29.06 Southwesto.9x 0.77 x 2.7 x 85.75 0.55 x 0.7 = 61.77 Southwesto.9x 0.77 x 2.22 x 85.75 0.55 x 0.7 = 50.79 Southwesto.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 = 63.6 Southwesto.9x 0.77 x 1.27 x 106.25 0.55 x 0.7 = 76.54 Southwesto.9x 0.77 x 2.22 x 106.25 0.55 x 0.7 = 62.93	(79) (79) (79) (79) (79) (79) (79) (79)
Southwesto.9x 0.77 x 1.27 x 85.75 0.55 x 0.7 = 29.06 Southwesto.9x 0.77 x 2.7 x 85.75 0.55 x 0.7 = 61.77 Southwesto.9x 0.77 x 2.22 x 85.75 0.55 x 0.7 = 50.79 Southwesto.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 = 63.6 Southwesto.9x 0.77 x 1.27 x 106.25 0.55 x 0.7 = 36 Southwesto.9x 0.77 x 2.7 x 106.25 0.55 x 0.7 = 76.54 Southwesto.9x 0.77 x 2.22 x 106.25 0.55 x 0.7 = 62.93	(79) (79) (79) (79) (79) (79) (79) (79)
Southwest0.9x 0.77 x 2.7 x 85.75 0.55 x 0.7 = 61.77 Southwest0.9x 0.77 x 2.22 x 85.75 0.55 x 0.7 = 50.79 Southwest0.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 = 63.6 Southwest0.9x 0.77 x 1.27 x 106.25 0.55 x 0.7 = 36 Southwest0.9x 0.77 x 2.27 x 106.25 0.55 x 0.7 = 76.54 Southwest0.9x 0.77 x 2.22 x 106.25 0.55 x 0.7 = 62.93	(79) (79) (79) (79) (79) (79) (79)
Southwest0.9x 0.77 x 2.22 x 85.75 0.55 x 0.7 = 50.79 Southwest0.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 = 63.6 Southwest0.9x 0.77 x 1.27 x 106.25 0.55 x 0.7 = 36 Southwest0.9x 0.77 x 2.7 x 106.25 0.55 x 0.7 = 76.54 Southwest0.9x 0.77 x 2.22 x 106.25 0.55 x 0.7 = 62.93	(79) (79) (79) (79) (79) (79)
Southwesto.9x 0.77 x 2.78 x 85.75 0.55 x 0.7 = 63.6 Southwesto.9x 0.77 x 1.27 x 106.25 0.55 x 0.7 = 36 Southwesto.9x 0.77 x 2.7 x 106.25 0.55 x 0.7 = 76.54 Southwesto.9x 0.77 x 2.22 x 106.25 0.55 x 0.7 = 62.93	(79) (79) (79) (79) (79)
Southwest0.9x 0.77 x 1.27 x 106.25 0.55 x 0.7 = 36 Southwest0.9x 0.77 x 2.7 x 106.25 0.55 x 0.7 = 76.54 Southwest0.9x 0.77 x 2.22 x 106.25 0.55 x 0.7 = 62.93	(79) (79) (79) (79)
Southwest0.9x 0.77 x 2.7 x 106.25 0.55 x 0.7 = 76.54 Southwest0.9x 0.77 x 2.22 x 106.25 0.55 x 0.7 = 62.93	(79) (79) (79)
Southwest _{0.9x} 0.77 x 2.22 x 106.25 0.55 x 0.7 = 62.93	(79) (79)
	(79)
Southwest _{0.9x} 0.77 x 2.78 x 106.25 0.55 x 0.7 = 78.81	╡
	7/70\
Southwest _{0.9x} 0.77 x 1.27 x 119.01 0.55 x 0.7 = 40.33	(79)
Southwest _{0.9x} 0.77 x 2.7 x 119.01 0.55 x 0.7 = 85.73	(79)
Southwest _{0.9x} 0.77 x 2.22 x 119.01 0.55 x 0.7 = 70.49	(79)
Southwest _{0.9x} 0.77 x 2.78 x 119.01 0.55 x 0.7 = 88.27	(79)
Southwest _{0.9x} 0.77 x 1.27 x 118.15 0.55 x 0.7 = 40.03	(79)
Southwest _{0.9x} 0.77 x 2.7 x 118.15 0.55 x 0.7 = 85.11	(79)
Southwest _{0.9x} 0.77 x 2.22 x 118.15 0.55 x 0.7 = 69.98	(79)
Southwest _{0.9x} 0.77 x 2.78 x 118.15 0.55 x 0.7 = 87.63	(79)
Southwest _{0.9x} 0.77 x 1.27 x 113.91 0.55 x 0.7 = 38.6	(79)
Southwest _{0.9x} 0.77 x 2.7 x 113.91 0.55 x 0.7 = 82.06	(79)
Southwest _{0.9x} 0.77 x 2.22 x 113.91 0.55 x 0.7 = 67.47	(79)
Southwest _{0.9x} 0.77 x 2.78 x 113.91 0.55 x 0.7 = 84.49	(79)
Southwest _{0.9x} 0.77 x 1.27 x 104.39 0.55 x 0.7 = 35.37	(79)
Southwest _{0.9x} 0.77 x 2.7 x 104.39 0.55 x 0.7 = 75.2	(79)
Southwest _{0.9x} 0.77 x 2.22 x 104.39 0.55 x 0.7 = 61.83	(79)
Southwest _{0.9x} 0.77 x 2.78 x 104.39 0.55 x 0.7 = 77.43	(79)
Southwest _{0.9x} 0.77 x 1.27 x 92.85 0.55 x 0.7 = 31.46	(79)
Southwest _{0.9x} 0.77 x 2.7 x 92.85 0.55 x 0.7 = 66.89	(79)
Southwest _{0.9x} 0.77 x 2.22 x 92.85 0.55 x 0.7 = 55	(79)
Southwesto.9x 0.77 x 2.78 x 92.85 0.55 x 0.7 = 68.87	(79)
Southwest _{0.9x} 0.77 x 1.27 x 69.27 0.55 x 0.7 = 23.47	(79)
Southwest _{0.9x} 0.77 x 2.7 x 69.27 0.55 x 0.7 = 49.9	(79)
Southwest _{0.9x} 0.77 x 2.22 x 69.27 0.55 x 0.7 = 41.03	(79)
Southwest _{0.9x} 0.77 x 2.78 x 69.27 0.55 x 0.7 = 51.38	(79)
Southwest _{0.9x} 0.77 x 1.27 x 44.07 0.55 x 0.7 = 14.93	(79)
Southwest _{0.9x} 0.77 x 2.7 x 44.07 0.55 x 0.7 = 31.75](79)
Southwest _{0.9x} 0.77 x 2.22 x 44.07 0.55 x 0.7 = 26.1](79)
Southwest _{0.9x} 0.77 x 2.78 x 44.07 0.55 x 0.7 = 32.69](79)
57.7	J'' "

		_													
Southwest _{0.9x}	0.77	X	1.2	27	X	31.	.49		0.55	X	0.7	=	1	0.67	(79)
Southwest _{0.9x}	0.77	X	2.	7	X	31.	.49		0.55	X	0.7	=	2:	2.68	(79)
Southwest _{0.9x}	0.77	X	2.2	22	X	31.	.49		0.55	X	0.7	=	18	8.65	(79)
Southwest _{0.9x}	0.77	X	2.7	'8	X	31.	.49		0.55	X	0.7	=	2:	3.36	(79)
Rooflights _{0.9x}	1	X	1.0)5	X	2	26	x	0.55	x	0.8		1	0.81	(82)
Rooflights _{0.9x}	1	X	1.0)5	X	5	54	X	0.55	X	0.8	=	2	2.45	(82)
Rooflights 0.9x	1	X	1.0)5	X	9	96	X	0.55	x	0.8	=	3	9.92	(82)
Rooflights 0.9x	1	X	1.0)5	X	15	50	x	0.55	x	0.8	=	6	2.37	(82)
Rooflights 0.9x	1	X	1.0)5	X	19	92	x	0.55	x	0.8	=	7:	9.83	(82)
Rooflights 0.9x	1	X	1.0)5	X	20	00	x	0.55	x	0.8		8:	3.16	(82)
Rooflights 0.9x	1	X	1.0)5	X	18	39	x	0.55	x	0.8	=	78	8.59	(82)
Rooflights 0.9x	1	X	1.0)5	X	15	57	x	0.55	x	0.8	_ =	6	5.28	(82)
Rooflights 0.9x	1	X	1.0)5	X	11	15	x	0.55	x	0.8	_ =	4	7.82	(82)
Rooflights 0.9x	1	X	1.0)5	X	6	66	x	0.55	x	0.8	=	2	7.44	(82)
Rooflights 0.9x	1	X	1.0)5	X	3	33	x	0.55	x	0.8	_ =	1:	3.72	(82)
Rooflights 0.9x	1	X	1.0)5	X	2	21	x	0.55	x	0.8	_ =	8	3.73	(82)
										<u> </u>					
Solar gains in wa	itts, calcul	ated	for eacl	h month	า			(83)m	n = Sum(74)m .	(82)m					
(83)m= 165.05 2	94.11 435	5.36	592.14	709.55	7	24.3	690.06	599	.75 489.39	334.0	9 200.09	139.67			(83)
Total gains – inte	ernal and	solar	(84)m =	= (73)m	+ (8	83)m , v	watts								
(84)m= 537.84 6	64.29 791	1.99	927.31	1022.96	10	16.67	969.12	885	.22 786.14	652.5	1 543.33	501.66			(84)
7. Mean interna	I temperat	ture (heating	seasor	n)								_		
7. Mean interna Temperature du	•	•				area fro	om Tab	ole 9,	, Th1 (°C)					21	(85)
	ıring heati	ng pe	eriods ir	n the livi	ing			ole 9,	, Th1 (°C)					21	(85)
Temperature du	ring heati	ng pe	eriods ir	n the livi	ing n (s				, Th1 (°C)	Oct	Nov	Dec		21	(85)
Temperature du Utilisation factor	r for gains	ng pe	eriods ir	the livi	ing n (s	ee Tab	le 9a)		ug Sep	Oct	Nov 0.99	Dec 1		21	(85)
Temperature du Utilisation factor Jan (86)m= 1	r for gains Feb M 0.99 0.9	ng pe for li lar	eriods ir ving are Apr 0.87	n the livi ea, h1,n May	ing n (s	ee Tab Jun ^{0.5}	Jul 0.37	A:	ug Sep 12 0.67	-				21	
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te	r for gains Feb N 0.99 0.	ng pe for li lar	eriods ir ving are Apr 0.87	n the livi ea, h1,n May	ing n (s	ee Tab Jun 0.5 w step:	Jul 0.37	A:	ug Sep 12 0.67 Table 9c)	-	0.99	1		21	
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2	r for gains Feb N 0.99 0.99 emperature 20.13 20	ng pe for li far 96 e in li	eriods ir ving are Apr 0.87 iving are	n the living the living the May 0.7 ea T1 (f	ing n (s follo	ee Tab Jun 0.5 w step:	Jul 0.37 s 3 to 7	0.4 ' in T	ug Sep 12 0.67 Table 9c) 1 20.96	0.93	0.99			21	(86)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du	r for gains Feb N 0.99 0. emperature 20.13 20 uring heati	for li far 96 e in li .44 ng pe	eriods ir ving are Apr 0.87 iving are 20.76	n the living the hand	ing n (s follo	ee Tab Jun 0.5 w step: 0.99 relling f	Jul 0.37 s 3 to 7 21	Al 0.4 ' in T 2'	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C)	20.69	0.99	19.88		21	(86)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1	r for gains Feb N 0.99 0. emperature 20.13 20 uring heati 19.99 2	for li far 96 e in li 44 ng pe	eriods ir ving are Apr 0.87 iving are 20.76 eriods ir 20.01	n the living the living the man of the living the man of the living the man of the living the man of the living the living the man of the living the livin	ing n (s	Jun 0.5 w step: 0.99 relling f	Jul 0.37 s 3 to 7 21 from Ta 20.02	Au 0.4 in T 2 ble 9	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C)	0.93	0.99	1		21	(86)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1	r for gains Feb N 0.99 0.0 emperature 20.13 20 uring heati 19.99 2 r for gains	for li for li far ge e in li 44 ng pe for re	eriods ir ving are Apr 0.87 iving are 20.76 eriods ir 20.01	n the living the high many the living the li	ing n (s	ee Tab Jun 0.5 w step: 0.99 relling f 0.02 m (see	Jul 0.37 s 3 to 7 21 from Ta 20.02	Ai 0.4 ' in T 2' ble 9 20.9	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02	20.69	20.24	19.88		21	(86) (87) (88)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1	r for gains Feb N 0.99 0.9 emperature 20.13 20 uring heati 19.99 2 r for gains	for li far 96 e in li 44 ng pe	eriods ir ving are Apr 0.87 iving are 20.76 eriods ir 20.01	n the living the living the man of the living the man of the living the man of the living the man of the living the living the man of the living the livin	ing n (s	Jun 0.5 w step: 0.99 relling f	Jul 0.37 s 3 to 7 21 from Ta 20.02	Au 0.4 in T 2 ble 9	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02	20.69	0.99	19.88		21	(86)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1	r for gains Feb N 0.99 0.9 emperature 20.13 20 uring heati 19.99 2 r for gains 0.98 0.9	for li for li for li for li for li for re for re	eriods ir ving are Apr 0.87 iving are 20.76 eriods ir 20.01 est of do	n the living the hand the living the hand the ha	ing (s) (s) (s) (s) (s) (s) (s) (s) (s) (s)	ustepsion of the second of the	Jul 0.37 s 3 to 7 21 from Ta 20.02 Table 0.29	Ai 0.4 7 in T 2 able 9 20.0 9a) 0.3	ug Sep 12 0.67 Table 9c) 1 20.96 20.02 3 0.59	0.93 20.69 20.01	20.24	19.88		21	(86) (87) (88)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1 Utilisation factor (89)m= 0.99 Mean internal te	r for gains Peb N 0.99 0. emperatur 20.13 20 uring heati 19.99 2 r for gains 0.98 0. emperatur	for li for li for li for li for li for re for re	eriods ir ving are Apr 0.87 iving are 20.76 eriods ir 20.01 est of do	n the living the hand the living the hand the ha	follo follo follo follo graph de la companyation de la companyatio	ustepsion of the second of the	Jul 0.37 s 3 to 7 21 from Ta 20.02 Table 0.29	Ai 0.4 7 in T 2 able 9 20.0 9a) 0.3	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 to 7 in Table 03 19.99	0.93 20.69 20.01 0.9 e 9c)	0.99 20.24 20.01 0.99	1 19.88 20 1 18.51		21	(86) (87) (88)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1 Utilisation factor (89)m= 0.99 Mean internal te	r for gains Peb N 0.99 0. emperatur 20.13 20 uring heati 19.99 2 r for gains 0.98 0. emperatur	for li far 96 e in li .44 ng pe for re 95 e in t	eriods in ving are 0.87 iving are 20.76 eriods in 20.01 est of do 0.83 he rest	man the living the sean of the living the sean of the	follo follo follo follo graph de la companyation de la companyatio	ustepsion of the second of the	Jul 0.37 s 3 to 7 21 from Ta 20.02 Table 0.29	Al 0.44 / in T 2 / 20.1 / 20.1 / 9a) 0.33 / ps 3	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 to 7 in Table 03 19.99	0.93 20.69 20.01 0.9 e 9c)	0.99 20.24 20.01 0.99	1 19.88 20 1 18.51		21	(86) (87) (88) (89)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1 Utilisation factor (89)m= 0.99 Mean internal te	r for gains Feb N 0.99 0.9 emperature 20.13 20 ring heati 19.99 2 r for gains 0.98 0.9 emperature 18.88 19	for li for li for li for li for re fo	eriods in ving are Apr 0.87 iving are 20.76 eriods in 20.01 est of do 0.83 he rest 19.75	n the living the livin	follo follo 2 f dw 2 h2,	w step: 0.99 relling f 0.02 m (see 0.43 T2 (fol	Jul 0.37 s 3 to 7 21 from Ta 20.02 e Table 0.29 llow ste 20.02	Al 0.4 7 in T 2 ble 9 20.0 9a) 0.3	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 15 7 in Table 19.99	0.93 20.69 20.01 0.9 e 9c)	0.99 20.24 20.01 0.99	1 19.88 20 1 18.51			(86) (87) (88) (89)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1 Utilisation factor (89)m= 0.99 Mean internal te (90)m= 18.56 1	r for gains Peb N 0.99 0.1 Pemperatur 20.13 20 Pemperatur 19.99 2 Pemperatur 19.99 2 Pemperatur 18.88 19 Pemperatur 18.88 19	for li for li for li e in li 44 ng pe for re 95 e in t	eriods in ving are Apr 0.87 iving are 20.76 eriods in 20.01 est of do 0.83 he rest 19.75	n the living the livin	follo follo follo follo g h2, u elling	w step: 0.99 relling f 0.02 m (see 0.43 T2 (fol	Jul 0.37 s 3 to 7 21 from Ta 20.02 e Table 0.29 llow ste 20.02	Al 0.4 7 in T 2 ble 9 20.0 9a) 0.3	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 15 7 in Table 03 19.99 - fLA) × T2	0.93 20.69 20.01 0.9 e 9c)	0.99 20.24 20.01 0.99 19.03 ving area ÷ (4	1 19.88 20 1 18.51			(86) (87) (88) (89)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1 Utilisation factor (89)m= 0.99 Mean internal te (90)m= 18.56 1	r for gains Feb N 0.99 0.9 emperature 20.13 20 ring heati 19.99 2 r for gains 0.98 0.9 emperature 18.88 19 emperature 19.32 19	for li for li for li for li e in li for re f	eriods in ving are Apr 0.87 iving are 20.76 eriods in 20.01 est of dv 0.83 he rest 19.75 the wh 20.11	n the living the livin	follo follo follo follo generalization of the selling of the s	ee Tab Jun 0.5 w step: 0.99 relling f 0.02 m (see 0.43 T2 (fol 0.02 g) = fL/	Jul 0.37 s 3 to 7 21 from Ta 20.02 Table 0.29 llow ste 20.02 A × T1 20.37	Ain 0.4 7' in T 2 ble § 20.1 9a) 0.3 pps 3 20.1 + (1 20.1	ug Sep 42 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 to 7 in Table 03 19.99 - fLA) × T2 37 20.34	0.93 20.69 20.01 0.9 e 9c) 19.67 LA = Liv	0.99 20.24 20.01 0.99 19.03 ving area ÷ (4	1 19.88 20 1 18.51 4) =			(86) (87) (88) (89) (90)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1 Utilisation factor (89)m= 0.99 1 Mean internal te (90)m= 18.56 1 Mean internal te (92)m= 19.04 1 Apply adjustment	r for gains Peb N 0.99 0.1 emperatur 20.13 20 ring heati 19.99 2 r for gains 0.98 0.1 emperatur 18.88 19 emperatur 19.32 19 nt to the m	for li for li for li for li e in li for re f	eriods in ving are Apr 0.87 iving are 20.76 eriods in 20.01 est of dv 0.83 he rest 19.75 the wh 20.11	n the living the livin	follo follo follo follo g h2, c pellin g ratu	ee Tab Jun 0.5 w step: 0.99 relling f 0.02 m (see 0.43 T2 (fol 0.02 g) = fL/	Jul 0.37 s 3 to 7 21 from Ta 20.02 Table 0.29 llow ste 20.02 A × T1 20.37	Ain 0.4 7' in T 2 ble § 20.1 9a) 0.3 pps 3 20.1 + (1 20.1	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 15 7 in Table 03 19.99 - fLA) × T2 137 20.34 where appre	0.93 20.69 20.01 0.9 e 9c) 19.67 LA = Liv	0.99 20.24 20.01 0.99 19.03 ving area ÷ (4	1 19.88 20 1 18.51 4) =			(86) (87) (88) (89) (90)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1 Utilisation factor (89)m= 0.99 1 Mean internal te (90)m= 18.56 1 Mean internal te (92)m= 19.04 1 Apply adjustment	r for gains Feb N 0.99 0.9 emperature 20.13 20 ring heati 19.99 2 r for gains 0.98 0.9 emperature 18.88 19 emperature 19.32 19 nt to the m 19.17 19	for li lar 96 e in li .44 ng pe 95 for re 95 e in t .31 e (for	eriods in ving are Apr 0.87 iving are 20.76 eriods in 20.01 est of do 0.83 he rest 19.75 the wh 20.11 internal	n the living the sea, h1,n May 0.7 lea T1 (for 20.94 leading) 0.64 leading to sea the	follo follo follo follo g h2, c pellin g ratu	ee Tab Jun 0.5 w step: 0.99 relling f 0.02 m (see 0.43 T2 (fol 0.02 g) = fL/ 0.36 ure from	Jul 0.37 s 3 to 7 21 from Ta 20.02 Table 0.29 llow ste 20.02 A × T1 20.37 n Table	Ai 0.4 ' in T 2 ble § 20.0 9a) 0.3 cps 3 20.0 + (1 20.0 4e, '	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 15 7 in Table 03 19.99 - fLA) × T2 137 20.34 where appre	0.93 20.69 20.01 0.9 6 9c) 19.67 6LA = Livitate popriate	0.99 20.24 20.01 0.99 19.03 ving area ÷ (4	1 19.88 20 1 18.51 4) =			(86) (87) (88) (89) (90) (91)
Temperature du Utilisation factor Jan (86)m= 1 Mean internal te (87)m= 19.92 2 Temperature du (88)m= 19.99 1 Utilisation factor (89)m= 0.99 Mean internal te (90)m= 18.56 1 Mean internal te (92)m= 19.04 1 Apply adjustment (93)m= 18.89 1	r for gains Feb N 0.99 0.9 emperature 20.13 20 ring heati 19.99 2 r for gains 0.98 0.9 emperature 18.88 19 emperature 19.32 19 nt to the m 19.17 19 g requirer ean interna	for li for li for li for li for re fo	eriods in ving are Apr 0.87 iving are 20.76 eriods in 20.01 est of do 0.83 he rest 19.75 the wh 20.11 internal 19.96	n the living the living that t	follo follo follo follo generation ge	ee Tab Jun 0.5 w step: 0.99 relling f 0.02 m (see 0.43 T2 (fol 0.02 g) = fL/ 0.36 ure from 0.21	Jul 0.37 s 3 to 7 21 from Ta 20.02 Table 0.29 llow ste 20.02 A × T1 20.37 n Table 20.22	Ai 0.4 ' in T 2 ble § 20.0 9a) 0.3 cps 3 20.0 + (1 20.0 4e, ; 20.0	ug Sep 12 0.67 Table 9c) 1 20.96 9, Th2 (°C) 03 20.02 13 0.59 15 7 in Table 03 19.99 - fLA) × T2 137 20.34 where appre 122 20.19	0.93 20.69 20.01 0.9 e 9c) 19.67 fLA = Livitation (Livitation 0.99 20.24 20.01 0.99 19.03 ving area ÷ (4	1 19.88 20 1 18.51 4) =			(86) (87) (88) (89) (90) (91)	

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Jan

Feb

Utilisati	on factor for	gains, hn	n:										
	0.99 0.98	0.94	0.83	0.65	0.44	0.3	0.35	0.61	0.9	0.98	0.99		(94)
Useful (gains, hmGr	n , W = (9	4)m x (8	4)m	ı								
(95)m= 5	533.48 649.6	7 743.75	770.86	661.21	449.93	291.98	306.94	477.75	585.42	533.19	498.7		(95)
Monthly	/ average ex	ternal ten	nperature	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 los	ss rate for m	-		erature,	1	=[(39)m :		– (96)m	ī —				
` ′ _	222.44 1192.4			692.72	453.37	292.33	307.66	494.35	760.62	1005.91	1213.46		(97)
_	heating requ										1		
(98)m= 5	512.58 364.7	6 256.04	99.16	23.44	0	0	0	0	130.35	340.36	531.78		_
							Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2258.47	(98)
Space I	heating requ	irement ir	n kWh/m²	²/year								29.95	(99)
9a. Ener	gy requirem	ents – Inc	lividual h	eating sy	ystems i	ncluding	micro-C	CHP)					
-	heating:	_									,		_
	n of space h				mentary	system						0	(201)
Fraction	n of space h	eat from r	nain syst	em(s)			(202) = 1	– (201) =				1	(202)
Fraction	n of total hea	ating from	main sys	stem 1			(204) = (2	02) × [1 –	(203)] =			1	(204)
Efficien	cy of main s	pace hea	ting syste	em 1								90.3	(206)
Efficien	cy of second	dary/supp	lementar	y heating	g systen	າ, %						0	(208)
	Jan Fel	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	kWh/ye	ar
Space I	heating requ	irement (calculate	d above)	•		•		•			
5	512.58 364.7	6 256.04	99.16	23.44	0	0	0	0	130.35	340.36	531.78		
(211)m =	= {[(98)m x (204)] } x	100 ÷ (20	06)									(211)
5	567.64 403.9	4 283.54	109.81	25.96	0	0	0	0	144.35	376.92	588.9		
							Tota	ıl (kWh/yea	ar) =Sum(2	211) _{15,1012}		2501.07	(211)
Space I	heating fuel	(seconda	ry), kWh/	month									
	n x (201)] } x												
(215)m=	0 0	0	0	0	0	0	0	0	0	0	0		_
							Tota	ıl (kWh/yea	ar) =Sum(2	215) _{15,1012}	Ē	0	(215)
Water h	_												
	rom water he		159.87	154.78	136.32	130.61	145.6	147.2	167.62	178.93	193.66		
<u> </u>	y of water h		100.07	1010	100.02	100.01	110.0		107.02	170.00	100.00	81	(216)
_	87.5 87.08	-	84.32	82.11	81	81	81	81	84.82	86.86	87.61	01	(217)
` ' _	water heatin		<u> </u>					<u> </u>	01.02	00.00	01.01		()
	= (64)m x 1	•											
(219)m= 2	226.66 198.9	4 209.07	189.59	188.5	168.3	161.24	179.75	181.73	197.61	205.99	221.04		
							Tota	I = Sum(2	19a) ₁₁₂ =			2328.42	(219)
Annual									k'	Wh/year		kWh/year	-
Space he	eating fuel u	sed, mair	system	1								2501.07	╛
Water he	eating fuel u	sed										2328.42	
Electricit	y for pumps	, fans and	l electric	keep-ho	t								

mechanical ventilation - balanced, extract or positive input from	186.28		(230a)	
central heating pump:		30		(230c)
boiler with a fan-assisted flue		45		(230e)
Total electricity for the above, kWh/year	sum of (230a)(230g) =		261.28	(231)
Electricity for lighting			329.94	(232)
12a. CO2 emissions – Individual heating systems including mi	cro-CHP			

12a. CO2 emissions – Individual heating system	s including micro-CHP				
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year		
Space heating (main system 1)	(211) x	0.216	540.23 (261)		
Space heating (secondary)	(215) x	0.519	0 (263)		
Water heating	(219) x	0.216	502.94 (264)		
Space and water heating	(261) + (262) + (263) + (264) =		1043.17 (265)		
Electricity for pumps, fans and electric keep-hot	(231) x	0.519 =	135.6 (267)		
Electricity for lighting	(232) x	0.519 =	171.24 (268)		
Total CO2, kg/year	sum	of (265)(271) =	1350.01 (272)		
Dwelling CO2 Emission Rate	(272	2) ÷ (4) =	17.9 (273)		
El rating (section 14)			85 (274)		

eight associates

SAP Worksheets Energy Statement 34A-36 Kilburn High Road

SAP Worksheets

Green DER Worksheets

		l lsor I	Details:								
Assessor Name:	Chris Hocknell	<u> </u>	Strom	a Num	ber:		STRO	016363			
Software Name:	Stroma FSAP 2012		Softwa	_		on: 1.0.4.16					
	F	Property	Address	Apartm	ent 1						
Address: 1. Overall dwelling dime	ansions:										
1. Overall awelling diffle		Are	a(m²)		Av. He	ight(m)		Volume(m ³	·)		
Ground floor				(1a) x		2.7	(2a) =	135.46	(3a)		
Total floor area TFA = (1a	a)+(1b)+(1c)+(1d)+(1e)+(1	n)	50.17	(4)			-				
Dwelling volume		· ·		(3a)+(3b)+(3c)+(3c	l)+(3e)+	.(3n) =	135.46	(5)		
2. Ventilation rate:											
	main seconda heating heating	ry	other		total			m³ per hou	r		
Number of chimneys	0 + 0	_ + [0] = [0	X 4	40 =	0	(6a)		
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)		
Number of intermittent fa	ns				0	x ′	10 =	0	(7a)		
Number of passive vents					0	x ′	10 =	0	(7b)		
Number of flueless gas fi	res				0	X 4	40 =	0	(7c)		
Air changes per hour											
Infiltration due to chimne	ys, flues and fans = (6a)+(6b)+(7a)+(7b)+	(7c) =	Г	0		÷ (5) =		(8)		
•	een carried out or is intended, proced			continue fr			- (3) =	0	(0)		
Number of storeys in the	ne dwelling (ns)							0	(9)		
Additional infiltration	OF for steel or timber from a	- 0 25 fo				[(9)-	-1]x0.1 =	0	(10)		
	.25 for steel or timber frame or resent, use the value corresponding to			•	uction			0	(11)		
deducting areas of openir	ngs); if equal user 0.35								_		
If suspended wooden to the sus	floor, enter 0.2 (unsealed) or (ter 0.05, else enter 0).1 (seal	ea), eise	enter 0				0	(12)		
•	s and doors draught stripped							0	(14)		
Window infiltration	3		0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)		
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)		
·	q50, expressed in cubic metr	•	•	•	etre of e	envelope	area	3	(17)		
•	ity value, then $(18) = [(17) \div 20] +$ s if a pressurisation test has been do				io boing u	and		0.15	(18)		
Number of sides sheltere	•	ne or a ue	gree air pe	пеавшу	is being u	seu		1	(19)		
Shelter factor			(20) = 1 -	[0.075 x (1	19)] =			0.92	(20)		
Infiltration rate incorporat	ting shelter factor		(21) = (18) x (20) =				0.14	(21)		
Infiltration rate modified f	or monthly wind speed					1		1			
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Monthly average wind sp	 	1	T		l	T		1			
(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	2)m ÷ 4										
(22a)m= 1.27 1.25	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18				

Adjusted infilt	ration rat	e (allowi	ing for st	nelter an	ıd wind s	speed) =	: (21a) x	(22a)m					
0.18	0.17	0.17	0.15	0.15	0.13	0.13	0.13	0.14	0.15	0.16	0.16]	
Calculate effe		_	rate for t	he appli	cable ca	se			•		•		
If mechanic			andiv NL (O	12h) - (22a	a) v Emy (4	aguation (NEV otho	nuina (22h	·\ = (22a\			0.5	(23:
If exhaust air h		0		, ,	,	. `	,, .	`)) = (23a)			0.5	(23
If balanced wit		-	-	_					0 1.) (4 (22.)	75.65	(23
a) If balance	1	ı —			1	- ` ` 	- ^ ` -	ŕ	 		1 ` ´) ÷ 100] 1	(24
(24a)m= 0.3	0.3	0.29	0.27	0.27	0.25	0.25	0.25	0.26	0.27	0.28	0.28	J	(24)
b) If balance	1	ı —			1	covery (I	, 	$\int_{0}^{\infty} \int_{0}^{\infty} dt = (22)$, 			1	(24
(24b)m= 0	0	0	0	0	. ,		0		0	0	0	J	(24
c) If whole h	nouse ex m < 0.5 ×			•	•				5 x (23h	.)			
(24c)m= 0	0.5	0	0	0	0	0	0	0	0	0	0	1	(24
d) If natural		n or wh	ole hous	<u> </u>		ventilati	on from					J	•
	m = 1, the								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
Effective air	change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	ld) in bo	x (25)	•		•		
(25)m= 0.3	0.3	0.29	0.27	0.27	0.25	0.25	0.25	0.26	0.27	0.28	0.28		(25
3. Heat losse	es and he	eat loss i	paramet	er:									
ELEMENT	Gros area	SS	Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/I	〈)	k-value kJ/m²·l		A X k kJ/K
Doors					2	x	1.3	=	2.6				(26
Windows Typ	e 1				9.56	x1	/[1/(1.3) +	0.04] =	11.81				(27
Windows Typ	e 2				4.62	x1	/[1/(1.3)+	0.04] =	5.71				(27
Windows Typ	e 3				4.17	x1	/[1/(1.3)+	0.04] =	5.15				(27
Rooflights Typ	oe 1				1.05	x1	/[1/(1.6) +	0.04] =	1.68				(27
Rooflights Typ	oe 2				1.79	x1	/[1/(1.6) +	0.04] =	2.864				(27
Walls Type1	35.4	.8	22.5	2	12.96		0.15	─ i	1.94	=			(29
Walls Type2	30.4		2	=	28.48	=	0.13	=	3.8	-		-	(29
Roof	50.1		2.84		47.33	=	0.1	= :	4.73	ᆿ 片		= =	(30
Total area of			2.04			=	0.1		4.73				(31
Party wall		, 111			116.1	=		— _ i		— [
-					26.97	=	0	=	0				(32
Party floor	d roof wind		ffa ativa wii	indou II w	50.17		a formula :	1/[/1/ 1 1 1 1 1 1 1 1 1	·a) · 0 041 a		norogrank		(32
* for windows and ** include the are						aleu using	y iormula i	7[(170-vait	<i>1e)+</i> 0.04j a	is given in	paragrapr	1 3.2	
abric heat lo	ss, W/K :	= S (A x	U)				(26)(30) + (32) =				45.18	(33
Heat capacity	Cm = S((Axk)						((28).	(30) + (32	2) + (32a).	(32e) =	10845.77	7 (34
		40×/TN/F	2 = Cm -	÷ TFA) ir	n kJ/m²K	,		Indica	ntive Value:	Medium		250	(35
Thermal mass	s parame	ter (Tivir	- 0111	,.,									
Thermal mass For design asses can be used inste	sments wh	ere the de	tails of the	,		t known p	recisely the	e indicative	e values of	TMP in Ta	able 1f		
For design asses	sments wh	ere the de tailed calc	tails of the ulation.	construct	ion are no	,	recisely the	e indicative	e values of	TMP in Ta	able 1f	14.19	(36

Total fabric heat loss	(33) + (36) = 59	(27)
Ventilation heat loss calculated monthly	$(33) + (36) = 59.$ $(38)m = 0.33 \times (25)m \times (5)$	37 (37)
Jan Feb Mar Apr May Jun Jul		
(38)m= 13.35 13.2 13.04 12.26 12.11 11.33 11.33	 	(38)
Heat transfer coefficient, W/K	(39)m = (37) + (38)m	
(39)m= 72.72 72.57 72.41 71.64 71.48 70.71 70.7		
	Average = Sum(39) ₁₁₂ /12= 71	.6 (39)
Heat loss parameter (HLP), W/m²K	(40)m = (39) m ÷ (4)	
(40)m= 1.45 1.45 1.44 1.43 1.42 1.41 1.41		(40)
Number of days in month (Table 1a)	Average = $Sum(40)_{112}/12=$ 1.4	(40)
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct Nov Dec	
(41)m= 31 28 31 30 31 30 31	31 30 31 30 31	(41)
	_	
4. Water heating energy requirement:	kWh/year:	
Assumed occupancy, N	17	(42)
if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13	3.9)2)] + 0.0013 x (TFA -13.9)	(42)
if TFA £ 13.9, N = 1	(05 N) : 00	
Annual average hot water usage in litres per day Vd, average Reduce the annual average hot water usage by 5% if the dwelling is designed.	, , ,	(43)
not more that 125 litres per person per day (all water use, hot and cold)		
Jan Feb Mar Apr May Jun Jul	Aug Sep Oct Nov Dec	
Hot water usage in litres per day for each month Vd,m = factor from Table 1	c x (43)	
(44)m= 81.9 78.93 75.95 72.97 69.99 67.01 67.0	1 69.99 72.97 75.95 78.93 81.9	
Energy content of hot water used, calculated monthly = 4.100 x Vd m x nm	Total = Sum(44) ₁₁₂ 893	.51 (44)
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm	· · · · · · · · · · · · · · · · · · ·	
(45)m= 121.46 106.23 109.62 95.57 91.7 79.13 73.33		1.53 (45)
If instantaneous water heating at point of use (no hot water storage), enter 0	Total = Sum(45) ₁₁₂ = 1177 0 in boxes (46) to (61)	1.53
(46)m= 18.22 15.93 16.44 14.34 13.76 11.87 11	12.62 12.77 14.89 16.25 17.64	(46)
Water storage loss:		
Storage volume (litres) including any solar or WWHRS storage		(47)
If community heating and no tank in dwelling, enter 110 litres	` '	
Otherwise if no stored hot water (this includes instantaneous Water storage loss:	combi boilers) enter '0' in (47)	
a) If manufacturer's declared loss factor is known (kWh/day)	: 0	(48)
Temperature factor from Table 2b		(49)
Energy lost from water storage, kWh/year	(48) x (49) = 110	(50)
b) If manufacturer's declared cylinder loss factor is not know		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0.02	(51)
If community heating see section 4.3 Volume factor from Table 2a	4.02	(50)
Temperature factor from Table 2b	1.03	(52) (53)
Energy lost from water storage, kWh/year	(47) x (51) x (52) x (53) = 1.03	(54)
Enter (50) or (54) in (55)	1.03	(55)

Water	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er contains	s dedicate	d solar sto	rage, (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=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primar	v circuit	loss (ar	nual) fro	m Table	3							0		(58)
	•	•	culated t			59)m = ((58) ÷ 36	65 × (41)	m				•	
(mo	dified by	factor f	rom 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 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 h	eat requ	uired 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=	176.74	156.16	164.9	149.06	146.98	132.63	128.6	139.42	138.64	154.51	161.81	172.91		(62)
Solar DI	-IW 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 a	dditiona	l lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Output	from w	ater hea	ter											
(64)m=	176.74	156.16	164.9	149.06	146.98	132.63	128.6	139.42	138.64	154.51	161.81	172.91		
			•					Outp	out from wa	ater heate	r (annual) ₁	12	1822.37	(64)
Heat g	ains fro	m water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m=	84.61	75.26	80.67	74.57	74.71	69.11	60.6				i e		1	(05)
			00.07	14.57	74.71	09.11	68.6	72.2	71.11	77.22	78.81	83.33		(65)
inclu	ıde (57)	!	culation o	<u> </u>			<u> </u>	<u> </u>			<u> </u>		eating	(65)
	. ,	m in cal		of (65)m	only if c		<u> </u>	<u> </u>			<u> </u>		eating	(65)
5. In	ternal ga	m in cald	culation of Table 5	of (65)m and 5a	only if c		<u> </u>	<u> </u>			<u> </u>		eating	(65)
5. In	ternal ga	m in cald	culation o	of (65)m and 5a	only if c		<u> </u>	<u> </u>			<u> </u>		eating	(65)
5. In	ernal ga	m in calo ains (see as (Table	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. In Metab	olic gain Jan 84.76	m in caldains (see	culation of Table 5 5), Wat Mar	of (65)m 5 and 5a ts Apr 84.76	only if constant of the consta	Jun 84.76	Jul 84.76	Aug 84.76	or hot w Sep 84.76	ater is fr	om com	munity h	eating	
5. In Metab	olic gain Jan 84.76	m in caldains (see	culation of the culation of th	of (65)m 5 and 5a ts Apr 84.76	only if constant of the consta	Jun 84.76	Jul 84.76	Aug 84.76	or hot w Sep 84.76	ater is fr	om com	munity h	eating	
5. In: Metab (66)m= Lightin (67)m=	olic gain Jan 84.76 g gains	m in calc ains (see s (Table Feb 84.76 (calcula	Example 5 to 2 to 3 to 3 to 3 to 3 to 3 to 3 to 3	of (65)m 5 and 5a ts Apr 84.76 opendix 7.2	only if constant of the consta	Jun 84.76 ion L9 o	Jul 84.76 r L9a), a	Aug 84.76 Iso see	Sep 84.76 Table 5 8.57	Oct 84.76	Nov 84.76	Dec 84.76	eating	(66)
5. In: Metab (66)m= Lightin (67)m=	olic gain Jan 84.76 g gains	m in calc ains (see s (Table Feb 84.76 (calcula	E Table 5 E 5), Wat Mar 84.76 ted in Ap	of (65)m 5 and 5a ts Apr 84.76 opendix 7.2	only if constant of the consta	Jun 84.76 ion L9 o	Jul 84.76 r L9a), a	Aug 84.76 Iso see	Sep 84.76 Table 5 8.57	Oct 84.76	Nov 84.76	Dec 84.76	eating	(66)
5. Interpretation of the second of the secon	olic gain Jan 84.76 g gains 13.17 nces ga	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calcula 149.21	culation of Table 5 2 5), Wat Mar 84.76 ted in Ap 9.51	of (65)m 5 and 5a ts Apr 84.76 opendix 7.2 Appendix 137.13	May 84.76 L, equat 5.38 dix L, eq	Jun 84.76 ion L9 of 4.54 uation L	Jul 84.76 r L9a), a 4.91 13 or L1 110.48	Aug 84.76 Iso see 6.38 3a), also	Sep 84.76 Table 5 8.57 see Ta 112.81	Oct 84.76 10.88 ble 5 121.03	Nov 84.76	Dec 84.76	eating	(66) (67)
5. Interpretation of the second of the secon	olic gain Jan 84.76 g gains 13.17 nces ga	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calcula 149.21	e Table 5 e 5), Wat Mar 84.76 ted in Ap 9.51 sulated in	of (65)m 5 and 5a ts Apr 84.76 opendix 7.2 Appendix 137.13	May 84.76 L, equat 5.38 dix L, eq	Jun 84.76 ion L9 of 4.54 uation L	Jul 84.76 r L9a), a 4.91 13 or L1 110.48	Aug 84.76 Iso see 6.38 3a), also	Sep 84.76 Table 5 8.57 see Ta 112.81	Oct 84.76 10.88 ble 5 121.03	Nov 84.76	Dec 84.76	eating	(66) (67)
5. Interpretation of the second of the secon	ernal gar olic gain Jan 84.76 g gains 13.17 nces ga 147.68 ng gains 31.48	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calc 149.21 (calcula 31.48	e Table 5 e 5), Wat Mar 84.76 ted in Ap 9.51 culated in 145.35	of (65)m s and 5a ts Apr 84.76 ppendix 7.2 Append 137.13 ppendix 31.48	only if constructions only if constructions on the construction of	Jun 84.76 ion L9 of 4.54 uation L 116.99	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a	Aug 84.76 Iso see 6.38 3a), also 108.95	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table	Oct 84.76 10.88 ble 5 121.03	Nov 84.76 12.69	Dec 84.76	eating	(66) (67) (68)
5. Interpretation of the second of the secon	ernal gar olic gain Jan 84.76 g gains 13.17 nces ga 147.68 ng gains 31.48	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calc 149.21 (calcula 31.48	Example 5 Exampl	of (65)m s and 5a ts Apr 84.76 ppendix 7.2 Append 137.13 ppendix 31.48	only if constructions only if constructions on the construction of	Jun 84.76 ion L9 of 4.54 uation L 116.99	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a	Aug 84.76 Iso see 6.38 3a), also 108.95	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table	Oct 84.76 10.88 ble 5 121.03	Nov 84.76 12.69	Dec 84.76	eating	(66) (67) (68)
5. Interpretation of the second of the secon	olic gain Jan 84.76 g gains 13.17 nces ga 147.68 ng gains 31.48 s and fai	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calc 149.21 (calcula 31.48 ns gains 0	e Table 5 e 5), Wat Mar 84.76 ted in Ap 9.51 sulated in 145.35 ated in A 31.48 (Table 5	of (65)m s and 5a ts Apr 84.76 ppendix 7.2 Appendix 137.13 ppendix 31.48 5a) 0	only if constructions only if constructions only if constructions on the construction of the construction	Jun 84.76 ion L9 of 4.54 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48	Oct 84.76 10.88 ble 5 121.03 5 31.48	Nov 84.76 12.69 131.41	Dec 84.76 13.53 141.16 31.48	eating	(66) (67) (68) (69)
5. Interpretation of the second of the secon	olic gain Jan 84.76 g gains 13.17 nces ga 147.68 ng gains 31.48 s and fai	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calc 149.21 (calcula 31.48 ns gains 0	Evaluation of the collection o	of (65)m s and 5a ts Apr 84.76 ppendix 7.2 Appendix 137.13 ppendix 31.48 5a) 0	only if constructions only if constructions only if constructions on the construction of the construction	Jun 84.76 ion L9 of 4.54 uation L 116.99 tion L15 31.48	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48	Oct 84.76 10.88 ble 5 121.03 5 31.48	Nov 84.76 12.69 131.41	Dec 84.76 13.53 141.16 31.48	eating	(66) (67) (68) (69)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m=	polic gain Jan 84.76 g gains 13.17 nces ga 147.68 ng gains 31.48 s and fai	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calcula 31.48 ns gains 0	culation of the Earth of the Ea	of (65)m s and 5a ts Apr 84.76 ppendix 7.2 Append 137.13 ppendix 31.48 5a) 0 tive valu	only if construction only if c	Jun 84.76 ion L9 of 4.54 uation L 116.99 tion L15 31.48 0	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48	Oct 84.76 10.88 ble 5 121.03 5 31.48	Nov 84.76 12.69 131.41	Dec 84.76 13.53 141.16 31.48	eating	(66) (67) (68) (69) (70)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m=	polic gain Jan 84.76 g gains 13.17 nces ga 147.68 ng gains 31.48 s and fai	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calcula 31.48 ns gains 0 raporatio	culation of the Earth of the Ea	of (65)m s and 5a ts Apr 84.76 ppendix 7.2 Append 137.13 ppendix 31.48 5a) 0 tive valu	only if construction only if c	Jun 84.76 ion L9 of 4.54 uation L 116.99 tion L15 31.48 0	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.57 see Ta 112.81 ee Table 31.48	Oct 84.76 10.88 ble 5 121.03 5 31.48	Nov 84.76 12.69 131.41	Dec 84.76 13.53 141.16 31.48	eating	(66) (67) (68) (69) (70)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garolic gain Jan 84.76 g gains 13.17 nces ga 147.68 ng gains 31.48 and far ces ga ev 67.8 heating	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calc 149.21 (calcula 31.48 ns gains 0 raporatio -67.8 gains (T	culation of the Table 5 2 5), Wat Mar 84.76 ted in Ap 9.51 culated in 145.35 ated in Ap 31.48 (Table 5 0 on (negation of the Table 5) 108.43	of (65)m s and 5a ts Apr 84.76 ppendix 7.2 Appendix 31.48 5a) 0 tive valu -67.8	only if constructions only if constructions only if constructions on the construction of the construction	Jun 84.76 ion L9 of 4.54 uation L 116.99 tion L15 31.48 0 ole 5) -67.8	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.57 See Ta 112.81 ee Table 31.48 0 -67.8	Oct 84.76 10.88 ble 5 121.03 5 31.48 0 -67.8	Nov 84.76 12.69 131.41 31.48 0	Dec 84.76 13.53 141.16 31.48 0 -67.8	eating	(66) (67) (68) (69) (70) (71)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal garolic gain Jan 84.76 g gains 13.17 nces ga 147.68 ng gains 31.48 and far ces ga ev 67.8 heating	m in calc ains (see s (Table Feb 84.76 (calcula 11.69 ins (calcula 31.48 as gains 0 raporatic -67.8 gains (T	culation of the Table 5 2 5), Wat Mar 84.76 ted in Ap 9.51 culated in 145.35 ated in Ap 31.48 (Table 5 0 on (negation of the Table 5) 108.43	of (65)m s and 5a ts Apr 84.76 ppendix 7.2 Appendix 31.48 5a) 0 tive valu -67.8	only if constructions only if constructions only if constructions on the construction of the construction	Jun 84.76 ion L9 of 4.54 uation L 116.99 tion L15 31.48 0 ole 5) -67.8	Jul 84.76 r L9a), a 4.91 13 or L1 110.48 or L15a) 31.48	Aug 84.76 Iso see 6.38 3a), also 108.95), also se 31.48	Sep 84.76 Table 5 8.57 See Ta 112.81 ee Table 31.48 0 -67.8	Oct 84.76 10.88 ble 5 121.03 5 31.48 0 -67.8	Nov 84.76 12.69 131.41 31.48 0	Dec 84.76 13.53 141.16 31.48 0 -67.8	eating	(66) (67) (68) (69) (70) (71)

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

Orientation: Access Facto Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	9.56	x	11.28	x	0.55	x	0.7	=	28.78	(75)
Northeast 0.9x 0.77	x	4.62	x	11.28	x	0.55	x	0.7	=	13.91	(75)
Northeast 0.9x 0.77	X	9.56	x	22.97	x	0.55	x	0.7	=	58.58	(75)
Northeast 0.9x 0.77	x	4.62	x	22.97	x	0.55	x	0.7] =	28.31	(75)
Northeast 0.9x 0.77	x	9.56	x	41.38	x	0.55	x	0.7	=	105.54	(75)
Northeast 0.9x 0.77	x	4.62	x	41.38	x	0.55	x	0.7	=	51.01	(75)
Northeast 0.9x 0.77	X	9.56	x	67.96	x	0.55	x	0.7	=	173.33	(75)
Northeast 0.9x 0.77	X	4.62	x	67.96	x	0.55	x	0.7	=	83.77	(75)
Northeast 0.9x 0.77	x	9.56	x	91.35	x	0.55	x	0.7	=	232.99	(75)
Northeast 0.9x 0.77	X	4.62	x	91.35	x	0.55	x	0.7	=	112.6	(75)
Northeast 0.9x 0.77	X	9.56	x	97.38	x	0.55	x	0.7	=	248.39	(75)
Northeast 0.9x 0.77	X	4.62	x	97.38	x	0.55	x	0.7	=	120.04	(75)
Northeast 0.9x 0.77	X	9.56	x	91.1	x	0.55	x	0.7	=	232.37	(75)
Northeast 0.9x 0.77	X	4.62	x	91.1	x	0.55	x	0.7	=	112.29	(75)
Northeast 0.9x 0.77	X	9.56	x	72.63	x	0.55	x	0.7	=	185.25	(75)
Northeast 0.9x 0.77	x	4.62	x	72.63	x	0.55	x	0.7	=	89.52	(75)
Northeast 0.9x 0.77	X	9.56	x	50.42	x	0.55	x	0.7	=	128.61	(75)
Northeast 0.9x 0.77	x	4.62	x	50.42	x	0.55	x	0.7	=	62.15	(75)
Northeast 0.9x 0.77	X	9.56	x	28.07	x	0.55	X	0.7	=	71.59	(75)
Northeast 0.9x 0.77	X	4.62	x	28.07	x	0.55	x	0.7	=	34.6	(75)
Northeast 0.9x 0.77	x	9.56	x	14.2	x	0.55	x	0.7	=	36.21	(75)
Northeast 0.9x 0.77	X	4.62	x	14.2	x	0.55	x	0.7	=	17.5	(75)
Northeast 0.9x 0.77	X	9.56	x	9.21	x	0.55	x	0.7	=	23.5	(75)
Northeast 0.9x 0.77	X	4.62	x	9.21	x	0.55	x	0.7	=	11.36	(75)
Northwest 0.9x 0.77	X	4.17	x	11.28	x	0.55	X	0.7	=	25.11	(81)
Northwest 0.9x 0.77	X	4.17	x	22.97	x	0.55	X	0.7	=	51.1	(81)
Northwest 0.9x 0.77	X	4.17	x	41.38	x	0.55	x	0.7	=	92.07	(81)
Northwest 0.9x 0.77	X	4.17	X	67.96	X	0.55	X	0.7	=	151.21	(81)
Northwest 0.9x 0.77	X	4.17	x	91.35	X	0.55	X	0.7	=	203.26	(81)
Northwest 0.9x 0.77	X	4.17	x	97.38	x	0.55	X	0.7	=	216.7	(81)
Northwest 0.9x 0.77	X	4.17	x	91.1	x	0.55	X	0.7	=	202.71	(81)
Northwest 0.9x 0.77	X	4.17	x	72.63	x	0.55	X	0.7	=	161.61	(81)
Northwest 0.9x 0.77	X	4.17	x	50.42	x	0.55	x	0.7	=	112.19	(81)
Northwest 0.9x 0.77	X	4.17	x	28.07	x	0.55	x	0.7	=	62.45	(81)
Northwest 0.9x 0.77	x	4.17	x	14.2	x	0.55	x	0.7	=	31.59	(81)
Northwest 0.9x 0.77	×	4.17	x	9.21	×	0.55	x	0.7] =	20.5	(81)
Rooflights 0.9x 1	×	1.05	x	26	x	0.55	x	0.8] =	10.81	(82)
Rooflights 0.9x 1	×	1.79	x	26	x	0.55	x	0.8] =	18.43	(82)
Rooflights _{0.9x} 1	X	1.05	x	54	×	0.55	X	0.8	=	22.45	(82)

Rooflights 0.9x	1	X	1.79	0	X	54	1 x	0.55	x	0.8		38.28	(82)
Rooflights 0.9x	1	→ x	1.0	=	×	96	」^] x	0.55	$\frac{1}{x}$	0.8	= =	39.92	(82)
Rooflights 0.9x	1	→ x	1.79	==	×	96] ^] x	0.55	 	0.8	= -	68.05	(82)
Rooflights 0.9x	1	$\frac{1}{x}$	1.0	==	X	150] ^] x	0.55	$\exists \hat{x}$	0.8	╡ .	62.37	(82)
Rooflights 0.9x	<u>'</u> 1	^ x	1.79		X	150] ^] x	0.55	d °	0.8	=	106.33	(82)
Rooflights 0.9x	<u>·</u> 1		1.0		x	192]	0.55		0.8	= =	79.83	(82)
Rooflights 0.9x	<u>·</u> 1	×	1.79	==	X	192] x	0.55	= x	0.8	╡ .	136.1	(82)
Rooflights _{0.9x}	<u>·</u> 1	= x	1.0	=	X	200]]	0.55	۲ ×	0.8	= =	83.16	(82)
Rooflights 0.9x	1	X	1.79	=	X	200]]	0.55	= x	0.8	= =	141.77	(82)
Rooflights 0.9x	1	X	1.0		X	189	X	0.55	×	0.8	=	78.59	(82)
Rooflights _{0.9x}	1	X	1.79	9	X	189	X	0.55	×	0.8		133.97	(82)
Rooflights 0.9x	1	x	1.0	5	X	157	x	0.55	×	0.8	=	65.28	(82)
Rooflights 0.9x	1	x	1.79	9	X	157	x	0.55	×	0.8	<u> </u>	111.29	(82)
Rooflights 0.9x	1	X	1.0	5	X	115	x	0.55	×	0.8	<u> </u>	47.82	(82)
Rooflights 0.9x	1	X	1.79	9	X	115	X	0.55	×	0.8	-	81.52	(82)
Rooflights 0.9x	1	X	1.0	5	X	66	X	0.55	x	0.8	=	27.44	(82)
Rooflights 0.9x	1	X	1.79	9	X	66	X	0.55	X	0.8	=	46.78	(82)
Rooflights _{0.9x}	1	X	1.0	5	X	33	X	0.55	X	0.8	=	13.72	(82)
Rooflights _{0.9x}	1	X	1.79	9	X	33	X	0.55	×	0.8	=	23.39	(82)
Rooflights _{0.9x}	1	X	1.0	5	X	21	X	0.55	X	0.8	=	8.73	(82)
Rooflights _{0.9x}	1	X	1.79	9	X	21	X	0.55	X	0.8	=	14.89	(82)
Solar gains in v			for each		Т		i i	n = Sum(74)m .				1	
(83)m= 97.03		356.59	577.01	764.78		10.06 759.93	612	.94 432.28	242.8	7 122.41	78.98		(83)
Total gains – ir			<u>` </u>		,	<u> </u>	1	<u> </u>		. 1 .		1	(0.1)
(84)m= 420.02		668.3	873.33	1045.75	_	1015.96	873	.74 700.84	526.9	3 424.4	394.11		(84)
7. Mean interr	nal temper	rature (heating	seasor	1)								_
Temperature	during hea	ating pe	eriods in	the livi	ing	area from Tal	ble 9	, Th1 (°C)				21	(85)
Utilisation fact	tor for gair	ns for li	ving are	a, h1,n	า (s	ee Table 9a)						Ī	
Jan	Feb	Mar	Apr	May	╙	Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.98	0.94	0.81	0.6	(0.41 0.3	0.3	0.65	0.92	0.98	0.99		(86)
Mean internal	temperati	ure in li	iving are	ea T1 (f	ollo	w steps 3 to	7 in T	able 9c)					
(87)m= 19.58	19.83	20.25	20.71	20.93	2	0.99 21	20.	99 20.93	20.54	19.97	19.54		(87)
Temperature	during hea	ating pe	eriods in	rest of	dw	elling from Ta	able 9	9, Th2 (°C)					
(88)m= 19.73	19.73	19.73	19.74	19.74	1	9.76 19.76	19.	76 19.75	19.74	19.74	19.73		(88)
Utilisation fact	tor for gair	ns for re	est of dv	velling,	h2,	m (see Table	9a)						
(89)m= 0.99	0.98	0.92	0.76	0.53	T	0.34 0.22	0.2	27 0.55	0.89	0.98	0.99		(89)
Mean internal	temperati	ure in t	he rest o	of dwell	lina	T2 (follow ste	eps 3	to 7 in Tabl	e 9c)			-	
(90)m= 17.89		18.84	19.45	19.69	Ť	9.75 19.76	19.		19.26	18.46	17.84		(90)
		<u>I</u> _			-			1	LA = Li	/ing area ÷ (4) =	0.47	(91)
													_

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

(92)m= 18.69 19 19.51	20.04 20.28	20.34	20.34	20.34	20.29	19.86	19.17	18.64		(92)
Apply adjustment to the mean	n internal tempe	rature fro	m Table	4e, whe	ere appro	opriate	Г			
(93)m= 18.69 19 19.51	20.04 20.28	20.34	20.34	20.34	20.29	19.86	19.17	18.64		(93)
8. Space heating requiremen			44.6	T		. —	-0)			
Set Ti to the mean internal te the utilisation factor for gains		ned at st	ep 11 of	able 9	o, so tha	t II,m=(/6)m an	d re-cald	ulate	
Jan Feb Mar	Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor for gains, hn	n:									
(94)m= 0.99 0.97 0.92	0.77 0.56	0.37	0.26	0.32	0.59	0.89	0.97	0.99		(94)
Useful gains, hmGm , W = (9	1' ` 1' 	1								(0-)
(95)m= 414.51 504.69 613.26	673.54 585.13	401.68	264.04	276.75	414.99	468.59	413.61	390.03		(95)
Monthly average external ten (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 interr		<u> </u>					7.1	7.2		(00)
(97)m= 1046.57 1022.97 941.87	798.28 613.04	1	264.66	278.14	439.39	662.11	866.57	1041.35		(97)
Space heating requirement for	or each month, k	:Wh/mon	th = 0.02	24 x [(97)m – (95)m] x (4	1)m			
(98)m= 470.25 348.29 244.48	89.81 20.77	0	0	0	0	143.97	326.13	484.58		
				Tota	l per year	(kWh/year	r) = Sum(9	8) _{15,912} =	2128.29	(98)
Space heating requirement in	n kWh/m²/year								42.42	(99)
9b. Energy requirements – Co	mmunity heating	g scheme)							
This part is used for space hea	• .	-		• .	-		unity sch	neme.		¬
Fraction of space heat from se	econdary/supple	mentary	heating (Table 1	1) '0' if n	one			0	(301)
Fraction of space heat from co	mmunity systen	1 1 – (30 ⁻	1) =						1	(302)
The community scheme may obtain h										
includes hailers heat numbs geather						up to four (other heat	sources; ti	ne latter	
includes boilers, heat pumps, geother Fraction of heat from Commur	mal and waste heat					up to four (other heat	sources; ti	ne latter	(303a)
· · · · · ·	mal and waste heat nity heat pump	from powe				up to four (other heat	sources; ti		(303a) (303a)
Fraction of heat from Commun	mal and waste heat nity heat pump nity heat pump (\	from powe	r stations.			up to four (other heat	sources; ti	1	=
Fraction of heat from Commun Fraction of heat from Commun Fraction of community heat from	mal and waste heat nity heat pump nity heat pump (\ om heat source 2	from power Water) (Water)	r stations.				other heat 02) x (303		0.7	(303a)
Fraction of heat from Commun Fraction of heat from Commun Fraction of community heat from Fraction of total space heat from	mal and waste heat nity heat pump nity heat pump (\ om heat source 2 om Community h	from powe Nater) (Water) eat pump	r stations.	See Appe	ndix C.	(3			1 0.7 0.3	(303a) (303b) (304a)
Fraction of heat from Commun Fraction of heat from Commun Fraction of community heat from Fraction of total space heat from Fractor for control and charging	mal and waste heat nity heat pump nity heat pump (\ om heat source 2 om Community h g method (Table	Nater) (Water) eat pumpled (4c(3)) for	r stations. O r commu	See Appe	ndix C.	(3			1 0.7 0.3 1	(303a) (303b) (304a) (305)
Fraction of heat from Community Fraction of heat from Community heat from Fraction of total space heat from Fraction for control and charging Distribution loss factor (Table 1)	mal and waste heat nity heat pump nity heat pump (\ om heat source 2 om Community h g method (Table 12c) for commun	Water) (Water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water)	r stations. o r commu	See Appe unity hea m	ndix C. ating sys	(3			1 0.7 0.3 1 1 1.05	(303a) (303b) (304a) (305) (306)
Fraction of heat from Community Fraction of heat from Community heat from Fraction of total space heat from Fraction of total space heat from Fraction for control and charging Distribution loss factor (Table Distribution loss factor (Table Postribution l	mal and waste heat nity heat pump nity heat pump (\ om heat source 2 om Community h g method (Table 12c) for commun	Water) (Water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water)	r stations. o r commu	See Appe unity hea m	ndix C. ating sys	(3			1 0.7 0.3 1 1 1.05	(303a) (303b) (304a) (305) (306) (306)
Fraction of heat from Community Fraction of heat from Community heat from Fraction of total space heat from Fraction for control and charging Distribution loss factor (Table 1)	mal and waste heat nity heat pump () om heat source 2 om Community heat method (Table 12c) for community for commu	Water) (Water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water)	r stations. o r commu	See Appe unity hea m	ndix C. ating sys	(3			1 0.7 0.3 1 1 1.05	(303a) (303b) (304a) (305) (306) (306)
Fraction of heat from Community Fraction of heat from Community Fraction of community heat from Fraction of total space heat from Fractor for control and charging Distribution loss factor (Table of Space heating	mal and waste heat nity heat pump () ity heat pump () om heat source 2 om Community heat method (Table 12c) for community for co	Water) (Water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water) (water)	r stations. o r commu	See Appe unity hea m	ating sys	(3 tem		a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year	(303a) (303b) (304a) (305) (306) (306)
Fraction of heat from Community Fraction of heat from Community heat from Fraction of total space heat from Fraction of total space heat from Fraction for control and charging Distribution loss factor (Table Distribution loss factor (Table Space heating Annual space heating requirements)	mal and waste heat nity heat pump nity heat pump (\) om heat source 2 om Community h g method (Table 12c) for commun 12c) for commun ment heat pump	Water) (Water) (Water) (Ac(3)) for the ation ity heating ity heati	o commung syste	unity hea m m (Wate	ating syser)	(3 tem ⁽³⁰ 4a) x (308	02) x (303 5) x (306) :	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2128.29	(303a) (303b) (304a) (305) (306) (306)
Fraction of heat from Community Fraction of heat from Community heat from Fraction of total space heat from Fraction of total space heat from Fraction for control and charging Distribution loss factor (Table Distribution loss factor (Table Space heating Annual space heating requirer Space heat from Community heat from Commun	mal and waste heat nity heat pump nity heat pump (Norm heat source 2 norm Community h ng method (Table 12c) for community 12c) for community nent neat pump ementary heating	Water) (Water)	or commung systeng syste	unity hea m m (Wate	ating syser) (98) x (30)	(3 tem ⁽³⁰ 4a) x (308	02) x (303 5) x (306) s E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2128.29 2234.71	(303a) (303b) (304a) (305) (306) (306)
Fraction of heat from Community Fraction of community heat from Fraction of total space heat from Fraction of total space heat from Fractor for control and charging Distribution loss factor (Table of Space heating Annual space heating requirer Space heat from Community heating requirer Space heating requirement from Space heating requirement from Space heating requirement from	mal and waste heat nity heat pump nity heat pump (Norm heat source 2 norm Community h ng method (Table 12c) for community 12c) for community nent neat pump ementary heating	Water) (Water)	or commung systeng syste	unity hea m m (Wate	ating syser) (98) x (30)	(3 tem 04a) x (309 ppendix	02) x (303 5) x (306) s E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2128.29 2234.71 0	(303a) (303b) (304a) (305) (306) (306) (307a) (308
Fraction of heat from Community Fraction of heat from Community Fraction of community heat from Fraction of total space heat from Fraction of total space heat from Fraction for control and charging Distribution loss factor (Table of Space heating Annual space heating requirer Space heat from Community he Efficiency of secondary/supple	mal and waste heat nity heat pump nity heat pump (Norm heat source 2 nm Community h ng method (Table 12c) for community nent neat pump nementary heating nm secondary/su	Water) (Water)	or commung systeng syste	unity hea m m (Wate	ating syser) (98) x (30)	(3 tem 04a) x (309 ppendix	02) x (303 5) x (306) s E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2128.29 2234.71 0	(303a) (303b) (304a) (305) (306) (306) (307a) (308
Fraction of heat from Community Fraction of heat from Community Fraction of community heat from Fraction of total space heat from Fractor for control and charging Distribution loss factor (Table of Distribution loss factor (Table of Space heating Annual space heating requirem Space heat from Community he Efficiency of secondary/supple Space heating requirement from Water heating	mal and waste heat nity heat pump nity heat pump (Norm heat source 2 norm Community h ng method (Table 12c) for community nent neat pump nementary heating norm secondary/su	Water) (Water)	or commung systeng syste	unity hea m m (Wate	er) (98) × (36) 44a or A (98) × (36)	(3 tem 04a) x (309 ppendix 01) x 100 -	02) x (303 5) x (306) s E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2128.29 2234.71 0 0	(303a) (303b) (304a) (305) (306) (306) (307a) (308

Mater boot from boot course 2 (Mater)		(64) × (2026) ×	(205) × (206) =	574.05	(240b)
Water heat from heat source 2 (Water)			(305) x (306) =	574.05	(310b)
Electricity used for heat distribution			7e) + (310a)(310e)] =	22.35	(313)
Electricity used for heat distribution (Wa	,	0.01 × [(307a)(307	7e) + (310a)(310e)] =	19.13	(313)
Cooling System Energy Efficiency Ratio				0	(314)
Space cooling (if there is a fixed cooling		$= (107) \div (314)$) =	0	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	• ,	utside		109.48	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	0b) + (330g) =	109.48	(331)
Energy for lighting (calculated in Apper	dix L)			232.5	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)			-684.44	(333)
Electricity generated by wind turbine (A	ppendix M) (negative quar	ntity)		0	(334)
12b. CO2 Emissions – Community hea	ting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v	vater heating (not CHP)				
Efficiency of heat source 1 (%)	If there is CHP using t	wo fuels repeat (363) to	(366) for the second fu	el 300	(367a)
CO2 associated with heat source 1	[(307b)+(3	10b)] x 100 ÷ (367b) x	0.52	386.6	(367)
Electrical energy for heat distribution	[(3	313) x	0.52	11.6	(372)
Water heating from separate communit	y system				
CO2 from other sources of space and Efficiency of heat source 1 (%)		wo fuels repeat (363) to	(366) for the second fue	el 300	(367a)
Efficiency of heat source 2 (%)	If there is CHP using t	wo fuels repeat (363) to	(366) for the second fue	el 100	(367b)
CO2 associated with heat source 1	[(307b)+(3	10b)] x 100 ÷ (367b) x	0	= 231.72	(367)
CO2 associated with heat source 2	[(307b)+(3	10b)] x 100 ÷ (367b) x	0.52	297.93	(368)
Electrical energy for heat distribution	[(3	313) x	0.52	9.93	(372)
Total CO2 associated with community	systems (36	63)(366) + (368)(37	2)	937.79	(373)
CO2 associated with space heating (se	condary) (3	09) x	0	= 0	(374)
CO2 associated with water from immer	sion heater or instantaneo	us heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and v	vater heating (3	73) + (374) + (375) =		937.79	(376)
CO2 associated with electricity for pum	ps and fans within dwelling	g (331)) x	0.52	56.82	(378)
CO2 associated with electricity for light	ng (3	32))) x	0.52	= 120.67	(379)
Energy saving/generation technologies Item 1	(333) to (334) as applicab	le	0.52 x 0.01 =	-355.23	(380)
Total CO2, kg/year	sum of (376)(382) =			760.05	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			15.15	(384)
					` ′

El rating (section 14)

89.3 (385)

		User De	etails:						
Assessor Name:	Chris Hocknell			a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012			are Vei				n: 1.0.4.16	
		Property A	Address	Apartm	ent 2				
Address :									
1. Overall dwelling dime	ensions:								
Ground floor		Area	` 	(10) 4		ight(m)] ₍₂₀₎ _	Volume(m³)	_
				(1a) x		2.7	(2a) =	159.98	(3a)
·	a)+(1b)+(1c)+(1d)+(1e)+(1n) 59	9.25	(4)					_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	.(3n) =	159.98	(5)
2. Ventilation rate:	main accord	- W	- 4la - 11					ma3 may bay	
	main second heating heating	•	other	_	total			m³ per hou	_
Number of chimneys	0 + 0	+	0] = [0	X 4	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	x 2	20 =	0	(6b)
Number of intermittent fa	ns			Γ	0	X '	10 =	0	(7a)
Number of passive vents	1			Ī	0	x '	10 =	0	(7b)
Number of flueless gas fi	res			Ī	0	X 4	40 =	0	(7c)
				_					_
							Air ch	anges per ho	ur _
•	ys, flues and fans = $(6a)+(6b)+$. [0		÷ (5) =	0	(8)
Number of storeys in the	neen carried out or is intended, proce the dwelling (ns)	eea to (17), o	tnerwise d	continue tr	om (9) to ((16)		0	(9)
Additional infiltration	no awaming (no)					[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0	.25 for steel or timber frame	or 0.35 for	masonr	y constr	uction	- ,		0	(11)
	resent, use the value corresponding	to the greate	er wall are	a (after			'		_
deducting areas of openii	ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or	0.1 (sealed	d) else	enter 0				0	(12)
If no draught lobby, en	,	0.1 (00a.0.	u), 0.00	00. 0				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration	•	(0.25 - [0.2	x (14) ÷ 1	00] =			0	(15)
Infiltration rate		((8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
Air permeability value,	q50, expressed in cubic met	res per hou	ur per s	quare m	etre of e	envelope	area	3	(17)
If based on air permeabil	ity value, then (18) = [(17) ÷ 20]	+(8), otherwis	se (18) = (16)				0.15	(18)
	es if a pressurisation test has been d	one or a degi	ree air pe	rmeability	is being u	sed			_
Number of sides sheltere	ed	,	(20) = 1	0.075 x (1	10)1 -			3	(19)
Shelter factor	line abaltan fastan	·	`	`	19)] –			0.78	(20)
Infiltration rate incorporat	-	((21) = (18)) X (20) –				0.12	(21)
Infiltration rate modified f	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp		1 001 1	Aug	ОСР	000	1404	Dec		
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
, ,	1 1 2 1 2 2 2					1	I	I	
Wind Factor (22a)m = (2					ı		1 .	Ī	
(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 infiltra	ation rate (allo	owing for s	helter an	nd wind s	peed) =	(21a) x	(22a)m					
0.15	0.15 0.14	1	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effect	-	ge rate for	the appli	cable ca	se	•	•			•	<u>,</u>	— ,
	al ventilation:	Annandiy N. (22h) – (22	a) v Emy /a	auation (VEVV otho	muiaa (22h	·) = (22a)			0.5	(238
	eat pump using A							i) – (23a)			0.5	(231
	n heat recovery: 6		_					0 1.) (4		4 (00)	75.65	(230
· -	ed mechanical		1	1	- ` ` 	- 	í `	r `		- ` `) ÷ 100] 1	(24a
(24a)m= 0.27	0.27 0.26		0.25	0.23	0.23	0.23	0.24	0.25	0.25	0.26	J	(240
_ ′ 	ed mechanical		1	1	covery (i	, 	, ` `	, 		Ι ,	1	(24)
(24b)m= 0	0 0	0	0	. ,	<u> </u>	0	0	0	0	0	J	(24)
•	iouse extract \ n < 0.5 × (23b		-	•				.5 × (23b)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0	1	(240
	ventilation or	whole hou	L se nositi	ve input	ventilatio	on from	l loft	<u> </u>		<u>!</u>	J	
,	n = 1, then (24)		•	•				0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
Effective air	change rate -	enter (24a	a) or (24l	b) or (24	c) or (24	d) in bo	x (25)	-		-	_	
(25)m= 0.27	0.27 0.26	6 0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.25	0.26]	(25)
3. Heat losse	s and heat los	ss paramet	er:									
ELEMENT	Gross area (m²)	Openir		Net Ar A ,r		U-val W/m2		A X U (W/ł	()	k-value kJ/m²·		X k J/K
Doors				2	x	1.3	= [2.6				(26)
Windows Type	e 1			8.26	= x1	/[1/(1.3)+	0.04] =	10.21	=			(27)
Windows Type	e 2			4.21	= _{x1}	/[1/(1.3)+	0.04] =	5.2				(27)
Windows Type	e 3			3.21	= _{x1}	/[1/(1.3)+	0.04] =	3.97	=			(27)
Windows Type	e 4			4.37	= _{x1}	/[1/(1.3)+	0.04] =	5.4	Ħ			(27)
Rooflights				1.61	→ x1	/[1/(1.6) +	0.041 =	2.576	=			(27)
Walls Type1	38.95	20.0	15	18.9	=	0.15		2.84	=			(29)
Walls Type2	45.47	2		43.47		0.13	╡┇	5.81	╡ ┆		-	(29)
Roof					=				북 남		╣	=
11001	59.25	1.6	·	57.64	1 X	0.1		5.76				(30)
Total area of o	lomonte m²			140.0	二							(.51
	elements, m²			143.6	=							``
Party wall	elements, m²			25.95	x	0	= [0	[(32)
Party wall Party floor			todo II	25.95 59.25	x] []			(32)
Party wall Party floor * for windows and	l roof windows, us			25.95 59.25 alue calcul	x				[s given in	paragrapl	h 3.2	(32)
Party wall Party floor * for windows and *** include the area	l roof windows, us as on both sides d	of internal wa		25.95 59.25 alue calcul	x				[[s given in	paragraph	h 3.2	(32)
Party wall Party floor * for windows and ** include the area Fabric heat los	roof windows, us as on both sides o ss, W/K = S (A	of internal wa A x U)		25.95 59.25 alue calcul	x	g formula 1	/[(1/U-valu) + (32) =					(32)
Total area of e Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	l roof windows, us as on both sides o ss, W/K = S (A Cm = S(A x k	of internal wa A x U)	lls and par	25.95 59.25 alue calcul titions	5 ×	g formula 1) + (32) = ((28)	ue)+0.04] a	?) + (32a).		44.2	(32)
Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass For design assess	I roof windows, us as on both sides o ss, W/K = S (A Cm = S(A x k parameter (T sments where the	of internal wa. A x U)) TMP = Cm - e details of the	lls and par ÷ TFA) ir	25.95 59.25 alue calcul titions	X Sated using	g formula 1 (26)(30	/[(1/U-valu) + (32) = ((28) Indica	(30) + (32 tive Value:	?) + (32a). Medium	(32e) =	44.2 15258.06	(32)
Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity	roof windows, us as on both sides of ss, W/K = S (A Cm = S(A x k parameter (T sments where the ad of a detailed of	of internal wa A x U)) MP = Cm · e details of the calculation.	ils and par ÷ TFA) in	25.95 59.25 alue calcul titions n kJ/m²K	x dated using	g formula 1 (26)(30	/[(1/U-valu) + (32) = ((28) Indica	(30) + (32 tive Value:	?) + (32a). Medium	(32e) =	44.2 15258.06	(32) (32) (32) (33) (34) (35)

Total fabric he	nat loce							(33) +	(36) =			50.77	7(27)
Ventilation he		alculated	d monthly	V				. ,	= 0.33 × (25)m x (5)		58.77	(37)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 14.25	14.1	13.95	13.18	13.02	12.26	12.26	12.1	12.56	13.02	13.33	13.64		(38)
Heat transfer	coefficie	nt. W/K	1	ļ	1	1		(39)m	= (37) + (3	 38)m			
(39)m= 73.02	72.86	72.71	71.94	71.79	71.02	71.02	70.87	71.33	71.79	72.1	72.4		
	1	!		!	!		•		Average =	Sum(39) ₁	12 /12=	71.91	(39)
Heat loss para		- 							= (39)m ÷			l	
(40)m= 1.23	1.23	1.23	1.21	1.21	1.2	1.2	1.2	1.2	1.21	1.22	1.22	1.01	7(40)
Number of da	ys in mo	nth (Tab	le 1a)					•	Average =	Sum(40) _{1.}	12 /12=	1.21	(40)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31	28	31	30	31	30	31	31	30	31	30	31		(41)
	•											•	
4. Water hea	ating ene	rgy requ	irement:								kWh/ye	ear:	
A												1	
Assumed occ if TFA > 13.			(1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13.		96		(42)
if TFA £ 13.		-		,	•		, ,1	,					
Annual average	_	,	_	•	•	_	` ,		torast -		.76		(43)
Reduce the annu	_		• .		-	-	io acriieve	a water us	se largel o	1			
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage								ОСР	001	1101	DCC		
(44)m= 88.83	85.6	82.37	79.14	75.91	72.68	72.68	75.91	79.14	82.37	85.6	88.83		
	1	<u> </u>	<u> </u>	l	<u> </u>	<u> </u>	1		Total = Su	m(44) ₁₁₂ =		969.1	(44)
Energy content o	of hot water	used - cal	lculated mo	onthly = 4.	190 x Vd,r	n x nm x L	OTm / 3600	kWh/mor	nth (see Ta	ıbles 1b, 1	c, 1d)		
(45)m= 131.74	115.22	118.9	103.66	99.46	85.83	79.53	91.26	92.35	107.63	117.49	127.58		_
If instantaneous	water heati	na at point	t of use (no	o hot water	r storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =	=	1270.64	(45)
(46)m= 19.76	17.28	17.83	15.55	14.92	12.87	11.93	13.69	13.85	16.14	17.62	19.14		(46)
Water storage	1	17.03	10.00	14.32	12.07	11.95	13.09	13.03	10.14	17.02	13.14		(10)
Storage volun	ne (litres) includir	ng any so	olar or W	WHRS	storage	within sa	ame ves	sel		0		(47)
If community	heating a	and no ta	ank in dw	elling, e	nter 110	litres in	(47)					•	
Otherwise if n		hot wate	er (this ir	ncludes i	nstantar	neous co	mbi boil	ers) ente	er '0' in (47)			
Water storage			ft	:-	(1.) \ / /	- /-l\ .						ı	
a) If manufac				or is kno	WII (KVVI	i/day).					0		(48)
Temperature							(40) + (40)				0		(49)
Energy lost from b) If manufact		-	-		or is not	known:	(48) x (49)) =		1	10		(50)
Hot water stor			-							0.	02		(51)
If community	•		on 4.3										
Volume factor										1.	03		(52)
Temperature										0	.6		(53)
Energy lost fro		_	e, kWh/ye	ear			(47) x (51)) x (52) x (53) =		03		(54)
Enter (50) or	(54) IN () (CO								1.	03		(55)

	je loss cal	culated f	or each	month			((56)m = (55) × (41)r	m				
(56)m= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder conta	ins 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= 32.0°	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circu	uit loss (ar	nual) fro	m Table	3							0		(58)
Primary circ	uit loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m				•	
(modified	by factor f	rom Tab	le H5 if t	here is s	solar wat	er heatir	ng and a	cylinde	r thermo	stat)			
(59)m= 23.26	3 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	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 re	quired for	water he	eating ca	alculated	for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 187.0	2 165.15	174.17	157.15	154.74	139.32	134.81	146.54	145.85	162.91	170.98	182.86		(62)
Solar DHW inpu	ıt calculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add addition	nal 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	water hea	ter			•					•	•	'	
(64)m= 187.0	2 165.15	174.17	157.15	154.74	139.32	134.81	146.54	145.85	162.91	170.98	182.86		
	_!	<u> </u>			<u> </u>		Outp	out from wa	ater heate	r (annual)₁	12	1921.48	(64)
Heat gains f	om water	heating.	kWh/mo	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n1 + 0.8 x	([(46)m	+ (57)m	+ (59)m	1	-
(65)m= 88.02		83.75	77.26	77.29	71.33	70.67	74.57	73.5	80.01	81.86	86.64	,	(65)
include (5		culation (of (65)m	only if c	vlinder i	s in the o	lwellina Iwellina	or hot w	ater is fr	om com	munity h	l eating	
· ·	·		31 (33)	oy o	yao			0	ato: 10 11	o oo		Joanna	
		a Lahla 5	and 5a	١-									
			and 5a):									
Metabolic ga	ins (Table	5), Wat	ts		lun	1, ,1	Aug	Son	Oct	Nov	Doo		
Metabolic ga	ins (Table	5), Wat Mar	ts Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		(66)
Metabolic ga Jar (66)m= 98.02	ins (Table Feb	5), Wat Mar 98.02	ts Apr 98.02	May 98.02	98.02	98.02	98.02	98.02	Oct 98.02	Nov 98.02	Dec 98.02		(66)
Metabolic ga Jar (66)m= 98.02 Lighting gair	Feb 98.02	98.02 ted in Ap	Apr 98.02 opendix	May 98.02 ., equat	98.02 ion L9 o	98.02 r L9a), a	98.02 Iso see	98.02 Table 5	98.02	98.02	98.02		, ,
Metabolic ga Jan (66)m= 98.02 Lighting gair (67)m= 15.25	Feb 98.02 s (calcula 13.54	98.02 ted in Ap	Apr 98.02 opendix 8.34	May 98.02 _, equati 6.23	98.02 ion L9 o 5.26	98.02 r L9a), a 5.69	98.02 Iso see 7.39	98.02 Table 5 9.92	98.02				(66) (67)
Metabolic ga Jar (66)m= 98.02 Lighting gair (67)m= 15.29 Appliances g	reb 98.02 s (calcula 13.54 gains (calc	98.02 ted in Ap	Apr 98.02 ppendix 8.34 Append	May 98.02 _, equati 6.23	98.02 ion L9 o 5.26 uation L	98.02 r L9a), a 5.69 13 or L1	98.02 Iso see 7.39 3a), also	98.02 Table 5 9.92 see Tal	98.02 12.6 ble 5	98.02	98.02 15.67		(67)
Metabolic ga Jan (66)m= 98.02 Lighting gain (67)m= 15.29 Appliances (68)m= 171.0	Feb 98.02 s (calcula 13.54 gains (calc 5 172.83	98.02 ted in Ap 11.02 ulated in 168.35	Apr 98.02 ppendix 8.34 Append 158.83	May 98.02 L, equati 6.23 dix L, equati	98.02 ion L9 of 5.26 uation L 135.51	98.02 r L9a), a 5.69 13 or L1	98.02 Iso see 7.39 3a), also	98.02 Table 5 9.92 see Tal	98.02 12.6 ble 5 140.19	98.02	98.02		, ,
Metabolic ga Jar (66)m= 98.02 Lighting gair (67)m= 15.29 Appliances g	Feb 98.02 s (calcula 13.54 gains (calc 5 172.83	98.02 ted in Ap 11.02 ulated in 168.35	Apr 98.02 ppendix 8.34 Append 158.83	May 98.02 L, equati 6.23 dix L, equati	98.02 ion L9 of 5.26 uation L 135.51	98.02 r L9a), a 5.69 13 or L1	98.02 Iso see 7.39 3a), also	98.02 Table 5 9.92 see Tal	98.02 12.6 ble 5 140.19	98.02	98.02 15.67		(67) (68)
Metabolic ga Jan (66)m= 98.02 Lighting gain (67)m= 15.29 Appliances (68)m= 171.0	reb 98.02 s (calcula 13.54 gains (calcula 172.83 ns (calcula	98.02 ted in Ap 11.02 ulated in 168.35	Apr 98.02 ppendix 8.34 Append 158.83	May 98.02 L, equati 6.23 dix L, equati	98.02 ion L9 of 5.26 uation L 135.51	98.02 r L9a), a 5.69 13 or L1	98.02 Iso see 7.39 3a), also	98.02 Table 5 9.92 see Tal	98.02 12.6 ble 5 140.19	98.02	98.02 15.67		(67)
Metabolic ga Jar (66)m= 98.02 Lighting gair (67)m= 15.29 Appliances G (68)m= 171.0 Cooking gair	reb 98.02 s (calcula 13.54 gains (calcula 172.83 ns (calcula 32.8	98.02 ted in Ap 11.02 ulated in 168.35 ated in A	Apr 98.02 opendix 8.34 Append 158.83 opendix 32.8	May 98.02 L, equati 6.23 dix L, equat 146.81 L, equat	98.02 ion L9 of 5.26 uation L 135.51 ion L15	98.02 r L9a), a 5.69 13 or L1 127.97 or L15a)	98.02 Iso see 7.39 3a), also 126.19	98.02 Table 5 9.92 9 see Tal 130.66 ee Table	98.02 12.6 ble 5 140.19	98.02 14.7 152.21	98.02 15.67 163.5		(67) (68)
Metabolic ga Jar (66)m= 98.02 Lighting gair (67)m= 15.29 Appliances g (68)m= 171.0 Cooking gair (69)m= 32.8	reb 98.02 s (calcula 13.54 gains (calcula 172.83 ns (calcula 32.8	98.02 ted in Ap 11.02 ulated in 168.35 ated in A	Apr 98.02 opendix 8.34 Append 158.83 opendix 32.8	May 98.02 L, equati 6.23 dix L, equat 146.81 L, equat	98.02 ion L9 of 5.26 uation L 135.51 ion L15	98.02 r L9a), a 5.69 13 or L1 127.97 or L15a)	98.02 Iso see 7.39 3a), also 126.19	98.02 Table 5 9.92 9 see Tal 130.66 ee Table	98.02 12.6 ble 5 140.19	98.02 14.7 152.21	98.02 15.67 163.5		(67) (68)
Metabolic ga Jan (66)m= 98.02 Lighting gair (67)m= 15.29 Appliances g (68)m= 171.0 Cooking gair (69)m= 32.8 Pumps and	reb 98.02 s (calcula 13.54 gains (calcula 32.8 fans gains 0	98.02 ted in Ap 11.02 ulated in 168.35 ted in Ap 32.8 (Table 5	Apr 98.02 opendix 8.34 Append 158.83 opendix 32.8 5a)	May 98.02 L, equati 6.23 dix L, equ 146.81 L, equat 32.8	98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	98.02 Iso see 7.39 3a), also 126.19), also se 32.8	98.02 Table 5 9.92 see Tal 130.66 ee Table 32.8	98.02 12.6 ble 5 140.19 5 32.8	98.02 14.7 152.21 32.8	98.02 15.67 163.5		(67) (68) (69)
Metabolic ga [66]m= 98.02 Lighting gair (67)m= 15.25 Appliances (68)m= 171.0 Cooking gair (69)m= 32.8 Pumps and (70)m= 0	reb service se	98.02 ted in Ap 11.02 ulated in 168.35 ted in Ap 32.8 (Table 5	Apr 98.02 opendix 8.34 Append 158.83 opendix 32.8 5a)	May 98.02 L, equati 6.23 dix L, equ 146.81 L, equat 32.8	98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	98.02 Iso see 7.39 3a), also 126.19), also se 32.8	98.02 Table 5 9.92 see Tal 130.66 ee Table 32.8	98.02 12.6 ble 5 140.19 5 32.8	98.02 14.7 152.21 32.8	98.02 15.67 163.5		(67) (68) (69)
Metabolic gas Jar (66)m= 98.02 Lighting gair (67)m= 15.29 Appliances g (68)m= 171.0 Cooking gair (69)m= 32.8 Pumps and f (70)m= 0 Losses e.g.	Feb 98.02	98.02 ted in Ap 11.02 ulated in 168.35 ated in A 32.8 (Table 5 0 on (negating 1-78.41	Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8 5a) 0	May 98.02 L, equati 6.23 dix L, equati 146.81 L, equati 32.8 0 es) (Tab	98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	98.02 Iso see 7.39 3a), also 126.19 0, also se 32.8	98.02 Table 5 9.92 see Tal 130.66 ee Table 32.8	98.02 12.6 ble 5 140.19 5 32.8	98.02 14.7 152.21 32.8	98.02 15.67 163.5 32.8		(67) (68) (69) (70)
Metabolic gas [66]m= 98.02 Lighting gair [67]m= 15.29 Appliances (68)m= 171.0 Cooking gair [69]m= 32.8 Pumps and from the cooking gair [70]m= 0 Losses e.g. [71]m= -78.4	revaporation of the page 1 of the page 1 of the page 2 of the page 2 of the page 3 of	98.02 ted in Ap 11.02 ulated in 168.35 ated in A 32.8 (Table 5 0 on (negating 1-78.41	Apr 98.02 ppendix 8.34 Append 158.83 ppendix 32.8 5a) 0	May 98.02 L, equati 6.23 dix L, equati 146.81 L, equati 32.8 0 es) (Tab	98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8	98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8	98.02 Iso see 7.39 3a), also 126.19 0, also se 32.8	98.02 Table 5 9.92 see Tal 130.66 ee Table 32.8	98.02 12.6 ble 5 140.19 5 32.8	98.02 14.7 152.21 32.8	98.02 15.67 163.5 32.8		(67) (68) (69) (70)
Metabolic gas Jar (66)m= 98.02 Lighting gair (67)m= 15.29 Appliances g (68)m= 171.0 Cooking gair (69)m= 32.8 Pumps and f (70)m= 0 Losses e.g. (71)m= -78.4 Water heatir (72)m= 118.3	Table Feb 98.02	98.02 ted in Ap 11.02 ulated in 168.35 ted in Ap 32.8 (Table 5 0 n (negation of the context) -78.41 able 5) 112.57	Apr 98.02 ppendix 8.34 Append 158.83 opendix 32.8 5a) 0 tive valu	May 98.02 L, equati 6.23 dix L, equ 146.81 L, equat 32.8 0 es) (Tab	98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8 0 le 5) -78.41	98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8 0	98.02 Iso see 7.39 3a), also 126.19 0, also se 32.8 0	98.02 Table 5 9.92 see Tal 130.66 ee Table 32.8 0 -78.41	98.02 12.6 ble 5 140.19 5 32.8 0 -78.41	98.02 14.7 152.21 32.8 0 -78.41 113.69	98.02 15.67 163.5 32.8 0 -78.41		(67) (68) (69) (70) (71)
Metabolic ga Jar (66)m= 98.02 Lighting gair (67)m= 15.29 Appliances G (68)m= 171.0 Cooking gair (69)m= 32.8 Pumps and G (70)m= 0 Losses e.g. (71)m= -78.4 Water heatin	Table Feb 98.02	98.02 ted in Ap 11.02 ulated in 168.35 ted in Ap 32.8 (Table 5 0 n (negation of the context) -78.41 able 5) 112.57	Apr 98.02 ppendix 8.34 Append 158.83 opendix 32.8 5a) 0 tive valu	May 98.02 L, equati 6.23 dix L, equ 146.81 L, equat 32.8 0 es) (Tab	98.02 ion L9 of 5.26 uation L 135.51 ion L15 32.8 0 le 5) -78.41	98.02 r L9a), a 5.69 13 or L1 127.97 or L15a) 32.8 0	98.02 Iso see 7.39 3a), also 126.19 0, also se 32.8 0	98.02 Table 5 9.92 see Tal 130.66 ee Table 32.8 0 -78.41	98.02 12.6 ble 5 140.19 5 32.8 0 -78.41	98.02 14.7 152.21 32.8 0 -78.41 113.69	98.02 15.67 163.5 32.8 0 -78.41		(67) (68) (69) (70) (71)

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

Orientation: Access Fact Table 6d	tor	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	X	4.21	x	11.28	x	0.55	x	0.7	=	12.67	(75)
Northeast _{0.9x} 0.77	×	4.21	x	22.97	x	0.55	x	0.7	=	25.8	(75)
Northeast 0.9x 0.77	×	4.21	x	41.38	x	0.55	x	0.7] =	46.48	(75)
Northeast 0.9x 0.77	×	4.21	x	67.96	x	0.55	x	0.7] =	76.33	(75)
Northeast 0.9x 0.77	X	4.21	x	91.35	x	0.55	x	0.7	=	102.6	(75)
Northeast 0.9x 0.77	x	4.21	x	97.38	x	0.55	x	0.7] =	109.39	(75)
Northeast 0.9x 0.77	X	4.21	x	91.1	X	0.55	x	0.7	=	102.33	(75)
Northeast 0.9x 0.77	x	4.21	x	72.63	x	0.55	x	0.7	=	81.58	(75)
Northeast _{0.9x} 0.77	×	4.21	x	50.42	x	0.55	x	0.7] =	56.63	(75)
Northeast 0.9x 0.77	x	4.21	x	28.07	x	0.55	x	0.7	=	31.53	(75)
Northeast _{0.9x} 0.77	X	4.21	x	14.2	x	0.55	x	0.7	=	15.95	(75)
Northeast 0.9x 0.77	X	4.21	x	9.21	x	0.55	x	0.7] =	10.35	(75)
Northwest 0.9x 0.77	x	8.26	x	11.28	x	0.55	x	0.7	=	24.87	(81)
Northwest 0.9x 0.77	X	3.21	x	11.28	x	0.55	x	0.7	=	9.66	(81)
Northwest 0.9x 0.77	×	4.37	x	11.28	x	0.55	x	0.7	=	13.16	(81)
Northwest 0.9x 0.77	X	8.26	x	22.97	x	0.55	x	0.7	=	50.61	(81)
Northwest 0.9x 0.77	X	3.21	x	22.97	x	0.55	x	0.7	=	19.67	(81)
Northwest 0.9x 0.77	X	4.37	x	22.97	x	0.55	x	0.7	=	26.78	(81)
Northwest 0.9x 0.77	x	8.26	x	41.38	X	0.55	X	0.7	=	91.19	(81)
Northwest 0.9x 0.77	x	3.21	x	41.38	X	0.55	x	0.7] =	35.44	(81)
Northwest 0.9x 0.77	x	4.37	x	41.38	x	0.55	x	0.7] =	48.25	(81)
Northwest 0.9x 0.77	X	8.26	x	67.96	x	0.55	x	0.7	=	149.76	(81)
Northwest 0.9x 0.77	X	3.21	x	67.96	x	0.55	x	0.7	=	58.2	(81)
Northwest 0.9x 0.77	X	4.37	x	67.96	x	0.55	x	0.7	=	79.23	(81)
Northwest 0.9x 0.77	X	8.26	x	91.35	X	0.55	X	0.7	=	201.31	(81)
Northwest 0.9x 0.77	X	3.21	x	91.35	X	0.55	X	0.7	=	78.23	(81)
Northwest 0.9x 0.77	X	4.37	X	91.35	X	0.55	X	0.7	=	106.5	(81)
Northwest 0.9x 0.77	X	8.26	x	97.38	X	0.55	X	0.7	=	214.62	(81)
Northwest 0.9x 0.77	X	3.21	x	97.38	X	0.55	X	0.7	=	83.4	(81)
Northwest 0.9x 0.77	X	4.37	x	97.38	X	0.55	X	0.7	=	113.54	(81)
Northwest 0.9x 0.77	X	8.26	x	91.1	X	0.55	X	0.7	=	200.77	(81)
Northwest 0.9x 0.77	X	3.21	x	91.1	X	0.55	X	0.7	=	78.02	(81)
Northwest 0.9x 0.77	X	4.37	X	91.1	X	0.55	X	0.7	=	106.22	(81)
Northwest 0.9x 0.77	X	8.26	x	72.63	X	0.55	X	0.7	=	160.06	(81)
Northwest 0.9x 0.77	X	3.21	x	72.63	x	0.55	x	0.7	=	62.2	(81)
Northwest 0.9x 0.77	X	4.37	x	72.63	x	0.55	x	0.7	=	84.68	(81)
Northwest 0.9x 0.77	X	8.26	x	50.42	x	0.55	x	0.7	=	111.12	(81)
Northwest 0.9x 0.77	X	3.21	x	50.42	x	0.55	x	0.7] =	43.18	(81)
Northwest 0.9x 0.77	X	4.37	×	50.42	x	0.55	X	0.7	=	58.79	(81)

Northwest 0.9x	0.77	×	8.26		, [28.07	7 x	0.55	×	0.7		61.85	(81)
Northwest 0.9x	0.77	$=$ $\frac{1}{x}$	3.21		<u>`</u>	28.07	」 ^] x	0.55	-	0.7	-	24.04	(81)
Northwest 0.9x	0.77	$=$ $\frac{1}{x}$	4.37	 	<u>`</u>	28.07	」 ^] x	0.55	^ x	0.7	╡ .	32.72	(81)
Northwest _{0.9x}	0.77	×	8.26		` <u> </u>	14.2]	0.55	i x	0.7	= =	31.29	(81)
Northwest _{0.9x}	0.77	×	3.21		, <u> </u>	14.2] x	0.55	→ ×	0.7	╡ .	12.16	(81)
Northwest 0.9x	0.77	×	4.37	 	,	14.2]]	0.55	×	0.7	= =	16.55	(81)
Northwest 0.9x	0.77	X	8.26		,	9.21]]	0.55	→ ×	0.7	= =	20.31	(81)
Northwest _{0.9x}	0.77	×	3.21	\dashv	,	9.21	X	0.55	→ ×	0.7	_ =	7.89	(81)
Northwest _{0.9x}	0.77	x	4.37		, 🗀	9.21	X	0.55	×	0.7	=	10.74	(81)
Rooflights 0.9x	1	×	1.61		, <u> </u>	26	j x	0.55	×	0.8		16.58	(82)
Rooflights _{0.9x}	1	×	1.61		, <u> </u>	54	X	0.55	×	0.8	_	34.43	(82)
Rooflights 0.9x	1	x	1.61		, <u> </u>	96	X	0.55	×	0.8	=	61.21	(82)
Rooflights 0.9x	1	x	1.61	=	·	150	X	0.55	x	0.8	=	95.63	(82)
Rooflights _{0.9x}	1	×	1.61		⟨ 🗀	192	X	0.55	×	0.8	=	122.41	(82)
Rooflights _{0.9x}	1	x	1.61		· _	200	X	0.55	x	0.8	=	127.51	(82)
Rooflights _{0.9x}	1	x	1.61		(189	X	0.55	x	0.8	=	120.5	(82)
Rooflights _{0.9x}	1	X	1.61		(157	X	0.55	X	0.8	=	100.1	(82)
Rooflights _{0.9x}	1	X	1.61		(115	X	0.55	x	0.8	=	73.32	(82)
Rooflights _{0.9x}	1	X	1.61		·	66	X	0.55	X	0.8	=	42.08	(82)
Rooflights 0.9x	1	X	1.61		(33	X	0.55	X	0.8	=	21.04	(82)
Rooflights 0.9x	1	X	1.61		(21	X	0.55	X	0.8	=	13.39	(82)
Solar gains in							T T	n = Sum(74)m .			I	1	(22)
(83)m= 76.93		82.56		11.06	648.4		488	.61 343.04	192.2	96.98	62.68		(83)
Total gains – ii			` 	'	• •		1	00 000 40	504.0	- 1 400 00	140.70	I	(94)
(84)m= 433.95	LL_	26.91		20.4	940.7	2 888.88	774	.82 638.12	504.9	429.99	410.72		(84)
7. Mean inter				·									_
Temperature	•	•			-		ble 9	, Th1 (°C)				21	(85)
Utilisation fac		- 1			<u> </u>			-		T	_	Ī	
Jan		Mar		May	Jur	+	+	ug Sep	Oct	+	Dec		
(86)m= 1	0.99	0.96	0.87	0.68	0.48	0.35	0.4	0.71	0.95	0.99	1		(86)
Mean interna			_	`		-i	_	<u> </u>			1	1	
(87)m= 19.77	19.96	20.3	20.7 2	0.93	20.99	21	2	1 20.94	20.58	20.1	19.74		(87)
Temperature	during hea	iting pe	eriods in re	est of o	dwellii	ng from Ta	able 9	9, Th2 (°C)					
(88)m= 19.89	19.9	19.9	19.91 1	9.91	19.92	19.92	19.	92 19.92	19.91	19.91	19.9		(88)
Utilisation fac	tor for gain	s for r	est of dwe	lling, h	2,m (see Table	9a)						
(89)m= 0.99	0.99	0.95	0.83	0.61	0.4	0.27	0.3	0.62	0.92	0.99	1		(89)
Mean interna	I temperatu	ıre in t	he rest of	dwelli	ng T2	(follow ste	eps 3	to 7 in Tabl	e 9c)				
(90)m= 18.28		19.04		9.85	19.91	`	19.		19.44	18.76	18.23		(90)
						•	•	·	LA = Liv	ving area ÷ (4) =	0.47	(91)

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

(92)m= 18.97 19.21 19.63 20.11 20.35	20.42	20.42	20.42	20.37	19.97	19.39	18.94		(92)
Apply adjustment to the mean internal temperate	ture fror	n Table	4e, whe	ere appro	priate				
` '	20.42	20.42	20.42	20.37	19.97	19.39	18.94		(93)
8. Space heating requirement									
Set Ti to the mean internal temperature obtaine the utilisation factor for gains using Table 9a	ed at ste	p 11 of	l able 9	o, so tha	t li,m=(76)m an	d re-calc	ulate	
Jan Feb Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation factor for gains, hm:									
(94)m= 0.99 0.98 0.95 0.84 0.64	0.43	0.3	0.37	0.66	0.92	0.98	0.99		(94)
Useful gains, hmGm , W = (94)m x (84)m									
` '	408.88	271.02	283.77	419.88	466.08	423.02	408.09		(95)
Monthly average external temperature from Tab		16.6	16.4	14.1	10.6	7.1	40		(06)
(96)m= 4.3 4.9 6.5 8.9 11.7 Heat loss rate for mean internal temperature, Li	14.6 m	16.6	16.4	14.1	10.6	7.1	4.2		(96)
	413.15	271.61	285.16	447.19	672.98	885.79	1067		(97)
Space heating requirement for each month, kW	l /h/montl			I)m – (95)m] x (4	1)m			
(98)m= 476.97 362.3 267.25 106.21 25.13	0	0	0	0	153.93	333.2	490.22		
			Tota	l per year	(kWh/year) = Sum(9	8) _{15,912} =	2215.21	(98)
Space heating requirement in kWh/m²/year							ĺ	37.39	(99)
9b. Energy requirements – Community heating s	cheme								
This part is used for space heating, space coolin						unity sch	neme.		_
Fraction of space heat from secondary/supplement	entary h	eating (Table 1	1) '0' if n	one			0	(301)
Fraction of space heat from community system 1	1 – (301) =						1	(302)
The community scheme may obtain heat from several source			allows for	CHP and t	up to four o	other heat	sources: tl		
includes boilers, heat pumps, geothermal and waste heat fro Fraction of heat from Community heat pump	om power	stations !						ne latter	
Fraction of heat from Community heat pump (Wa		olaliono. C	See Appei	ndix C.					(303a)
reaction of neat norm Community neat pump (vva	ator)	otatione.	See Appei	ndix C.			 	1	(303a)
Erection of community heat from heat course 2 (,	olano no.	See Appei	ndix C.				0.7	(303a)
Fraction of community heat from heat source 2 (Water)		See Appei	ndix C.	(0)	00) (000	[0.7	(303a) (303b)
Fraction of total space heat from Community hea	Water) at pump					02) x (303	[0.7	(303a) (303b) (304a)
·	Water) at pump					02) x (303	[0.7	(303a) (303b)
Fraction of total space heat from Community hea	Water) at pump c(3)) for	commu	inity hea			02) x (303.	[1 0.7 0.3	(303a) (303b) (304a)
Fraction of total space heat from Community hear Factor for control and charging method (Table 4d	Water) at pump c(3)) for y heatin	commu	inity hea	ating sys		02) x (303	[1 0.7 0.3 1	(303a) (303b) (304a) (305)
Fraction of total space heat from Community heat Factor for control and charging method (Table 4d Distribution loss factor (Table 12c) for community	Water) at pump c(3)) for y heatin	commu	inity hea	ating sys		02) x (303	[1 0.7 0.3 1 1 1.05	(303a) (303b) (304a) (305) (306) (306)
Fraction of total space heat from Community heat Factor for control and charging method (Table 4d Distribution loss factor (Table 12c) for community Distribution loss factor (Table 12c) for community	Water) at pump c(3)) for y heatin	commu	inity hea	ating sys		02) x (303	[1 0.7 0.3 1 1 1.05	(303a) (303b) (304a) (305) (306) (306)
Fraction of total space heat from Community heat Factor for control and charging method (Table 4d Distribution loss factor (Table 12c) for community Distribution loss factor (Table 12c) for community Space heating	Water) at pump c(3)) for y heatin	commu	inity hea	ating sys er)			a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year	(303a) (303b) (304a) (305) (306) (306)
Fraction of total space heat from Community heat Factor for control and charging method (Table 4d Distribution loss factor (Table 12c) for community Distribution loss factor (Table 12c) for community Space heating Annual space heating requirement	Water) at pump c(3)) for y heatin y heatin	commu ng syster ng syster	inity hea n n (Wate	ating sys er) (98) x (30	tem 04a) x (305	5) x (306) =	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2215.21	(303a) (303b) (304a) (305) (306) (306)
Fraction of total space heat from Community heat Factor for control and charging method (Table 4d Distribution loss factor (Table 12c) for community Distribution loss factor (Table 12c) for community Space heating Annual space heating requirement Space heat from Community heat pump	Water) at pump c(3)) for y heatin y heatin	commung systering systering	inity hea n n (Wate m Table	er) (98) x (30 e 4a or A	tem 04a) x (305	5) x (306) = E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2215.21 2325.97	(303a) (303b) (304a) (305) (306) (306)
Fraction of total space heat from Community heat Factor for control and charging method (Table 4d Distribution loss factor (Table 12c) for community Distribution loss factor (Table 12c) for community Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating s Space heating requirement from secondary/supplementary	Water) at pump c(3)) for y heatin y heatin	commung systering systering	inity hea n n (Wate m Table	er) (98) x (30 e 4a or A	tem 04a) x (308 ppendix	5) x (306) = E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2215.21 2325.97 0	(303a) (303b) (304a) (305) (306) (306) (307a) (308
Fraction of total space heat from Community heat Factor for control and charging method (Table 4d Distribution loss factor (Table 12c) for community Distribution loss factor (Table 12c) for community Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating s	Water) at pump c(3)) for y heatin y heatin	commung systering systering	inity hea n n (Wate m Table	er) (98) x (30 e 4a or A	tem 04a) x (308 ppendix	5) x (306) = E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2215.21 2325.97 0	(303a) (303b) (304a) (305) (306) (306) (307a) (308
Fraction of total space heat from Community heat Factor for control and charging method (Table 4d Distribution loss factor (Table 12c) for community Distribution loss factor (Table 12c) for community Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating s Space heating requirement from secondary/supplementary Water heating	Water) at pump c(3)) for y heatin y heatin	commung systeming systeming systeming systeming materials and the communication of the commun	inity hea n n (Wate m Table	(98) x (30 e 4a or A (98) x (30	tem 04a) x (308 ppendix	5) x (306) = E) - (308) =	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 2215.21 2325.97 0 0	(303a) (303b) (304a) (305) (306) (306) (307a) (308

Motor boot from boot course 2 (Motor)		(64) v (2020) v	(205) × (206) =	005.07	(310b)
Water heat from heat source 2 (Water)			(305) x (306) =	605.27	╡`
Electricity used for heat distribution		-, , ,	'e) + (310a)(310e)] =	23.26	(313)
Electricity used for heat distribution (Wa	,	0.01 × [(307a)(307	'e) + (310a)(310e)] =	20.18	(313)
Cooling System Energy Efficiency Ratio				0	(314)
Space cooling (if there is a fixed cooling	,	= (107) ÷ (314)) =	0	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	• · · · · · ·	utside		129.3	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =	129.3	(331)
Energy for lighting (calculated in Appen	dix L)			269.31	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)			-684.44	(333)
Electricity generated by wind turbine (A	ppendix M) (negative quar	ntity)		0	(334)
12b. CO2 Emissions – Community hea	ting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v					
Efficiency of heat source 1 (%)	If there is CHP using t	wo fuels repeat (363) to	(366) for the second fue	300	(367a)
CO2 associated with heat source 1	[(307b)+(3	10b)] x 100 ÷ (367b) x	0.52	402.39	(367)
Electrical energy for heat distribution	[(3	313) x	0.52	12.07	(372)
Water heating from separate communit	y system				
CO2 from other sources of space and Efficiency of heat source 1 (%)		wo fuels repeat (363) to	(366) for the second fue	el 300	(367a)
Efficiency of heat source 2 (%)	If there is CHP using t	wo fuels repeat (363) to	(366) for the second fue	el 100	(367b)
CO2 associated with heat source 1	[(307b)+(3	10b)] x 100 ÷ (367b) x	0	244.33	(367)
CO2 associated with heat source 2	[(307b)+(3	10b)] x 100 ÷ (367b) x	0.52	314.13	(368)
Electrical energy for heat distribution	[(3	313) x	0.52	10.47	(372)
Total CO2 associated with community s	systems (30	63)(366) + (368)(37	2)	983.4	(373)
CO2 associated with space heating (se	condary) (30	09) x	0	= 0	(374)
CO2 associated with water from immer	sion heater or instantaneo	us heater (312) x	0.52	0	(375)
Total CO2 associated with space and v	vater heating (3	73) + (374) + (375) =		983.4	(376)
CO2 associated with electricity for pum	ps and fans within dwelling	g (331)) x	0.52	67.11	(378)
CO2 associated with electricity for light	ing (3	32))) x	0.52	139.77	(379)
Energy saving/generation technologies Item 1	(333) to (334) as applicab	le	0.52 x 0.01 =	-355.23	(380)
Total CO2, kg/year	sum of (376)(382) =	L		835.05	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			14.09	(384)
3					 '

El rating (section 14)

89.27 (385)

		User [Details:						
Assessor Name:	Chris Hocknell		Strom	a Num	ber:		STRO	016363	
Software Name:	Stroma FSAP 2012		Softwa	-				n: 1.0.4.16	
		Property	Address	: Apartm	ent 3				
Address :									
1. Overall dwelling dime	ensions:								
Ground floor			a(m²)	(40) v		ight(m)	7(20) -	Volume(m³)	_
	N. (41 N. (4			(1a) x		2.7	(2a) =	196.69	(3a)
	a)+(1b)+(1c)+(1d)+(1e)+(1n)	72.85	(4)					_
Dwelling volume				(3a)+(3b)+(3c)+(3c	d)+(3e)+	(3n) =	196.69	(5)
2. Ventilation rate:	main accord		a Alba y		total			ma3 may bay	
	main second heating heating		other		total			m³ per hou	_
Number of chimneys	0 + 0	+	0	_ = [0	X	40 =	0	(6a)
Number of open flues	0 + 0	+	0] = [0	X :	20 =	0	(6b)
Number of intermittent fa	ins				0	X	10 =	0	(7a)
Number of passive vents	3			Ī	0	x '	10 =	0	(7b)
Number of flueless gas fi	ires			Ī	0	x -	40 =	0	(7c)
				<u> </u>					
							Air ch	anges per ho	ur
	ys, flues and fans = (6a)+(6b)-				0		÷ (5) =	0	(8)
If a pressurisation test has be Number of storeys in the	peen carried out or is intended, proc he dwelling (ns)	eed to (17),	otherwise (continue fr	om (9) to	(16)		0	(9)
Additional infiltration	ne aweiling (113)					[(9)	-1]x0.1 =	0	(10)
	.25 for steel or timber frame	or 0.35 fo	r masoni	ry constr	uction	L(°)	•	0	(11)
	resent, use the value corresponding	to the grea	ter wall are	a (after					_
deducting areas of openii	_{ngs); if equal user 0.35} floor, enter 0.2 (unsealed) or	0.1 (seale	ed) else	enter 0				0	(12)
If no draught lobby, en	,	0.1 (00an	ou), 0.00	Oritor o				0	(13)
•	s and doors draught stripped							0	(14)
Window infiltration			0.25 - [0.2	2 x (14) ÷ 1	00] =			0	(15)
Infiltration rate			(8) + (10)	+ (11) + (1	12) + (13)	+ (15) =		0	(16)
•	q50, expressed in cubic met	•	•	•	etre of e	envelope	area	3	(17)
·	lity value, then $(18) = [(17) \div 20]$							0.15	(18)
Number of sides sheltere	es if a pressurisation test has been o	one or a de	gree air pe	rmeability	is being u	sed		3	(19)
Shelter factor	,u		(20) = 1 -	[0.075 x (19)] =			0.78	(20)
Infiltration rate incorporate	ting shelter factor		(21) = (18) x (20) =				0.12	(21)
Infiltration rate modified f	or monthly wind speed								_
Jan Feb	Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								
(22)m= 5.1 5	4.9 4.4 4.3 3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2.	2)m ÷ 4								
	1.23 1.1 1.08 0.95	0.95	0.92	1	1.08	1.12	1.18		
,	1 1111 9.00		1	<u> </u>			1	I	

Adjusted infilti	ration rat	e (allowi	ing for sh	nelter an	ıd wind s	speed) =	: (21a) x	(22a)m					
0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.12	0.12	0.13	0.14]	
Calculate effe		_	rate for t	he appli	cable ca	se							
If mechanic												0.5	(23
If exhaust air h		0		, ,	,	. `	,, .	`	o) = (23a)			0.5	(23)
If balanced wit		-		_								75.65	(23
a) If balance			1		1	- ` ` 	- ^ ` -	ŕ	- 		- ` `) ÷ 100]	
(24a)m= 0.27	0.27	0.26	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.25	0.26]	(24
b) If balance	1	anical ve	entilation		heat red	covery (I	MV) (24k	o)m = (22	2b)m + (2	23b)		7	
(24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
c) If whole h	nouse ex m < 0.5 ×			•	•				.5 × (23b)		_	
(24c)m= 0	0	0	0	0	0	0	0	0	0	0	0		(24
d) If natural if (22b)r	ventilation m = 1, the								0.5]				
(24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(24
Effective air	r change	rate - er	nter (24a) or (24b	o) or (24	c) or (24	ld) in bo	x (25)			•	-	
(25)m= 0.27	0.27	0.26	0.25	0.25	0.23	0.23	0.23	0.24	0.25	0.25	0.26]	(25
3. Heat losse	e and he	at loss i	naramet	or.	•	•		•	,		•		
ELEMENT	Gros area	ss	Openin m	ıgs	Net Ar A ,r		U-val W/m2		A X U (W/ł	〈)	k-value		A X k kJ/K
Doors		,			2	x	1.3	=	2.6	$\stackrel{\prime}{\Box}$			(26
Windows Type	e 1				7.1	x1	 /[1/(1.3)+	0.04] =	8.77				(27
Windows Type	e 2				9.86	x1	/[1/(1.3)+	0.04] =	12.18				(27
Windows Type	e 3				7.48	x1	/[1/(1.3)+	0.04] =	9.24				(27
Windows Type					1.53	<u> </u>	/[1/(1.3) +	0.04] =	1.89				(27
Rooflights					1.14	=	·		1.824	=			(27
Walls Type1	40.5	; <u>o</u>	25.9	7	14.6	=	0.15		2.19	=			(29
Walls Type1	56.9			<u>′</u>		=		-		ᆿ 片		╡	(29
Roof			2		54.98	=	0.13	_	7.34	ᆿ ¦		_	=
	72.8		1.14	·	71.7		0.1	=	7.17				(30
Total area of	elements	, 111-			170.4	=							(31
Party wall					23.2	=	0	=	0			_	(32
Party floor					72.85					L L			(32
* for windows and ** include the are						ated using	g formula 1	1/[(1/U-valu	ue)+0.04] a	ıs given in	paragrapi	n 3.2	
abric heat lo							(26)(30) + (32) =				53.11	(33
		,	•					((28).	(30) + (32	2) + (32a).	(32e) =	17245.49	===
	CIII - S($\neg \land \land)$							-				, ,
Heat capacity		,	P = Cm ÷	÷ TFA) ir	า kJ/m²K	,		Indica	ative Value:	Medium		250	(35
Heat capacity Thermal mass For design asses	s parame	ter (TMF	etails of the	,			recisely the				able 1f	250	(35
Heat capacity Thermal mass For design asses can be used inste Thermal bridg	s parame sments wh	eter (TMF ere the de tailed calc	etails of the rulation.	construct	ion are no	t known p	recisely the				able 1f	250	(35

Total fabric heat loss			(33) +	(36) =		İ	69.42	(37)
Ventilation heat loss calculated monthly			. ,	` /	25)m x (5)		09.42	(01)
Jan Feb Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 17.52 17.33 17.15 16.2 16.01 15.07	15.07	14.88	15.45	16.01	16.39	16.77		(38)
Heat transfer coefficient, W/K	1	1	(39)m	= (37) + (37)	38)m		l	
(39)m= 86.94 86.76 86.57 85.62 85.43 84.49	84.49	84.3	84.87	85.43	85.81	86.19		
Heat loss parameter (HLP), W/m²K	•	•		Average = = (39)m ÷	Sum(39) _{1.}	12 /12=	85.58	(39)
(40)m= 1.19 1.19 1.18 1.17 1.16	1.16	1.16	1.16	1.17	1.18	1.18		
Number of days in month (Table 1a)	•	•	,	Average =	Sum(40) ₁ .	12 /12=	1.17	(40)
Jan Feb Mar Apr May Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28 31 30 31 30	31	31	30	31	30	31		(41)
	•						l	
4. Water heating energy requirement:						kWh/ye	ear:	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (T	FΔ -13 9	1)2)1 + 0 (0013 x (ΓFΔ -13		31		(42)
if TFA £ 13.9, N = 1	1 A - 10.5	<i>,,,</i> 2,,, . 0.0) X 010 X (1174-10.	3)			
Annual average hot water usage in litres per day Vd,av						.14		(43)
Reduce the annual average hot water usage by 5% if the dwelling is not more that 125 litres per person per day (all water use, hot and or	_	to achieve	a water us	se target o	f			
	·	۸	Con	Oat	Nov	Daa		
Jan Feb Mar Apr May Jun Hot water usage in litres per day for each month Vd,m = factor from	Jul Table 1c x	Aug (43)	Sep	Oct	Nov	Dec		
(44)m= 98.05 94.49 90.92 87.36 83.79 80.23	80.23	83.79	87.36	90.92	94.49	98.05		
(17)	1 00.20	30.73			m(44) ₁₁₂ =		1069.69	(44)
Energy content of hot water used - calculated monthly = 4.190 x Vd,	m x nm x L	DTm / 3600			. ,			`
(45)m= 145.41 127.18 131.24 114.42 109.78 94.74	87.79	100.74	101.94	118.8	129.68	140.82		
				Total = Su	m(45) ₁₁₂ =		1402.53	(45)
If instantaneous water heating at point of use (no hot water storage)	, enter 0 in	boxes (46,) to (61)		Г	ı	ı	
(46)m= 21.81 19.08 19.69 17.16 16.47 14.21	13.17	15.11	15.29	17.82	19.45	21.12		(46)
Water storage loss: Storage volume (litres) including any solar or WWHRS	storage	within sa	ame ves	sel		0		(47)
If community heating and no tank in dwelling, enter 11	•		arric voo	501		0		(47)
Otherwise if no stored hot water (this includes instanta		• •	ers) ente	er '0' in <i>(</i>	47)			
Water storage loss:			,	`	,			
a) If manufacturer's declared loss factor is known (kW	h/day):					0		(48)
Temperature factor from Table 2b						0		(49)
Energy lost from water storage, kWh/year		(48) x (49)) =		1	10		(50)
b) If manufacturer's declared cylinder loss factor is no							1	<i>(</i> - <i>(</i>)
Hot water storage loss factor from Table 2 (kWh/litre/d If community heating see section 4.3	ay)				0.	02		(51)
Volume factor from Table 2a					1	03		(52)
Temperature factor from Table 2b					—	.6		(53)
Energy lost from water storage, kWh/year		(47) x (51)) x (52) x (53) =	1.	03		(54)
Enter (50) or (54) in (55)						03		(55)
							•	

Water	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylind	er contains	dedicate	d solar sto	rage, (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=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Prima	v circuit	loss (ar	nual) fro	m Table	3							0		(58)
	•	`	culated t			59)m = ((58) ÷ 36	65 × (41)	m				'	
(mo	dified by	factor fi	rom 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)
Comb	i loss ca	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 h	neat requ	uired for	water he	eating ca	alculated	l for eac	h month	(62)m =	0.85 × ((45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m=	200.69	177.11	186.51	167.91	165.06	148.23	143.06	156.01	155.43	174.08	183.17	196.1		(62)
Solar D	HW input of	alculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	if no sola	r contribut	ion to wate	er heating)	•	
(add a	dditiona	lines if	FGHRS	and/or \	VWHRS	applies	, see Ap	pendix (€)					
(63)m=	0	0	0	0	0	0	0	0	0	0	0	0		(63)
Outpu	t from w	ater hea	ter	-		-	-	-			-	-		
(64)m=	200.69	177.11	186.51	167.91	165.06	148.23	143.06	156.01	155.43	174.08	183.17	196.1		
			•			•		Outp	out from wa	ater heate	r (annual)	12	2053.37	(64)
Heat o	jains froi	n water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m=	92.57	82.23	87.86	80.84	80.72	74.29	73.41	77.70	70.00	00.70	05.04	04.05		(65)
				00.0	00.72	17.25	13.41	77.72	76.69	83.72	85.91	91.05		(00)
inclu	ude (57)ı	m in cald	culation of	<u> </u>		l .		<u> </u>			<u> </u>		eating	(00)
	. ,		culation o	of (65)m	only if c	l .		<u> </u>			<u> </u>		eating	(00)
5. In	ternal ga	ins (see	culation of Table 5	of (65)m and 5a	only if c	l .		<u> </u>			<u> </u>		eating	(00)
5. In	ternal ga	ins (see	culation o	of (65)m and 5a	only if c	l .		<u> </u>			<u> </u>		eating	(00)
5. In	ternal ga	ins (see	culation of Table 5	of (65)m and 5a	only if c	ylinder i	s in the o	dwelling	or hot w	ater is fr	om com	munity h	eating	(66)
5. In Metab	olic gain Jan 115.66	s (Table Feb 115.66	culation of Table 5 (5), Wat Mar	of (65)m 5 and 5a ts Apr 115.66	only if constant of the consta	ylinder is Jun 115.66	Jul 115.66	Aug 115.66	or hot w Sep 115.66	ater is fr	om com	munity h	eating	
5. In Metab	olic gain Jan 115.66	s (Table Feb 115.66	e Table 5 e 5), Wat Mar	of (65)m 5 and 5a ts Apr 115.66	only if constant of the consta	ylinder is Jun 115.66	Jul 115.66	Aug 115.66	or hot w Sep 115.66	ater is fr	om com	munity h	eating	
5. In Metab (66)m= Lightir (67)m=	olic gain Jan 115.66 ng gains 18.17	s (Table Feb 115.66 (calcula	ETable 5 E 5), Wat Mar 115.66 ted in Ap	of (65)m 6 and 5a ts Apr 115.66 opendix 9.94	only if constant of the consta	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov	Dec	eating	(66)
5. In Metab (66)m= Lightir (67)m=	olic gain Jan 115.66 ag gains 18.17 nces ga	s (Table Feb 115.66 (calcula	ETable 5 E Table 5 E 5), Wat Mar 115.66 ted in Ap	of (65)m 6 and 5a ts Apr 115.66 opendix 9.94	only if constant of the consta	Jun 115.66 ion L9 o	Jul 115.66 r L9a), a	Aug 115.66 Iso see	Sep 115.66 Table 5	Oct 115.66	Nov	Dec	eating	(66)
5. In Metab (66)m= Lightir (67)m= Applia (68)m=	olic gain Jan 115.66 ng gains 18.17 nces ga	s (Table Feb 115.66 (calcula 16.14 ns (calc	Example 5 ted in Apulated in Apulated in	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29	May 115.66 L, equat 7.43 dix L, eq 174.97	Jun 115.66 ion L9 of 6.27 uation L	Jul 115.66 r L9a), a 6.78 13 or L1 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta	Oct 115.66 15.01 ble 5 167.07	Nov 115.66	Dec 115.66	eating	(66) (67)
5. In Metab (66)m= Lightir (67)m= Applia (68)m=	olic gain Jan 115.66 ng gains 18.17 nces ga	s (Table Feb 115.66 (calcula 16.14 ns (calc	Example 5 ted in April 13.13 ulated in 200.64	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29	May 115.66 L, equat 7.43 dix L, eq 174.97	Jun 115.66 ion L9 of 6.27 uation L	Jul 115.66 r L9a), a 6.78 13 or L1 152.51	Aug 115.66 Iso see 8.81 3a), also	Sep 115.66 Table 5 11.82 see Ta	Oct 115.66 15.01 ble 5 167.07	Nov 115.66	Dec 115.66	eating	(66) (67)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookir (69)m=	olic gain Jan 115.66 ag gains 18.17 nces gains 203.86 ag gains	s (Table Feb 115.66 (calcula 16.14 ns (calc 205.97 (calcula 34.57	ted in Apulated in 200.64	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57	only if controls: May 115.66 L, equat 7.43 dix L, equat 174.97 L, equat	Jun 115.66 ion L9 o 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68	eating	(66) (67) (68)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookir (69)m=	olic gain Jan 115.66 ag gains 18.17 nces gains 203.86 ag gains	s (Table Feb 115.66 (calcula 16.14 ns (calc 205.97 (calcula 34.57	Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57	only if controls: May 115.66 L, equat 7.43 dix L, equat 174.97 L, equat	Jun 115.66 ion L9 o 6.27 uation L 161.5	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a	Aug 115.66 Iso see 8.81 3a), also 150.39	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table	Oct 115.66 15.01 ble 5 167.07	Nov 115.66 17.52	Dec 115.66 18.68	eating	(66) (67) (68)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m=	olic gain Jan 115.66 ag gains 18.17 nces gains 203.86 ag gains 34.57 a and far	s (Table Feb 115.66 (calcula 16.14 ns (calc 205.97 (calcula 34.57 ns gains	ted in Apulated in	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 0	only if controls: May 115.66 L, equat 7.43 dix L, equat 174.97 L, equat 34.57	Jun 115.66 ion L9 of 6.27 uation L 161.5 cion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86	eating	(66) (67) (68) (69)
5. In Metab (66)m= Lightir (67)m= Applia (68)m= Cookir (69)m= Pumps (70)m=	olic gain Jan 115.66 ag gains 18.17 ances gains 203.86 ag gains 34.57 as and far 0 as e.g. ev	s (Table Feb 115.66 (calcula 16.14 ns (calc 205.97 (calcula 34.57 ns gains	ted in Apulated in	of (65)m and 5a ts Apr 115.66 ppendix 9.94 Appendix 189.29 ppendix 34.57 5a) 0	only if controls: May 115.66 L, equat 7.43 dix L, equat 174.97 L, equat 34.57	Jun 115.66 ion L9 of 6.27 uation L 161.5 cion L15 34.57	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86	eating	(66) (67) (68) (69)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookin (69)m= Pumps (70)m= Losse (71)m=	olic gain Jan 115.66 ag gains 18.17 ances gains 203.86 ag gains 34.57 a and far 0 as e.g. ev	s (Table Feb 115.66 (calcula 16.14 ns (calcula 34.57 ns gains 0 aporatio -92.53	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 ated in A 34.57 (Table 5 0 on (negation) on (negation) of the table 5 on (negation) of the table 5 on (negation) of the table 5 on (negation) of the table 5 on (negation) of the table 5 on (negation) of table 5 on (neg	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0 tive valu	only if construction only if c	Jun 115.66 ion L9 o 6.27 uation L 161.5 ion L15 34.57 0 le 5)	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 0	eating	(66) (67) (68) (69)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookin (69)m= Pumps (70)m= Losse (71)m=	olic gain Jan 115.66 ag gains 18.17 ances ga 203.86 ag gains 34.57 and far 0 as e.g. ev -92.53 heating	s (Table Feb 115.66 (calcula 16.14 ns (calcula 34.57 ns gains 0 aporatio -92.53	culation of the Table 5 2 5), Wat Mar 115.66 ted in Ap 13.13 ulated in 200.64 ated in A 34.57 (Table 5 0 on (negation) on (negation) of the table 5 on (negation) of the table 5 on (negation) of the table 5 on (negation) of the table 5 on (negation) of the table 5 on (negation) of table 5 on (neg	of (65)m s and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0 tive valu	only if construction only if c	Jun 115.66 ion L9 o 6.27 uation L 161.5 ion L15 34.57 0 le 5)	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57	Oct 115.66 15.01 ble 5 167.07 5 34.57	Nov 115.66 17.52 181.4	Dec 115.66 18.68 194.86 0	eating	(66) (67) (68) (69)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookin (69)m= Pumps (70)m= Losse (71)m= Water (72)m=	olic gain Jan 115.66 ag gains 18.17 ances ga 203.86 ag gains 34.57 and far 0 as e.g. ev -92.53 heating	s (Table Feb 115.66 (calcula 16.14 ns (calcula 205.97 (calcula 34.57 ns gains 0 aporatio -92.53 gains (Table 122.36	culation of the Table 5 (a) Wat Mar 115.66 (b) ted in Apr 13.13 (c) ulated in 200.64 (c) ted in Apr 14.57 (c) Table 5 (c) on (negative of the table 5) (c) 118.09	of (65)m c and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0 tive valu -92.53	only if control only if contro	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0 le 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57 0	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57 0	Oct 115.66 15.01 ble 5 167.07 5 34.57 0 -92.53	Nov 115.66 17.52 181.4 34.57 0	Dec 115.66 18.68 194.86 34.57 0	eating	(66) (67) (68) (69) (70) (71)
5. In Metab (66)m= Lightin (67)m= Applia (68)m= Cookin (69)m= Pumpe (70)m= Losse (71)m= Water (72)m=	olic gain Jan 115.66 ag gains 18.17 ances gains 203.86 ag gains 34.57 as and far 0 s e.g. ev -92.53 heating	s (Table Feb 115.66 (calcula 16.14 ns (calcula 205.97 (calcula 34.57 ns gains 0 aporatio -92.53 gains (Table 122.36	culation of the Table 5 (a) Wat Mar 115.66 (b) ted in Apr 13.13 (c) ulated in 200.64 (c) ted in Apr 14.57 (c) Table 5 (c) on (negative of the table 5) (c) 118.09	of (65)m c and 5a ts Apr 115.66 ppendix 9.94 Append 189.29 ppendix 34.57 5a) 0 tive valu -92.53	only if control only if contro	Jun 115.66 ion L9 of 6.27 uation L 161.5 ion L15 34.57 0 le 5) -92.53	Jul 115.66 r L9a), a 6.78 13 or L1 152.51 or L15a) 34.57	Aug 115.66 Iso see 8.81 3a), also 150.39), also se 34.57 0	Sep 115.66 Table 5 11.82 see Ta 155.72 ee Table 34.57 0	Oct 115.66 15.01 ble 5 167.07 5 34.57 0 -92.53	Nov 115.66 17.52 181.4 34.57 0	Dec 115.66 18.68 194.86 34.57 0	eating	(66) (67) (68) (69) (70) (71)

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

Orientation:	Access Factor Table 6d	r	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x	0.77	X	1.53	x	11.28	x	0.55	x	0.7	=	4.61	(75)
Northeast 0.9x	0.77	x	1.53	x	22.97	X	0.55	x	0.7	=	9.38	(75)
Northeast 0.9x	0.77	x	1.53	x	41.38	x	0.55	x	0.7	=	16.89	(75)
Northeast 0.9x	0.77	x	1.53	x	67.96	x	0.55	x	0.7	=	27.74	(75)
Northeast 0.9x	0.77	x	1.53	x	91.35	X	0.55	x	0.7	=	37.29	(75)
Northeast 0.9x	0.77	x	1.53	x	97.38	x	0.55	x	0.7	=	39.75	(75)
Northeast 0.9x	0.77	x	1.53	x	91.1	x	0.55	x	0.7] =	37.19	(75)
Northeast 0.9x	0.77	x	1.53	x	72.63	X	0.55	x	0.7	=	29.65	(75)
Northeast 0.9x	0.77	x	1.53	x	50.42	x	0.55	x	0.7	=	20.58	(75)
Northeast 0.9x	0.77	x	1.53	x	28.07	x	0.55	x	0.7	=	11.46	(75)
Northeast 0.9x	0.77	X	1.53	x	14.2	X	0.55	X	0.7	=	5.8	(75)
Northeast 0.9x	0.77	x	1.53	x	9.21	x	0.55	x	0.7	=	3.76	(75)
Southeast 0.9x	0.77	x	7.1	x	36.79	x	0.55	x	0.7	=	69.7	(77)
Southeast 0.9x	0.77	x	9.86	x	36.79	x	0.55	x	0.7	=	96.79	(77)
Southeast 0.9x	0.77	x	7.48	x	36.79	x	0.55	x	0.7	=	73.43	(77)
Southeast 0.9x	0.77	x	7.1	x	62.67	x	0.55	X	0.7	=	118.72	(77)
Southeast 0.9x	0.77	x	9.86	x	62.67	x	0.55	x	0.7	=	164.87	(77)
Southeast 0.9x	0.77	x	7.48	x	62.67	х	0.55	x	0.7	=	125.08	(77)
Southeast 0.9x	0.77	x	7.1	x	85.75	x	0.55	X	0.7	=	162.44	(77)
Southeast 0.9x	0.77	x	9.86	x	85.75	x	0.55	x	0.7	=	225.59	(77)
Southeast 0.9x	0.77	x	7.48	x	85.75	x	0.55	x	0.7	=	171.14	(77)
Southeast 0.9x	0.77	x	7.1	x	106.25	x	0.55	x	0.7	=	201.27	(77)
Southeast 0.9x	0.77	x	9.86	x	106.25	x	0.55	x	0.7	=	279.52	(77)
Southeast 0.9x	0.77	x	7.48	x	106.25	x	0.55	x	0.7	=	212.05	(77)
Southeast 0.9x	0.77	x	7.1	x	119.01	X	0.55	x	0.7	=	225.44	(77)
Southeast 0.9x	0.77	X	9.86	x	119.01	x	0.55	X	0.7	=	313.08	(77)
Southeast 0.9x	0.77	x	7.48	x	119.01	x	0.55	x	0.7	=	237.51	(77)
Southeast 0.9x	0.77	X	7.1	x	118.15	x	0.55	X	0.7	=	223.81	(77)
Southeast 0.9x	0.77	x	9.86	x	118.15	x	0.55	X	0.7	=	310.82	(77)
Southeast 0.9x	0.77	x	7.48	x	118.15	x	0.55	x	0.7	=	235.79	(77)
Southeast 0.9x	0.77	x	7.1	x	113.91	X	0.55	x	0.7	=	215.78	(77)
Southeast 0.9x	0.77	x	9.86	x	113.91	x	0.55	x	0.7	=	299.66	(77)
Southeast 0.9x	0.77	x	7.48	x	113.91	x	0.55	x	0.7] =	227.33	(77)
Southeast 0.9x	0.77	x	7.1	x	104.39	x	0.55	x	0.7	=	197.75	(77)
Southeast 0.9x	0.77	x	9.86	x	104.39	x	0.55	x	0.7	=	274.62	(77)
Southeast 0.9x	0.77	X	7.48	x	104.39	x	0.55	x	0.7] =	208.33	(77)
Southeast 0.9x	0.77	X	7.1	x	92.85	x	0.55	x	0.7] =	175.89	(77)
Southeast 0.9x	0.77	X	9.86	x	92.85	x	0.55	x	0.7] =	244.27	(77)
Southeast 0.9x	0.77	X	7.48	x	92.85	x	0.55	X	0.7] =	185.3	(77)
			·						·			

Southeast _{0.9x}	0.77	X	7.1		X	69.27	X	0.55	X	0.7	=	131.21	(77)
Southeast _{0.9x}	0.77	X	9.86	6	x	69.27	x	0.55	X	0.7	=	182.22	(77)
Southeast _{0.9x}	0.77	×	7.48	8	x	69.27	x	0.55	X	0.7	=	138.24	(77)
Southeast _{0.9x}	0.77	x	7.1		x	44.07	x	0.55	x	0.7		83.48	(77)
Southeast _{0.9x}	0.77	x	9.86	6	x	44.07	x	0.55	x	0.7	=	115.94	(77)
Southeast _{0.9x}	0.77	x	7.48	8	x	44.07	x	0.55	x	0.7	=	87.95	(77)
Southeast 0.9x	0.77	×	7.1		x	31.49	X	0.55	x	0.7	=	59.65	(77)
Southeast _{0.9x}	0.77	×	9.86	6	x	31.49	x	0.55	×	0.7	=	82.83	(77)
Southeast _{0.9x}	0.77	x	7.48	8	x	31.49	X	0.55	x	0.7	=	62.84	(77)
Rooflights 0.9x	1	x	1.14	4	x	26	X	0.55	x	0.8	=	11.74	(82)
Rooflights 0.9x	1	x	1.14	4	x	54	x	0.55	x	0.8	=	24.38	(82)
Rooflights 0.9x	1	×	1.14	4	x	96	x	0.55	x	0.8	=	43.34	(82)
Rooflights _{0.9x}	1	×	1.14	4	x	150	x	0.55	x	0.8	=	67.72	(82)
Rooflights 0.9x	1	×	1.14	4	x	192	x	0.55	×	0.8	=	86.68	(82)
Rooflights 0.9x	1	×	1.14	4	x	200	x	0.55	x	0.8	=	90.29	(82)
Rooflights 0.9x	1	×	1.14	4	x	189	x	0.55	×	0.8		85.32	(82)
Rooflights 0.9x	1	×	1.14	4	x	157	x	0.55	×	0.8	=	70.88	(82)
Rooflights 0.9x	1	×	1.14	4	x	115	x	0.55	x	0.8	=	51.92	(82)
Rooflights 0.9x	1	×	1.14	4	x	66	x	0.55	×	0.8		29.8	(82)
Rooflights 0.9x	1	×	1.14	4	x	33	x	0.55	x	0.8	=	14.9	(82)
Rooflights 0.9x	1	×	1.14	4	x	21	x	0.55	x	0.8	=	9.48	(82)
_							•						
Solar gains in	watts, calcu	ılated	for each	month			(83)m	n = Sum(74)m .	(82)m				
(83)m= 256.27		19.4	788.29	900	Т	00.46 865.28	781	<u> </u>	492.9	3 308.06	218.56		(83)
Total gains – i	nternal and	solar	(84)m =	(73)m	+ (8	33)m , watts		•		•	•	•	
(84)m= 660.42	844.6 10	08.95	1157.5	1248.59	12	29.12 1180.93	1102	2.58 1009.72	845.2	4 684.01	612.18		(84)
7. Mean inter	nal tempera	ature (heating	season)								
Temperature	·					area from Tal	ole 9	, Th1 (°C)				21	(85)
Utilisation fac	tor for gain	s for li	ving are	a, h1,m	า (ร	ee Table 9a)					!		
Jan	Feb	Mar	Apr	May		Jun Jul	Α	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.96).91	0.78	0.61	(0.31	0.3	35 0.56	0.85	0.97	0.99		(86)
Mean interna	l temperatu	re in li	iving are	a T1 (fo	ollo	w steps 3 to 7	7 in T	able 9c)		-		•	
(87)m= 19.98		0.56	20.83	20.96	_	0.99 21	2	<u> </u>	20.78	20.32	19.92		(87)
Temperature	during heat	tina ne	eriods in	rest of	dw	elling from Ta	hle (Th2 (°C)		!		I	
(88)m= 19.93		9.93	19.94	19.94	_	9.95 19.95	19.	· · · · ·	19.94	19.94	19.93		(88)
				م مالا م	L ادم	m (aaa Tabla	00)					l	
Utilisation fac).88	0.74	0.55	_).37 0.24	9a) 0.2	27 0.48	0.81	0.96	0.99		(89)
` '	<u> </u>					<u> </u>		<u> </u>		0.30	0.00		(55)
Mean interna	 				Ť	<u>`</u>	-					1	(00)
(90)m= 18.6	18.99 1	9.42	19.77	19.91	<u> </u>	9.95 19.95	19.		19.72		18.52		(90)
								I	LA = LI\	ving area ÷ (+) -	0.45	(91)
						\ C A T 4		(I A) TO					

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

(92)m= 19.22 19.56 19.93 20.24 20.38 20.42 20.42 20.42	20.4	20.2	19.65	19.15		(92)
Apply adjustment to the mean internal temperature from Table 4e, w	nere appr	opriate				
(93)m= 19.22 19.56 19.93 20.24 20.38 20.42 20.42 20.42	20.4	20.2	19.65	19.15		(93)
8. Space heating requirement						
Set Ti to the mean internal temperature obtained at step 11 of Table the utilisation factor for gains using Table 9a	9b, so tha	at Ii,m=(76)m an	d re-calc	ulate	
Jan Feb Mar Apr May Jun Jul Aug	Sep	Oct	Nov	Dec		
Utilisation factor for gains, hm:						
(94)m= 0.98 0.95 0.88 0.75 0.57 0.4 0.27 0.31	0.52	0.82	0.96	0.99		(94)
Useful gains, hmGm , W = (94)m x (84)m						
(95)m= 648.14 802.43 891.42 869.8 717.4 488.37 322.44 338.39	5 523.88	692.27	655.44	603.78		(95)
Monthly average external temperature from Table 8 (96)m=	14.1	10.6	7.1	4.2		(96)
Heat loss rate for mean internal temperature, Lm , W = $[(39)$ m x $[(93)$ m		<u> </u>	7.1	4.2		(90)
(97)m= 1296.82 1271.7 1162.82 971.38 741.31 491.42 322.8 339	534.78	820.02	1076.86	1288.54		(97)
Space heating requirement for each month, kWh/month = 0.024 x [(9						, ,
(98)m= 482.62 315.35 201.93 73.13 17.79 0 0 0	0	95.05	303.42	509.46		
Тс	tal per year	(kWh/year	·) = Sum(9	8) _{15,912} =	1998.75	(98)
Space heating requirement in kWh/m²/year					27.44	(99)
9b. Energy requirements – Community heating scheme						
This part is used for space heating, space cooling or water heating pro	vided by	a comm	unity sch	neme.		
Fraction of space heat from secondary/supplementary heating (Table	11) '0' if n	one			0	(301)
Fraction of space heat from community system 1 – (301) =				1		
					1	(302)
The community scheme may obtain heat from several sources. The procedure allows for		up to four	other heat	sources; ti		(302)
includes boilers, heat pumps, geothermal and waste heat from power stations. See App		up to four	other heat	sources; ti	he latter	
includes boilers, heat pumps, geothermal and waste heat from power stations. See App Fraction of heat from Community heat pump		up to four	other heat	sources; ti	he latter	(303a)
includes boilers, heat pumps, geothermal and waste heat from power stations. See App Fraction of heat from Community heat pump Fraction of heat from Community heat pump (Water)		up to four	other heat	sources; ti	ne latter 1 0.7	(303a) (303a)
includes boilers, heat pumps, geothermal and waste heat from power stations. See Apper Fraction of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water)					1 0.7 0.3	(303a) (303a) (303b)
includes boilers, heat pumps, geothermal and waste heat from power stations. See Apper Fraction of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump	endix C.	(3	other heat 02) x (303		1 0.7 0.3	(303a) (303a) (303b) (304a)
includes boilers, heat pumps, geothermal and waste heat from power stations. See Apper Fraction of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water)	endix C.	(3			1 0.7 0.3	(303a) (303a) (303b)
includes boilers, heat pumps, geothermal and waste heat from power stations. See Apper Fraction of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump	endix C.	(3			1 0.7 0.3	(303a) (303a) (303b) (304a)
Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Fractor for control and charging method (Table 4c(3)) for community heat	eating sys	(3			1 0.7 0.3 1 1	(303a) (303a) (303b) (304a) (305)
includes boilers, heat pumps, geothermal and waste heat from power stations. See Apperentation of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system (Water) Space heating	eating sys	(3			1 0.7 0.3 1 1 1.05	(303a) (303a) (303b) (304a) (305) (306) (306)
includes boilers, heat pumps, geothermal and waste heat from power stations. See App. Fraction of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Factor for control and charging method (Table 4c(3)) for community he Distribution loss factor (Table 12c) for community heating system Distribution loss factor (Table 12c) for community heating system (Water)	eating sys	(3			1 0.7 0.3 1 1 1.05 1.05	(303a) (303a) (303b) (304a) (305) (306) (306)
includes boilers, heat pumps, geothermal and waste heat from power stations. See Apperentation of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system (Water) Space heating	eating sys	(3	02) x (303	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year	(303a) (303a) (303b) (304a) (305) (306) (306)
Fraction of heat from Community heat pump (Water) Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Factor for control and charging method (Table 4c(3)) for community heat pump Distribution loss factor (Table 12c) for community heating system Distribution loss factor (Table 12c) for community heating system (Water) Space heating Annual space heating requirement	eating syster)	(3 stem 04a) x (30	02) x (303 5) x (306) :	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 1998.75	(303a) (303a) (303b) (304a) (305) (306)
Fraction of heat from Community heat pump (Water) Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system (Water) Space heating Annual space heating requirement Space heat from Community heat pump	eating syster) (98) × (3	(3 stem 04a) x (30	02) x (303 5) x (306) a E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 1998.75 2098.69	(303a) (303a) (303b) (304a) (305) (306) (306)
Fraction of heat from Community heat pump (Water) Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Factor for control and charging method (Table 4c(3)) for community heat pump Distribution loss factor (Table 12c) for community heating system Distribution loss factor (Table 12c) for community heating system (Water) Space heating Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Table 12c) for community system in % (from Table 12c) for community heating system in % (from Tab	eating syster) (98) × (3	(3 stem 04a) x (30 Appendix	02) x (303 5) x (306) a E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 1998.75 2098.69 0	(303a) (303a) (303b) (304a) (305) (306) (306) (307a) (308
Fraction of heat from Community heat pump Fraction of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Factor for control and charging method (Table 4c(3)) for community he Distribution loss factor (Table 12c) for community heating system Distribution loss factor (Table 12c) for community heating system (Water heating) Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Table Space heating) Annual water heating requirement	eating syster) (98) × (3	(3 stem 04a) x (30 Appendix	02) x (303 5) x (306) a E)	a) =	1 0.7 0.3 1 1 1.05 1.05 kWh/year 1998.75 2098.69 0	(303a) (303a) (303b) (304a) (305) (306) (306) (307a) (308
includes boilers, heat pumps, geothermal and waste heat from power stations. See App. Fraction of heat from Community heat pump Fraction of heat from Community heat pump (Water) Fraction of community heat from heat source 2 (Water) Fraction of total space heat from Community heat pump Factor for control and charging method (Table 4c(3)) for community heating system Distribution loss factor (Table 12c) for community heating system (Water heating) Annual space heating requirement Space heat from Community heat pump Efficiency of secondary/supplementary heating system in % (from Table Space heating) Water heating	eating syster) (98) × (3) le 4a or A (98) × (3)	(3 stem 04a) x (30 Appendix	02) x (303) 5) x (306) : E) ÷ (308) =	a) =	1 0.7 0.3 1 1 1 1.05 1.05 kWh/year 1998.75 2098.69 0 0	(303a) (303a) (303b) (304a) (305) (306) (306) (307a) (308

Motor boot from boot course 2 (Motor)		(64) v (2020) v	(205) × (206) =	040.04	(240b)
Water heat from heat source 2 (Water)			(305) x (306) =	646.81	(310b)
Electricity used for heat distribution		-, , ,	'e) + (310a)(310e)] =	20.99	(313)
Electricity used for heat distribution (Wa	,	0.01 × [(307a)(307	'e) + (310a)(310e)] =	21.56	(313)
Cooling System Energy Efficiency Ratio				0	(314)
Space cooling (if there is a fixed cooling		= (107) ÷ (314)	ı =	0	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	• ,	utside		158.98	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	b) + (330g) =	158.98	(331)
Energy for lighting (calculated in Appen	dix L)			320.96	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)			-684.44	(333)
Electricity generated by wind turbine (A	ppendix M) (negative quar	ntity)		0	(334)
12b. CO2 Emissions – Community hea	ting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v	vater heating (not CHP)				
Efficiency of heat source 1 (%)	If there is CHP using t	wo fuels repeat (363) to	(366) for the second fue	300	(367a)
CO2 associated with heat source 1	[(307b)+(3	10b)] x 100 ÷ (367b) x	0.52	363.07	(367)
Electrical energy for heat distribution	[(3	313) x	0.52	10.89	(372)
Water heating from separate communit	y system				
CO2 from other sources of space and Efficiency of heat source 1 (%)		wo fuels repeat (363) to	(366) for the second fue	el 300	(367a)
Efficiency of heat source 2 (%)	If there is CHP using t	wo fuels repeat (363) to	(366) for the second fue	100	(367b)
CO2 associated with heat source 1	[(307b)+(3	10b)] x 100 ÷ (367b) x	0	261.1	(367)
CO2 associated with heat source 2	[(307b)+(3	10b)] x 100 ÷ (367b) x	0.52	335.69	(368)
Electrical energy for heat distribution	[(3	313) x	0.52	11.19	(372)
Total CO2 associated with community s	systems (30	63)(366) + (368)(37	2)	981.95	(373)
CO2 associated with space heating (se	condary) (30	09) x	0	0	(374)
CO2 associated with water from immer	sion heater or instantaneo	us heater (312) x	0.52	= 0	(375)
Total CO2 associated with space and w	vater heating (3	73) + (374) + (375) =		981.95	(376)
CO2 associated with electricity for pum	ps and fans within dwelling	g (331)) x	0.52	82.51	(378)
CO2 associated with electricity for lighting	ng (3	32))) x	0.52	166.58	(379)
Energy saving/generation technologies Item 1	(333) to (334) as applicab	le	0.52 x 0.01 =	-355.23	(380)
Total CO2, kg/year	sum of (376)(382) =	<u> </u>		875.81	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			12.02	(384)
3					

El rating (section 14)

90.04 (385)

Stroma Number: STRO016363 Software Name: Stroma FSAP 2012 Software Version: Version: 1.0.4.16
Software Version: Version: 1.0.4.16 Property Address: Apartment 4 Address: Apartment 4 Address: Apartment 4 Address: Apartment 4 Address: Apartment 4 Address: Apartment 4 Av. Height(m) Volume(m³) Ground floor 61.4 (1a) x 2.7 (2a) = 165.78 (3a) Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 61.4 (4) Dwelling volume 2. Ventilation rate: main heating heating secondary heating other total m³ per hour heating Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 (6a) 0 (6a) Number of open flues 0 + 0 + 0 = 0 x 20 = 0 (6b) Number of intermittent fans 0 x 10 = 0 (7a)
Address: 1. Overall dwelling dimensions: Area(m²)
1. Overall dwelling dimensions: Area(m²)
Area(m²)
Ground floor
Dwelling volume $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
2. Ventilation rate: main heating secondary heating other heating total m³ per hour Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 x 20 = 0 (6b) Number of intermittent fans 0 x 10 = 0 (7a)
2. Ventilation rate: main heating secondary heating other heating total m³ per hour Number of chimneys 0 + 0 + 0 = 0 × 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 × 20 = 0 (6b) Number of intermittent fans 0 × 10 = 0 (7a)
Number of chimneys 0 + 0 + 0 = 0 x40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 x20 = 0 (6b) Number of intermittent fans
Number of chimneys 0 + 0 + 0 = 0 x 40 = 0 (6a) Number of open flues 0 + 0 + 0 = 0 x 20 = 0 (6b) Number of intermittent fans 0 x 10 = 0 (7a)
Number of intermittent fans $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Number of passive vents
Number of flueless gas fires $0 \times 40 = 0$ (7c)
Air changes per hour
Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ $\div (5) = 0$ (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)
Additional infiltration $[(9)-1] \times 0.1 = 0 $ (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction o (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
If no draught lobby, enter 0.05, else enter 0
Percentage of windows and doors draught stripped $ 0 (14) $ Window infiltration $ 0.25 - [0.2 \times (14) \div 100] = 0 $ (15)
Window infiltration $0.25 - [0.2 \times (14) \div 100] = 0$ (15) Infiltration rate $(8) + (10) + (11) + (12) + (13) + (15) = 0$ (16)
Air permeability value, q50, expressed in cubic metres per hour per square metre of envelope area (17)
If based on air permeability value, then $(18) = [(17) \div 20] + (8)$, otherwise $(18) = (16)$ 0.15 (18)
Air permeability value applies if a pressurisation test has been done or a degree air permeability is being used
Number of sides sheltered $2 mtext{(19)}$ Shelter factor $(20) = 1 - [0.075 \times (19)] = 0.85 mtext{(20)}$
Infiltration rate incorporating shelter factor $(21) = (18) \times (20) =$ 0.13 (21)
Infiltration rate modified for monthly wind speed
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Monthly average wind speed from Table 7
(22)m= 5.1 5 4.9 4.4 4.3 3.8 3.8 3.7 4 4.3 4.5 4.7
Wind Factor (22a)m = (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 (allo	wing for sl	nelter an	nd wind s	peed) =	(21a) x	(22a)m					
0.16	0.16 0.16	0.14	0.14	0.12	0.12	0.12	0.13	0.14	0.14	0.15		
Calculate effec	-	e rate for t	he appli	cable ca	se	!	•	•		•	•	_
	al ventilation:		201-) (00.	- \ - \ (-		\) (00 -)			0.5	(238
	eat pump using A) = (23a)			0.5	(23h
	n heat recovery: e	-	_								75.65	(230
	ed mechanical		1	1	<u> </u>	- 	í `	r `		- `) ÷ 100] 1	(24)
(24a)m= 0.28	0.28 0.28	ļ	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27		(248
· -	ed mechanical		1	r	- 	, 	´`	r Ó			1	(0.4)
(24b)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(24t
•	ouse extract v n < 0.5 × (23b		•	•				.5 × (23b)			
(24c)m= 0	0 0	0	0	0	0	0	0	0	0	0		(240
,	ventilation or v		•	•				0.5]				
(24d)m= 0	0 0	0	0	0	0	0	0	0	0	0]	(240
Effective air	change rate -	enter (24a	a) or (24h	o) or (24	c) or (24	d) in bo	x (25)	•		•	•	
(25)m= 0.28	0.28 0.28	0.26	0.26	0.24	0.24	0.24	0.25	0.26	0.27	0.27]	(25)
3. Heat losse	s and heat los	s paramet	er:	•		•	•					
ELEMENT	Gross area (m²)	Openir m	ngs 1²	Net Ar A ,r		U-val W/m2		A X U (W/ł	۲)	k-value kJ/m²·		X k J/K
Doors				2	X	1.3	= [2.6				(26)
Windows Type) 1			3.7	x1	/[1/(1.3)+	0.04] =	4.57	$\overline{}$			(27)
Windows Type	2			0.91	x1	/[1/(1.3)+	0.04] =	1.12				(27)
Windows Type	e 3			6.29	= x1	/[1/(1.3)+	0.04] =	7.77	=			(27)
Windows Type	e 4			8.37	= x1	/[1/(1.3)+	0.04] =	10.34				(27)
Windows Type	e 5			6.29	$=$ $_{x^1}$	/[1/(1.3)+	· 0.04] =	7.77	Ħ			(27
Walls Type1	51.43	29.2	6	22.17	=	0.15		3.33	=		$\neg \vdash$	(29)
Walls Type2	35.95	2	$\stackrel{\smile}{=}$	33.95	_	0.13	╡┇	4.53	=		╡	(29)
, , , , , , , , , , , , , , , ,] 55.95			33.30	^	0.13		4.55				(30)
• •	61.4			61.4		0.1		6 1 4			I I	1130
Roof	61.4	0		61.4	_	0.1	= [6.14				
Roof Total area of e		0		148.7	8							(31)
Roof Total area of e Party wall		0		148.7	8 x	0.1	= [6.14				(31)
Roof Total area of e Party wall Party floor	elements, m²		indow II w	148.7 17.92 61.4	8 x	0	= [0		naragraph		(31)
Roof Total area of e Party wall Party floor * for windows and	elements, m²	se effective w		148.7 17.92 61.4	8 x	0	= [0	[] [s given in	paragraph	n 3.2	(31)
Roof Total area of e Party wall Party floor * for windows and ** include the area	elements, m² I roof windows, us	se effective w		148.7 17.92 61.4	8 x	0	= []/[(1/U-valu	0	s given in	paragraph	13.2 52.76	(31)
Roof Total area of e Party wall Party floor * for windows and ** include the area Fabric heat los	elements, m² I roof windows, us as on both sides on sides of sides on sides on sides on sides of sides on sides of sides on sides of sides on sides of side	se effective wi of internal wai (x U)		148.7 17.92 61.4	8 x	0 g formula 1	= [/[(1/U-valu) + (32) =	0				(31)
Roof Total area of e Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	elements, m² I roof windows, us as on both sides of as, W/K = S (A Cm = S(A x k	se effective w of internal wai (x U)	lls and par	148.7 17.92 61.4 alue calcul titions	8 x	0 g formula 1	= [0 ue)+0.04] a	?) + (32a).		52.76	(31) (32) (32) (32) (33) (34)
Roof Total area of e Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity Thermal mass	elements, m ² I roof windows, us as on both sides on ss, W/K = S (A compared or S) Cm = S(A x kompared or S) I roof windows, us as on both sides of second or sides or sid	se effective w. of internal wal (x x U)) MP = Cm - details of the	lls and pan	148.7 17.92 61.4 alue calcul titions	8 x	0 formula 1 (26)(30	= [//[(1/U-valu) + (32) = ((28)	0 ie)+0.04] a (30) + (32) tive Value:	?) + (32a). Medium	(32e) =	52.76 14029.8	(31) (32) (32) (32) (33) (34)
Roof Total area of e Party wall Party floor * for windows and ** include the area Fabric heat los Heat capacity	elements, m ² I roof windows, us as on both sides of ss, W/K = S (A x k) Cm = S(A x k) parameter (T) sments where the sad of a detailed of	se effective was to internal was a X U) MP = Cm - details of the alculation.	e construct	148.7 17.92 61.4 alue calcultitions n kJ/m²K	8 x Sated using	0 formula 1 (26)(30	= [//[(1/U-valu) + (32) = ((28)	0 ie)+0.04] a (30) + (32) tive Value:	?) + (32a). Medium	(32e) =	52.76 14029.8	(31)

Total fabric heat loss							(33) +	(36) =		İ	68.55	(37)
Ventilation heat loss	calculated	d monthl	V				• ,	= 0.33 × (25)m x (5)		00.00	(07)
Jan Feb		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(38)m= 15.55 15.38	15.21	14.33	14.16	13.29	13.29	13.11	13.64	14.16	14.51	14.86		(38)
Heat transfer coeffici	ent, W/K	!	l	<u> </u>	!		(39)m	= (37) + (37)	 38)m			
(39)m= 84.11 83.93		82.89	82.71	81.84	81.84	81.67	82.19	82.71	83.06	83.41		
Heat loss parameter	 (HLP), W	/m²K	I.		I.			Average = = (39)m ÷		12 /12=	82.84	(39)
(40)m= 1.37 1.37	1.36	1.35	1.35	1.33	1.33	1.33	1.34	1.35	1.35	1.36		
Number of days in m	onth (Tab	le 1a)	!		!	•	,	Average =	Sum(40) _{1.}	12 /12=	1.35	(40)
Jan Feb	<u> </u>	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(41)m= 31 28	31	30	31	30	31	31	30	31	30	31		(41)
<u> </u>			•					•			l	
4. Water heating en	erav reau	irement								kWh/ye	ear.	
n. Water nearing on	519y 15qa									ice vi ii y c		
Assumed occupancy		F.4		. 40 (T	- 400	\0\1 · 0 (2040 (TEA 40		02		(42)
if TFA > 13.9, N = if TFA £ 13.9, N =		([1 - exp	0.0003	349 X (11	-A -13.9)2)] + 0.0)013 x (IFA -13.	9)			
Annual average hot		ae in litre	es per da	av Vd.av	erage =	(25 x N)	+ 36		83	2.2		(43)
Reduce the annual averag	ge hot water	usage by	5% if the a	lwelling is	designed i			se target o		2		(10)
not more that 125 litres pe	r person pe	r day (all w	/ater use, l	hot and co	ld)							
Jan Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Hot water usage in litres p	er day for e	ach month	Vd,m = fa	ctor from	Table 1c x	(43)						
(44)m= 90.42 87.13	83.84	80.55	77.27	73.98	73.98	77.27	80.55	83.84	87.13	90.42		
Coordinate of hot wat	ar wood oo	laulatad m	anthly 1	100 × 1/d =		Tm / 2600		Total = Su	. ,		986.36	(44)
Energy content of hot wat	-		-								1	
(45)m= 134.09 117.2	7 121.01	105.5	101.23	87.36	80.95	92.89	94	109.55	119.58	129.85		7(45)
If instantaneous water hea	ating at poin	t of use (no	o hot water	storage).	enter 0 in	boxes (46		Total = Su	m(45) ₁₁₂ =		1293.28	(45)
(46)m= 20.11 17.59	18.15	15.83	15.18	13.1	12.14	13.93	14.1	16.43	17.94	19.48		(46)
Water storage loss:	10.13	10.00	13.10	10.1	12.14	13.93	14.1	10.43	17.94	19.40		(10)
Storage volume (litre	s) includir	ng any s	olar or W	/WHRS	storage	within sa	ame ves	sel		0		(47)
If community heating	and no ta	ank in dw	velling, e	nter 110) litres in	(47)						
Otherwise if no store	d hot wate	er (this ir	ncludes i	nstantar	neous co	ombi boil	ers) ente	er '0' in (47)			
Water storage loss:												
a) If manufacturer's	declared	loss fact	or is kno	wn (kWł	n/day):					0		(48)
Temperature factor f	om Table	2b								0		(49)
Energy lost from wat	_	-				(48) x (49)) =		1	10		(50)
b) If manufacturer's		-									' 	
Hot water storage los			ie 2 (kw	n/litre/da	ay)				0.	02		(51)
If community heating Volume factor from T		011 4.3								02		(52)
Temperature factor f		2b								.6		(52) (53)
Energy lost from wat			ear			(47) x (51)) v (52) v (53) =				. ,
Enter (50) or (54) in	_	, 1. v v i i/ y i	Cui			(TI) X (OI)	, A (OZ) A (-	03 03		(54) (55)
(, (,	` '								<u>''</u>			(-2)

Water	storage	loss cal	culated f	for each	month			((56)m = (55) × (41)	m				
(56)m=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinde	er contains	dedicate	d solar sto	rage, (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=	32.01	28.92	32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primar	y circuit	loss (an	nual) fro	m Table	3							0		(58)
Primar	y circuit	loss cal	culated t	for each	month (59)m = ((58) ÷ 36	65 × (41)	m					
(mod	dified by	factor fr	rom Tab	le H5 if t	here is s	olar 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 cal	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 h	eat requ	uired 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=	189.36	167.2	176.29	159	156.51	140.85	136.23	148.17	147.49	164.82	173.07	185.13		(62)
Solar DF	HW input o	alculated	using App	endix G or	Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	r contribut	ion to wate	er heating)		
(add ad	dditiona	l lines if	FGHRS	and/or \	VWHRS	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=	189.36	167.2	176.29	159	156.51	140.85	136.23	148.17	147.49	164.82	173.07	185.13		_
			<u>-</u>	-	-	-	-	Outp	out from wa	ater heate	r (annual) ₁	12	1944.12	(64)
Heat g	ains froi	n water	heating,	kWh/m	onth 0.2	5 ′ [0.85	× (45)m	+ (61)m	n] + 0.8 x	((46)m	+ (57)m	+ (59)m]	
(65)m=	88.8	78.93	84.46	77.87	77.88	71.84	71.14	75.11	74.05	80.65	82.55	07.4		(65)
						' ''	' ''-	75.11	74.05	60.05	02.55	87.4		(00)
inclu	de (57)ı	m in calc	ulation o	<u> </u>		<u> </u>	<u> </u>	<u> </u>				munity h	eating	(55)
	` ′		culation of the Table 5	of (65)m	only if c	<u> </u>	<u> </u>	<u> </u>					eating	(00)
5. Int	ernal ga	ains (see	e Table 5	of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>					eating	
5. Int	ernal ga	ains (see		of (65)m and 5a	only if c	<u> </u>	<u> </u>	<u> </u>					eating	
5. Int	ernal ga	ins (see	Table 5	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	eating	(66)
5. Int Metabo (66)m=	ernal gain Jan 101.05	s (Table Feb 101.05	E Table 5 E 5), Wat Mar	of (65)m 5 and 5a ts Apr 101.05	only if c): May 101.05	ylinder is Jun 101.05	Jul 101.05	Aug 101.05	or hot w Sep 101.05	ater is fr	om com	munity h	eating	
5. Int Metabo (66)m=	ernal gain Jan 101.05	s (Table Feb 101.05	2 5), Wat Mar 101.05	of (65)m 5 and 5a ts Apr 101.05	only if c): May 101.05	ylinder is Jun 101.05	Jul 101.05	Aug 101.05	or hot w Sep 101.05	ater is fr	om com	munity h	eating	
5. Int Metabo (66)m= Lighting (67)m=	ernal gan Dlic gain Jan 101.05 g gains	s (Table Feb 101.05 (calcula	E Table 5 E 5), Wat Mar 101.05 ted in Ap	of (65)m 6 and 5a ts Apr 101.05 opendix 8.6	May 101.05 L, equati 6.43	Jun 101.05 ion L9 o	Jul 101.05 r L9a), a	Aug 101.05 Iso see	Sep 101.05 Table 5	Oct 101.05	Nov	Dec	eating	(66)
5. Int Metabo (66)m= Lighting (67)m=	ernal gan Dlic gain Jan 101.05 g gains	s (Table Feb 101.05 (calcula	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.36	of (65)m 6 and 5a ts Apr 101.05 opendix 8.6	May 101.05 L, equati 6.43	Jun 101.05 ion L9 o	Jul 101.05 r L9a), a	Aug 101.05 Iso see	Sep 101.05 Table 5	Oct 101.05	Nov	Dec	eating	(66)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m=	ernal gain Jan 101.05 g gains 15.73 nces gai	s (Table Feb 101.05 (calcula 13.97 ins (calc	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.36 ulated in 173.68	of (65)m and 5a ts Apr 101.05 ppendix 8.6 Appendix 163.86	only if c May 101.05 L, equati 6.43 dix L, eq 151.46	Jun 101.05 ion L9 of 5.43 uation L	Jul 101.05 r L9a), a 5.87 13 or L1 132.02	Aug 101.05 Iso see 7.63 3a), also	Sep 101.05 Table 5 10.23 see Ta 134.8	Oct 101.05 13 ble 5 144.62	Nov 101.05	Dec 101.05	eating	(66) (67)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m=	ernal gain Jan 101.05 g gains 15.73 nces gai	s (Table Feb 101.05 (calcula 13.97 ins (calc	Mar 101.05 ted in Ap 11.36	of (65)m and 5a ts Apr 101.05 ppendix 8.6 Appendix 163.86	only if c May 101.05 L, equati 6.43 dix L, eq 151.46	Jun 101.05 ion L9 of 5.43 uation L	Jul 101.05 r L9a), a 5.87 13 or L1 132.02	Aug 101.05 Iso see 7.63 3a), also	Sep 101.05 Table 5 10.23 see Ta 134.8	Oct 101.05 13 ble 5 144.62	Nov 101.05	Dec 101.05	eating	(66) (67)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m=	ernal gain Jan 101.05 g gains 15.73 nces gain 176.46 ng gains 33.1	s (Table Feb 101.05 (calcula 13.97 ins (calcula 178.29 (calcula 33.1	Mar 101.05 ted in Ap 11.36 ulated in 173.68 tted in A 33.1	of (65)m s and 5a ts Apr 101.05 opendix 8.6 Appendix 163.86 oppendix 33.1	May 101.05 L, equati 6.43 dix L, equat 151.46 L, equat	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a	Aug 101.05 Iso see 7.63 3a), also 130.18	Sep 101.05 Table 5 10.23 See Ta 134.8 ee Table	Oct 101.05 13 ble 5 144.62 5	Nov 101.05 15.17	Dec 101.05 16.17	eating	(66) (67) (68)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m=	ernal gain Jan 101.05 g gains 15.73 nces gain 176.46 ng gains 33.1	s (Table Feb 101.05 (calcula 13.97 ins (calcula 178.29 (calcula 33.1	Mar 101.05 ted in Ap 11.36 ulated in Ap 173.68	of (65)m s and 5a ts Apr 101.05 opendix 8.6 Appendix 163.86 oppendix 33.1	May 101.05 L, equati 6.43 dix L, equat 151.46 L, equat	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a	Aug 101.05 Iso see 7.63 3a), also 130.18	Sep 101.05 Table 5 10.23 See Ta 134.8 ee Table	Oct 101.05 13 ble 5 144.62 5	Nov 101.05 15.17	Dec 101.05 16.17	eating	(66) (67) (68)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m=	ernal gar Jan 101.05 g gains 15.73 nces gar 176.46 ng gains 33.1 and far	s (Table Feb 101.05 (calcula 13.97 ins (calcula 178.29 (calcula 33.1 ns gains	101.05 ted in Ap 11.36 ulated in Ap 173.68 ted in Ap 173.68 ted in Ap 174.68	of (65)m and 5a ts Apr 101.05 ppendix 8.6 Appendix 163.86 ppendix 33.1 5a) 0	only if controls: May 101.05 L, equation 6.43 dix L, equation 151.46 L, equation 33.1	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1	Oct 101.05 13 ble 5 144.62 5 33.1	Nov 101.05 15.17 157.02	Dec 101.05 16.17 168.68 33.1	eating	(66) (67) (68) (69)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m= Losses	ernal gain Jan 101.05 g gains 15.73 nces gai 176.46 ng gains 33.1 and far 0 s e.g. ev	s (Table Feb 101.05 (calcular 13.97 Ins (calcular 178.29 (calcular 33.1 Ins gains 0 aporatio	ted in Apulated in 173.68 ted in Apulated	of (65)m and 5a ts Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1 5a) 0 tive valu	only if control only if contro	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1	Oct 101.05 13 ble 5 144.62 5 33.1	Nov 101.05 15.17 157.02	Dec 101.05 168.68 33.1	eating	(66) (67) (68) (69)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal gar Jan 101.05 g gains 15.73 nces gains 176.46 ng gains 33.1 and far 0 s e.g. ev	s (Table Feb 101.05 (calcula 13.97 ins (calc 178.29 (calcula 33.1 ns gains 0 aporatio -80.84	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.36 ulated in 173.68 ated in A 33.1 (Table 5 0 on (negat	of (65)m and 5a ts Apr 101.05 ppendix 8.6 Appendix 163.86 ppendix 33.1 5a) 0	only if controls: May 101.05 L, equation 6.43 dix L, equation 151.46 L, equation 33.1	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1	Oct 101.05 13 ble 5 144.62 5 33.1	Nov 101.05 15.17 157.02	Dec 101.05 16.17 168.68 33.1	eating	(66) (67) (68) (69) (70)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m=	ernal gar Jan 101.05 g gains 15.73 nces gains 176.46 ng gains 33.1 and far 0 s e.g. ev	s (Table Feb 101.05 (calcular 13.97 Ins (calcular 178.29 (calcular 33.1 Ins gains 0 aporatio	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.36 ulated in 173.68 ated in A 33.1 (Table 5 0 on (negat	of (65)m and 5a ts Apr 101.05 ppendix 8.6 Append 163.86 ppendix 33.1 5a) 0 tive valu	only if control only if contro	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.23 see Ta 134.8 ee Table 33.1	Oct 101.05 13 ble 5 144.62 5 33.1	Nov 101.05 15.17 157.02	Dec 101.05 168.68 33.1	eating	(66) (67) (68) (69) (70)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal gar Jan 101.05 g gains 15.73 nces gar 176.46 ng gains 33.1 and far 0 s e.g. ev -80.84 heating 119.36	s (Table Feb 101.05) (calcular 13.97) (calcular 178.29) (calcular 33.1) as gains 0 aporation -80.84 gains (Table 117.46)	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.36 ulated in 173.68 ited in Ap 33.1 (Table 5 0 in (negation 10.84) Table 5) 113.52	of (65)m s and 5a ts Apr 101.05 opendix 8.6 Appendix 33.1 5a) 0 tive valu -80.84	only if control only if contro	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1 0 le 5) -80.84	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.23 See Ta 134.8 See Table 33.1 0 -80.84	Oct 101.05 13 ble 5 144.62 5 33.1 0 -80.84	Nov 101.05 15.17 157.02 33.1 0	Dec 101.05 16.17 168.68 33.1 0	eating	(66) (67) (68) (69) (70) (71)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water (72)m= Total i	ernal gar Jan 101.05 g gains 15.73 nces gar 176.46 ng gains 33.1 and far 0 s e.g. ev -80.84 heating 119.36 nternal	s (Table Feb 101.05 (calcula 13.97 ins (calcula 33.1 ins gains 0 aporatio -80.84 gains (T 117.46 gains =	E Table 5 E 5), Wat Mar 101.05 Ited in Ap 11.36 ulated in 173.68 Ited in A 33.1 (Table 5 0 In (negation of the context) able 5) 113.52	of (65)m and 5a ts Apr 101.05 ppendix 8.6 Appendix 163.86 ppendix 33.1 5a) 0 tive valu -80.84	only if construction only if c	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1 0 le 5) -80.84	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1 0	Sep 101.05 Table 5 10.23 See Ta 134.8 See Table 33.1 0	Oct 101.05 13 ble 5 144.62 5 33.1 0 -80.84 108.39 70)m + (7	Nov 101.05 15.17 157.02 33.1 0 -80.84 114.66 1)m + (72)	Dec 101.05 16.17 168.68 33.1 0	eating	(66) (67) (68) (69) (70) (71)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cookin (69)m= Pumps (70)m= Losses (71)m= Water	ernal gain Jan 101.05 g gains 15.73 nces gain 176.46 g gains 33.1 s and far 0 s e.g. ev -80.84 heating	s (Table Feb 101.05 (calcula 13.97 ins (calcula 178.29 (calcula 33.1 ns gains 0 aporatio -80.84 gains (T	e Table 5 e 5), Wat Mar 101.05 ted in Ap 11.36 ulated in 173.68 ted in A 33.1 (Table 5 0 on (negation of the content of the co	of (65)m s and 5a ts Apr 101.05 opendix 8.6 Appendix 33.1 5a) 0 tive valu -80.84	only if control only if contro	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1 0 le 5) -80.84	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.23 See Ta 134.8 See Table 33.1	Oct 101.05 13 ble 5 144.62 5 33.1 0	Nov 101.05 15.17 157.02 33.1	Dec 101.05 16.17 168.68 33.1 0	eating	(66) (67) (68) (69) (70) (71)
5. Int Metabo (66)m= Lighting (67)m= Appliar (68)m= Cooking (69)m= Pumps (70)m= Losses (71)m= Water (72)m=	ernal gar Jan 101.05 g gains 15.73 nces gar 176.46 ng gains 33.1 and far 0 s e.g. ev -80.84 heating 119.36	s (Table Feb 101.05) (calcular 13.97) (calcular 178.29) (calcular 33.1) as gains 0 aporation -80.84 gains (Table 117.46)	E Table 5 E 5), Wat Mar 101.05 ted in Ap 11.36 ulated in 173.68 ited in Ap 33.1 (Table 5 0 in (negation 10.84) Table 5) 113.52	of (65)m s and 5a ts Apr 101.05 opendix 8.6 Appendix 33.1 5a) 0 tive valu -80.84	only if control only if contro	Jun 101.05 ion L9 of 5.43 uation L 139.8 ion L15 33.1 0 le 5) -80.84	Jul 101.05 r L9a), a 5.87 13 or L1 132.02 or L15a) 33.1	Aug 101.05 Iso see 7.63 3a), also 130.18), also se 33.1	Sep 101.05 Table 5 10.23 See Ta 134.8 See Table 33.1 0 -80.84	Oct 101.05 13 ble 5 144.62 5 33.1 0 -80.84	Nov 101.05 15.17 157.02 33.1 0	Dec 101.05 16.17 168.68 33.1 0	eating	(66) (67) (68) (69) (70) (71)

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

	Access Factor Fable 6d	•	Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Southwest _{0.9x}	0.77	X	8.37	x	36.79		0.55	x	0.7	=	82.17	(79)
Southwest _{0.9x}	0.77	X	6.29	x	36.79		0.55	x	0.7	=	61.75	(79)
Southwest _{0.9x}	0.77	X	8.37	x	62.67		0.55	x	0.7	=	139.96	(79)
Southwest _{0.9x}	0.77	x	6.29	x	62.67		0.55	x	0.7] =	105.18	(79)
Southwest _{0.9x}	0.77	x	8.37	x	85.75		0.55	x	0.7	=	191.5	(79)
Southwest _{0.9x}	0.77	X	6.29	x	85.75		0.55	x	0.7	=	143.91	(79)
Southwest _{0.9x}	0.77	X	8.37	X	106.25		0.55	x	0.7	=	237.28	(79)
Southwest _{0.9x}	0.77	X	6.29	x	106.25		0.55	x	0.7	=	178.31	(79)
Southwest _{0.9x}	0.77	X	8.37	x	119.01		0.55	x	0.7	=	265.77	(79)
Southwest _{0.9x}	0.77	x	6.29	x	119.01		0.55	x	0.7	=	199.72	(79)
Southwest _{0.9x}	0.77	x	8.37	x	118.15		0.55	x	0.7	=	263.85	(79)
Southwest _{0.9x}	0.77	X	6.29	x	118.15		0.55	x	0.7	=	198.28	(79)
Southwest _{0.9x}	0.77	x	8.37	x	113.91		0.55	x	0.7	=	254.38	(79)
Southwest _{0.9x}	0.77	x	6.29	x	113.91		0.55	x	0.7	=	191.16	(79)
Southwest _{0.9x}	0.77	x	8.37	x	104.39		0.55	x	0.7	=	233.12	(79)
Southwest _{0.9x}	0.77	X	6.29	x	104.39		0.55	x	0.7	=	175.19	(79)
Southwest _{0.9x}	0.77	X	8.37	x	92.85		0.55	x	0.7	=	207.35	(79)
Southwest _{0.9x}	0.77	X	6.29	x	92.85		0.55	x	0.7	=	155.82	(79)
Southwest _{0.9x}	0.77	x	8.37	x	69.27		0.55	x	0.7	=	154.69	(79)
Southwest _{0.9x}	0.77	X	6.29	x	69.27		0.55	x	0.7	=	116.25	(79)
Southwest _{0.9x}	0.77	X	8.37	x	44.07		0.55	x	0.7	=	98.42	(79)
Southwest _{0.9x}	0.77	X	6.29	X	44.07		0.55	x	0.7	=	73.96	(79)
Southwest _{0.9x}	0.77	X	8.37	X	31.49		0.55	X	0.7	=	70.32	(79)
Southwest _{0.9x}	0.77	X	6.29	X	31.49		0.55	X	0.7	=	52.84	(79)
Northwest 0.9x	0.77	X	3.7	X	11.28	X	0.55	X	0.7	=	22.28	(81)
Northwest 0.9x	0.77	X	0.91	X	11.28	X	0.55	X	0.7	=	2.74	(81)
Northwest 0.9x	0.77	X	6.29	X	11.28	X	0.55	X	0.7	=	18.94	(81)
Northwest _{0.9x}	0.77	X	3.7	X	22.97	X	0.55	X	0.7	=	45.34	(81)
Northwest 0.9x	0.77	X	0.91	X	22.97	X	0.55	X	0.7	=	5.58	(81)
Northwest _{0.9x}	0.77	X	6.29	X	22.97	X	0.55	X	0.7	=	38.54	(81)
Northwest 0.9x	0.77	X	3.7	X	41.38	X	0.55	X	0.7	=	81.7	(81)
Northwest 0.9x	0.77	X	0.91	x	41.38	X	0.55	X	0.7	=	10.05	(81)
Northwest 0.9x	0.77	X	6.29	X	41.38	X	0.55	X	0.7	=	69.44	(81)
Northwest 0.9x	0.77	X	3.7	X	67.96	X	0.55	X	0.7	=	134.17	(81)
Northwest 0.9x	0.77	X	0.91	x	67.96	x	0.55	x	0.7	=	16.5	(81)
Northwest 0.9x	0.77	X	6.29	x	67.96	x	0.55	x	0.7	=	114.04	(81)
Northwest _{0.9x}	0.77	X	3.7	x	91.35	x	0.55	x	0.7	=	180.35	(81)
Northwest 0.9x	0.77	X	0.91	x	91.35	x	0.55	x	0.7	=	22.18	(81)
Northwest _{0.9x}	0.77	X	6.29	X	91.35	x	0.55	X	0.7	=	153.3	(81)

N41							_		_			<u> </u>	–
Northwest 0.9x	0.77	X	3.7	7	X	97.38	×	0.55	X	0.7	=	192.27	(81)
Northwest 0.9x	0.77	X	0.9	1	X	97.38	X	0.55	X	0.7	=	23.64	(81)
Northwest 0.9x	0.77	X	6.2	9	X	97.38	×	0.55	X	0.7	=	163.43	(81)
Northwest _{0.9x}	0.77	X	3.7	7	X	91.1	×	0.55	X	0.7	=	179.87	(81)
Northwest 0.9x	0.77	X	0.9	1	X	91.1	X	0.55	X	0.7	=	22.12	(81)
Northwest _{0.9x}	0.77	X	6.2	9	X	91.1	X	0.55	X	0.7	=	152.89	(81)
Northwest 0.9x	0.77	X	3.7	7	X	72.63	x	0.55	X	0.7	=	143.39	(81)
Northwest 0.9x	0.77	X	0.9	1	X	72.63	x	0.55	X	0.7	=	17.63	(81)
Northwest 0.9x	0.77	X	6.2	.9	X	72.63	×	0.55	X	0.7	=	121.88	(81)
Northwest 0.9x	0.77	X	3.7	7	X	50.42	×	0.55	х	0.7	=	99.55	(81)
Northwest _{0.9x}	0.77	x	0.9	1	X	50.42	×	0.55	x	0.7	=	12.24	(81)
Northwest _{0.9x}	0.77	X	6.2	9	X	50.42	×	0.55	x	0.7	=	84.62	(81)
Northwest _{0.9x}	0.77	X	3.7	7	X	28.07	₹ ×	0.55	X	0.7	=	55.41	(81)
Northwest _{0.9x}	0.77	x	0.9	1	X	28.07	T x	0.55	x	0.7	=	6.81	(81)
Northwest _{0.9x}	0.77	X	6.2	9	X	28.07	×	0.55	x	0.7	=	47.1	(81)
Northwest 0.9x	0.77	x	3.7	7	X	14.2	T x	0.55	x	0.7	=	28.03	(81)
Northwest _{0.9x}	0.77	x	0.9	1	X	14.2	T x	0.55	X	0.7	=	3.45	(81)
Northwest 0.9x	0.77	X	6.2	9	X	14.2	i x	0.55	x	0.7	=	23.83	(81)
Northwest _{0.9x}	0.77	x	3.7	7	X	9.21	i x	0.55	×	0.7	_ =	18.19	(81)
Northwest _{0.9x}	0.77	X	0.9	1	X	9.21	۲ ×	0.55	x	0.7	= =	2.24	(81)
Northwest _{0.9x}	0.77	X	6.2	9	X	9.21	۲ ×	0.55	X	0.7		15.46	(81)
							_						_
Solar gains in	watts cal	culated	for each	n month	1		(83)n	n = Sum(74)m	(82)m				
(83)m= 187.86		496.59	680.3	821.32	$\overline{}$	41.47 800.41	`		380.2		159.05		(83)
Total gains – ii	nternal an	ıd solar	(84)m =	(73)m	+ (B3)m , watts	<u> </u>		!		<u> </u>		
(84)m= 552.74	697.65	848.47	1014.23	1137.2	1	139.8 1087.22	2 983	.29 860.78	699.5	9 567.84	514.68		(84)
7. Mean inter	nal tempe	erature (heating	seasor	n)	,		<u> </u>					
Temperature						area from Ta	able 9	Th1 (°C)				21	(85)
Utilisation fac	•	•			_			, (0)					
Jan	Feb	Mar	Apr	May	Ť	Jun Jul	\neg	ug Sep	Oct	Nov	Dec		
(86)m= 0.99	0.97	0.93	0.81	0.63	+	0.45 0.33	0.3		0.89		0.99		(86)
, ,		!					-		ı				. ,
Mean interna (87)m= 19.74		20.37	1VING are	20.93	_	w steps 3 to	/ IN		20.65	5 20.12	19.69		(87)
` '		!					<u> </u>		20.00	20.12	19.09		(07)
Temperature					_	_ 	1		T			1	(00)
(88)m= 19.79	19.79	19.79	19.8	19.8	1	9.82 19.82	19.	82 19.81	19.8	19.8	19.8		(88)
Utilisation fac	tor for gai	ins for r	est of d	welling,	h2	m (see Tabl	e 9a)						
(89)m= 0.99	0.96	0.91	0.77	0.56		0.37 0.24	0.2	28 0.53	0.85	0.97	0.99		(89)
Mean interna	I tempera	ture in t	he rest	of dwel	ling	T2 (follow st	teps 3	to 7 in Tab	le 9c)				
(90)m= 18.16	18.55	19.05	19.53	19.74	Ť	9.81 19.81	19.		19.44	18.71	18.09		(90)
	·	٠			•		•	•	fLA = Li	ving area ÷ (4) =	0.5	(91)
								(1 A) —-					_

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

(92)m= 18.94 19.27 19.71 20.13 20.33 20.39 20.4 20.4	20.36 20.	.04 19.41	18.88		(92)
Apply adjustment to the mean internal temperature from Table 4e, wh	ere appropria	ate			
(93)m= 18.94 19.27 19.71 20.13 20.33 20.39 20.4 20.4	20.36 20.	.04 19.41	18.88		(93)
8. Space heating requirement					
Set Ti to the mean internal temperature obtained at step 11 of Table 9 the utilisation factor for gains using Table 9a	9b, so that Ti,r	m=(76)m an	d re-calc	ulate	
Jan Feb Mar Apr May Jun Jul Aug	Sep O	Oct Nov	Dec		
Utilisation factor for gains, hm:	<u> </u>				
(94)m= 0.98 0.96 0.9 0.78 0.6 0.41 0.29 0.33	0.57 0.8	86 0.97	0.99		(94)
Useful gains, hmGm , W = (94)m x (84)m					
(95)m= 543.49 669.56 767.46 790.22 677.4 468.72 310.44 325.33	492.43 600).24 548.3	508.09		(95)
Monthly average external temperature from Table 8	1 444 1 40	7.4	10		(06)
(96)m= 4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 Heat loss rate for mean internal temperature, Lm , W =[(39)m x [(93)r	14.1 10	7.1	4.2		(96)
(97)m= 1231.64 1206.5 1106.16 930.68 714.01 474.25 311.26 326.91	514.66 781	1.02 1022.45	1224.79		(97)
Space heating requirement for each month, kWh/month = $0.024 \times [(9)]$	<u> </u>		1221.70		(-)
(98)m= 511.98 360.82 251.99 101.13 27.24 0 0 0	0 134		533.23		
Tol	al per year (kWh	/year) = Sum(9	8)15,912 =	2262.29	(98)
Space heating requirement in kWh/m²/year			İ	36.85	(99)
9b. Energy requirements – Community heating scheme			L		
This part is used for space heating, space cooling or water heating pro	vided by a co	mmunity sch	neme.		_
Fraction of space heat from secondary/supplementary heating (Table 7	11) '0' if none			0	(301)
Fraction of space heat from community system 1 – (301) =				1	(302)
The community scheme may obtain heat from several sources. The procedure allows fo		four other heat	sources; tl	ne latter	
includes boilers, heat pumps, geothermal and waste heat from power stations. See Appl Fraction of heat from Community heat pump	endix C.		I	1	(303a)
Fraction of heat from Community heat pump (Water)				0.7	(303a)
Fraction of community heat from heat source 2 (Water)				0.3	(303b)
Fraction of total space heat from Community heat pump		(302) x (303	a) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for community he	ating system			1	(305)
Distribution loss factor (Table 12c) for community heating system	3 7			1.05	(306)
Distribution loss factor (Table 12c) for community heating system (Wat	er)		[1.05	(306)
Space heating	,		l	kWh/yea	
Annual space heating requirement				2262.29	7
Space heat from Community heat pump	(98) x (304a) x	x (305) x (306)	-	2375.4	(307a)
Efficiency of secondary/supplementary heating system in % (from Table	e 4a or Apper	ndix E)		0	(308
Space heating requirement from secondary/supplementary system	(98) x (301) x	100 ÷ (308) =	İ	0	(309)
Water heating			•		_
Annual water heating requirement				1944.12	
If DHW from community scheme: Water heat from CHP (Water)	(64) x (303a) x	x (305) x (306)	= [1428.93	(310a)
	. , , , , , , , , , , , , , , , , , , ,	()		0.00	1, 17,

Motor hoot from hoot course 2 (Motor)		(64) v (202a) v	(305) x (306) =	040.4	(310b)
Water heat from heat source 2 (Water)				612.4	= '
Electricity used for heat distribution Electricity used for heat distribution (Wa	ator)		7e) + (310a)(310e)] =	23.75	(313)
,	,	0.01 ^ [(307a)(307	7e) + (310a)(310e)] =	20.41	(313)
Cooling System Energy Efficiency Ratio		= (107) ÷ (314	\ -	0	(314)
Space cooling (if there is a fixed cooling	,	- (107) ÷ (314)) –	0	(315)
Electricity for pumps and fans within dw mechanical ventilation - balanced, extra	· ,	utside		133.99	(330a)
warm air heating system fans				0	(330b)
pump for solar water heating				0	(330g)
Total electricity for the above, kWh/yea	r	=(330a) + (330	0b) + (330g) =	133.99	(331)
Energy for lighting (calculated in Appen	dix L)			277.83	(332)
Electricity generated by PVs (Appendix	M) (negative quantity)			-684.44	(333)
Electricity generated by wind turbine (A	ppendix M) (negative quai	ntity)		0	(334)
12b. CO2 Emissions – Community hea	ting scheme				
		Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and v					
Efficiency of heat source 1 (%)	If there is CHP using t	wo fuels repeat (363) to	(366) for the second fue	el 300	(367a)
CO2 associated with heat source 1	[(307b)+(3	10b)] x 100 ÷ (367b) x	0.52	410.94	(367)
Electrical energy for heat distribution	[(3	313) x	0.52	12.33	(372)
Water heating from separate communit	y system				
CO2 from other sources of space and Efficiency of heat source 1 (%)		wo fuels repeat (363) to	(366) for the second fue	el 300	(367a)
Efficiency of heat source 2 (%)	If there is CHP using t	wo fuels repeat (363) to	(366) for the second fue	el 100	(367b)
CO2 associated with heat source 1	[(307b)+(3	10b)] x 100 ÷ (367b) x	0	247.2	(367)
CO2 associated with heat source 2	[(307b)+(3	10b)] x 100 ÷ (367b) x	0.52	317.83	(368)
Electrical energy for heat distribution	[(3	313) x	0.52	10.59	(372)
Total CO2 associated with community s	systems (3	63)(366) + (368)(37	2)	998.91	(373)
CO2 associated with space heating (se	condary) (3	09) x	0	= 0	(374)
CO2 associated with water from immer	sion heater or instantaneo	us heater (312) x	0.52	0	(375)
Total CO2 associated with space and v	vater heating (3	73) + (374) + (375) =		998.91	(376)
CO2 associated with electricity for pum	ps and fans within dwelling	g (331)) x	0.52	69.54	(378)
CO2 associated with electricity for light	ing (3	32))) x	0.52	144.19	(379)
Energy saving/generation technologies Item 1	(333) to (334) as applicab	le	0.52 x 0.01 =	-355.23	(380)
Total CO2, kg/year	sum of (376)(382) =			857.41	(383)
Dwelling CO2 Emission Rate	(383) ÷ (4) =			13.96	(384)
-					_

El rating (section 14)

89.2 (385)

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Assessor Name: Software Name:	Chris Hocknell Stroma FSAP 201	2		Stroma Softwa	_				016363 on: 1.0.4.16	
Software Name.	Ottoma i Orti 201			Address:				VCISIO	JII. 1.0.4.10	
Address :			, ,							
1. Overall dwelling dimensions:										
Ground floor				a(m²)	(4-)		ight(m)] ₍₀₌₎ =	Volume(m³)	_
	N. 741 N. 74 N. 74 N. 74	\.			(1a) x		2.7	(2a) =	203.58	(3a)
Total floor area TFA = (1	a)+(1b)+(1c)+(1d)+(1e)+(1 n)	7	75.4	(4)					_
Dwelling volume					(3a)+(3b))+(3c)+(3c	l)+(3e)+	.(3n) =	203.58	(5)
2. Ventilation rate:	main se	econdary		other		total			m³ per hou	r
Novele an of ables on a co	heating h	eating	_		,			40 - 1	-	_
Number of chimneys	0 +	0	+ _	0] = [0		40 =	0	(6a)
Number of open flues	0 +	0	+	0]	0		20 =	0	(6b)
Number of intermittent fa						0	X '	10 =	0	(7a)
Number of passive vents	3					0	X ·	10 =	0	(7b)
Number of flueless gas f	ires					0	X 4	40 =	0	(7c)
								Δir ch	anges per ho	ur
Air changes per hour Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) =$ 0 $\div (5) =$ 0 (8)										
	peen carried out or is intende				ontinue fr			. (3) =	0	(0)
Number of storeys in t	he dwelling (ns)								0	(9)
Additional infiltration							[(9)	-1]x0.1 =	0	(10)
Structural infiltration: 0					•	uction			0	(11)
deducting areas of openi	resent, use the value corres _l ngs); if equal user 0.35	ponaing to tr	ne greate	er wall are	а (аптег					
	floor, enter 0.2 (unseal	ed) or 0.1	(seale	d), else	enter 0				0	(12)
If no draught lobby, en	ter 0.05, else enter 0								0	(13)
Percentage of window	s and doors draught st	ripped							0	(14)
Window infiltration				0.25 - [0.2					0	(15)
Infiltration rate				(8) + (10)	, , ,	, , ,	, ,		0	(16)
Air permeability value,	•		•	•	•	etre of e	envelope	area	3	(17)
If based on air permeabi Air permeability value applie	-					io boing u	and		0.15	(18)
Number of sides sheltere		s been done	or a deg	пее ап рег	пеаышу	is being u	seu		1	(19)
Shelter factor				(20) = 1 - [0.075 x (1	9)] =			0.92	(20)
Infiltration rate incorpora	ting shelter factor			(21) = (18)	x (20) =				0.14	(21)
Infiltration rate modified t	for monthly wind speed	I						ļ		_
Jan Feb	Mar Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Monthly average wind sp	peed from Table 7								=	
(22)m= 5.1 5	4.9 4.4 4.3	3.8	3.8	3.7	4	4.3	4.5	4.7		
Wind Factor (22a)m = (2	2)m ÷ 4									
	2)m ÷ 4 1.23	0.95	0.95	0.92	1	1.08	1.12	1.18		
(1.00	3.00	0.00	J.02	•		L <u>-</u>		I	

djusted infiltra	<u>`</u>				1	` 	(21a) x	`´				1	
0.18 Calculate effec		.17	0.15	0.15	0.13	0.13	0.13	0.14	0.15	0.16	0.16]	
If mechanica		-	מופ וטו נו	те арри	cable ca	SE						0.5	(2:
If exhaust air he	at pump using	ј Арре	endix N, (2	3b) = (23a	a) × Fmv (e	equation (N5)) , othe	rwise (23b) = (23a)			0.5	(2
If balanced with	heat recovery	: effici	ency in %	allowing f	for in-use f	actor (fror	n Table 4h) =				74.8	(2
a) If balance	d mechanic	al ve	ntilation	with he	at recov	ery (MV	HR) (24a	a)m = (22	2b)m + (2	23b) × [1 – (23c)	÷ 100]	
24a)m= 0.3	0.3 0).3	0.28	0.28	0.26	0.26	0.25	0.26	0.28	0.28	0.29]	(2
b) If balance	d mechanic	al ve	ntilation	without	heat red	overy (l	MV) (24b)m = (22	2b)m + (2	23b)		_	
24b)m= 0	0	0	0	0	0	0	0	0	0	0	0		(2
c) If whole ho				•	•								
<u> </u>	1 < 0.5 × (23		<u> </u>	<u> </u>	´	· `	ı´ ` 	ŕ	<u> </u>			1	(0
24c)m= 0		0 .	0	0	0	0	0	0	0	0	0	J	(2
d) If natural v if (22b)m	ventilation on a second of the contraction of the c								0.5]				
24d)m= 0	0	0	0	0	0	0	0	0	0	0	0]	(2
Effective air	change rate	e - en	ter (24a	or (24)	b) or (24	c) or (24	d) in box	x (25)			•		
25)m= 0.3	0.3 0).3	0.28	0.28	0.26	0.26	0.25	0.26	0.28	0.28	0.29]	(2
3. Heat losses	s and heat l	oss r	naramete	zr.									
LEMENT	Gross	000	Openin		Net Ar	ea	U-valı	ue	AXU		k-value	e	ΑΧk
	area (m²	·)	m		A ,r		W/m2		(W/ł	<)	kJ/m²·l		kJ/K
oors					2	X	1.3	=	2.6				(2
Vindows Type	1				1.27	x1	/[1/(1.3)+	0.04] =	1.57				(2
Vindows Type	2				2.7	x1	/[1/(1.3)+	0.04] =	3.34				(2
Vindows Type	3				2.22	x1	/[1/(1.3)+	0.04] =	2.74				(2
Vindows Type	4				2.78	x1	/[1/(1.3)+	0.04] =	3.44				(2
/indows Type	5				7.75	x1	/[1/(1.3)+	0.04] =	9.58				(2
Vindows Type	6				1.19	x1	/[1/(1.3)+	0.04] =	1.47				(2
Vindows Type	7				2	x1	/[1/(1.3)+	0.04] =	2.47				(2
Rooflights					1.05	x1	/[1/(1.6) +	0.04] =	1.68				(2
Valls Type1	68.45		21.91	1	46.54	×	0.15	i	6.98	= [(2
Valls Type2	4.03	Ī	2	一	2.03	x	0.13	= i	0.27	T i		7 F	(2
toof	75.4	Ī	1.05	一	74.35	5 x	0.1	<u> </u>	7.44			7 7	(3
otal area of el	lements, m²	_ 2			147.8	8							(3
arty wall					42.95	, x	0		0				(3
arty floor					75.4	=			-			-	(3
for windows and	roof windows,	use e	ffective wii	ndow U-va			g formula 1	/[(1/U-valu	ıe)+0.04] a	L s given in	paragraph		
include the area				s and par	titions								
abric heat los		,	U)				(26)(30)					45.9	4 (3
	0/4	L \						((28)	.(30) + (32)	0) + (32a)	(32e) =	10770	AF 1/2
leat capacity (hermal mass	•	•	_						tive Value:	, , ,	(020) –	13772	45 (3

can be used indetend of a detailed calculated using Appendix K if details of thermal bridging are not known (36) = 0.15 x (31) Total fabric heat loss calculated monthly Ventilation heat loss calcul	can he i	isad insta	ad of a de	tailed calci	ulation										
Internal bridging are not known (36) = 0.15 x (31) (33) + (36) =						usina Ap	pendix I	K						17 49	(36)
Total Eabric heat loss calculated monthly California		Ū	`	,		• .	•							17.40	(00)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec										(33) +	(36) =			63.43	(37)
(38) (38) (38) (38) (32) (32) (38) (3	Ventila	tion hea	it loss ca	alculated	monthly	y				(38)m	= 0.33 × ((25)m x (5))		
Heat transfer coefficient, W/K (39)m = 83.78 83.55 83.32 82.15 81.92 80.75 80.75 80.52 81.22 81.92 82.38 82.85 Average \(\sum \) \(\text{Average} \) \(\text{Average} \) \(\sum \) \(\text{Average} \) \(\text{Average} \) \(\text{Average} \) \(\text{Average} \) \(\text{Average}		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Sayme 83.78 83.55 83.32 82.15 81.92 80.75 80.75 80.52 81.92 82.85 82.85 82.85 82.99 (39)	(38)m=	20.35	20.12	19.88	18.72	18.49	17.32	17.32	17.09	17.79	18.49	18.95	19.42		(38)
Heat loss parameter (HLP), W/m²/K	Heat tr	ansfer c	oefficier	nt, W/K						(39)m	= (37) + (38)m		_	
Heat loss parameter (HLP), W/m²K (40)m= 1.11 1.11 1.11 1.19 1.09 1.09 1.07 1.07 1.07 1.08 1.09 1.09 1.1 Average = Sum(40)z/12= 1.09 (40) Number of days in month (Table 1a) (41)m= 31 28 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 30 31 (41) 4. Water heating energy requirement: **Whit/year** Assumed occupancy, N	(39)m=	83.78	83.55	83.32	82.15	81.92	80.75	80.75	80.52	81.22	81.92	82.38	82.85		
Average = Sum(40)/12= 1.09 (40)	Heat Id	ss para	meter (H	HLP), W/	m²K						_		12 /12=	82.09	(39)
Number of days in month (Table 1a)	(40)m=	1.11	1.11	1.1	1.09	1.09	1.07	1.07	1.07	1.08	1.09	1.09	1.1		
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	Numbe	er of day	e in moi	nth (Tah	le 1a)					,	Average =	Sum(40) ₁	12 /12=	1.09	(40)
### Assumed occupancy, N ### AT 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) ### TFA A 13.9, N = 1 ### Annual average hot water usage in litres per day Vd. average = (25 x N) + 36 ### Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target or not more that 126 litres per person per day (all water use, hot and cold) ### Total = Sum(44). ** a	rvambe				<u> </u>	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1	
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44)e = 1085.79 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm /3600 kWh/month (see Tables 1b, ct, d) (45)m= 147.6 129.09 133.21 116.14 111.44 96.16 89.11 102.25 103.47 120.59 131.63 142.94 If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a (1.03 (52)	(41)m=	31	28	31	30	31	30	31	31		31	30	31	1	(41)
Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) if TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44)e = 1085.79 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, ct, d) (45)m= 147.6 129.09 133.21 116.14 111.44 96.16 89.11 102.25 103.47 120.59 131.63 142.94 It instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) If community heating see section 4.3 Volume factor from Table 2a (1.03 (52)								!			l.			4	
If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1 c x (43) (44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44); = 1085.79 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 147.6 129.09 133.21 116.14 111.44 96.16 89.11 102.25 103.47 120.59 131.63 142.94 It instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Energy lost from Water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	4. Wa	iter heat	ing ener	rgy requi	rement:								kWh/y	ear:	
If TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -13.9)2)] + 0.0013 x (TFA -13.9) If TFA £ 13.9, N = 1 Annual average hot water usage in litres per day Vd, average = (25 x N) + 36 Reduce the annual average hot water usage by 5% if the dwelling is designed to achieve a water use target of not more that 125 litres per person per day (all water use, hot and cold) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Hot water usage in litres per day for each month Vd,m = factor from Table 1 c x (43) (44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44); = 1085.79 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 147.6 129.09 133.21 116.14 111.44 96.16 89.11 102.25 103.47 120.59 131.63 142.94 It instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Energy lost from Water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	A			VI.										1	(10)
Annual average hot water usage in litres per day Vd,average = (25 x N) + 36	if TF	A > 13.9	9, N = 1		[1 - exp	(-0.0003	349 x (TF	FA -13.9)2)] + 0.0	0013 x (⁻	TFA -13		.37]	(42)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			•	ater usag	ge in litre	es per da	ay Vd,av	erage =	(25 x N)	+ 36		90).48	1	(43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec			_				_	-	to achieve	a water us	se target o	f		_	
Hot water usage in litres per day for each month Vd,m = factor from Table 1c x (43) (44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44) = 1085.79 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 147.6 129.09 133.21 116.14 111.44 96.16 89.11 102.25 103.47 120.59 131.63 142.94 Total = Sum(45) = 1423.64 (45) If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (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 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	not more	: IIIal 125											I _	1	
(44)m= 99.53 95.91 92.29 88.67 85.05 81.43 81.43 85.05 88.67 92.29 95.91 99.53 Total = Sum(44) 1085.79 (44) Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m= 147.6 129.09 133.21 116.14 111.44 96.16 89.11 102.25 103.47 120.59 131.63 142.94 It instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 (46) Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (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 0 (49) Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	Hot wate					,				Sep	Oct	Nov	Dec		
Total = Sum(44) = 1085.79 (44)		-		,			 		·	00.07	00.00	05.04	00.50	1	
Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm x DTm / 3600 kWh/month (see Tables 1b, 1c, 1d) (45)m=	(44)m=	99.53	95.91	92.29	88.67	85.05	81.43	81.43	85.05		<u> </u>			1085 70	(44)
Total = Sum(45)112 = 1423.64 (45)	Energy o	content of	hot water	used - cal	culated mo	onthly $= 4$.	190 x Vd,r	m x nm x E	OTm / 3600					1005.79	()
If instantaneous water heating at point of use (no hot water storage), enter 0 in boxes (46) to (61) (46)m= 22.14 19.36 19.98 17.42 16.72 14.42 13.37 15.34 15.52 18.09 19.74 21.44 Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): 0 (48) Temperature factor from Table 2b 0 (49) Energy lost from water storage, kWh/year (48) × (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	(45)m=	147.6	129.09	133.21	116.14	111.44	96.16	89.11	102.25	103.47	120.59	131.63	142.94]	
(46)m=22.1419.3619.9817.4216.7214.4213.3715.3415.5218.0919.7421.44Water storage loss:Storage volume (litres) including any solar or WWHRS storage within same vessel0(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 2b0(49)Energy lost from water storage, kWh/year(48) x (49) =110(50)b) If manufacturer's declared cylinder loss factor is not known:Hot water storage loss factor from Table 2 (kWh/litre/day)0.02(51)If community heating see section 4.3Volume factor from Table 2a1.03(52)											Total = Su	m(45) ₁₁₂ =	-	1423.64	(45)
Water storage loss: Storage volume (litres) including any solar or WWHRS storage within same vessel o (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): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	If instant	taneous w	ater heatii	ng at point		hot water	storage),	enter 0 in	boxes (46) to (61)	,	,	,	-	
Storage volume (litres) including any solar or WWHRS storage within same vessel 0 (47) If community heating and no tank in dwelling, enter 110 litres in (47) Otherwise if no stored hot water (this includes instantaneous combi boilers) enter '0' in (47) Water storage loss: a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year (48) × (49) = 110 (50) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	, ,			19.98	17.42	16.72	14.42	13.37	15.34	15.52	18.09	19.74	21.44		(46)
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): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)		_		includin	ia anv so	olar or W	/WHRS	storage	within sa	ame ves	sel		<u> </u>	1	(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): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (48) (48) (48) (49) (48) (49) (50) (51)	•		, ,					_						1	()
a) If manufacturer's declared loss factor is known (kWh/day): Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (48) (48) (48) (49) 0 (49) 0 (50) 1.03		-	_			_			. ,	ers) ente	er '0' in (47)			
Temperature factor from Table 2b Energy lost from water storage, kWh/year b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a (48) × (49) = 110 0.02 (51) 1.03		_												-	
Energy lost from water storage, kWh/year (48) x (49) = 110 (50) b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) 0.02 (51) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	,					or is kno	wn (kWl	n/day):					0	<u> </u>	(48)
b) If manufacturer's declared cylinder loss factor is not known: Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	•												0	<u>]</u>	(49)
Hot water storage loss factor from Table 2 (kWh/litre/day) If community heating see section 4.3 Volume factor from Table 2a 1.03 (51)				_	-		or is not	known:	(48) x (49)) =		1	10		(50)
If community heating see section 4.3 Volume factor from Table 2a 1.03 (52)	•				-							0.	.02	1	(51)
			_			`		-,						_	• ,
Temperature factor from Table 2b 0.6 (53)					0.1							1.	.03]	
	rempe	erature fa	actor fro	m Table	2b							0	.6	J	(53)

Energy lost from	water storag	je, kWh/y	ear			(47) x (51) x (52) x (53) =	1.	03		(54)
Enter (50) or (54	l) in (55)								1.	03		(55)
Water storage lo	ss calculated	d for each	month			((56)m = ((55) × (41)r	n				
(56)m= 32.01	28.92 32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(56)
If cylinder contains d	edicated solar s	torage, (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= 32.01	28.92 32.01	30.98	32.01	30.98	32.01	32.01	30.98	32.01	30.98	32.01		(57)
Primary circuit lo	ss (annual) t	rom Table	e 3							0		(58)
Primary circuit lo	ss calculated	d for each	month (59)m = ((58) ÷ 36	65 × (41))m					
(modified by fa	ctor from Ta	ble H5 if	there is s	olar wat	ter heatii	ng and a	cylinde	thermo	stat)		1	
(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 calcu	lated for ead	ch 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 requir	ed for water	heating c	alculated	for eac	h month	(62)m =	0.85 × (45)m +	(46)m +	(57)m +	(59)m + (61)m	
(62)m= 202.88 1	79.02 188.49	169.63	166.71	149.66	144.38	157.53	156.97	175.87	185.13	198.22		(62)
Solar DHW input cal	culated using A	opendix G o	r Appendix	H (negati	ve quantity	/) (enter '0	' if no sola	contributi	on to wate	er heating)		
(add additional li	nes if FGHR	S 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 water	er heater	-			-	-	-			-		
(64)m= 202.88 1	79.02 188.49	169.63	166.71	149.66	144.38	157.53	156.97	175.87	185.13	198.22		
	•					Outp	out from wa	ater heater	(annual)	12	2074.48	(64)
Heat gains from	water heatin	a k\Mh/m	onth 0 2	5 ′ [0 85	x (45)m	⊥ (61)m	1 ± 0 0 v	[(46)m	⊥ (57)m	. /E0\m	1	
	water neathr	9, KVVII/III	011111 0.20	, [0.03	^ (4 3)III	. + (0 i <i>)</i> ii	ıj = U.O x	. [(4 6)III	+ (3 <i>1)</i> 111	+ (59)111	J	
	32.87 88.51	-	81.27	74.77	73.85	78.22	77.2	84.32	86.56	91.75]	(65)
	32.87 88.51	81.41	81.27	74.77	73.85	78.22	77.2	84.32	86.56	91.75		(65)
(65)m= 93.3 8 include (57)m	88.51 in calculation	81.41 n of (65)m	81.27 only if c	74.77	73.85	78.22	77.2	84.32	86.56	91.75		(65)
include (57)m 5. Internal gain	32.87 88.51 in calculation s (see Table	81.41 n of (65)m 5 and 5a	81.27 only if c	74.77	73.85	78.22	77.2	84.32	86.56	91.75		(65)
(65)m= 93.3 8 include (57)m	32.87 88.51 in calculation s (see Table	81.41 n of (65)m 5 and 5a	81.27 only if c	74.77	73.85	78.22 dwelling	77.2 or hot w	84.32	86.56	91.75		(65)
include (57)m 5. Internal gain Metabolic gains	32.87 88.51 in calculation s (see Table (Table 5), W Feb Mai	81.41 n of (65)m 5 and 5a atts Apr	81.27 only if c	74.77 ylinder i	73.85 s in the o	78.22	77.2	84.32 ater is fr	86.56 om com	91.75 munity h		(65)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 118.49 1	32.87 88.51 in calculation s (see Table (Table 5), W Feb Mai 18.49 118.49	81.41 n of (65)m 5 and 5a atts Apr 9 118.49	81.27 only if c): May 118.49	74.77 ylinder is Jun 118.49	73.85 s in the o	78.22 dwelling Aug 118.49	77.2 or hot w Sep 118.49	84.32 ater is fr	86.56 om com	91.75 munity h		
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 118.49 1 Lighting gains (c	32.87 88.51 in calculation s (see Table (Table 5), W Feb Mai 18.49 118.49	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix	81.27 only if c): May 118.49	74.77 ylinder is Jun 118.49	73.85 s in the o	78.22 dwelling Aug 118.49	77.2 or hot w Sep 118.49	84.32 ater is fr	86.56 om com	91.75 munity h		
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 118.49 1 Lighting gains (c) (67)m= 18.68	32.87 88.51 in calculation s (see Table (Table 5), W Feb Mai 18.49 118.49 alculated in a 16.59 13.49	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22	81.27 only if control only if	74.77 ylinder is Jun 118.49 on L9 of 6.45	73.85 s in the o	Aug 118.49 lso see 9.06	77.2 or hot w Sep 118.49 Table 5	84.32 ater is fr Oct 118.49	86.56 om com Nov 118.49	91.75 munity h		(66)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 118.49 1 Lighting gains (c (67)m= 18.68	in calculations (see Table (Table 5), W Feb Mai 18.49 118.49 alculated in 16.59 13.49 (calculated	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appen	81.27 only if control only if	74.77 ylinder is Jun 118.49 on L9 of 6.45	73.85 s in the o	Aug 118.49 lso see 9.06	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal	84.32 ater is fr Oct 118.49	86.56 om com Nov 118.49	91.75 munity h		(66)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 118.49 1 Lighting gains (c (67)m= 18.68 1 Appliances gains (68)m= 209.56 2	32.87 88.51 in calculation s (see Table (Table 5), W Feb Man 18.49 118.49 alculated in A 16.59 13.49 s (calculated	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appen 5 194.59	81.27 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86	74.77 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02	73.85 s in the o Jul 118.49 r L9a), a 6.97 13 or L1 156.78	78.22 dwelling Aug 118.49 lso see 9.06 3a), also	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08	84.32 ater is fr Oct 118.49 15.43 ble 5 171.75	86.56 om com Nov 118.49	91.75 munity h		(66) (67)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 118.49 1 Lighting gains (c (67)m= 18.68 Appliances gains (68)m= 209.56 2 Cooking gains (c	in calculations (see Table (Table 5), W Feb Mai 18.49 118.49 alculated in 16.59 13.49 (calculated 11.73 206.29 calculated in	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appen 5 194.59 Appendix	81.27 only if control May 118.49 L, equati 7.64 dix L, equati 179.86 L, equat	74.77 ylinder is Jun 118.49 fon L9 of 6.45 uation L 166.02 ion L15	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a	78.22 dwelling Aug 118.49 lso see 9.06 3a), also 154.6	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table	84.32 ater is fr Oct 118.49 15.43 ole 5 171.75 5	86.56 om com Nov 118.49 18.01	91.75 munity h Dec 118.49 19.2		(66) (67) (68)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 118.49 1 Lighting gains (c (67)m= 18.68 Appliances gains (68)m= 209.56 2 Cooking gains (c (69)m= 34.85	32.87 88.51 in calculation s (see Table Table 5), W Feb Mai 18.49 118.49 alculated in 26.59 13.49 (calculated 11.73 206.28 calculated in 34.85 34.85	81.41 n of (65)m 5 and 5a atts Apr 0 118.49 Appendix 10.22 in Appen 5 194.59 Appendix 34.85	81.27 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86	74.77 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02	73.85 s in the o Jul 118.49 r L9a), a 6.97 13 or L1 156.78	78.22 dwelling Aug 118.49 lso see 9.06 3a), also	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08	84.32 ater is fr Oct 118.49 15.43 ble 5 171.75	86.56 om com Nov 118.49	91.75 munity h		(66) (67)
include (57)m 5. Internal gain Metabolic gains (Jan (66)m= 118.49 1 Lighting gains (c (67)m= 18.68 Appliances gains (68)m= 209.56 2 Cooking gains (c (69)m= 34.85 3	32.87 88.51 in calculation s (see Table (Table 5), W Feb Man 18.49 118.49 alculated in A 16.59 13.49 s (calculated 11.73 206.29 alculated in 34.85 34.85 gains (Table	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appendi 5 194.59 Appendix 34.85	81.27 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85	74.77 ylinder is Jun 118.49 fon L9 of 6.45 uation L 166.02 ion L15 34.85	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	Aug 118.49 Iso see 9.06 3a), also 154.6), also se 34.85	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	84.32 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	86.56 om com Nov 118.49 18.01 186.47	91.75 munity h Dec 118.49 19.2 200.31		(66) (67) (68) (69)
include (57)m 5. Internal gain Metabolic gains (Jan (66)m= 118.49 1 Lighting gains (c (67)m= 18.68 Appliances gains (68)m= 209.56 2 Cooking gains (c (69)m= 34.85 3 Pumps and fans (70)m= 0	32.87 88.51 in calculation s (see Table (Table 5), W Feb Mai 18.49 118.49 alculated in a 16.59 13.49 s (calculated 11.73 206.29 alculated in a 34.85 34.85 gains (Table 0 0	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appendix 34.85 2 5a) 0	81.27 only if control is a control in the control is a control in the control in	74.77 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a	78.22 dwelling Aug 118.49 lso see 9.06 3a), also 154.6	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table	84.32 ater is fr Oct 118.49 15.43 ole 5 171.75 5	86.56 om com Nov 118.49 18.01	91.75 munity h Dec 118.49 19.2		(66) (67) (68)
include (57)m 5. Internal gain Metabolic gains Jan (66)m= 118.49 1 Lighting gains (c (67)m= 18.68 2 Appliances gains (68)m= 209.56 2 Cooking gains (c (69)m= 34.85 3 Pumps and fans (70)m= 0 Losses e.g. evap	32.87 88.51 in calculation s (see Table (Table 5), W Feb Man 18.49 118.49 alculated in An 16.59 13.49 s (calculated 11.73 206.29 alculated in 34.85 34.85 gains (Table 0 0	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appendix 34.85 2 5a) 0 ative value	81.27 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equati 34.85	74.77 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5)	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	78.22 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	84.32 ater is fr Oct 118.49 15.43 ole 5 171.75 5 34.85	86.56 om com Nov 118.49 18.01 186.47 34.85	91.75 munity h Dec 118.49 19.2 200.31 34.85		(66) (67) (68) (69) (70)
include (57)m 5. Internal gain Metabolic gains (57)m 5. Internal gain Metabolic gains (57)m Lighting gains (58)m= 18.68 Appliances gains (68)m= 209.56 2 Cooking gains (669)m= 34.85 3 Pumps and fans (70)m= 0 Losses e.g. evap (71)m= -94.79 -	32.87 88.51 in calculation s (see Table (Table 5), W Feb Man 18.49 118.49 alculated in A 16.59 13.49 s (calculated 11.73 206.29 alculated in A 34.85 34.85 gains (Table 0 0 poration (neg 94.79 -94.79	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appendix 34.85 e 5a) 0 attive value 9 -94.79	81.27 only if control is a control in the control is a control in the control in	74.77 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	Aug 118.49 Iso see 9.06 3a), also 154.6), also se 34.85	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85	84.32 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85	86.56 om com Nov 118.49 18.01 186.47	91.75 munity h Dec 118.49 19.2 200.31		(66) (67) (68) (69)
include (57)m 5. Internal gain Metabolic gains (Jan (66)m= 118.49 1 Lighting gains (c (67)m= 18.68 Appliances gains (68)m= 209.56 2 Cooking gains (c (69)m= 34.85 3 Pumps and fans (70)m= 0 Losses e.g. evap (71)m= -94.79 Water heating gains	32.87 88.51 in calculation s (see Table (Table 5), W Feb Mai 18.49 118.49 alculated in a 16.59 13.49 s (calculated 11.73 206.29 alculated in 34.85 34.85 gains (Table 0 0 poration (neg 94.79 -94.79 ains (Table 5	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appendix 34.85 9 5a) 0 attive value 0 -94.79)	81.27 only if colors May 118.49 L, equati 7.64 dix L, equ 179.86 L, equati 34.85 0 es) (Tab	74.77 ylinder is Jun 118.49 fon L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85	78.22 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tall 160.08 ee Table 34.85 0	84.32 ater is fr Oct 118.49 15.43 ole 5 171.75 5 34.85	86.56 om com Nov 118.49 18.01 186.47 34.85	91.75 munity h Dec 118.49 19.2 200.31 34.85		(66) (67) (68) (69) (70) (71)
include (57)m 5. Internal gain Metabolic gains (57)m 5. Internal gain Metabolic gains (57)m (66)m= 118.49 1 Lighting gains (57)m= 18.68 1 Appliances gains (68)m= 209.56 2 Cooking gains (69)m= 34.85 3 Pumps and fans (70)m= 0 Losses e.g. evap (71)m= -94.79 - 44.	32.87 88.51 in calculation s (see Table (Table 5), W Feb Man 18.49 118.49 alculated in An 16.59 13.49 s (calculated 11.73 206.29 alculated in 34.85 34.85 gains (Table 0 0 poration (neg 94.79 -94.79 ains (Table 5 23.31 118.99	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appendix 34.85 9 5a) 0 attive value 0 -94.79)	81.27 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equati 34.85	74.77 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85 0 -94.79	78.22 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85 0	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 0 -94.79	84.32 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79	86.56 Om com Nov 118.49 18.01 186.47 34.85 0 -94.79	91.75 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79		(66) (67) (68) (69) (70)
include (57)m 5. Internal gain Metabolic gains (32.87 88.51 in calculation s (see Table (Table 5), W Feb Man 18.49 118.49 alculated in a 16.59 13.49 s (calculated 11.73 206.29 alculated in 34.85 34.85 gains (Table 0 0 poration (neg 94.79 -94.79 ains (Table 5 23.31 118.99 ains =	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appendix 34.85 e 5a) 0 ative value 0 -94.79) 7 113.07	81.27 only if c): May 118.49 L, equati 7.64 dix L, equ 179.86 L, equat 34.85 0 es) (Tab -94.79	74.77 ylinder is Jun 118.49 fon L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79 103.85 (66)	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85 0 -94.79 99.26 m + (67)m	78.22 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85 0 -94.79 105.14 1+ (68)m	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 0 -94.79 107.22 + (69)m + (84.32 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79 113.33 70)m + (7	86.56 Om com Nov 118.49 18.01 186.47 34.85 0 -94.79 120.23 1)m + (72)	91.75 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79		(66) (67) (68) (69) (70) (71)
include (57)m 5. Internal gain Metabolic gains (32.87 88.51 in calculation s (see Table (Table 5), W Feb Man 18.49 118.49 alculated in An 16.59 13.49 s (calculated 11.73 206.29 alculated in 34.85 34.85 gains (Table 0 0 poration (neg 94.79 -94.79 ains (Table 5 23.31 118.99	81.41 n of (65)m 5 and 5a atts Apr 9 118.49 Appendix 10.22 in Appendix 34.85 9 5a) 0 ative value 0 -94.79) 7 113.07	81.27 only if colors May 118.49 L, equati 7.64 dix L, equ 179.86 L, equati 34.85 0 es) (Tab	74.77 ylinder is Jun 118.49 on L9 of 6.45 uation L 166.02 ion L15 34.85 0 le 5) -94.79	73.85 s in the of Jul 118.49 r L9a), a 6.97 13 or L1 156.78 or L15a) 34.85 0 -94.79	78.22 dwelling Aug 118.49 lso see 9.06 3a), also 154.6), also se 34.85 0	77.2 or hot w Sep 118.49 Table 5 12.15 o see Tal 160.08 ee Table 34.85 0 -94.79	84.32 ater is fr Oct 118.49 15.43 ble 5 171.75 5 34.85 0 -94.79	86.56 Om com Nov 118.49 18.01 186.47 34.85 0 -94.79	91.75 munity h Dec 118.49 19.2 200.31 34.85 0 -94.79		(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.

Orientation: Access Factor Table 6d		Area m²		Flux Table 6a		g_ Table 6b		FF Table 6c		Gains (W)	
Northeast 0.9x 0.77	x	7.75	x	11.28	x	0.55	x	0.7	=	23.33	(75)
Northeast 0.9x 0.77	X	1.19	x	11.28	x	0.55	x	0.7	=	3.58	(75)
Northeast 0.9x 0.77	X	7.75	x	22.97	x	0.55	x	0.7] =	47.49	(75)
Northeast 0.9x 0.77	X	1.19	x	22.97	x	0.55	x	0.7	Ī =	7.29	(75)
Northeast 0.9x 0.77	X	7.75	x	41.38	x	0.55	x	0.7] =	85.56	(75)
Northeast 0.9x 0.77	X	1.19	x	41.38	x	0.55	x	0.7] =	13.14	(75)
Northeast 0.9x 0.77	X	7.75	x	67.96	x	0.55	x	0.7	=	140.51	(75)
Northeast _{0.9x} 0.77	X	1.19	X	67.96	x	0.55	X	0.7] =	21.58	(75)
Northeast _{0.9x} 0.77	X	7.75	x	91.35	x	0.55	X	0.7] =	188.88	(75)
Northeast _{0.9x} 0.77	X	1.19	x	91.35	X	0.55	X	0.7] =	29	(75)
Northeast _{0.9x} 0.77	X	7.75	x	97.38	X	0.55	X	0.7	=	201.37	(75)
Northeast _{0.9x} 0.77	X	1.19	x	97.38	x	0.55	X	0.7] =	30.92	(75)
Northeast _{0.9x} 0.77	X	7.75	x	91.1	X	0.55	X	0.7] =	188.37	(75)
Northeast _{0.9x} 0.77	X	1.19	x	91.1	X	0.55	X	0.7	=	28.92	(75)
Northeast 0.9x 0.77	X	7.75	x	72.63	x	0.55	x	0.7	=	150.17	(75)
Northeast 0.9x 0.77	X	1.19	x	72.63	x	0.55	x	0.7	=	23.06	(75)
Northeast _{0.9x} 0.77	X	7.75	x	50.42	x	0.55	X	0.7	=	104.26	(75)
Northeast 0.9x 0.77	X	1.19	x	50.42	x	0.55	x	0.7	=	16.01	(75)
Northeast _{0.9x} 0.77	X	7.75	x	28.07	x	0.55	x	0.7	=	58.04	(75)
Northeast 0.9x 0.77	X	1.19	x	28.07	x	0.55	x	0.7] =	8.91	(75)
Northeast 0.9x 0.77	X	7.75	x	14.2	x	0.55	x	0.7	Ī =	29.36	(75)
Northeast 0.9x 0.77	X	1.19	x	14.2	x	0.55	х	0.7] =	4.51	(75)
Northeast 0.9x 0.77	X	7.75	x	9.21	x	0.55	x	0.7] =	19.05	(75)
Northeast 0.9x 0.77	X	1.19	x	9.21	x	0.55	x	0.7	=	2.93	(75)
Southeast 0.9x 0.77	X	2	X	36.79	X	0.55	X	0.7	=	39.27	(77)
Southeast 0.9x 0.77	X	2	x	62.67	x	0.55	X	0.7] =	66.89	(77)
Southeast 0.9x 0.77	X	2	X	85.75	x	0.55	X	0.7] =	91.52	(77)
Southeast 0.9x 0.77	X	2	x	106.25	x	0.55	X	0.7	=	113.39	(77)
Southeast 0.9x 0.77	X	2	x	119.01	x	0.55	x	0.7	=	127.01	(77)
Southeast 0.9x 0.77	X	2	x	118.15	x	0.55	x	0.7	=	126.09	(77)
Southeast 0.9x 0.77	X	2	X	113.91	X	0.55	X	0.7	=	121.57	(77)
Southeast 0.9x 0.77	X	2	x	104.39	x	0.55	X	0.7] =	111.41	(77)
Southeast 0.9x 0.77	X	2	x	92.85	X	0.55	X	0.7] =	99.09	(77)
Southeast 0.9x 0.77	X	2	X	69.27	X	0.55	X	0.7	=	73.92	(77)
Southeast 0.9x 0.77	x	2	x	44.07	x	0.55	x	0.7] =	47.03	(77)
Southeast 0.9x 0.77	x	2	x	31.49	x	0.55	x	0.7] =	33.6	(77)
Southwest _{0.9x} 0.77	x	1.27	x	36.79]	0.55	x	0.7	j =	12.47	(79)
Southwest _{0.9x} 0.77	x	2.7	x	36.79		0.55	x	0.7	j =	26.51	(79)
Southwest _{0.9x} 0.77	x	2.22	x	36.79		0.55	x	0.7	=	21.79	(79)

Southwest _{0.9x}		1 .,	0.70	1	00.70		.,	0.7	1 =	07.00	7(70)
Southwest _{0.9x}	0.77	X	2.78	X	36.79	0.55	X	0.7] 1	27.29	(79)
Southwest _{0.9x}	0.77	X	1.27	X	62.67	0.55	X	0.7] = 1	21.24	(79)
Southwest _{0.9x}	0.77] X]	2.7	X 	62.67	0.55	X	0.7] = 1 _	45.15	(79)
<u> </u>	0.77	X	2.22	X I	62.67	0.55	X	0.7] = 1	37.12	(79)
Southwesters	0.77	X	2.78	X	62.67	0.55	X	0.7] = 1	46.49	(79)
Southwesto.9x	0.77	X	1.27	X	85.75	0.55	X	0.7] = 1	29.06	(79)
Southwesto.9x	0.77	X	2.7	X	85.75	0.55	X	0.7] = 1	61.77	(79)
Southwesto.9x	0.77	X	2.22	X	85.75	0.55	X	0.7] = 1	50.79	(79)
Southwest _{0.9x}	0.77	X	2.78	X	85.75	0.55	X	0.7] = 1	63.6	(79)
Southwesto.9x	0.77	X	1.27	X	106.25	0.55	X	0.7] = 1	36	(79)
Southwesto.9x	0.77	X	2.7	X	106.25	0.55	X	0.7] = 1	76.54	(79)
Southwest _{0.9x}	0.77	X	2.22	X	106.25	0.55	X	0.7] = 1	62.93	(79)
Southwest _{0.9x}	0.77	X	2.78	X	106.25	0.55	X	0.7] = 1	78.81	(79)
Southwest _{0.9x}	0.77	X	1.27	X	119.01	0.55	X	0.7] =	40.33	(79)
Southwest _{0.9x}	0.77	X	2.7	X	119.01	0.55	X	0.7] =	85.73	(79)
Southwest _{0.9x}	0.77	X	2.22	X	119.01	0.55	X	0.7	=	70.49	(79)
Southwest _{0.9x}	0.77	X	2.78	X	119.01	0.55	X	0.7	=	88.27	(79)
Southwest _{0.9x}	0.77	X	1.27	X	118.15	0.55	X	0.7] =	40.03	(79)
Southwest _{0.9x}	0.77	X	2.7	X	118.15	0.55	X	0.7] =	85.11	(79)
Southwest _{0.9x}	0.77	X	2.22	X	118.15	0.55	X	0.7	<u> </u>	69.98	(79)
Southwest _{0.9x}	0.77	X	2.78	X	118.15	0.55	X	0.7	=	87.63	(79)
Southwest _{0.9x}	0.77	X	1.27	X	113.91	0.55	X	0.7	=	38.6	(79)
Southwest _{0.9x}	0.77	X	2.7	x	113.91	0.55	X	0.7	_ =	82.06	(79)
Southwest _{0.9x}	0.77	X	2.22	x	113.91	0.55	X	0.7	=	67.47	(79)
Southwest _{0.9x}	0.77	X	2.78	X	113.91	0.55	X	0.7	=	84.49	(79)
Southwest _{0.9x}	0.77	X	1.27	x	104.39	0.55	X	0.7	=	35.37	(79)
Southwest _{0.9x}	0.77	X	2.7	x	104.39	0.55	X	0.7	=	75.2	(79)
Southwest _{0.9x}	0.77	X	2.22	X	104.39	0.55	X	0.7	=	61.83	(79)
Southwest _{0.9x}	0.77	X	2.78	x	104.39	0.55	X	0.7	=	77.43	(79)
Southwest _{0.9x}	0.77	X	1.27	X	92.85	0.55	X	0.7	=	31.46	(79)
Southwest _{0.9x}	0.77	X	2.7	X	92.85	0.55	X	0.7	=	66.89	(79)
Southwest _{0.9x}	0.77	X	2.22	X	92.85	0.55	X	0.7	=	55	(79)
Southwest _{0.9x}	0.77	X	2.78	X	92.85	0.55	X	0.7	=	68.87	(79)
Southwest _{0.9x}	0.77	X	1.27	x	69.27	0.55	X	0.7	=	23.47	(79)
Southwest _{0.9x}	0.77	X	2.7	x	69.27	0.55	X	0.7	=	49.9	(79)
Southwest _{0.9x}	0.77	x	2.22	x	69.27	0.55	x	0.7] =	41.03	(79)
Southwest _{0.9x}	0.77	X	2.78	x	69.27	0.55	x	0.7] =	51.38	(79)
Southwest _{0.9x}	0.77	X	1.27	x	44.07	0.55	X	0.7	=	14.93	(79)
Southwest _{0.9x}	0.77	x	2.7	x	44.07	0.55	x	0.7] =	31.75	(79)
Southwest _{0.9x}	0.77	x	2.22	x	44.07	0.55	x	0.7	=	26.1	(79)
Southwest _{0.9x}	0.77	x	2.78	x	44.07	0.55	x	0.7] =	32.69	(79)
_							,				_

Southwes	st _{0.9x}	0.77)		1.2	7	X	3	1.49]	0).55	x	0.7		=	10.67	(79)
Southwes	st _{0.9x}	0.77)		2.7	7	x	3	1.49]	0).55	x	0.7		=	22.68	(79)
Southwes	st _{0.9x}	0.77)		2.2	2	x	3.	1.49]	0).55	x	0.7		=	18.65	(79)
Southwes	st _{0.9x}	0.77)		2.7	8	x	3.	1.49]	0).55	x	0.7		=	23.36	(79)
Rooflights	3 0.9x	1)	Ē	1.0	5	x		26	x	0).55	x	0.8		=	10.81	(82)
Rooflights	3 0.9x	1	<u> </u>	┌	1.0	5	x		54	x	0).55	x	0.8		=	22.45	(82)
Rooflights	3 0.9x	1)	Ē	1.0	5	x		96	x	0).55	×	0.8		=	39.92	(82)
Rooflights	0.9x	1	<u> </u>	Ē	1.0	5	x	1	50	x	0).55	T x	0.8		=	62.37	(82)
Rooflights	0.9x	1)	Ē	1.0	5	x	1	92	x	0).55	x	0.8		=	79.83	(82)
Rooflights	3 0.9x	1)	Ē	1.0	5	x	2	200	x	0).55	T x	0.8		=	83.16	(82)
Rooflights	0.9x	1)	Ē	1.0	5	x	1	89	x	0).55	X	0.8		=	78.59	(82)
Rooflights	0.9x	1)	Ē	1.0	5	x	1	57	x	0).55	x	0.8		=	65.28	(82)
Rooflights	0.9x	1)	Ē	1.0	5	x	1	15	x	0).55	Īx	0.8		=	47.82	(82)
Rooflights	3 0.9x	1)	Ē	1.0	5	x		66	x	0).55	×	0.8		=	27.44	(82)
Rooflights	3 0.9x	1)	Ē	1.0	5	x		33	x	0).55	×	0.8		=	13.72	(82)
Rooflights	0.9x	1	>	┌	1.0	5	x		21	x	0).55	×	0.8	一	=	8.73	(82)
	_			_														
Solar gai	ins in v	watts. ca	lculate	d fo	or each	n mont	h			(83)m	ı = Sum	n(74)m	.(82)m					
—	165.05	294.11	435.36	_	92.14	709.55	\neg	24.3	690.06	599	.75 4	189.39	334.09	200.09	139	.67		(83)
Total gai	ns – ir	nternal a	nd sola	ır (8	34)m =	(73)m	1 + (83)m ,	watts					_!			•	
(84)m= 5	77.24	704.3	832.63	9	68.56	1064.8	3 10	59.16	1011.61	927	.09 8	827.4	693.14	583.35	541	.05		(84)
(84)m= 577.24 704.3 832.63 968.56 1064.83 1059.16 1011.61 927.09 827.4 693.14 583.35 541.05 (84)																		
7. Mear	n interr	nal temp	erature	(he	eating	seaso	n)			<u> </u>								
		nal temp during h			Ŭ			area f	rom Tal	ole 9	. Th1 ((°C)					21	(85)
Temper	rature	during h	eating	peri	iods in	the liv	/ing			ole 9	, Th1 ((°C)					21	(85)
Temper	rature on fac	during h	eating ains for	peri livii	iods in	the liva, h1,i	ving m (s	ee Tal	ole 9a)				Oct	Nov	D	ec	21	(85)
Temper Utilisatio	rature	during h	eating	peri livii	iods in	the liv	ring m (s				ug	(°C) Sep 0.65	Oct	Nov 0.99	D(ec	21	(85)
Temper Utilisatio	rature on fac Jan _{0.99}	during h tor for ga Feb 0.98	eating ains for Mar 0.95	peri livii	iods in ng are Apr	the live a, h1,i May	ving m (s	ee Tal Jun ^{0.48}	Jul 0.35	A 0.	ug 4	Sep 0.65		+	╁		21	
Temper Utilisatio	rature on fac Jan 0.99	during h tor for ga Feb 0.98 tempera	eating ains for Mar 0.95 ature in	peri livii (iods in ng are Apr 0.85	the live a, h1,i May 0.68	ring m (s	ee Tal Jun 0.48 w ster	ole 9a) Jul 0.35 os 3 to 7	A 0.7	ug 4 able 9	Sep 0.65 Pc)	0.91	0.99	1		21	(86)
Temper Utilisatio	rature on fac Jan _{0.99}	during h tor for ga Feb 0.98	eating ains for Mar 0.95	peri livii (iods in ng are Apr	the live a, h1,i May	ring m (s	ee Tal Jun ^{0.48}	Jul 0.35	A 0.	ug 4 able 9	Sep 0.65		0.99	╁		21	
Temper Utilisatio (86)m= Mean ir (87)m= Temper	rature on fac Jan 0.99 nternal 19.96	during h tor for ga Feb 0.98 tempera	eating ains for Mar 0.95 ature in	peri livii livi livi peri	ng are Apr 0.85 ing are 20.79	o the lives, h1,1 May 0.68 ea T1 (ring (s	ee Tal Jun 0.48 www.ster 20.99 velling	ole 9a) Jul 0.35 os 3 to 7 21 from Ta	0.7 in T	ug 4 able 9	Sep 0.65 9c) 20.97	0.91	0.99	1		21	(86)
Temper Utilisatio (86)m= Mean ir (87)m= Temper	on fac Jan 0.99 nternal	during h tor for ga Feb 0.98 tempera 20.18	eating ains for Mar 0.95 ature in	peri livii livi livi peri	ng are Apr 0.85 ing are	o the lives, h1,1 May 0.68 ea T1 (ring (s	Jun 0.48 w ster	ole 9a) Jul 0.35 os 3 to 7	0.7 in T	ug 4 fable 9 1 2 9, Th2	Sep 0.65 9c) 20.97	0.91	0.99	1	93	21	(86)
Temper Utilisatio (86)m= Mean ir (87)m= Temper (88)m=	rature on fac Jan 0.99 nternal 19.96 rature 19.99	during h tor for ga Feb 0.98 tempera 20.18 during h	eating ains for Mar 0.95 ature in 20.48 eating	peri livii livii peri	iods in ng are Apr 0.85 ing are 20.79 iods in	n the lives, h1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	ring m (s	Jun 0.48 w step 0.99 velling	Jul 0.35 os 3 to 7 21 from Ta 20.02	A 0.7 in T 2 able 9 20.	ug 4 fable 9 1 2 9, Th2	Sep 0.65 Pc) 20.97 (°C)	20.72	0.99	19.9	93	21	(86)
Temper Utilisatio (86)m= Mean ir (87)m= Temper (88)m= Utilisatio	rature on fac Jan 0.99 nternal 19.96 rature 19.99	during h for for ga Feb 0.98 tempera 20.18 during h	eating ains for Mar 0.95 ature in 20.48 eating	peri livii livii 2 peri 2	iods in ng are Apr 0.85 ing are 20.79 iods in	n the lives, h1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	ving m (s	Jun 0.48 w step 0.99 velling	Jul 0.35 os 3 to 7 21 from Ta 20.02	A 0.7 in T 2 able 9 20.	ug 4 Fable 9 1 2 9, Th2	Sep 0.65 Pc) 20.97 (°C)	20.72	0.99	19.9	93	21	(86)
Temper Utilisatio (86)m= Mean ir (87)m= Temper (88)m= Utilisatio (89)m=	on factors Jan 0.99 nternal 19.96 rature 19.99 on factors 0.99	during h tor for ga Feb 0.98 tempera 20.18 during h 19.99 tor for ga 0.98	eating ains for Mar 0.95 ature in 20.48 eating 20 ains for 0.94	peri livi	iods in ng are Apr 0.85 ing are 20.79 iods in 20.01 st of dv 0.81	the livea, h1,1 May 0.68 ea T1 (20.95 rest c 20.01 welling 0.62	ring m (s follo	Jun 0.48 www.step 0.99 velling 0.02 m (second)	ole 9a) Jul 0.35 os 3 to 7 21 from Ta 20.02 e Table 0.27	A 0.7 in T 2 able 9 20. 9a) 0.3	ug 4 Fable 9 1 2 9, Th2 03 2	Sep 0.65 Pc) 20.97 20.02 0.57	0.91 20.72 20.01 0.88	20.28	19.9	93	21	(86) (87) (88)
Temper Utilisatio (86)m= Mean ir (87)m= Temper (88)m= Utilisatio (89)m= Mean ir	on factors Jan 0.99 nternal 19.96 rature 19.99 on factors 0.99	during h tor for ga Feb 0.98 tempera 20.18 during h 19.99 tor for ga	eating ains for Mar 0.95 ature in 20.48 eating 20 ains for 0.94	peri livii livii peri 2 res	iods in ng are Apr 0.85 ing are 20.79 iods in 20.01 st of dv 0.81	the livea, h1,1 May 0.68 ea T1 (20.95 rest c 20.01 welling 0.62	ring m (s / s / s / s / s / s / s / s / s / s	Jun 0.48 www.step 0.99 velling 0.02 m (second)	ole 9a) Jul 0.35 os 3 to 7 21 from Ta 20.02 e Table 0.27	A 0.7 in T 2 able 9 20. 9a) 0.3	ug 4 4 4 4 4 4 4 4 4	Sep 0.65 Pc) 20.97 20.02 0.57	0.91 20.72 20.01 0.88	20.28	19.9	93	21	(86) (87) (88)
Temper Utilisatio (86)m= Mean ir (87)m= Temper (88)m= Utilisatio (89)m= Mean ir	nature on fac Jan 0.99 nternal 19.96 rature 19.99 on fac 0.99	during h tor for ga Feb 0.98 tempera 20.18 during h 19.99 tor for ga 0.98 tempera	eating ains for Mar 0.95 ature in 20.48 eating 20 ains for 0.94 ature in	peri livii livii peri 2 res	iods in ng are Apr 0.85 ing are 20.79 iods in 20.01 st of dv 0.81 e rest of	the lives, h1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	ring m (s / s / s / s / s / s / s / s / s / s	ee Tal Jun 0.48 w step 20.99 velling 20.02 m (see 0.41 T2 (fo	Jul 0.35 0.35 0.35 0.35 0.37 21 from Ta 20.02 e Table 0.27 ollow ste	A 0 7 in T 2 20 9a) 0.3	ug 4 4 4 4 4 4 4 4 4	Sep 0.65 9c) 20.97 2 (°C) 20.02 0.57 n Table 20 1 20 20	0.91 20.72 20.01 0.88 90) 19.72	20.28	19.9	93	21	(86) (87) (88) (89)
Temper Utilisatio (86)m= Mean ir (87)m= Temper (88)m= Utilisatio (89)m= Mean ir (90)m=	rature on fac Jan 0.99 nternal 19.96 rature 19.99 on fac 0.99 nternal 18.63	during h tor for ga Feb 0.98 tempera 20.18 during h 19.99 tor for ga 0.98 tempera 18.94	eating ains for Mar 0.95 ature in 20.48 eating 20 ains for 0.94 ature in 19.36	peri livii 2 2 peri 1 the	iods in ng are Apr 0.85 ing are 20.79 iods in 20.01 et of dv 0.81 erest of 19.78	the lives, h1,1 May 0.68 ea T1 (20.95 rest of 20.01 welling 0.62 of dwe 19.97	ring (s (s follows), h2, h2, h2, h2, h2, h2, h2, h2, h2, h2	yelling 0.41 T2 (fc	Jul 0.35 0.35 0.35 0.35 0.37 21 from Ta 20.02 e Table 0.27 ollow ster 20.02	A 0 7 in T 2 able 9 20 9a) 0.3	ug 4 4 4 4 4 4 4 4 4	Sep 0.65 20.97 20.97 20.02 0.57 n Table 20 ft	0.91 20.72 20.01 0.88 90) 19.72	20.28 20.01 0.98	19.9	93		(86) (87) (88) (89)
Temper Utilisatio (86)m= Mean ir (87)m= Temper (88)m= Utilisatio (89)m= Mean ir (90)m=	on factors on factors	during h tor for ga Feb 0.98 tempera 20.18 during h 19.99 tor for ga 0.98 tempera 18.94	eating ains for Mar 0.95 ature in 20.48 eating 20 ains for 0.94 ature in 19.36	periliviii livii	iods in ng are Apr 0.85 ing are 20.79 iods in 20.01 st of dv 0.81 e rest of 19.78 he who	the lives, h1,1 May 0.68 ea T1 (20.95 a rest of 20.01 evelling 0.62 of dwe 19.97 ole dw	ving m (s / l / l / l / l / l / l / l / l / l /	ee Tal Jun 0.48 w step 0.99 velling 0.02 m (sec 0.41 T2 (fc 0.02 g) = fL	Jul 0.35 DS 3 to 7 21 from Ta 20.02 e Table 0.27 ollow ste 20.02	A O.7 in T 2 20. 20. 20. 4 + (1	ug 4 4 4 4 4 4 4 4 4	Sep 0.65 9c) 20.97 (°C) 20.02	0.91 20.72 20.01 0.88 90) 19.72 A = Liv	0.99 20.28 20.01 0.98 19.1 ring area ÷ (19.9	993		(86) (87) (88) (89) (90) (91)
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Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Mar

Jan

Feb

Litilization factor for gains, hm:						
Utilisation factor for gains, hm: (94)m= 0.99 0.97 0.93 0.82 0.63 0.44 0.3	0.34 0.59	0.88	0.98	0.99		(94)
Useful gains, hmGm , W = (94)m x (84)m			1			` '
	319.04 491.6	3 612.57	569.72	536.86		(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 (97) m = 1240.2 1209.93 1104.51 923.15 705.65 465.57 304.45	[(93)m- (96) 319.76 506.9	-ī	1023.21	1221.00		(97)
(97)m= 1240.2 1209.93 1104.51 923.15 705.65 465.57 304.45 Space heating requirement for each month, kWh/month = 0.024				1231.09		(91)
(98)m= 497.7 352.23 244.87 93.42 22 0 0	0 0	121.67	326.52	516.51		
	Total per ye	ar (kWh/yea	r) = Sum(9	8)15,912 =	2174.92	(98)
Space heating requirement in kWh/m²/year				Ì	28.85	(99)
9b. Energy requirements – Community heating scheme				_		
This part is used for space heating, space cooling or water heating.	• .	•	unity sch	neme.		7(204)
Fraction of space heat from secondary/supplementary heating (T	rable II) U II	none		Ĺ	0	(301)
Fraction of space heat from community system 1 – (301) =				L	1	(302)
The community scheme may obtain heat from several sources. The procedure as includes boilers, heat pumps, geothermal and waste heat from power stations. So		nd up to four	other heat	sources; th	e latter	_
Fraction of heat from Community heat pump				L	1	(303a)
Fraction of heat from Community heat pump (Water)					0.7	(303a)
Fraction of community heat from heat source 2 (Water)				[0.3	(303b)
Fraction of total space heat from Community heat pump		(3	302) x (303	sa) =	1	(304a)
Factor for control and charging method (Table 4c(3)) for commun	nity heating s	ystem		[1	(305)
Distribution loss factor (Table 12c) for community heating system	n				1.05	(306)
Distribution loss factor (Table 12c) for community heating system	n (Water)				1.05	(306)
Space heating				_	kWh/yea	
Annual space heating requirement					2174.92	
Space heat from Community heat pump	(98) x	(304a) x (30	5) x (306)	= [2283.66	(307a)
Efficiency of secondary/supplementary heating system in % (from	n Table 4a or	Appendix	(E)	[0	(308
Space heating requirement from secondary/supplementary systematics	em (98) x	(301) x 100	÷ (308) =	[0	(309)
Water heating				_		_
Annual water heating requirement				L	2074.48	
If DHW from community scheme: Water heat from CHP (Water)	(64) x	(303a) x (30	5) x (306)	= [1524.75	(310a)
Water heat from heat source 2 (Water)	(64) x	(303a) x (30	5) x (306)	= [653.46	(310b)
Electricity used for heat distribution	0.01 × [(307	a)(307e) ·	+ (310a)((310e)] =	22.84	(313)
Electricity used for heat distribution (Water)	0.01 × [(307	a)(307e)	+ (310a)((310e)] =	21.78	(313)
Cooling System Energy Efficiency Ratio				Ţ	0	(314)
Space cooling (if there is a fixed cooling system, if not enter 0)	= (107	() ÷ (314) =		[0	(315)

Electricity for pumps and fans within dwelling (Table 4f)·			
mechanical ventilation - balanced, extract or p	•		186.28	(330a)
warm air heating system fans			0	(330b)
pump for solar water heating			0	(330g)
Total electricity for the above, kWh/year	=(330a) + (330	0b) + (330g) =	186.28	(331)
Energy for lighting (calculated in Appendix L)			329.94	(332)
Electricity generated by PVs (Appendix M) (ne	gative quantity)		-684.44	(333)
Electricity generated by wind turbine (Appendi	x M) (negative quantity)		0	(334)
12b. CO2 Emissions – Community heating sch	neme			
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
CO2 from other sources of space and water he Efficiency of heat source 1 (%)	eating (not CHP) If there is CHP using two fuels repeat (363) to	o (366) for the second fue	300	(367a)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	395.07	(367)
Electrical energy for heat distribution	[(313) x	0.52	11.85	(372)
Water heating from separate community syste	m			
CO2 from other sources of space and water I Efficiency of heat source 1 (%)	neating (not CHP) If there is CHP using two fuels repeat (363) to	o (366) for the second fue	300	(367a)
Efficiency of heat source 2 (%)	If there is CHP using two fuels repeat (363) to	(366) for the second fue	100	(367b)
CO2 associated with heat source 1	[(307b)+(310b)] x 100 ÷ (367b) x	0	263.78	(367)
CO2 associated with heat source 2	[(307b)+(310b)] x 100 ÷ (367b) x	0.52	339.15	(368)
Electrical energy for heat distribution	[(313) x	0.52	11.3	(372)
Total CO2 associated with community systems	S (363)(366) + (368)(37	(2)	1021.16	(373)
CO2 associated with space heating (secondar	y) (309) x	0 :	0	(374)
CO2 associated with water from immersion he	ater or instantaneous heater (312) x	0.52	0	(375)
Total CO2 associated with space and water he	eating (373) + (374) + (375) =		1021.16	(376)
CO2 associated with electricity for pumps and	fans within dwelling (331)) x	0.52	96.68	(378)
CO2 associated with electricity for lighting	(332))) x	0.52	171.24	(379)
Energy saving/generation technologies (333) t	o (334) as applicable	0.52 x 0.01 =	-355.23	(380)
Total CO2, kg/year sum of	(376)(382) =	-	933.85	(383)
Dwelling CO2 Emission Rate (383)	- (4) =		12.39	(384)
El rating (section 14)			89.61	(385)