Regulations Compliance Report

| Printed on 08 Nov | ember 2019 at 12:17 | n, England assessed by Stroma FSA 7:25 | AP 2012 program, Ve | rsion: 1.0.4.18 | |
|--|---|---|-------------------------|-------------------|----|
| Project Information | on: | | | | |
| Assessed By: | Ross Boulton (ST | RO028068) | Building Type: | Flat | |
| Dwelling Details: | · · · · · · · · · · · · · · · · · · · | | 0 71 | | |
| NEW DWELLING | | | Total Floor Area: 9 | 14 Fm^2 | |
| | | | | | |
| Site Reference : | B2 Stg 4 Issue | | Plot Reference: | B2A-105-07 | |
| Address : | B2A-105-07, Flat | Гуре 2-17A, Wimbledon, London | | | |
| Client Details: | | | | | |
| Name: | Galliard Homes | | | | |
| Address : | | | | | |
| This report cover | rs items included w | ithin the SAP calculations. | | | |
| • | ete report of regulat | | | | |
| 1a TER and DEF | | | | | |
| | ting system: Mains ga | as (c) Mains das (c) | | | |
| | mains gas (c), mains | ., | | | |
| | oxide Emission Rate | • • • • • | 16.64 kg/m² | | |
| • | Dioxide Emission Rat | | 10.81 kg/m ² | | ОК |
| 1b TFEE and DF | | | J. J. | | |
| | rgy Efficiency (TFEE |) | 50.0 kWh/m ² | | |
| - | nergy Efficiency (DFE | | 48.1 kWh/m ² | | |
| 5 | - <u>-</u> | , | | | ОК |
| 2 Fabric U-value | es | | | | |
| Element | | Average | Highest | | |
| External | wall | 0.15 (max. 0.30) | 0.15 (max. 0.70) | | ок |
| Floor | | (no floor) | · · · · · | | |
| Roof | | 0.13 (max. 0.20) | 0.13 (max. 0.35) | | ок |
| Openings | 6 | 1.35 (max. 2.00) | 1.35 (max. 3.30) | | ΟΚ |
| 2a Thermal brid | ging | | | | |
| Thermal | bridging calculated fr | om linear thermal transmittances fo | r each junction | | |
| 3 Air permeabili | ty | | | | |
| Air permea | bility at 50 pascals | | 5.00 (design va | lue) | |
| Maximum | , i | | 10.0 | , | OK |
| 4 Heating efficie | nev | | | | |
| Main Heati | | Community booting cohomoo | | | |
| | ig system. | Community heating schemes - ma | ans yas | | |
| | | | | | |
| Secondary | heating system: | None | | | |
| C C C C C C C C C C C C C C C C C C C | | | | | |
| 5 Cylinder insul | ation | | | | |
| Hot water S | | No cylinder | | | |
| 6 Controls | | | | | |
| | | | | | |
| Snace heat | ting controls | Charging system linked to use of | community beating | | |
| Opace riedi | | programmer and at least two roor | | | ок |
| Hot water o | controls: | No cylinder thermostat | | | |
| | | No cylinder | | | |
| | | | | | |

Regulations Compliance Report

| 7 Low energy lights | | |
|---|---------------------------|--------------|
| Percentage of fixed lights with low-energy fittings | 100.0% | |
| Minimum | 75.0% | OK |
| 8 Mechanical ventilation | | |
| Continuous extract system | | |
| Specific fan power: | 0.31 | |
| Maximum | 0.7 | OK |
| 9 Summertime temperature | | |
| Overheating risk (Thames valley): | Slight | OK |
| Based on: | | |
| Overshading: | Average or unknown | |
| Windows facing: South West | 2.74m ² | |
| Windows facing: South West | 1.59m ² | |
| Windows facing: South West | 2.92m ² | |
| Windows facing: North East | 2.74m² | |
| Windows facing: North East | 1.59m² | |
| Windows facing: South West | 13.23m ² | |
| Ventilation rate: | 4.00 | |
| Blinds/curtains: | Light-coloured curtain or | roller blind |
| | Closed 100% of daylight | hours |

10 Key features

Community heating, heat from boilers – mains gas Photovoltaic array

Predicted Energy Assessment

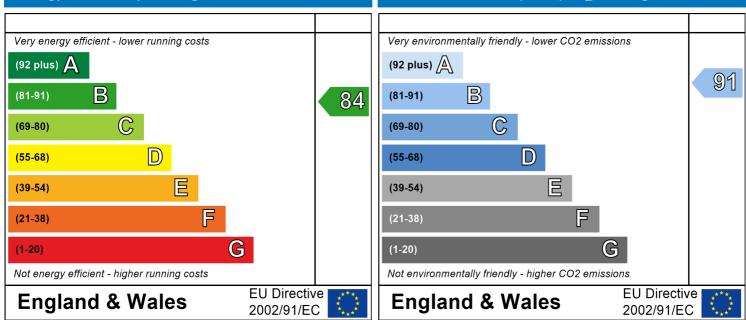
B2A-105-07 Flat Type 2-17A Wimbledon London Dwelling type: Date of assessment: Produced by: Total floor area: Top floor Flat 01 December 2018 Ross Boulton 94.5 m²

Environmental Impact (CO₂) Rating

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

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

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be. The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.



SAP Input

| Address: | 2A-105-07 | B2A-105-07, Flat Type 2 | 174 Wimblodon I | ondon | | |
|--------------------------------------|------------------------------|--|--------------------------------|-------------|----------|----------------|
| Located in: | | England | - I/A, WIIIDIEUUII, L | UNUUN | | |
| Region: | | Thames valley | | | | |
| JPRN: | | , | | | | |
| Date of assessm | ent: | 01 December 2018 | | | | |
| Date of certifica | te: | 08 November 2019 | | | | |
| Assessment type | e: | New dwelling design stag | ge | | | |
| ransaction type | e: | New dwelling | | | | |
| enure type: | | Unknown | | | | |
| Related party di | | No related party | | | | |
| Thermal Mass P | | Indicative Value Low | | | | |
| PCDF Version: | 25 litres/person/d | 451 | | | | |
| | | | | | | |
| Property descriptio | n: | | | | | |
| Owelling type: | | Flat | | | | |
| Detachment: (ear Completed: | | 2018 | | | | |
| -loor Location: | | Floor area: | | | | |
| | | | St | orey height | | |
| loor 0 | | 94.5 m² | | 2.6 m | | |
| | | | | 2.0 11 | | |
| Living area: Front of dwelling f | aces: | 36.267 m ² (fraction 0.3 North | 84) | | | |
| Opening types: | | | | | | |
| Name: | Source: | Type: | Glazing: | | Argon: | Frame: |
| 5W_1.07_2.56 x 1 | Manufacturer | Windows | low-E, $En = 0$ | | No | |
| SW_0.62_2.56 x 1 | Manufacturer | Windows | low-E, En = 0 | | No | |
| SW_1.14_2.56 x 1 | Manufacturer | Windows | low-E, En = 0 | | No | |
| NE_1.07_2.56 x 1 NE_0.62_2.56 x 1 | Manufacturer Manufacturer | Windows Windows | low-E, En = 0 low-E, En = 0 | | No No | |
| SW_5.07_2.61 x 1 | Manufacturer | Windows | low-E, En = 0 | | No | |
| Name: | Gap: | Frame Facto | v. a-value. | U-value: | Area: | No. of Opening |
| SW_1.07_2.56 x 1 | 16mm or more | 0.8 | 0.5 | 1.35 | 2.74 | 1 |
| W_0.62_2.56 x 1 | 16mm or more | 0.8 | 0.5 | 1.35 | 1.59 | 1 |
| W_1.14_2.56 x 1 | 16mm or more | 0.8 | 0.5 | 1.35 | 2.92 | 1 |
| IE_1.07_2.56 x 1 | 16mm or more | 0.8 | 0.5 | 1.35 | 2.74 | 1 |
| NE_0.62_2.56 x 1 | 16mm or more | 0.8 | 0.5 | 1.35 | 1.59 | 1 |
| W_5.07_2.61 x 1 | 16mm or more | 0.8 | 0.5 | 1.35 | 13.23 | 1 |
| Name: | Type-Name: | Location: | Orient: | | Width: | Height: |
| 5W_1.07_2.56 x 1 | | Wall | South West | | 1.07 | 2.56 |
| SW_0.62_2.56 x 1 | | Wall | South West | | 0.62 | 2.56 |
| SW_1.14_2.56 x 1 | | Wall | South West | | 1.14 | 2.56 |
| NE_1.07_2.56 x 1 | | Wall | North East | | 1.07 | 2.56 |
| NE_0.62_2.56 x 1 | | Wall | North East | | 0.62 | 2.56 |
| W_5.07_2.61 x 1 | | Wall | South West | | 5.07 | 2.61 |
| Overshading: | | Average or unknown | | | | |
| Opaque Elements: | | | | | | |
| | | | | | | |
| ype: xternal Elements | • | nings: Net area: | U-value: | Ru value: | Curtain | wall: Kappa: |

SAP Input

| Roof <u>Internal Elem</u> Party Elemen | | 0 | 94.5 | 0.13 | 0 | N/A |
|---|--|--|--|--|---|---|
| Thermal bridg | <u>aes:</u> | | | | | |
| Thermal bridg | - | | | | Y-Value = 0.1838 | |
| | [Approved] [Approved] [Approved] | Length 9.59 0 30.82 9.921 7.29 2.865 2.865 8.595 2.865 0 17.211 0 24.388 0 | Psi-valu 0.3 0.04 0.05 0.14 0.35 0.18 0 0.12 0.12 0.32 0.56 0 0.24 0.16 | LUE E2 E3 E4 E7 E23 E16 E17 E18 E25 E20 E15 P3 P4 P7 | Other lintels (including o Sill Jamb Party floor between dwe Balcony within or betwee Corner (normal) Corner (inverted internal Party wall between dwell Staggered party wall bet Exposed floor (normal) Flat roof with parapet Intermediate floor betwee Roof (insulation at ceiling Exposed floor (normal) | ellings (in blocks of flats) een dwellings, balcony support penetrates wall al area greater than external area) ellings etween dwellings reen dwellings (in blocks of flats) |
| | | 0 | 0.16 | P1 | Ground floor | |
| Ventilation: Pressure test: | | Yes (As de | relaned) | | | |
| Ventilation: | | Centralised Number of Ductwork: Approved I | d whole house f wet rooms: K | Kitchen + 3 | ž | |
| Number of ch Number of op Number of fa Number of pa Number of sic Pressure test: | pen flues: ans: assive stacks: des sheltered: | 0 0 0 2 5 | | | | |
| Main heating | | | | | | |
| Main heating | system: | Heat sourc heat from Heat sourc heat from | ce: Community n boilers – mai | y CHP ains gas, hea y boilers ains gas, hea | at fraction 0.666, efficien at fraction 0.334, efficien emp, variable flow | |
| Main heating | Control: | | | | | |
| Main heating | Control: | Charging s thermostat Control coc | ts | to use of cor | mmunity heating, progra | rammer and at least two room |
| Secondary he | eating system: | | | | | |
| Secondary he Water heating | eating system: g: | None | | | | |
| Water heating | | Water code Fuel :heat | from boilers – ter cylinder | | | |
| Others: | | | | | | |
| Electricity tari In Smoke Cor | | Standard T Yes | ariff | | | |

SAP Input

Conservatory: Low energy lights: Terrain type: EPC language: Wind turbine: Photovoltaics: No conservatory 100% Dense urban English No <u>Photovoltaic 1</u> Installed Peak power: 0.309 Tilt of collector: 30° Overshading: None or very little Collector Orientation: South West No

Assess Zero Carbon Home:

| Assessor Name: Software Name:Ross BoultonStroma FSAP 2012Stroma Number: Software Version:STRO028068Software Name:Stroma FSAP 2012Software Version: Software Version:Version: 1.0.4.18Address:B2A-105-07, Flat Type 2-17A, Wimbledon, LondonAddress: Software Version:Version: 1.0.4.18Address:B2A-105-07, Flat Type 2-17A, Wimbledon, LondonAv. Height(m) 94.5Volume(m ⁹) (2a) =Volume(m ⁹) (245.7Ground floor94.5(1a) x2.6(2a) =245.7(3a) (3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n)94.5(4)Volume(m ⁹) (2b)+(3n) =245.7(5)Develing volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =245.7(5)(5)Number of chinneysSecondary heatingothertotalm ³ per hour (6a)Number of open flues0+0=0x 40 =0(6a) (7a)Number of passive vents0+0=0x 10 =0(7a) (7b)Number of flueless gas fires0x 10 =0(7b) (7c)X 10 =0(7c) (7c) |
|--|
| Property Address: B2A-105-07Address :B2A-105-07, Flat Type 2-17A, Wimbledon, London1. Overall dwelling dimensions:Area(m ²)Av. Height(m)Volume(m ³)Ground floor 94.5 (1a) x 2.6 (2a) = 245.7 (3a)Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)+(1n) 94.5 (4) 94.5 (4) 94.5 (4)Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) =$ 245.7 (5)2. Ventilation rate:main heating heating +0=0 $x 40 =$ 0Number of chimneys 0 + 0 + 0 = 0 $x 40 =$ 0 (6a)Number of open flues 0 + 0 + 0 = 0 $x 10 =$ 0 (7a)Number of passive vents 0 $x 10 =$ 0 (7b) 0 $x 40 =$ 0 (7c) |
| Address :B2A-105-07, Flat Type 2-17A, Wimbledon, London1. Overall dwelling dimensions:Area(m²)Av. Height(m)Volume(m³)Ground floor 94.5 $(1a) \times 2.6$ $(2a) = 245.7$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 94.5 (4) $(3a)+(3c)+(3d)+(3e)+(3n) = 245.7$ (5) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 245.7$ (5) 2. Ventilation rate:Number of chimneys 0 $+$ 0 $=$ 0 $x 40 =$ 0 $(6a)$ Number of open flues 0 $+$ 0 $=$ 0 $x 20 =$ 0 $(6b)$ Number of passive vents 0 $x 10 =$ 0 $(7a)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ |
| Area(m²)Av. Height(m)Volume(m³) Ground floor 94.5 $(1a) \times 2.6$ $(2a) = 245.7$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 94.5 (4) $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 245.7$ (5) 2. Ventilation rate:Number of chimneyso thertotalmain heatingbecondary heatingo thertotalmain heating Number of chimneys 0 $+$ 0 $=$ 0 $x40 =$ 0 (6a)Number of open flues 0 $+$ 0 $=$ 0 $x40 =$ 0 (6b)Number of passive vents 0 $x 10 =$ 0 $(7a)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ |
| Area(m²)Av. Height(m)Volume(m³)Ground floor 94.5 $(1a) \times 2.6$ $(2a) = 245.7$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 94.5 (4) $(3a)+(3c)+(3d)+(3e)+(3n) = 245.7$ (5) Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 245.7 (5) Number of chimneys 0 $+$ 0 e 0 $x 40 = 0$ $(6a)$ Number of open flues 0 $+$ 0 $+$ 0 $=$ 0 $x 40 = 0$ $(6b)$ Number of intermittent fans 0 $x 10 = 0$ $(7a)$ Number of flueless gas fires 0 $x 40 = 0$ $(7c)$ |
| Ground floor 94.5 $(1a) \times 2.6$ $(2a) = 245.7$ $(3a)$ Total floor area TFA = $(1a)+(1b)+(1c)+(1d)+(1e)+(1n)$ 94.5 (4) Dwelling volume $(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 245.7$ (5) 2. Ventilation rate: $\mathbf{main heating}$ $\mathbf{secondary heating}$ \mathbf{other} \mathbf{total} $\mathbf{m^3 per hour}$ Number of chimneys 0 $+$ 0 $+$ 0 $=$ 0 $(40) =$ Number of open flues 0 $+$ 0 $+$ 0 $=$ 0 $(6a)$ Number of intermittent fans 0 $\times 10 =$ 0 $(7a)$ Number of flueless gas fires 0 $\times 40 =$ 0 $(7c)$ |
| Dwelling volume(3a)+(3b)+(3c)+(3d)+(3e)+(3n) = 245.7 (5) 2. Ventilation rate: main heatingsecondary heatingothertotalm³ per hourNumber 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 passive vents 0 × 40 = 0 (7b)Number of flueless gas fires 0 × 40 = 0 (7c) |
| 2. Ventilation rate: Number of chimneys 0 + 0 = 0 $x 40$ 0 (6a)Number of open flues 0 + 0 + 0 = 0 $x 20$ 0 (6b)Number of intermittent fans 0 + 0 = 0 $x 10$ 0 (7a)Number of passive vents 0 $x 10$ 0 $(7b)$ 0 $x 40$ 0 $(7c)$ |
| main heatingsecondary heatingothertotal m^3 per hourNumber of chimneys 0 $+$ 0 $=$ 0 $\times 40 =$ 0 (6a)Number of open flues 0 $+$ 0 $=$ 0 $\times 20 =$ 0 (6b)Number of intermittent fans 0 $+$ 0 $=$ 0 $\times 10 =$ 0 (7a)Number of passive vents 0 $\times 10 =$ 0 (7b)Number of flueless gas fires 0 $\times 40 =$ 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 0 $x 10 =$ 0 $(7a)$ 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 0 $x 10 =$ 0 $(7a)$ Number of passive vents 0 $x 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ |
| Number of intermittent fans 0 $x 10 =$ 0 $(7a)$ Number of passive vents 0 $x 10 =$ 0 $(7b)$ Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ |
| Number of passive vents 0 $x 10 =$ 0 (7) Number of flueless gas fires 0 $x 40 =$ 0 $(7c)$ |
| Number of flueless gas fires $0 	 x 40 = 0 	 (7c)$ |
| |
| Air changes per hour |
| |
| Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ \div (5) = 0 (8) |
| Infiltration due to chimneys, flues and fans = $(6a)+(6b)+(7a)+(7b)+(7c) = 0$ If a pressurisation test has been carried out or is intended, proceed to (17), otherwise continue from (9) to (16) \div (5) = 0 (8) |
| 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 |
| 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 (12) |
| If no draught lobby, enter 0.05, else enter 0 0 (13) |
| Percentage of windows and doors draught stripped 0 (14) |
| 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 5 (17) |
| If based on air permeability value, then $(18) = [(17) \div 20]+(8)$, otherwise $(18) = (16)$ 0.25 (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 (19) Shelter factor $(20) = 1 - [0.075 \times (19)] =$ 0.85 (20) |
| Infiltration rate incorporating shelter factor $(21) = (18) \times (20) = 0.21$ (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 |

| Adjust | ed infiltr | ation rat | e (allowi | ng for sh | nelter an | d wind s | peed) = | (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 | | |
| | | al ventila | • | rate for t | he appli | cable ca | se | | | | | 1 | 0.5 | (23a) |
| | | | | endix N, (2 | 3b) = (23a | ı) × Fmv (e | equation (I | N5)) . othe | rwise (23b | o) = (23a) | | l | 0.5 | (23b) |
| | | | | iency in % | | | | | | , , , | | l | 0.5 | (23c) |
| | | | - | - | - | | | | | 2b)m + (| 23b) x [′ | l 1 – (23c) | - | (200) |
| (24a)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24a) |
| | balance | d mecha | ı anical ve | ntilation | without | heat rec | L Coverv (N | и ЛV) (24b | m = (2) | 1 2b)m + (j | 1 23b) | II | | |
| (24b)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24b) |
| c) If | whole h | use ex | ract ver | ntilation of | or positiv | re input v | ı ventilatio | n from o | utside | | | | | |
| , | | | | | • | • | | | | .5 × (23b |)) | | | |
| (24c)m= | 0.52 | 0.52 | 0.51 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | (24c) |
| , | | | | ole hous m = (221 | | • | | | | 0.5] | • | | | |
| (24d)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24d) |
| Effe | ctive air | change | rate - er | nter (24a |) or (24t | o) or (24 | c) or (24 | d) in box | (25) | | | | | |
| (25)m= | 0.52 | 0.52 | 0.51 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | (25) |
| 3 He | at losse | s and he | eat loss i | paramete | ər. | | | | • | • | • | • | | |
| ELEN | | Gros | | Openin | | Net Ar | ea | U-valı | ue | AXU | | k-value |) Д | Xk |
| | ws Type | area | (m²) | m | | A ,r | | W/m2 -(1.35) | | (W/ | K) | kJ/m²∙ł | K k | J/K (27) |
| | ws Type | | | | | 1.59 | | [1/(1.35)- | | 2.04 | | | | (27) |
| | ws Type | | | | | | _ | [1/(1.35)- | | | | | | |
| | | | | | | 2.92 | | | | 3.74 | | | | (27) |
| | ws Type | | | | | 2.74 | | [1/(1.35)- | | 3.51 | | | | (27) |
| | ws Type T | | | | | 1.59 | _ | [1/(1.35)- | | 2.04 | | | | (27) |
| | ws Type | 9 0 | | | | 13.23 | | [1/(1.35)+ | • 0.04] = | 16.95 | ╡, | | | (27) |
| Walls | | 45.5 | 52 | 24.8 | 1 | 20.71 | X | 0.15 | = | 3.11 | | | _ | (29) |
| Roof | | 94. | | 0 | | 94.5 | × | 0.13 | = | 12.28 | | | | (30) |
| | | lements | | | | 140.0 | | | | | | | | (31) |
| | | | | effective wi nternal wal | | | ated using | formula 1 | /[(1/U-valı | ue)+0.04] a | as given in | paragraph | 3.2 | |
| Fabric | heat los | s, W/K : | = S (A x | U) | , | | | (26)(30) |) + (32) = | | | | 47.17 | (33) |
| Heat c | apacity | Cm = S(| (Axk) | | | | | | ((28). | (30) + (32 | 2) + (32a). | (32e) = | 1140.41 | (34) |
| Therm | al mass | parame | ter (TMF | ⁻ = Cm ÷ | - TFA) ir | ∩ kJ/m²K | | | Indica | ative Value | : Low | | 100 | (35) |
| | - | sments wh ad of a de | | | constructi | ion are not | t known pi | ecisely the | e indicative | e values of | TMP in Ta | able 1f | | |
| Therm | al bridge | es : S (L | x Y) cal | culated u | using Ap | pendix ł | < | | | | | | 25.74 | (36) |
| | of therma | | are not kn | own (36) = | = 0.05 x (3 | 1) | | | (33) + | - (36) = | | | 72.91 | (37) |
| | | | alculated | d monthly | / | | | | | $1 = 0.33 \times ($ | 25)m x (5) | l | 12.31 | (0,) |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (38)m= | 42.24 | 41.81 | 41.38 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | | (38) |
| Heat ti | ransfer o | coefficier | nt. W/K | | | | ļ | I | (39)m | I = (37) + (10) | 38)m | | I | |
| (39)m= | 115.15 | r | 114.29 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | | |
| | FSAP 201 | 2 Version: | 1.0.4.18 | (SAP 9.92) | | ww.stroma | .com | I | | I Average = | Sum(39)1. | 12 /12= | 113.77 _{ag} | e 2 of 39) |

| Heat lo | oss para | meter (H | HLP), W | /m²K | | | | | (40)m | = (39)m ÷ | · (4) | | | |
|------------|-------------|------------|----------------------|--------------------------|-------------|-------------|-------------|------------------------|-----------------------|-------------------|----------------------------------|-----------|---------|------|
| (40)m= | 1.22 | 1.21 | 1.21 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | | |
| Numhe | er of day | s in mo | nth (Tab | le 1a) | | | | | | Average = | Sum(40) ₁ . | .12 /12= | 1.2 | (40) |
| - turnov | 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) |
| | | | 1 | 1 | 1 | | | ! | 1 | 1 | | | | |
| 4. Wa | ter heat | ting ene | rgy requ | irement: | | | | | | | | kWh/ye | ear: | |
| if TF | | | | : [1 - exp | 0(-0.0003 | 349 x (TI | FA -13.9 |)2)] + 0.(| 0013 x (⁻ | TFA -13. | | 68 | | (42) |
| Reduce | the annua | al average | hot water | | 5% if the c | welling is | designed | (25 x N) to achieve | | se target o | 97 f | .91 | | (43) |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| | - | - | - | ach month | r | r | | r | | | | | | |
| (44)m= | 107.7 | 103.78 | 99.87 | 95.95 | 92.03 | 88.12 | 88.12 | 92.03 | 95.95 | 99.87 | 103.78 m(44) ₁₁₂ = | 107.7 | 1174.9 | (44) |
| Energy | content of | hot water | used - cal | culated m | onthly = 4. | 190 x Vd,ı | m x nm x L | OTm / 3600 | | | | | 1174.9 | (44) |
| (45)m= | 159.71 | 139.69 | 144.14 | 125.67 | 120.58 | 104.05 | 96.42 | 110.64 | 111.97 | 130.49 | 142.43 | 154.67 | | |
| lf instan | taneous w | ater heati | ng at point | t of use (no | o hot wate | r storage), | enter 0 in | boxes (46 | | Total = Su | m(45) ₁₁₂ = | | 1540.48 | (45) |
| (46)m= | 23.96 | 20.95 | 21.62 | 18.85 | 18.09 | 15.61 | 14.46 | 16.6 | 16.79 | 19.57 | 21.37 | 23.2 | | (46) |
| | storage | | | | | | | | | | | | | |
| - | | | | | | | - | within sa | ame ves | sel | | C | | (47) |
| | - | - | | ank in dw ar (this in | - | | | ı (47) ombi boil | ers) ente | r '0' in <i>(</i> | 47) | | | |
| | storage | | not wat | 51 (ti 115 11 | | nstanta | 10003 00 | | | | | | | |
| a) If m | anufact | urer's de | eclared I | oss facto | or is kno | wn (kWł | n/day): | | | | | C | | (48) |
| Tempe | erature f | actor fro | m Table | 2b | | | | | | | | C | | (49) |
| ••• | | | - | e, kWh/ye | | | | (48) x (49) |) = | | 1 | 10 | | (50) |
| | | | | cylinder com Tobl | | | | | | | | | | (54) |
| | | - | ee secti | rom Tabl on 4 3 | ie z (kvv | n/iitre/ua | ay) | | | | 0. | 02 | | (51) |
| | | from Ta | | | | | | | | | 1. | 03 | | (52) |
| Tempe | erature f | actor fro | m Table | 2b | | | | | | | 0 | | | (53) |
| Energy | / lost fro | m water | ⁻ storage | , kWh/ye | ear | | | (47) x (51) |) x (52) x (| 53) = | 1. | 03 | | (54) |
| Enter | (50) or (| (54) in (5 | 55) | | | | | | | | 1. | 03 | | (55) |
| Water | storage | loss cal | culated | 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 Appendi | хH | |
| (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 (ar | nnual) fro | om Table | e 3 | | | | | | |) | | (58) |
| | - | • | , | | | 59)m = | (58) ÷ 36 | 65 × (41) | m | | | | | |
| (mo | | | r | r | r | r | | ng and a | · · | i | 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 | ombi loss calculated for each month (61)m = (60) \div 365 × (41)m | | | | | | | | | | | | | |
|-------------------|---|-------------|---------------|--------------|------------|----------|----------------|--------------|--------------|-------------|-------------|-------------|---------------|------|
| (61)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (61) |
| Total h | eat req | uired for | water h | neating c | alculated | for ea | ach month | (62)m = | = 0.85 × (| (45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= | 214.99 | 189.61 | 199.42 | 179.16 | 175.86 | 157.5 | 5 151.7 | 165.92 | 165.46 | 185.76 | 195.93 | 209.95 | | (62) |
| Solar DH | IW input | calculated | using Ap | pendix G o | r Appendix | H (neg | ative quantit | y) (enter '0 | ' if no sola | r contribut | ion to wate | er heating) | | |
| (add ac | dditiona | al lines if | FGHRS | S and/or | WWHRS | applie | es, see Ap | pendix (| G) | | | | _ | |
| (63)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output | from w | ater hea | ter | | | | | | | | | | | |
| (64)m= | 214.99 | 189.61 | 199.42 | 179.16 | 175.86 | 157.5 | 5 151.7 | 165.92 | 165.46 | 185.76 | 195.93 | 209.95 | | |
| | | | | - | - | | - | Out | out from w | ater heate | r (annual)₁ | 12 | 2191.32 | (64) |
| Heat g | ains fro | m water | heating | ı, kWh/m | onth 0.2 | 5 ´ [0.8 | 35 × (45)m | n + (61)n | n] + 0.8 x | k [(46)m | + (57)m | + (59)m |] | |
| (65)m= | 97.33 | 86.39 | 92.15 | 84.58 | 84.32 | 77.39 | 76.28 | 81.01 | 80.02 | 87.61 | 90.15 | 95.65 | | (65) |
| inclu | de (57) | m in calo | culation | of (65)m | only if c | ylinde | r is in the | dwelling | or hot w | ater is fi | rom com | munity h | leating | |
| 5. Int | ernal a | ains (see | Table | 5 and 5a |): | - | | - | | | | • | - | |
| | | ns (Table | | | | | | | | | | | | |
| metabl | Jan | Feb | Mar | Apr | May | Jur | ı Jul | Aug | Sep | Oct | Nov | Dec | | |
| (66)m= | 160.95 | 160.95 | 160.95 | 160.95 | 160.95 | 160.9 | | 160.95 | 160.95 | 160.95 | 160.95 | 160.95 | | (66) |
| · · | n dains | (calcula | L ted in A | | 1 | on I 9 | or L9a), a | lso see | 1 | | | | 1 | |
| (67)m= | 55.08 | 48.92 | 39.78 | 30.12 | 22.51 | 19.01 | | 26.7 | 35.83 | 45.5 | 53.1 | 56.61 |] | (67) |
| | | 1 | | | | | L13 or L1 | | | | | | I | |
| Appilai (68)m= | 368.83 | <u>,</u> | 363.01 | 342.48 | 316.56 | 292.2 | | 272.1 | 281.75 | 302.28 | 328.2 | 352.56 | 1 | (68) |
| | | | | | | | | | | | 520.2 | 352.50 | l | (00) |
| | | <u> </u> | | 53.78 | · · · | | 5 or L15a | . <u> </u> | 1 | | 50.70 | 50.70 | 1 | (69) |
| (69)m= | 53.78 | 53.78 | 53.78 | | 53.78 | 53.78 | 3 53.78 | 53.78 | 53.78 | 53.78 | 53.78 | 53.78 | | (09) |
| | | ins gains | i | 1 | | | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | <u> </u> | 1 | (70) |
| (70)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (70) |
| 1 | <u> </u> | vaporatio | - <u> </u> | T | , `` | , | | | | | r | r | 1 | |
| (71)m= | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107. | 3 -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | | (71) |
| Water | heating | gains (T | able 5) | | | | | | | | | | | |
| (72)m= | 130.82 | 128.55 | 123.86 | 117.47 | 113.33 | 107.4 | 9 102.53 | 108.89 | 111.14 | 117.75 | 125.21 | 128.56 | | (72) |
| Total i | nterna | l gains = | | - | | (| 66)m + (67)n | n + (68)m · | + (69)m + | (70)m + (7 | '1)m + (72) | m | | |
| (73)m= | 662.15 | 657.56 | 634.08 | 597.5 | 559.83 | 526.1 | 3 506.42 | 515.11 | 536.15 | 572.95 | 613.94 | 645.15 | | (73) |
| 6. Sol | ar gain | s: | | | | | | | | | | | | |
| Solar g | ains are | calculated | using sola | ar flux from | Table 6a a | | ociated equa | ations to co | onvert to th | ne applicat | | ion. | | |
| Orienta | | Access F | actor | Area | l | | lux | т | g_ | - | FF | | Gains | |
| | | Table 6d | | m² | | ا | able 6a | ا | able 6b | | able 6c | | (VV) | - |
| Northea | | 0.77 | × | 2. | 74 | x | 11.28 | x | 0.5 | x | 0.8 | = | 8.57 | (75) |
| Northea | ast <mark>0.9x</mark> | 0.77 | × | 1. | 59 | x | 11.28 | x | 0.5 | x | 0.8 | = | 4.97 | (75) |
| Northea | ast <mark>0.9x</mark> | 0.77 | × | 2. | 74 | x | 22.97 | x | 0.5 | x | 0.8 | = | 17.44 | (75) |
| Northea | ast <mark>0.9x</mark> | 0.77 | × | 1. | 59 | x | 22.97 | x | 0.5 | x | 0.8 | = | 10.12 | (75) |
| Northea | ast <mark>0.9x</mark> | 0.77 | × | 2. | 74 | x | 41.38 | x | 0.5 | x | 0.8 | = | 31.43 | (75) |

| Northeast 0.9x | 0.77 |] x | 1.59 | × | 41.38 | × | 0.5 | x | 0.8 |] = | 18.24 | (75) |
|---------------------------|------|------------|-------|---|--------|----------|-----|---|-----|----------|--------|------|
| Northeast 0.9x | 0.77 |) ^] x | 2.74 | x | 67.96 | x | 0.5 | x | 0.8 |] = | 51.61 | (75) |
| Northeast 0.9x | 0.77 |] ^] x | 1.59 | x | 67.96 | ^ x | 0.5 | x | 0.8 |] = | 29.95 | (75) |
| Northeast 0.9x | 0.77 |] × | 2.74 | x | 91.35 | x | 0.5 | x | 0.8 |]] = | 69.38 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 1.59 | x | 91.35 | x | 0.5 | x | 0.8 |]] _ | 40.26 | (75) |
| Northeast 0.9x | 0.77 | 」 】 x | 2.74 | x | 97.38 | x | 0.5 | x | 0.8 | = | 73.97 | (75) |
| Northeast 0.9x | 0.77 |] x | 1.59 | x | 97.38 | x | 0.5 | x | 0.8 | = | 42.92 | (75) |
| Northeast 0.9x | 0.77 |] x | 2.74 | x | 91.1 | x | 0.5 | x | 0.8 | = | 69.19 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 91.1 | x | 0.5 | x | 0.8 | = | 40.15 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 72.63 | x | 0.5 | x | 0.8 | = | 55.16 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 72.63 | x | 0.5 | x | 0.8 |] = | 32.01 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 50.42 | x | 0.5 | x | 0.8 | = | 38.3 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 50.42 | x | 0.5 | x | 0.8 |] = | 22.22 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 28.07 | x | 0.5 | x | 0.8 | = | 21.32 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | × | 28.07 | x | 0.5 | x | 0.8 |] = | 12.37 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | × | 14.2 | x | 0.5 | x | 0.8 | = | 10.78 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 14.2 | x | 0.5 | x | 0.8 | = | 6.26 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 9.21 | x | 0.5 | x | 0.8 |] = | 7 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 9.21 | x | 0.5 | x | 0.8 | = | 4.06 | (75) |
| Southwest _{0.9x} | 0.77 | x | 2.74 | x | 36.79 | | 0.5 | x | 0.8 | = | 27.95 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.59 | x | 36.79 | | 0.5 | x | 0.8 | = | 16.22 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.92 | x | 36.79 | | 0.5 | x | 0.8 | = | 29.78 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13.23 | x | 36.79 | | 0.5 | x | 0.8 | = | 94.63 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.74 | x | 62.67 | | 0.5 | x | 0.8 | = | 47.6 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.59 | x | 62.67 | | 0.5 | x | 0.8 | = | 27.62 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.92 | x | 62.67 | | 0.5 | x | 0.8 | = | 50.73 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13.23 | x | 62.67 | | 0.5 | x | 0.8 | = | 161.19 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.74 | x | 85.75 | | 0.5 | x | 0.8 | = | 65.13 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.59 | × | 85.75 | | 0.5 | x | 0.8 | = | 37.8 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | x | 85.75 | | 0.5 | x | 0.8 | = | 69.41 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13.23 | x | 85.75 | | 0.5 | x | 0.8 | = | 220.55 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | x | 106.25 | | 0.5 | x | 0.8 | = | 80.7 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.59 | x | 106.25 | | 0.5 | x | 0.8 | = | 46.83 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | x | 106.25 | | 0.5 | x | 0.8 | = | 86 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13.23 | x | 106.25 | | 0.5 | x | 0.8 | = | 273.27 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | × | 119.01 | | 0.5 | x | 0.8 | = | 90.39 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | × | 119.01 | | 0.5 | x | 0.8 | = | 52.45 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | × | 119.01 | | 0.5 | x | 0.8 | = | 96.33 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | × | 119.01 | | 0.5 | x | 0.8 | = | 306.08 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | x | 118.15 | | 0.5 | x | 0.8 | = | 89.74 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | X | 118.15 | J | 0.5 | x | 0.8 | = | 52.07 | (79) |

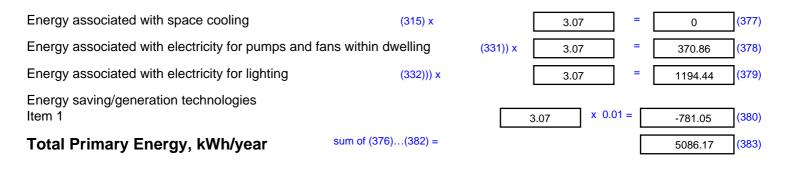
| Southwoote o | | | | | | | | | | | 7 | | | 1 | | |
|---------------------------|------------|----------|------------|----------|----------|----------|-----------|-------------|----------|----------|----------|----------|-------|----|--------|------|
| Southwest _{0.9x} | 0.77 | × | 2.9 | 2 | X | <u>1</u> | 18.15 | | | 0.5 | | 0.8 | | = | 95.63 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13. | 23 | X | 1 | 18.15 | | | 0.5 | × | 0.8 | | = | 303.87 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 4 | X | 1 | 13.91 | | | 0.5 | × | 0.8 | | = | 86.52 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.5 | 9 | X | 1 | 13.91 | | | 0.5 | × | 0.8 | | = | 50.21 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.9 | 2 | x | 1 | 13.91 | | | 0.5 | × | 0.8 | | = | 92.2 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13. | 23 | x | 1 | 13.91 | | | 0.5 | × | 0.8 | | = | 292.96 | (79) |
| Southwest0.9x | 0.77 | x | 2.7 | 4 | x | 10 | 04.39 | | | 0.5 | x | 0.8 | | = | 79.29 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 9 | x | 10 | 04.39 | | | 0.5 | × | 0.8 | | = | 46.01 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | 2 | x | 10 | 04.39 | | | 0.5 | × | 0.8 | | = | 84.5 | (79) |
| Southwest0.9x | 0.54 | x | 13. | 23 | x | 10 | 04.39 | | | 0.5 | x | 0.8 | | = | 268.48 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 4 | x | 9 | 2.85 | | | 0.5 | × | 0.8 | | = | 70.52 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 9 | x | 9 | 2.85 | | | 0.5 | × | 0.8 | | = | 40.92 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | 2 | x | 9 | 2.85 | | | 0.5 | x | 0.8 | | = | 75.16 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13. | 23 | x | 9 | 2.85 | | | 0.5 | x | 0.8 | | = | 238.81 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 4 | x | 6 | 9.27 | | | 0.5 | x | 0.8 | | = | 52.61 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 9 | x | 6 | 9.27 | | | 0.5 | × | 0.8 | | = | 30.53 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | 2 | x | 6 | 9.27 | | | 0.5 | × | 0.8 | | = | 56.07 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13. | 23 | x | 6 | 9.27 | | | 0.5 | × | 0.8 | | = | 178.15 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 4 | x | 4 | 4.07 | | | 0.5 | × | 0.8 | | = | 33.47 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 9 | x | 4 | 4.07 | | | 0.5 | × | 0.8 | | = | 19.42 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | 2 | x | 4 | 4.07 | | | 0.5 | × | 0.8 | | = | 35.67 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13. | 23 | x | 4 | 4.07 | | | 0.5 | ۲ × آ | 0.8 | | = | 113.35 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 4 | x | 3 | 1.49 | | | 0.5 | ۲ × آ | 0.8 | | = | 23.92 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.5 | 9 | x | 3 | 1.49 | | | 0.5 | ۲ × آ | 0.8 | | = | 13.88 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | 2 | x | 3 | 1.49 | | | 0.5 | ۲ × آ | 0.8 | | = | 25.49 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13. | 23 | x | 3 | 1.49 | | | 0.5 | ۲ × ۲ | 0.8 | | = | 80.98 | (79) |
| L | | | | | | | | | | | | | | | | |
| Solar gains in | watts, ca | lculated | l for eacl | n month | ו | | | (83)m | ı = Sı | um(74)m | .(82)m | | | | | |
| (83)m= 182.12 | 314.71 | 442.55 | 568.37 | 654.9 | - | 58.21 | 631.23 | 565 | .45 | 485.93 | 351.0 | 5 218.95 | 155.3 | 32 | | (83) |
| Total gains – i | nternal ar | nd solar | (84)m = | : (73)m | + (8 | 83)m | , watts | | | • | | • | | | | |
| (84)m= 844.27 | 972.27 | 1076.63 | 1165.87 | 1214.73 | 11 | 84.33 | 1137.66 | 1080 |).56 | 1022.08 | 924 | 832.89 | 800.4 | 48 | | (84) |
| 7. Mean inter | nal tempe | erature | (heating | seasor | ר) | | | | | - | | • | - | | | |
| Temperature | | | , J | | <i>.</i> | area | from Tab | ole 9. | . Th | 1 (°C) | | | | | 21 | (85) |
| Utilisation fac | • | 0. | | | Ŭ | | | , | | ~ / | | | | | | |
| Jan | Feb | Mar | Apr | May | Ť | Jun | Jul | A | ug | Sep | Oct | Nov | De | C | | |
| (86)m= 0.93 | 0.9 | 0.85 | 0.77 | 0.67 | - | 0.53 | 0.41 | 0.4 | <u> </u> | 0.62 | 0.8 | 0.9 | 0.93 | | | (86) |
| Mean interna | L tompore | turo in | | 00 T1 /f | | w ete | no 2 to 7 | [7 in T | | | | | | | | |
| (87)m= 18.89 | 19.19 | 19.62 | 20.13 | 20.54 | | 20.82 | 20.93 | 20.9 | | 20.72 | 20.18 | 19.46 | 18.8 | 5 | | (87) |
| | II | | | | | | | | | | 20.10 | 10.10 | 10.0 | 0 | | () |
| | <u> </u> | • • | | | - | | | | | <u> </u> | 10.00 | 10.00 | 40.0 | 2 | | (99) |
| (88)m= 19.91 | 19.91 | 19.91 | 19.92 | 19.92 | _ | 9.92 | 19.92 | 19.9 | 92 | 19.92 | 19.92 | 19.92 | 19.9 | 2 | | (88) |
| Utilisation fac | <u> </u> | | | | <u> </u> | | | <u> </u> | i | i | | | | | | |
| (89)m= 0.92 | 0.88 | 0.83 | 0.74 | 0.62 | (| 0.46 | 0.32 | 0.3 | 85 | 0.55 | 0.76 | 0.88 | 0.92 | 2 | | (89) |

| Mean | interna | l temper | ature in | the rest | of dwelli | ing T2 (f | ollow ste | eps 3 to 3 | 7 in Tabl | le 9c) | | | | |
|---|---|-----------|-----------------------|----------------------|-------------|-------------|-------------|------------|-------------|-------------|--------------|-------------|-----------|----------|
| (90)m= | 17.13 | 17.57 | 18.18 | 18.87 | 19.42 | 19.76 | 19.88 | 19.86 | 19.65 | 18.96 | 17.96 | 17.08 | | (90) |
| | | | | | | | | • | f | fLA = Livin | ig area ÷ (4 | 4) = | 0.38 | (91) |
| Mean | interna | l temper | ature (fo | or the wh | ole dwe | lling) = fl | LA × T1 | + (1 – fL | .A) × T2 | | | | | |
| (92)m= | 17.81 | 18.19 | 18.73 | 19.35 | 19.85 | 20.17 | 20.28 | 20.27 | 20.06 | 19.43 | 18.53 | 17.76 | | (92) |
| Apply | adjustn | nent to t | he mear | n interna | temper | ature fro | m Table | 4e, whe | ere appro | opriate | | | | |
| (93)m= | 17.81 | 18.19 | 18.73 | 19.35 | 19.85 | 20.17 | 20.28 | 20.27 | 20.06 | 19.43 | 18.53 | 17.76 | | (93) |
| | | | uirement | | | | | | | | | | | |
| | | | | mperatui using Ta | | ned at ste | ep 11 of | Table 9 | b, so tha | t Ti,m=(| 76)m an | d re-calc | ulate | |
| line ui | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Utilisa | | | ains, hm | | may | - our | - oui | 7.03 | 000 | | | 200 | | |
| (94)m= | 0.89 | 0.85 | 0.8 | 0.72 | 0.61 | 0.48 | 0.35 | 0.38 | 0.56 | 0.75 | 0.85 | 0.9 | | (94) |
| Usefu | I gains, | hmGm | , W = (94 | 4)m x (84 | 4)m | | | • | | | | | | |
| (95)m= | 750.59 | 830.08 | 864.53 | 843.86 | 746.76 | 564.66 | 396.44 | 411.23 | 572.14 | 689.39 | 710.81 | 719.51 | | (95) |
| Montl | nly aver | age exte | ernal tem | perature | e 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) |
| | | | 1 | | | 1 | 1 | x [(93)m | 1 | | | | 1 | |
| (97)m= | 1555.51 | 1524.69 | 1397.94 | | 924.99 | 631.42 | 417.75 | 438.7 | 676.37 | 1001.81 | 1296.93 | 1538.03 | | (97) |
| • | | <u> </u> | 1 | 1 | | 1 | 1 | 24 x [(97] | Í | í - · | r í | 000.00 | | |
| (98)m= | 598.86 | 466.78 | 396.86 | 246.28 | 132.61 | 0 | 0 | 0 | 0 | 232.44 | 422.01 | 608.98 | 2404.0 | |
| | | | | | ., | | | Tota | ll per year | (kwn/yea | r) = Sum(9 | 8)15,912 = | 3104.8 | (98) |
| Spac | e heatin | g require | ement in | kWh/m ² | /year | | | | | | | | 32.86 | (99) |
| 9b. En | ergy rec | quiremer | nts – Coi | nmunity | heating | scheme | • | | | | | | | |
| • | | • | | | | - | | ting prov | • | | unity scł | neme. | 0 | (301) |
| | • | | | | •• | | Ū | (Table 1 | 1) U II N | one | | | 0 | |
| Fractic | on of spa | ace heat | from co | mmunity | system | 1 – (30′ | 1) = | | | | | | 1 | (302) |
| | - | | | | | | | | | up to four | other heat | sources; ti | he latter | |
| | | | s, geotneri Commun | | aste neat i | rom powei | r stations. | See Appel | naix C. | | | | 0.67 | (303a) |
| | | | | m heat s | ource 2 | | | | | | | | 0.33 | (303b) |
| | | | | m Comn | | | | | | (2 | 02) x (303 | (a) - | | (304a) |
| | | • | | | | | . 0 | | | | | | 0.67 | <u> </u> |
| | | • | | m comm | | | | | | | 02) x (303 | D) = | 0.33 | (304b) |
| | | | | | | , | | unity hea | ating sys | tem | | | 1 | (305) |
| Distribution loss factor (Table 12c) for community heating system | | | | | | | | | | | 1.05 | (306) | | |
| - | heating | - | | | | | | | | | | I | kWh/year | ¬ |
| | | - | requiren | | | | | | | | | | 3104.8 | |
| • | | | munity C | | | | | | (98) x (30 | 04a) x (30 | 5) x (306) : | = | 2171.19 | (307a) |
| Space | heat fro | m heat | source 2 | 2 | | | | | (98) x (30 | 04b) x (30 | 5) x (306) | = | 1088.85 | (307b) |
| Efficie | Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E) | | | | | | | | | | | 0 | (308 | |

| Space heating requirement from second | lary/supplementary system | (98) x (301) x 100 ÷ (308) = | 0 | (309) |
|--|----------------------------------|--------------------------------------|----------------------------|--------|
| Water heating Annual water heating requirement | | | 2191.32 | 7 |
| If DHW from community scheme: Water heat from Community CHP | | (64) x (303a) x (305) x (306) = | 1532.39 | (310a) |
| Water heat from heat source 2 | | (64) x (303b) x (305) x (306) = | 768.49 | (310b) |
| Electricity used for heat distribution | 0. | 01 × [(307a)(307e) + (310a)(310e)] = | 55.61 | (313) |
| Cooling System Energy Efficiency Ratio | | | 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 dw mechanical ventilation - balanced, extra | | le | 120.8 | (330a) |
| warm air heating system fans | | | 0 | (330b) |
| pump for solar water heating | | | 0 | (330g) |
| Total electricity for the above, kWh/year | | =(330a) + (330b) + (330g) = | 120.8 | (331) |
| Energy for lighting (calculated in Append | dix L) | | 389.07 | (332) |
| Electricity generated by PVs (Appendix | M) (negative quantity) | | -254.41 | (333) |
| Electricity generated by wind turbine (Ap | opendix M) (negative quantity) | | 0 | (334) |
| 10b. Fuel costs – Community heating s | scheme | | | |
| | Fuel kWh/year | Fuel Price (Table 12) | Fuel Cost £/year | |
| Space heating from CHP | (307a) x | 3.35 × 0.01 = | 72.73 | (340a) |
| Space heating from heat source 2 | (307b) x | 4.79 × 0.01 = | 52.16 | (340b) |
| Water heating from CHP | (310a) x | 3.35 × 0.01 = | 51.33 | (342a) |
| Water heating from heat source 2 | (310b) x | 4.79 × 0.01 = | 36.81 | (342b) |
| Pumps and fans | (331) | Fuel Price 0 × 0.01 = | 21.21 | (349) |
| Energy for lighting | (332) | 0 x 0.01 = | 68.32 | (350) |
| Additional standing charges (Table 12) | | | 88 | (351) |
| Energy saving/generation technologies Total energy cost | = (340a)(342e) + (345)(354) = | | 390.57 | (355) |
| 11b. SAP rating - Community heating s | scheme | | | |
| Energy cost deflator (Table 12) | | | 0.42 | (356) |
| Energy cost factor (ECF) | [(355) x (356)] ÷ [(4) + 45.0] = | | 1 13 | (357) |

| Energy cost denator (Table 12) | | 0.42 | (356) |
|-----------------------------------|----------------------------------|-------|-------|
| Energy cost factor (ECF) | [(355) x (356)] ÷ [(4) + 45.0] = | 1.13 | (357) |
| SAP rating (section12) | | 84.21 | (358) |
| 12b. CO2 Emissions – Communit | y heating scheme | | |
| Electrical efficiency of CHP unit | | 32 | (361) |
| Heat efficiency of CHP unit | | 50.4 | (362) |

| | | Energy kWh/year | Emission factor kg CO2/kWh | Emissions kg CO2/year | |
|--|----------------------------|---------------------------------|-------------------------------|--------------------------|------------------|
| Space heating from CHP) | (307a) × 100 ÷ (362) = | 4307.91 × | 0.22 | 930.51 | (363) |
| less credit emissions for electricity | –(307a) × (361) ÷ (362) = | 1378.53 × | 0.52 | -715.46 | (364) |
| Water heated by CHP | (310a) × 100 ÷ (362) = | 3040.45 × | 0.22 | 656.74 | (365) |
| less credit emissions for electricity | –(310a) × (361) ÷ (362) = | 972.94 × | 0.52 | -504.96 | (366) |
| Efficiency of heat source 2 (%) | If there is CHP | using two fuels repeat (363) to | (366) for the second fu | el 95 | (367b) |
| CO2 associated with heat source 2 | [(30] | 7b)+(310b)] x 100 ÷ (367b) x | 0.22 | = 422.3 | (368) |
| Electrical energy for heat distributio | n | [(313) x | 0.52 | = 28.86 | (372) |
| Total CO2 associated with commun | nity systems | (363)(366) + (368)(37 | 2) | = 817.99 | (373) |
| CO2 associated with space heating | (secondary) | (309) x | 0 | = 0 | (374) |
| CO2 associated with water from im | mersion heater or instant | aneous heater (312) x | 0.22 | = 0 | (375) |
| Total CO2 associated with space a | nd water heating | (373) + (374) + (375) = | | 817.99 | (376) |
| CO2 associated with electricity for p | oumps and fans within dw | velling (331)) x | 0.52 | = 62.7 | (378) |
| CO2 associated with electricity for I | ighting | (332))) x | 0.52 | = 201.93 | (379) |
| Energy saving/generation technolog | gies (333) to (334) as app | blicable | 0.52 × 0.01 = | -132.04 | (380) |
| Total CO2, kg/year | sum of (376)(382) = | | 0.32 | 950.58 |](000)](383) |
| Dwelling CO2 Emission Rat | | | | 10.06 | (384) |
| El rating (section 14) | | | | 90.87 | (385) |
| 13b. Primary Energy – Community | heating scheme | | | | |
| Electrical efficiency of CHP unit | | | | 32 | (361) |
| Heat efficiency of CHP unit | | | | 50.4 | (362) |
| | | Energy kWh/year | Primary factor | P.Energy kWh/year | |
| Space heating from CHP) | (307a) × 100 ÷ (362) = | 4307.91 × | 1.22 | 5255.65 | (363) |
| less credit emissions for electricity | –(307a) × (361) ÷ (362) = | 1378.53 × | 3.07 | -4232.09 | (364) |
| Water heated by CHP | (310a) × 100 ÷ (362) = | 3040.45 × | 1.22 | 3709.35 | (365) |
| less credit emissions for electricity | –(310a) × (361) ÷ (362) = | 972.94 × | 3.07 | -2986.94 | (366) |
| Efficiency of heat source 2 (%) | If there is CHP | using two fuels repeat (363) to | (366) for the second fu | el 95 | (367b) |
| Energy associated with heat source | e 2 [(30] | 7b)+(310b)] x 100 ÷ (367b) x | 1.22 | = 2385.23 | (368) |
| Electrical energy for heat distributio | n | [(313) x | | = 170.72 | (372) |
| Total Energy associated with comm | nunity systems | (363)(366) + (368)(37 | 2) | = 4301.92 | (373) |
| if it is negative set (373) to zero (| unless specified otherwis | e, see C7 in Appendix (| C) | 4301.92 | (373) |
| Energy associated with space heat | ing (secondary) | (309) x | 0 | = 0 | (374) |
| Energy associated with water from | immersion heater or insta | antaneous heater(312) x | 1.22 | = 0 | (375) |
| Total Energy associated with space | e and water heating | (373) + (374) + (375) = | | 4301.92 | (376) |



| | | | User D | etails: | | | | | | |
|---|--------------------|----------------------|-------------|----------------------|---------------------|-------------------|----------------------|-----------|---------------------------------------|----------|
| Assessor Name: | Ross Boulton | | | Stroma | a Num | ber: | | STRO | 028068 | |
| Software Name: | Stroma FSAP | 2012 | | Softwa | are Ver | sion: | | Versio | n: 1.0.4.18 | |
| | | Р | roperty / | Address: | B2A-10 | 5-07 | | | | |
| Address : | B2A-105-07, F | lat Type 2-17 | A, Wimb | ledon, L | ondon | | | | | |
| 1. Overall dwelling dimen | sions: | | | | | | | | | |
| Ground floor | | | | a(m²) 94.5 | (1a) x | Av. Hei | i ght(m) 6 | (2a) = | Volume(m³) 245.7 | (3a) |
| Total floor area TFA = (1a) |)+(1b)+(1c)+(1d) |)+(1e)+(1n | I) g | 94.5 | (4) | | | | | |
| Dwelling volume | | | L | | (3a)+(3b) | +(3c)+(3d |)+(3e)+ | .(3n) = | 245.7 | (5) |
| 2. Ventilation rate: | | | | _ | | | | | | |
| | main heating | secondar heating | У | other | | total | | | m ³ per hour | |
| Number of chimneys | 0 | + 0 | + | 0 |] = [| 0 | x 4 | 40 = | 0 | (6a) |
| Number of open flues | 0 | + 0 | - + [| 0 | ī = Ē | 0 | x 2 | 20 = | 0 | (6b) |
| Number of intermittent fan | s | | | | | 3 | x 1 | 10 = | 30 | (7a) |
| Number of passive vents | | | | | Γ | 0 | x 1 | 10 = | 0 | (7b) |
| Number of flueless gas fire | es | | | | | 0 | x 4 | 40 = | 0 | (7c) |
| | | | | | | | | Air ch | anges per ho | _ ur |
| Infiltration due to chimneys | s flues and fans | - (6a) + (6b) + (7) | a)+(7b)+(7 | 7c) = | Г | | | | | - |
| If a pressurisation test has be | | | | | continue fro | 30 om (9) to (| | ÷ (5) = | 0.12 | (8) |
| Number of storeys in the | e dwelling (ns) | | | | | | | | 0 | (9) |
| Additional infiltration | | | | | | | [(9)- | -1]x0.1 = | 0 | (10) |
| Structural infiltration: 0.2 | 5 for steel or tim | nber frame or | 0.35 for | masonr | y constr | uction | | | 0 | (11) |
| if both types of wall are pre deducting areas of opening | | | the greate | er wall area | a (after | | | | | |
| If suspended wooden flo | | | 1 (seale | d), else | enter 0 | | | | 0 | (12) |
| If no draught lobby, ente | , (| , | , | ,, | | | | | 0 | (13) |
| Percentage of windows | and doors draug | ght stripped | | | | | | | 0 | (14) |
| Window infiltration | | | | 0.25 - [0.2 | x (14) ÷ 1 | = [00 | | | 0 | (15) |
| Infiltration rate | | | | (8) + (10) - | + (11) + (1 | 2) + (13) + | + (15) = | | 0 | (16) |
| Air permeability value, q | 50, expressed in | n cubic metre | s per ho | ur per so | quare me | etre of e | nvelope | area | 5 | (17) |
| If based on air permeabilit | y value, then (18 | $(17) \div 20 + (8)$ | 3), otherwi | se (18) = (| 16) | | | | 0.37 | (18) |
| Air permeability value applies | | est has been don | e or a deg | iree air pei | rmeability i | is being us | sed | | | - |
| Number of sides sheltered Shelter factor | | | | (20) = 1 - [| 0.075 x (1 | 9)] = | | | 2 | (19) |
| Infiltration rate incorporatir | a shelter factor | | | (21) = (18) | | •/] | | - | 0.85 | (20) |
| Infiltration rate modified for | 0 | | | (21) = (10) | / x (2 0) - | | | | 0.32 | (21) |
| | | May Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Monthly average wind spe | · · · | - · · | 2.01 | | 207 | 000 | | | I | |
| r | - I I I | 4.3 3.8 | 3.8 | 3.7 | 4 | 4.3 | 4.5 | 4.7 | | |
| | | | | | | | | | l | |
| Wind Factor (22a)m = (22) | - I - I | 00 007 | 0.05 | 0.00 | | 4.00 | 4.40 | 4.40 | l | |
| (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 | | |

| Adjust | ed infiltr | ation rat | e (allowi | ng for sh | nelter an | d wind s | peed) = | (21a) x | (22a)m | _ | | _ | | |
|---------|------------|------------|----------------------------|-------------|-------------|-------------|------------------|----------------|-------------|----------------------|-------------|-----------|-----------------------|-------------------|
| ~ ' ' | 0.4 | 0.4 | 0.39 | 0.35 | 0.34 | 0.3 | 0.3 | 0.29 | 0.32 | 0.34 | 0.36 | 0.37 | | |
| | | al ventila | change i | rate for t | he appli | cable ca | se | | | | | | 0 | (23a) |
| | | | using Appe | endix N. (2 | 3b) = (23a |) × Fmv (e | equation (I | N5)) . othe | wise (23b |) = (23a) | | | 0 | (23b) |
| | | | overy: effici | | , , | , , | | | | , (, | | | 0 | (23c) |
| | | | - | - | - | | | | | 2h)m + (| 23b) × [1 | l – (23c) | | (230) |
| (24a)m= | r | | | 0 | 0 | 0 | | 0 | 0 | | | 1 - (230) | ÷ 100] | (24a) |
| | | - | anical ve | - | without | heat rec | | 1 /\/) (24h | 1 - (22) | <u> </u> 2b)m + (| 23h) | | | |
| (24b)m= | 0 | | | 0 | 0 | | | | 0 | | 0 | 0 | | (24b) |
| | whole h | - | tract ven | - | _ | | <u>entilatio</u> | n from c | - | | - | | | |
| , | | | (23b), t | | • | • | | | | .5 × (23b |)) | | | |
| (24c)m= | r í í | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24c) |
| d) If | natural | ventilatio | on or wh | ole hous | e positiv | /e input | ventilatio | on from I | oft | 1 | | | | |
| , | if (22b)n | n = 1, th | en (24d) | m = (22 | o)m othe | rwise (2 | 4d)m = | 0.5 + [(2 | 2b)m² x | 0.5] | | | | |
| (24d)m= | 0.58 | 0.58 | 0.58 | 0.56 | 0.56 | 0.55 | 0.55 | 0.54 | 0.55 | 0.56 | 0.56 | 0.57 | | (24d) |
| Effe | ctive air | change | rate - er | nter (24a |) or (24b |) or (24 | c) or (24 | d) in boy | (25) | | | | | |
| (25)m= | 0.58 | 0.58 | 0.58 | 0.56 | 0.56 | 0.55 | 0.55 | 0.54 | 0.55 | 0.56 | 0.56 | 0.57 | | (25) |
| 3. He | at losse | s and he | eat loss p | paramete | er: | | | | | | | | | |
| ELEN | | Gros | | Openin | | Net Ar | ea | U-valu | Je | ΑXU | | k-value | , Α | Xk |
| | | area | (m²) | ŕ | 2 | A ,r | n² | W/m2 | K | (W/ | K) | kJ/m²∙ł | K k | J/K |
| Windo | ws Type | e 1 | | | | 2.61 | x1 | /[1/(1.4)+ | 0.04] = | 3.46 | | | | (27) |
| Windo | ws Type | 92 | | | | 1.51 | x1 | /[1/(1.4)+ | 0.04] = | 2 | | | | (27) |
| Windo | ws Type | 93 | | | | 2.78 | x1 | /[1/(1.4)+ | 0.04] = | 3.69 | | | | (27) |
| Windo | ws Type | 9 4 | | | | 2.61 | x1 | /[1/(1.4)+ | 0.04] = | 3.46 | | | | (27) |
| Windo | ws Type | e 5 | | | | 1.51 | x1 | /[1/(1.4)+ | 0.04] = | 2 | | | | (27) |
| Windo | ws Type | e 6 | | | | 12.6 | x1 | /[1/(1.4)+ | 0.04] = | 16.7 | | | | (27) |
| Walls | | 45.5 | 52 | 23.6 | 2 | 21.9 | × | 0.18 | | 3.94 | | | ┐ | (29) |
| Roof | | 94. | 5 | 0 | | 94.5 | × | 0.13 | | 12.28 | | | \dashv | (30) |
| Total a | area of e | lements | | | | 140.0 | 2 | | I | - | L | | | (31) |
| | | | | ffective wi | ndow U-va | | | formula 1 | /[(1/U-valu | ıe)+0.04] a | as given in | paragraph | 3.2 | |
| | | | sides of in | | | | - | | | , <u>-</u> | • | | | |
| Fabric | heat los | s, W/K : | = S (A x | U) | | | | (26)(30) | + (32) = | | | | 47.54 | (33) |
| Heat c | apacity | Cm = S(| (Axk) | | | | | | ((28) | (30) + (32 | 2) + (32a). | (32e) = | 1157.07 | (34) |
| Therm | al mass | parame | ter (TMF | P = Cm ÷ | - TFA) in | ı kJ/m²K | | | Indica | tive Value | : Medium | | 250 | (35) |
| | • | | ere the de tailed calcu | | constructi | ion are noi | t known pr | ecisely the | indicative | e values of | TMP in Ta | able 1f | | |
| Therm | al bridge | es : S (L | x Y) cal | culated u | using Ap | pendix I | < | | | | | | 15.97 | (36) |
| | | | are not kn | own (36) = | = 0.05 x (3 | 1) | | | | | | | | _ |
| | abric he | | | | | | | | | (36) = | | | 63.51 | (37) |
| Ventila | | 1 | alculated | monthl | | | | | | | 25)m x (5) | _ | I | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (38)m= | 47.13 | 46.88 | 46.63 | 45.45 | 45.23 | 44.2 | 44.2 | 44.01 | 44.6 | 45.23 | 45.67 | 46.14 | | (38) |
| Heat ti | ansfer o | coefficier | nt, W/K | | | | | | (39)m | = (37) + (| 38)m | | I | |
| (39)m= | 110.64 | 110.39 | 110.13 | 108.96 | 108.74 | 107.71 | 107.71 | 107.52 | 108.1 | 108.74 | 109.18 | 109.65 | | |
| Stroma | FSAP 201 | 2 Version: | 1.0.4.18 (| SAP 9.92) | - http://ww | vw.stroma | .com | | , | Average = | Sum(39)1. | 12 /12= | 108.945 _{ag} | <u>e 2 of 89)</u> |

| Heat lo | oss para | meter (H | HLP), W | /m²K | | | | | (40)m | = (39)m ÷ | (4) | | | |
|------------|-----------------------|---------------------|-------------|--------------|-------------|-------------|-------------------|------------------------|-----------------------|-------------|------------------------|----------|---------|------|
| (40)m= | 1.17 | 1.17 | 1.17 | 1.15 | 1.15 | 1.14 | 1.14 | 1.14 | 1.14 | 1.15 | 1.16 | 1.16 | | |
| Numbe | ar of day | /s in mo | nth (Tab | le 12) | | | | 1 | , | Average = | Sum(40)1 | .12 /12= | 1.15 | (40) |
| T UTTE | 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) |
| | | | | | 1 | 1 | | I | | | | | | |
| 4. Wa | ater heat | ting ene | rgy requ | irement: | | | | | | | | kWh/ye | ear: | |
| if TF | | | | (1 - exp | (-0.0003 | 349 x (TF | FA -13.9 | 9)2)] + 0.0 | 0013 x (⁻ | TFA -13. | <u>2.</u> 9) | 68 | | (42) |
| Reduce | the annua | al average | hot water | | 5% if the c | welling is | designed | (25 x N) to achieve | | se target o | 97. f | .91 | | (43) |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Hot wate | er usage i | n litres per | r day for e | ach month | | | Table 1c x | | | | | | | |
| (44)m= | 107.7 | 103.78 | 99.87 | 95.95 | 92.03 | 88.12 | 88.12 | 92.03 | 95.95 | 99.87 | 103.78 | 107.7 | | |
| | | | | | | | | | | | m(44) ₁₁₂ = | | 1174.9 | (44) |
| Energy o | content of | hot water | used - ca | lculated m | onthly = 4. | 190 x Vd,r | m x nm x L | DTm / 3600 |) kWh/mor | nth (see Ta | ables 1b, 1 | c, 1d) | | |
| (45)m= | 159.71 | 139.69 | 144.14 | 125.67 | 120.58 | 104.05 | 96.42 | 110.64 | 111.97 | 130.49 | 142.43 | 154.67 | | _ |
| lf instant | taneous w | vater heati | ng at poin | t of use (no | o hot wate | r storage), | enter 0 in | boxes (46 | | Total = Su | m(45) ₁₁₂ = | | 1540.48 | (45) |
| (46)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (46) |
| Water | storage | loss: | | <u> </u> | I | I | | 1 | ļ | ļ | | | | |
| Storag | e volum | e (litres) |) includir | ng any so | olar or W | /WHRS | storage | within sa | ame ves | sel | | 150 | | (47) |
| | | - | | ank in dw | - | | | . , | | | (-) | | | |
| | vise if no storage | | hot wate | er (this ir | ICLUDES I | nstantar | neous co | ombi boil | ers) ente | er '0' in (| 47) | | | |
| | • | | eclared I | oss facto | or is kno | wn (kWł | n/day): | | | | (|) | | (48) |
| | | actor fro | | | | , | , | | | | | с Э | | (49) |
| • | | | | e, kWh/ye | ear | | | (48) x (49) |) = | | |) | | (50) |
| | | | • | cylinder | | or is not | known: | | | | | | | |
| | | - | | rom Tabl | le 2 (kW | h/litre/da | ay) | | | | (| C | | (51) |
| | • | eating s from Ta | | on 4.3 | | | | | | | | 2 | | (52) |
| | | actor fro | | 2b | | | | | | | |)) | | (52) |
| • | | | | e, kWh/ye | ear | | | (47) x (51) |) x (52) x (| 53) = | |) | | (54) |
| | | (54) in (5 | - | ,, y | | | | | | , | |)) | | (55) |
| Water | storage | loss cal | culated | 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 | s dedicate | d solar sto | orage, (57) | m = (56)m | x [(50) – (| (5 [H11)] ÷ (5 | 50), 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 (ar | nnual) fro | om Table | e 3 | | | | | | (|) | | (58) |
| | - | • | | | | 59)m = (| (58) ÷ 30 | 65 × (41) | m | | | | | |
| (mod | dified by | factor f | rom 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 eac | h mon | h (61)m = | (60 | 0) ÷ 36 | 65 × (41) | m | | | | | | |
|----------|-----------------------|----------------------|-----------|----------|-------------|-----------|------------|-------------|-------------------|-----------------|-----------------|---------------|-------------|---------------|------|
| (61)m= | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (61) |
| Total h | eat req | uired for | water | neating | calculate | d fo | or eacl | h month | (62)m | = 0.85 × | (45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= | 135.76 | 118.73 | 122.52 | 106.8 | 102.49 | 8 | 88.45 | 81.96 | 94.05 | 95.17 | 110.91 | 121.07 | 131.47 |] | (62) |
| Solar Dł | -IW input | calculated | using Ap | pendix (| or Appendi | хH | (negati | ve quantity |) (enter | 0' if no sola | r contribu | tion to wate | er heating) | - | |
| (add a | dditiona | al lines if | FGHR | S and/o | or WWHR | Sa | pplies | , see Ap | pendix | G) | | | | _ | |
| (63)m= | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output | from w | ater hea | ter | | | | | | | | | | | | |
| (64)m= | 135.76 | 118.73 | 122.52 | 106.8 | 102.49 | 8 | 88.45 | 81.96 | 94.05 | 95.17 | 110.91 | 121.07 | 131.47 | | _ |
| | | | | | | | | | Ou | tput from w | ater heate | er (annual) | 112 | 1309.4 | (64) |
| Heat g | ains fro | m water | heating | g, kWh | month 0.2 | 25 ´ | [0.85 | × (45)m | + (61) | m] + 0.8 x | x [(46)m | n + (57)m | + (59)m | 1] | |
| (65)m= | 33.94 | 29.68 | 30.63 | 26.7 | 25.62 | | 22.11 | 20.49 | 23.51 | 23.79 | 27.73 | 30.27 | 32.87 |] | (65) |
| inclu | ide (57) | m in calo | culation | of (65 |)m only if | cyli | nder i | s in the c | dwelling | , g or hot w | vater is f | rom com | Imunity ł | - neating | |
| 5. Int | ernal g | ains (see | e Table | 5 and | 5a): | | | | | | | | | | |
| | | ns (Table | | | | | | | | | | | | | |
| metab | Jan | Feb | Mar | | r May | Т | Jun | Jul | Aug | Sep | Oct | Nov | Dec |] | |
| (66)m= | 134.12 | 134.12 | 134.12 | _ | - | 1 | 34.12 | 134.12 | 134.12 | | 134.12 | | 134.12 | | (66) |
| Liahtin | a aains | (calcula | ted in A | | ix L, equa | tior | ר L9 סו | r L9a). a | lso see | Table 5 | 1 | 1 | | 1 | |
| (67)m= | 22.03 | 19.57 | 15.91 | 12.0 | | T | 7.6 | 8.21 | 10.68 | 14.33 | 18.2 | 21.24 | 22.64 |] | (67) |
| | | ins (calc | | | endix L, eo | _L nua | tion L | | | i o see Ta | l ble 5 | | ļ | J | |
| (68)m= | 247.12 | 249.68 | 243.22 | | | | 95.78 | 184.87 | 182.31 | 188.77 | 202.53 | 219.89 | 236.21 | 1 | (68) |
| | | | | | lix L, equa | | | | | | | | 200121 | 1 | . , |
| (69)m= | 36.41 | 36.41 | 36.41 | 36.4 | | - | 36.41 | 36.41 | , aiso s 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 1 | (69) |
| | | | | | 1 30.41 | <u> </u> | 50.41 | 00.41 | 50.41 | 30.41 | 00.41 | 00.41 | 30.41 | 1 | (00) |
| • | | ns gains | r` | <u> </u> | | - | 0 | | 0 | | | | | 1 | (70) |
| (70)m= | | 0 | 0 | 0 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | J | (70) |
| | <u> </u> | <u> </u> | <u> </u> | | alues) (Ta | - | , | 107.0 | | | | 1 107 0 | | 1 | (74) |
| (71)m= | | | -107.3 | | 3 -107.3 | - | 107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | J | (71) |
| | | gains (T | í | | -i | | | | | 1 | | 1 | . <u> </u> | 1 | |
| (72)m= | 45.62 | 44.17 | 41.17 | 37.0 | 9 34.44 | ; | 30.71 | 27.54 | 31.6 | 33.05 | 37.27 | 42.04 | 44.18 | | (72) |
| | | gains = | · · · · · | | | | | . , | . , | + (69)m + | (70)m + (` T | 71)m + (72) | 1 | 1 | |
| (73)m= | 378 | 376.66 | 363.54 | 341.8 | 318.78 | 2 | 297.33 | 283.86 | 287.82 | 299.38 | 321.23 | 346.41 | 366.27 | | (73) |
| | lar gain | | | | | | | | | | | | | | |
| - | | | • | | om Table 6a | and | | | tions to a | | ne applica | | tion. | | |
| Orienta | | Access F Table 6d | | | ea 1² | | Flu Tał | x ble 6a | | g_ Table 6b | г | FF able 6c | | Gains (W) | |
| Northo | _ | | | | | | | | . – | | | | | . , | ٦ |
| Northea | L | 0.77 | | × | 2.61 | x | | 1.28 | × | 0.63 | | 0.7 | = | 9 | (75) |
| Northea | L | 0.77 | | × | 1.51 | x | | 1.28 | × | 0.63 | | 0.7 | = | 5.21 | (75) |
| Northea | Ļ | 0.77 | | × | 2.61 | x | | 2.97 | × | 0.63 | | 0.7 | = | 18.32 | (75) |
| Northea | | 0.77 | | × | 1.51 | x | 2 | 2.97 | x | 0.63 | × [| 0.7 | = | 10.6 | (75) |
| Northea | ast <mark>0.9x</mark> | 0.77 | | x | 2.61 | x | 4 | 1.38 | x | 0.63 | × | 0.7 | = | 33.01 | (75) |

| Northeast 0.9x | 0.77 | × | 1.51 | × | 41.38 | × | 0.63 | x | 0.7 | = | 19.1 | (75) |
|---------------------------|------|------------|------|---|--------|---------|------|---|-----|---|--------|------|
| Northeast 0.9x | 0.77 | l x | 2.61 | x | 67.96 | x x | 0.63 | x | 0.7 | = | 54.2 | (75) |
| Northeast 0.9x | 0.77 | l ^ l x | 1.51 | x | 67.96 | x | 0.63 | x | 0.7 | = | 34.2 | (75) |
| Northeast 0.9x | 0.77 |) ^ x | 2.61 | x | 91.35 | x x | 0.63 | x | 0.7 | = | 72.86 | (75) |
| Northeast 0.9x | 0.77 | ^ x | 1.51 | x | 91.35 | x | 0.63 | x | 0.7 | = | 42.15 | (75) |
| Northeast 0.9x | 0.77 |] ^] x | 2.61 | x | 97.38 | x x | 0.63 | x | 0.7 | = | 77.68 | (75) |
| Northeast 0.9x | 0.77 | ^ x | 1.51 | x | 97.38 | x | 0.63 | x | 0.7 | = | 44.94 | (75) |
| Northeast 0.9x | 0.77 |] x | 2.61 | x | 91.1 | x | 0.63 | x | 0.7 | = | 72.67 | (75) |
| Northeast 0.9x | 0.77 |] x | 1.51 | x | 91.1 | x | 0.63 | x | 0.7 | = | 42.04 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | x | 72.63 | x | 0.63 | x | 0.7 | = | 57.93 | (75) |
| Northeast 0.9x | 0.77 | x | 1.51 | x | 72.63 | x | 0.63 | x | 0.7 | = | 33.52 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | x | 50.42 | × | 0.63 | x | 0.7 | = | 40.22 | (75) |
| Northeast 0.9x | 0.77 | x | 1.51 | x | 50.42 | × | 0.63 | x | 0.7 | = | 23.27 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | x | 28.07 | × | 0.63 | x | 0.7 | = | 22.39 | (75) |
| Northeast 0.9x | 0.77 | x | 1.51 | x | 28.07 | × | 0.63 | x | 0.7 | = | 12.95 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | x | 14.2 | x | 0.63 | x | 0.7 | = | 11.32 | (75) |
| Northeast 0.9x | 0.77 | × | 1.51 | x | 14.2 | × | 0.63 | x | 0.7 | = | 6.55 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | x | 9.21 | x | 0.63 | x | 0.7 | = | 7.35 | (75) |
| Northeast 0.9x | 0.77 | × | 1.51 | x | 9.21 | × | 0.63 | x | 0.7 | = | 4.25 | (75) |
| Southwest _{0.9x} | 0.77 | × | 2.61 | x | 36.79 | Ì | 0.63 | x | 0.7 | = | 29.35 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.51 | x | 36.79 | | 0.63 | x | 0.7 | = | 16.98 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.78 | x | 36.79 | | 0.63 | x | 0.7 | = | 31.26 | (79) |
| Southwest0.9x | 0.54 | x | 12.6 | x | 36.79 | | 0.63 | x | 0.7 | = | 99.36 | (79) |
| Southwest0.9x | 0.77 | × | 2.61 | x | 62.67 |] | 0.63 | x | 0.7 | = | 49.99 | (79) |
| Southwest0.9x | 0.77 | x | 1.51 | x | 62.67 | | 0.63 | x | 0.7 | = | 28.92 | (79) |
| Southwest0.9x | 0.77 | × | 2.78 | x | 62.67 | | 0.63 | x | 0.7 | = | 53.25 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12.6 | x | 62.67 | | 0.63 | x | 0.7 | = | 169.25 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.61 | x | 85.75 | | 0.63 | x | 0.7 | = | 68.4 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.51 | x | 85.75 | | 0.63 | x | 0.7 | = | 39.57 | (79) |
| Southwest0.9x | 0.77 | x | 2.78 | x | 85.75 | | 0.63 | x | 0.7 | = | 72.86 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12.6 | x | 85.75 | | 0.63 | x | 0.7 | = | 231.58 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.61 | x | 106.25 | | 0.63 | x | 0.7 | = | 84.75 | (79) |
| Southwest0.9x | 0.77 | × | 1.51 | x | 106.25 | | 0.63 | x | 0.7 | = | 49.03 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.78 | x | 106.25 | ļ | 0.63 | x | 0.7 | = | 90.27 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12.6 | x | 106.25 | | 0.63 | x | 0.7 | = | 286.93 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.61 | x | 119.01 | | 0.63 | x | 0.7 | = | 94.93 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.51 | x | 119.01 | | 0.63 | x | 0.7 | = | 54.92 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.78 | x | 119.01 | | 0.63 | x | 0.7 | = | 101.11 | (79) |
| Southwest _{0.9x} | 0.54 | × | 12.6 | x | 119.01 | | 0.63 | x | 0.7 | = | 321.39 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.61 | x | 118.15 | | 0.63 | x | 0.7 | = | 94.24 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.51 | x | 118.15 |] | 0.63 | x | 0.7 | = | 54.52 | (79) |

| Couthwarts | | | | | | | | 1 | | | - | | | | | - |
|---------------------------|---|-----------|--------------------|----------|----------|-------|-----------|-------------|----------|------------------|----------|----------|------|-----|--------|----------|
| Southwest _{0.9x} | 0.77 | × | 2.7 | 8 | x | 1 | 18.15 | | | 0.63 | × | 0.7 | | = | 100.38 | (79) |
| Southwest _{0.9x} | 0.54 | X | 12 | 6 | x | 1 | 18.15 | ļ | | 0.63 | × | 0.7 | | = | 319.07 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.6 | 1 | x | 1 | 13.91 | | | 0.63 | × | 0.7 | | = | 90.86 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 1 | x | 1 | 13.91 | | | 0.63 | × | 0.7 | | = | 52.57 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 8 | x | 1 | 13.91 | | | 0.63 | × | 0.7 | | = | 96.78 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12 | 6 | x | 1 | 13.91 |] | | 0.63 | x | 0.7 | | = | 307.61 | (79) |
| Southwest0.9x | 0.77 | x | 2.6 | 1 | x | 1 | 04.39 |] | | 0.63 | x | 0.7 | | = | 83.27 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 1 | x | 1 | 04.39 |] | | 0.63 | x | 0.7 | | = | 48.17 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 8 | x | 1 | 04.39 |] | | 0.63 | × | 0.7 | | = | 88.69 | (79) |
| Southwest0.9x | 0.54 | x | 12 | 6 | x | 1 | 04.39 |] | | 0.63 | × | 0.7 | | = | 281.91 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.6 | 1 | x | g | 2.85 |] | | 0.63 | × | 0.7 | | = | 74.06 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 1 | x | g | 2.85 | Ī | | 0.63 | × | 0.7 | | = | 42.85 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 8 | x | g | 2.85 | i | | 0.63 | × | 0.7 | | = | 78.89 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12 | 6 | x | g | 2.85 | İ | | 0.63 | × | 0.7 | | = | 250.75 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.6 | 1 | x | 6 | 9.27 | İ | | 0.63 | × | 0.7 | | = | 55.25 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 1 | x | 6 | 9.27 | ĺ | | 0.63 | × | 0.7 | | = | 31.97 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | 8 | x | 6 | 9.27 | ĺ | | 0.63 | × | 0.7 | | = | 58.85 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12 | 6 | x | 6 | 9.27 | ĺ | | 0.63 | × | 0.7 | | = | 187.06 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.6 | 1 | x | 4 | 4.07 | i | | 0.63 | × ٦ | 0.7 | | = | 35.15 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.5 | 1 | x | 4 | 4.07 | 1 | | 0.63 | ۲ × آ | 0.7 | | = | 20.34 | (79) |
| Southwest0.9x | 0.77 | x | 2.7 | 8 | x | 4 | 4.07 | ĺ | | 0.63 | × ٦ | 0.7 | = | = | 37.44 | (79) |
| Southwest0.9x | 0.54 | x | 12 | 6 | x | 4 | 4.07 | i | | 0.63 | × ٦ | 0.7 | | = | 119.01 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.6 | 1 | x | 3 | 31.49 | 1 | | 0.63 | × | 0.7 | = | = | 25.12 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | 1 | x | 3 | 31.49 |] | | 0.63 | ۲ × ۲ | 0.7 | | = | 14.53 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.7 | | x | | 31.49 |] | | 0.63 | ۲ × ۲ | 0.7 | | = | 26.75 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12 | | x | | 31.49 |] | | 0.63 | × | 0.7 | | = | 85.03 | (79) |
| | | | | | | | - | 1 | | | | | | | | |
| Solar gains in | watts, cal | culated | for eac | n montł | า | | | (83)m | ו = Sו | um(74)m . | (82)m | | | | | |
| (83)m= 191.16 | 330.33 | 464.51 | 596.55 | 687.37 | 6 | 90.83 | 662.52 | 593 | .48 | 510.03 | 368.4 | 6 229.82 | 163 | .03 | | (83) |
| Total gains – | internal an | nd solar | (84)m = | : (73)m | + (8 | 83)m | , watts | | | | | | | | | |
| (84)m= 569.16 | 706.99 | 828.04 | 938.39 | 1006.15 | 5 98 | 88.16 | 946.39 | 881 | .31 | 809.42 | 689.6 | 9 576.23 | 529 | 9.3 | | (84) |
| 7. Mean inte | rnal tempe | erature | (heating | seaso | n) | | | | - | | | | | | - | |
| Temperature | | | ` | | <i>´</i> | area | from Tab | ole 9 | , Th | 1 (°C) | | | | | 21 | (85) |
| Utilisation fa | ctor for gai | ins for I | iving are | ea, h1,n | n (s | ee Ta | ble 9a) | | | 、 , | | | | | | |
| Jan | Feb | Mar | Apr | May | тÒ | Jun | Jul | A | ug | Sep | Oc | Nov | D | ес | | |
| (86)m= 1 | 0.99 | 0.98 | 0.94 | 0.84 | (| 0.66 | 0.49 | 0.5 | | 0.8 | 0.97 | 1 | 1 | | | (86) |
| Mean interna | | ture in l | living ar | a T1 (f | follo | w sta | ns 3 to 7 | ı 7 in T | able | | | | 1 | | 1 | |
| (87)m= 19.73 | 19.94 | 20.22 | 20.57 | 20.83 | - | 20.96 | 20.99 | 20. | | 20.9 | 20.54 | 20.06 | 19 | .7 |] | (87) |
| | | I | | | _ | | I | | | | | | | | J | |
| Temperature | 19.95 | 19.95 | eriods ir 19.96 | 19.96 | | 9.97 | 19.97 | 19. | · · | 12 (°C) 19.97 | 19.96 | 5 19.96 | 19. | 95 | 1 | (88) |
| | | I | | | _ | | I | | 51 | 10.01 | 10.90 | , 10.00 | 1.3. | | J | |
| Utilisation fa | , , , , , , , , , , , , , , , , , , , | | | | · | | i | ŕ | 10 | 0.70 | 0.05 | 0.00 | | | 1 | (90) |
| (89)m= 1 | 0.99 | 0.97 | 0.92 | 0.78 | | 0.57 | 0.38 | 0.4 | +3 | 0.72 | 0.95 | 0.99 | 1 | | J | (89) |

| Mean | internal | l temper | ature in | the rest | of dwelli | ng T2 (fo | ollow ste | eps 3 to 7 | 7 in Tabl | e 9c) | | | | |
|--|---|---|---|--|---|--|--|--|--|---|---|---|------------------------|--|
| (90)m= | 18.79 | 18.99 | 19.28 | 19.62 | 19.85 | 19.95 | 19.97 | 19.97 | 19.91 | 19.6 | 19.13 | 18.76 | | (90) |
| | | | | | | | | | f | LA = Livin | g area ÷ (4 | +) = | 0.38 | (91) |
| Maan | internel | | atura lta | | مام مارزما | lline ar) fl | ΔΤ4 | . (4 4) | A) TO | | | I | | _ |
| | 19.15 | 19.36 | 19.64 | or the wh | 20.23 | 20.34 | 20.36 | + (1 – 1L 20.36 | A) × 12 20.29 | 19.96 | 19.49 | 19.12 | | (92) |
| (92)m= | | | | | | | | | | | 19.49 | 19.12 | | (32) |
| | | | | internal | · · · · | | i | i | | - | 10.40 | 40.40 | | (93) |
| (93)m= | 19.15 | 19.36 | 19.64 | 19.98 | 20.23 | 20.34 | 20.36 | 20.36 | 20.29 | 19.96 | 19.49 | 19.12 | | (93) |
| | | ting requ | | | | | | - | | . — | | | | |
| | | | | mperatui using Ta | | ied at ste | ep 11 of | l able 9t | o, so tha | t II,m=(| 76)m an | d re-calc | ulate | |
| the ut | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| l Itilies | | tor for g | | | Iviay | Juli | 501 | Aug | Geb | 001 | INOV | Dec | | |
| (94)m= | | 0.99 | 0.97 | 0.92 | 0.8 | 0.6 | 0.42 | 0.48 | 0.75 | 0.95 | 0.99 | 1 | | (94) |
| | | | | 4)m x (84 | | 0.0 | 0.12 | 0.10 | 0.10 | 0.00 | 0.00 | · | | () |
| (95)m= | 567.21 | 700.01 | 805.18 | 862.72 | 803.03 | 595.33 | 401.87 | 420.08 | 604.4 | 654.86 | 571.59 | 528.02 | | (95) |
| | | | | | | | 401.07 | 420.00 | 004.4 | 004.00 | 071.00 | 520.02 | | (00) |
| (96)m= | 4.3 | 4.9 | 6.5 | perature 8.9 | 11.7 | 14.6 | 16.6 | 16.4 | 14.1 | 10.6 | 7.1 | 4.2 | | (96) |
| | | _ | | | | | | | | | 7.1 | 4.2 | | (00) |
| (97)m= | | | | al tempe 1207.42 | i | 618.22 | 405.04 | 425.65 | - (90)m 669.44 |] 1017.71 | 1352.56 | 1636.09 | | (97) |
| | | | | | | | | | | | | 1030.09 | | (37) |
| - | | | | r each n | роптп, ку 92.35 | 1 | i | | | | · · · · · · · · · · · · · · · · · · · | 004.4 | | |
| (98)m= | 800.66 | 601.92 | 477.78 | 248.18 | 92.35 | 0 | 0 | 0 | 0 | 269.96 | 562.3 | 824.4 | | |
| | | | | | | | | Tota | l per year | (kWh/year |) = Sum(9 | B) _{15,912} = | 3877.55 | (98) |
| | | | | | | | | | | | | | | |
| Space | e heating | g require | ement in | kWh/m² | ²/year | | | | | | | | 41.03 | (99) |
| | | • • | | | ²/year | | | | | | | ĺ | 41.03 | (99) |
| 8c. S | pace co | oling req | luiremer | nt | | ole 10b | | | | | | | 41.03 | (99) |
| 8c. S | pace co | oling req | luiremer | nt August. | See Tal | ole 10b Jun | Jul | Aug | Sep | Oct | Nov | Dec | 41.03 | (99) |
| 8c. Sp Calcu | bace coo lated fo Jan | oling req r June, J Feb | uiremer July and Mar | nt August. Apr | See Tal May | Jun | | Aug and exte | Sep ernal ten | | | | 41.03 | (99) |
| 8c. Sp Calcu | lated for Jan loss rate | oling req r June, J Feb | uiremer July and Mar | nt August. | See Tal May | Jun | perature | | | | | | 41.03 | (99) |
| 8c. Sp Calcu Heat (100)m= | oace coo Ilated fo Jan Ioss rate | oling req r June, J Feb e Lm (ca | uiremer July and Mar Iculated 0 | nt August. Apr using 25 | See Tal May 5°C inter | Jun nal temp | perature | and exte | ernal ten | nperatur | e from T | able 10) | 41.03 | |
| 8c. Sp Calcu Heat (100)m= | oace coo Ilated fo Jan Ioss rate | oling req r June, J Feb e Lm (ca 0 | uiremer July and Mar Iculated 0 | nt August. Apr using 25 | See Tal May 5°C inter | Jun nal temp | perature | and exte | ernal ten | nperatur | e from T | able 10) | 41.03 | |
| 8c. Sp Calcu Heat (100)m= Utilisa (101)m= | lated fo Jan loss rate 0 ation fac | oling req r June, J Feb e Lm (ca 0 tor for lo | luiremer July and Mar Iculated 0 oss hm 0 | nt August. Apr using 25 0 | See Tal May 5°C inter 0 | Jun nal temp 1012.46 0.92 | perature 797.05 | and exte 817.14 | ernal ten 0 | nperatur 0 | e from T 0 | able 10) 0 | 41.03 | (100) |
| 8c. Sp Calcu Heat (100)m= Utilisa (101)m= | lated for Jan loss rate 0 ation fac 0 Il loss, h | oling req r June, J Feb e Lm (ca 0 tor for lo | luiremer July and Mar Iculated 0 oss hm 0 | nt August. Apr using 25 0 | See Tal May 5°C inter 0 | Jun nal temp 1012.46 0.92 | perature 797.05 | and exte 817.14 | ernal ten 0 | nperatur 0 | e from T 0 | able 10) 0 | 41.03 | (100) |
| 8c. Sp Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= | lated fo Jan loss rate 0 ation fac 0 Il loss, h | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 | July and Mar Iculated 0 oss hm 0 /atts) = (0 | nt August. Apr using 25 0 0 (100)m x 0 | See Tal May 5°C inter 0 (101)m | Jun nal temp 1012.46 0.92 930.98 | 0.96 764.89 | and exte 817.14 0.94 771.74 | o 0 0 | nperatur 0 0 | e from T 0 | able 10) 0 | 41.03 | (100) (101) |
| 8c. Sp Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= | lated for Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar c | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 | July and Mar Iculated 0 oss hm 0 /atts) = (0 | nt August. Apr using 25 0 (100)m x | See Tal May 5°C inter 0 (101)m | Jun nal temp 1012.46 0.92 930.98 eather re | 797.05 0.96 764.89 egion, se | and exte 817.14 0.94 771.74 | o 0 0 | nperatur 0 0 | e from T 0 | able 10) 0 | 41.03 | (100) (101) |
| 8c. Sp Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= | lated fo Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains cal 0 | July and Mar Iculated 0 oss hm 0 /atts) = 0 culated 0 | August. Apr using 25 0 (100)m x 0 for appli | See Tal May 5°C inter 0 (101)m 0 cable we | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 | 2000 797.05 0.96 764.89 2000, se 1245.02 | and exte 817.14 0.94 771.74 e Table 1167.44 | ernal ten 0 0 10) 0 | nperatur 0 0 0 | e from T 0 0 0 | able 10) 0 0 | | (100) (101) (102) |
| 8c. Sp Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space | lated for Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 e cooling | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains cal 0 g require | July and Mar Iculated 0 oss hm 0 /atts) = 0 culated 0 culated | nt August. Apr using 25 0 (100)m x 0 for appli | See Tal May 5°C inter 0 (101)m (101)m cable we 0 whole c | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 | 2000 797.05 0.96 764.89 2000, se 1245.02 | and exte 817.14 0.94 771.74 e Table 1167.44 | ernal ten 0 0 10) 0 | nperatur 0 0 0 | e from T 0 0 0 | able 10) 0 0 | | (100) (101) (102) |
| 8c. Sp Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space | lated for Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 e cooling | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains cal 0 g require | July and Mar Iculated 0 oss hm 0 /atts) = 0 culated 0 culated | August. Apr using 25 0 (100)m x (100)m x for appli 0 <i>r month,</i> | See Tal May 5°C inter 0 (101)m (101)m cable we 0 whole c | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 | 2000 797.05 0.96 764.89 2000, se 1245.02 | and exte 817.14 0.94 771.74 e Table 1167.44 | ernal ten 0 0 10) 0 | nperatur 0 0 0 | e from T 0 0 0 | able 10) 0 0 | | (100) (101) (102) |
| 8c. Sf Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 | lated for Jan loss rate 0 ation fac 0 il loss, h 0 (solar (0 (solar (0 e coolin(04)m to | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 gains ca 0 g require zero if (| uiremer July and Mar Iculated 0 ss hm 0 /atts) = (0 culated 0 culated 0 ament fo 104)m < | nt August. Apr using 25 0 0 (100)m x 0 for appli 0 r month, 3 x (98 | See Tal May 5°C inter 0 (101)m 0 (101)m 0 cable we 0 whole c)m | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 <i>Iwelling,</i> | 2000 2007 200 200 | and exte 817.14 0.94 771.74 e Table 1167.44 ous (kW | $0 \\ 0 \\ 0 \\ 10) \\ 0 \\ 0 \\ 10) \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$ | 0 0 0 24 x [(10 | e from T 0 0 0 03) <i>m</i> – (* | able 10) 0 0 0 102)m]> | | (100) (101) (102) |
| 8c. Sf Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= | lated for Jan loss rate 0 ation fac 0 il loss, h 0 (solar (0 (solar (0 e coolin(04)m to | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains cal 0 g require zero if (0 | uiremer July and Mar Iculated 0 ss hm 0 /atts) = (0 culated 0 culated 0 ament fo 104)m < | nt August. Apr using 25 0 0 (100)m x 0 for appli 0 r month, 3 x (98 | See Tal May 5°C inter 0 (101)m 0 (101)m 0 cable we 0 whole c)m | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 <i>Iwelling,</i> | 2000 2007 200 200 | and exte 817.14 0.94 771.74 e Table 1167.44 ous (kW | $\frac{1}{0}$ | 0 0 0 24 x [(10 0 = Sum(| e from T 0 0 0 03) <i>m</i> – (* | able 10) 0 0 0 102)m] > 0 = | s (41)m | (100) (101) (102) (103) |
| 8c. Sf Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec | lated for Jan loss rate 0 ation fac 0 il loss, h 0 s (solar g 0 e cooling 04)m to 0 | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains cal 0 g require zero if (0 | uiremer July and Mar Iculated 0 oss hm 0 /atts) = (0 culated 0 culated 0 cment fo 104)m < 0 | nt August. Apr using 25 0 0 (100)m x 0 (100)m x 0 for appli 0 r month, 3 x (98 0 | See Tal May 5°C inter 0 (101)m 0 (101)m 0 cable we 0 whole c)m | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 <i>Iwelling,</i> | 2000 2007 200 200 | and exte 817.14 0.94 771.74 e Table 1167.44 ous (kW | $\frac{1}{0}$ | 0 0 0 24 x [(10 0 = Sum(| e from T 0 0 0 03) <i>m</i> – (* 0 104) | able 10) 0 0 0 102)m] > 0 = | c (41)m 915.49 | (100) (101) (102) (103) |
| 8c. Sf Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec | lated for Jan loss rate 0 ation fac 0 il loss, h 0 s (solar o 0 e cooling 04)m to 0 d fractior | oling req r June, J Feb E Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 gains ca 0 g require zero if (0 | uiremer July and Mar Iculated 0 oss hm 0 /atts) = (0 culated 0 culated 0 cment fo 104)m < 0 | nt August. Apr using 25 0 0 (100)m x 0 (100)m x 0 for appli 0 r month, 3 x (98 0 | See Tal May 5°C inter 0 (101)m 0 (101)m 0 cable we 0 whole c)m | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 <i>Iwelling,</i> | 2000 2007 200 200 | and exte 817.14 0.94 771.74 e Table 1167.44 ous (kW | $\frac{1}{0}$ | 0 0 0 24 x [(10 0 = Sum(| e from T 0 0 0 03) <i>m</i> – (* 0 104) | able 10) 0 0 0 102)m] > 0 = | c (41)m 915.49 | (100) (101) (102) (103) |
| 8c. Sf Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolece Intermi | lated for Jan loss rate 0 ation fac 0 il loss, h 0 s (solar o 0 e cooling 04)m to 0 d fractior | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains cal 0 g require zero if (0 | uiremenJuly andMarIculated0 | nt August. Apr using 25 0 (100)m x 0 (100)m x 0 for appli 0 <i>r month,</i> 3 x (98 0 | See Tal May 5°C inter 0 (101)m 0 (101)m 0 cable we 0 whole c)m 0 | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 <i>Iwelling,</i> 263.88 | 2000 2000 2000 2000 2000 2000 2000 200 | and exte 817.14 0.94 771.74 e Table 1167.44 ous (kW 294.4 | $\begin{array}{c} \text{ernal ten} \\ 0 \\ \hline 0 \\ \hline 0 \\ 10) \\ \hline 0 \\ 10) \\ 0 \\ (h) = 0.02 \\ \hline 0 \\ \hline 0 \\ Total \\ f C = \\ \hline 0 \\ \end{array}$ | 0 0 0 24 x [(10 0 = Sum(cooled a | e from T 0 0 0 0 0 0 3) <i>m</i> – (* 0 104) area ÷ (4 0 | able 10) 0 0 0 102)m] > 0 = +) = | c (41)m 915.49 | (100) (101) (102) (103) |
| 8c. Sf Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spac</i> set (1 (104)m= Coolec Intermi (106)m= | lated for Jan loss rate 0 ation fac 0 ation fac 0 ation fac 0 s (solar c 0 e cooling 04)m to 0 d fractior ittency fa | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains cal 0 grequire zero if (0 | uiremer July and Mar Iculated 0 pss hm 0 /atts) = (0 /atts) = (0 /atts) = (0 lculated 0 able 10b 0 | nt August. Apr using 25 0 (100)m x 0 (100)m x 0 for appli 0 <i>r month,</i> 3 x (98 0 | See Tal May 5°C inter 0 (101)m 0 (101)m 0 cable we 0 whole c)m 0 | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 <i>Jwelling,</i> 263.88 | 0.96 764.89 2000, se 1245.02 continue 357.21 | and exte 817.14 0.94 771.74 re Table 1167.44 Dus (kW 294.4 0.25 | $\begin{array}{c} \text{ernal ten} \\ 0 \\ \hline 0 \\ \hline 0 \\ 10) \\ \hline 0 \\ 10) \\ 0 \\ (h) = 0.02 \\ \hline 0 \\ \hline 0 \\ Total \\ f C = \\ \hline 0 \\ \end{array}$ | 0 0 0 24 x [(10 0 = Sum(cooled a | e from T 0 0 0 0 0 0 3) <i>m</i> – (* 0 104) area ÷ (4 0 | able 10) 0 0 0 102)m]> 0 = +) = 0 | c (41)m 915.49 1 | (100) (101) (102) (103) (104) (105) |
| 8c. Sf Calcu Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Spac</i> set (1 (104)m= Coolec Intermi (106)m= | lated for Jan loss rate 0 ation fac 0 il loss, h 0 il loss, h 0 is (solar g 0 e cooling 04)m to 0 d fractior ittency fa 0 cooling | oling req r June, J Feb e Lm (ca 0 tor for lo 0 mLm (W 0 gains cal 0 grequire zero if (0 | uiremer July and Mar Iculated 0 pss hm 0 /atts) = (0 /atts) = (0 /atts) = (0 lculated 0 able 10b 0 | nt August. Apr using 25 0 (100)m x 0 (100)m x 0 for appli 0 r month, 3 x (98 0 | See Tal May 5°C inter 0 (101)m 0 (101)m 0 cable we 0 whole c)m 0 | Jun nal temp 1012.46 0.92 930.98 eather re 1297.48 <i>Jwelling,</i> 263.88 | 0.96 764.89 2000, se 1245.02 continue 357.21 | and exte 817.14 0.94 771.74 re Table 1167.44 Dus (kW 294.4 0.25 | $\begin{array}{c} \text{ernal ten} \\ 0 \\ \hline 0 \\ \hline 0 \\ 10) \\ \hline 0 \\ 10) \\ 0 \\ (h) = 0.02 \\ \hline 0 \\ \hline 0 \\ Total \\ f C = \\ \hline 0 \\ \end{array}$ | 0 0 0 24 x [(10 0 = Sum(cooled a | e from T 0 0 0 0 0 0 3) <i>m</i> – (* 0 104) area ÷ (4 0 | able 10) 0 0 0 102)m]> 0 = +) = 0 | c (41)m 915.49 1 | (100) (101) (102) (103) (104) (105) |

| Space cooling requirement in kWh/m²/year | (107) ÷ (4) = | 2.42 | (108) |
|--|---------------------------|-------|-------|
| 8f. Fabric Energy Efficiency (calculated only under special co | nditions, see section 11) | | |
| Fabric Energy Efficiency | (99) + (108) = | 43.45 | (109) |
| Target Fabric Energy Efficiency (TFEE) | | 49.97 | (109) |

| | | | User D | etails: | | | | | | |
|--|---|-------------------------|------------|----------------------|--------------|-------------------|----------------------|-----------|----------------------------------|------|
| | Ross Boulton Stroma FSAP 20 ⁻ | 12 | | Stroma Softwa | | | | | 028068 on: 1.0.4.18 | |
| | | Р | roperty A | Address: | B2A-10 | 5-07 | | | | |
| | B2A-105-07, Flat T | ype 2-17. | A, Wimb | ledon, L | ondon | | | | | |
| 1. Overall dwelling dimens | ions: | | _ | | | | | | | |
| Ground floor | | | | a(m²) 94.5 | (1a) x | Av. Hei | i ght(m) 6 | (2a) = | Volume(m ³) 245.7 | (3a) |
| Total floor area TFA = (1a)+ | +(1b)+(1c)+(1d)+(1 | e)+(1n | l) g | 94.5 | (4) | | | | | |
| Dwelling volume | | | | | (3a)+(3b) | +(3c)+(3d |)+(3e)+ | .(3n) = | 245.7 | (5) |
| 2. Ventilation rate: | | | | | | | | | <u> </u> | |
| Number of chimneys | main s heating + | econdar heating 0 | y + | 0 0 |] = [| total 0 | x | 40 = | m ³ per hour | (6a) |
| Number of open flues | 0 + | 0 |] + [| 0 |] = [| 0 | x | 20 = | 0 | (6b) |
| Number of intermittent fans | | | | | - L | 3 | × ′ | 10 = | 30 | (7a) |
| Number of passive vents | | | | | | 0 | x ′ | 10 = | 0 | (7b) |
| Number of flueless gas fires | 5 | | | | | 0 | x 4 | 40 = | 0 | (7c) |
| | | | | | L | | | Air ch | anges per ho | _l |
| Infiltration due to obimpour | flues and fans | Sa) ((6 b) (7 | a) (7b) (7 | 7c) - | Г | | | | | - |
| Infiltration due to chimneys, If a pressurisation test has been | | | | | continue fro | 30 om (9) to (| | ÷ (5) = | 0.12 | (8) |
| Number of storeys in the | | , | ,,,,, | | | | -7 | | 0 | (9) |
| Additional infiltration | | | | | | | [(9) | -1]x0.1 = | 0 | (10) |
| Structural infiltration: 0.25 | o for steel or timber | frame or | 0.35 for | masonr | y constr | uction | | | 0 | (11) |
| if both types of wall are prese deducting areas of openings, | | sponding to | the greate | er wall area | a (after | | | | | |
| If suspended wooden floo | or, enter 0.2 (unsea | led) or 0. | 1 (seale | d), else | enter 0 | | | | 0 | (12) |
| If no draught lobby, enter | 0.05, else enter 0 | | | | | | | | 0 | (13) |
| Percentage of windows a | nd doors draught s | tripped | | | | | | | 0 | (14) |
| Window infiltration | | | | 0.25 - [0.2 | | - | (| | 0 | (15) |
| Infiltration rate | | | | (8) + (10) · | | | | | 0 | (16) |
| Air permeability value, q5 | • | | | | • | etre of e | nvelope | area | 5 | (17) |
| If based on air permeability Air permeability value applies if | | | | | | is haina us | od | | 0.37 | (18) |
| Number of sides sheltered | a pressunsation test na | S Deen don | e or a deg | nee an per | Πεαριπτγ | is being us | seu | | 2 | (19) |
| Shelter factor | | | | (20) = 1 - [| 0.075 x (1 | 9)] = | | | 0.85 | (20) |
| Infiltration rate incorporating | g shelter factor | | | (21) = (18) | x (20) = | | | | 0.32 | (21) |
| Infiltration rate modified for | monthly wind spee | d | | | | | | | | |
| Jan Feb Ma | ar Apr May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Monthly average wind spee | d from Table 7 | | | | | | | | | |
| (22)m= 5.1 5 4.9 | 9 4.4 4.3 | 3.8 | 3.8 | 3.7 | 4 | 4.3 | 4.5 | 4.7 | | |
| Wind Factor (22a)m = (22)n | n ÷ 4 | | | | | | | | | |
| (22a)m= 1.27 1.25 1.2 | 3 1.1 1.08 | 0.95 | 0.95 | 0.92 | 1 | 1.08 | 1.12 | 1.18 | | |

| Adjust | ed infiltr | ation rat | e (allowi | ng for sh | nelter an | d wind s | peed) = | (21a) x | (22a)m | | | | | |
|--------------|--------------|---------------------------------|---------------------------------------|--------------------------|-------------|-------------|-----------------|---------------|----------------------|-------------------|-------------|----------------|-----------|-------------------------------|
| | 0.4 | 0.4 | 0.39 | 0.35 | 0.34 | 0.3 | 0.3 | 0.29 | 0.32 | 0.34 | 0.36 | 0.37 | | |
| | | c <i>tive air</i> al ventila | - | rate for t | ne appli | cable ca | se | | | | | Г | 0 | (23a) |
| | | | | endix N, (2 | 3b) = (23a | ı) × Fmv (e | equation (N | N5)) , othe | rwise (23b |) = (23a) | | L | 0 | (23b) |
| | | | | iency in % | | | | | | , , , | | L L | 0 | (23c) |
| a) If | balance | d mech | anical ve | entilation | with hea | at recove | erv (MVI | HR) (24a | a)m = (2) | 2b)m + (| 23b) × [| L 1 – (23c) | - | () |
| (24a)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24a) |
| b) If | balance | d mech | anical ve | ntilation | without | heat rec | overv (N | и ЛV) (24b |)m = (22 | 1 2b)m + (| 23b) | | | |
| , (24b)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24b) |
| c) If | whole h | use ex | tract ver | tilation o | or positiv | ve input v | ventilatic | n from o | utside | ! | ļ | · | | |
| | | | | hen (240 | - | - | | | | .5 × (23b |)) | | | |
| (24c)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24c) |
| | | | | ole hous m = (22 | | | | | | 0.5] | | | | |
| (24d)m= | 0.58 | 0.58 | 0.58 | 0.56 | 0.56 | 0.55 | 0.55 | 0.54 | 0.55 | 0.56 | 0.56 | 0.57 | | (24d) |
| Effe | ctive air | change | rate - er | nter (24a |) or (24t | o) or (240 | c) or (24 | d) in box | x (25) | | | | | |
| (25)m= | 0.58 | 0.58 | 0.58 | 0.56 | 0.56 | 0.55 | 0.55 | 0.54 | 0.55 | 0.56 | 0.56 | 0.57 | | (25) |
| 3. He | at losse | s and he | eat loss r | paramete | ər: | | | | | | | | | |
| ELEN | | Gros | | Openin | | Net Ar | ea | U-val | Je | ΑXU | | k-value | ŀ | A X k |
| | | area | (m²) | m | | A ,n | n² | W/m2 | K | (W/ | K) | kJ/m²∙K | K k | κJ/K |
| Windo | ws Type | e 1 | | | | 2.74 | /1 _X | [1/(1.35)- | + 0.04] = | 3.51 | | | | (27) |
| Windo | ws Type | 2 | | | | 1.59 | x1/ | [1/(1.35)- | - 0.04] = | 2.04 | | | | (27) |
| Windo | ws Type | 93 | | | | 2.92 | /1 <u>x</u> | [1/(1.35)- | - 0.04] = | 3.74 | | | | (27) |
| Windo | ws Type | 94 | | | | 2.74 | ×1/ | [1/(1.35)- | + 0.04] ₌ | 3.51 | | | | (27) |
| Windo | ws Type | e 5 | | | | 1.59 | ×1/ | [1/(1.35)- | + 0.04] = | 2.04 | | | | (27) |
| Windo | ws Type | e 6 | | | | 13.23 | s x1/ | [1/(1.35)- | + 0.04] ₌ | 16.95 | | | | (27) |
| Walls | | 45.5 | 52 | 24.8 | 1 | 20.71 | x | 0.15 | | 3.11 | = 1 | | | (29) |
| Roof | | 94. | 5 | 0 | | 94.5 | x | 0.13 | | 12.28 | i F | | i — | (30) |
| Total a | rea of e | lements | , m² | | | 140.0 | 2 | | | | | | | (31) |
| | | | | ffective wi | | | ated using | formula 1 | /[(1/U-valı | ıe)+0.04] a | as given in | paragraph | 3.2 | |
| Fabric | heat los | s, W/K | = S (A x | U) | | | | (26)(30) | + (32) = | | | Г | 47.17 | (33) |
| Heat c | apacity | Cm = S(| (Axk) | | | | | | ((28). | (30) + (3 | 2) + (32a). | (32e) = | 1140.41 | (34) |
| Therm | al mass | parame | ter (TMF | ^o = Cm ÷ | - TFA) ir | ∩ kJ/m²K | | | Indica | itive Value | : Low | Ī | 100 | (35) |
| | - | | ere the de tailed calci | tails of the ulation. | constructi | ion are not | t known pr | ecisely the | e indicative | e values of | TMP in T | able 1f | | |
| Therm | al bridge | es : S (L | x Y) cal | culated (| using Ap | pendix ł | < | | | | | | 25.74 | (36) |
| | | | are not kn | own (36) = | = 0.05 x (3 | 1) | | | (00) | (0.0) | | г | | |
| | abric he | | | 1 | | | | | | · (36) = | (0.5) (5) | L | 72.91 | (37) |
| Ventila | | 1 | | monthl | | | ll | A | | $= 0.33 \times ($ | T | | | |
| (22)~ | Jan 47.13 | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | | | (38) |
| (38)m= | 47.13 | 46.88 | 46.63 | 45.45 | 45.23 | 44.2 | 44.2 | 44.01 | 44.6 | 45.23 | 45.67 | 46.14 | | (30) |
| | | | · · · · · · · · · · · · · · · · · · · | 440.00 | 440.55 | 44-11 | 44-7-1-1 | 440.00 | | = (37) + (| · · | | | |
| (39)m= | 120.04 | | 119.54 | 118.36 | 118.14 | 117.11 | 117.11 | 116.92 | 117.51 | 118.14 | 118.58 | 119.05 | 440.00 | (20) |
| Stroma | FSAP 201 | 2 Version | : 1.0.4.18 (| (SAP 9.92) | - http://ww | ww.stroma | .com | | | Average = | Sum(39)1 | 12 / 12= | 118. #0ag | <u>le 2 o^{f 39)}</u> |

| Heat lo | oss para | ameter (H | HLP), W | /m²K | | | | | (40)m | = (39)m ÷ | - (4) | | | |
|------------|-----------------|-----------------|------------------|--------------------------|-------------|----------------------|-----------------|------------------------|-----------------------|--------------------|------------------------|---------------|---------|------|
| (40)m= | 1.27 | 1.27 | 1.26 | 1.25 | 1.25 | 1.24 | 1.24 | 1.24 | 1.24 | 1.25 | 1.25 | 1.26 | | |
| Numbe | er of day | /s in mo | nth (Tab | le 1a) | • | • | • | | , | Average = | Sum(40)1. | .12 /12= | 1.25 | (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 | ter hea | ting ene | rgy requ | irement: | | | | | | | | kWh/ye | ear: | |
| if TF | | | | ([1 - exp | o(-0.0003 | 349 x (TF | FA -13.9 | 9)2)] + 0.0 | 0013 x (⁻ | TFA -13 | .9) | 68 | | (42) |
| Reduce | the annua | al average | hot water | | 5% if the a | welling is | designed | (25 x N) to achieve | | se target o | 97. f | .91 | | (43) |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Hot wate | er usage i | n litres pei | r day for e | ach month | Vd,m = fa | ctor from | Table 1c x | (43) | · · · · · | | | | | |
| (44)m= | 107.7 | 103.78 | 99.87 | 95.95 | 92.03 | 88.12 | 88.12 | 92.03 | 95.95 | 99.87 | 103.78 | 107.7 | | |
| Enorm | contont of | bot wator | upped op | loulotod m | onthly - 1 | 100 v Vd r | | Tm / 2600 | | | $m(44)_{112} =$ | | 1174.9 | (44) |
| | | | · | | · · | | | | | | ables 1b, 10 | - | | |
| (45)m= | 159.71 | 139.69 | 144.14 | 125.67 | 120.58 | 104.05 | 96.42 | 110.64 | 111.97 | 130.49 | 142.43 | 154.67 | 1540.48 | (45) |
| lf instant | taneous v | vater heati | ng at poin | t of use (no | o hot water | r storage), | enter 0 in | boxes (46 | | 10tal = Su | m(45) ₁₁₂ = | | 1540.46 | (40) |
| (46)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (46) |
| | storage | | | | | | | | | | · | | | |
| - | | . , | | • • | | | - | within sa | ame ves | sel | (| 0 | | (47) |
| | • | - | | ank in dw er (this ir | - | | | n (47) ombi boil | ers) ente | er 'O' in <i>(</i> | (47) | | | |
| | storage | | not hat | | | notantai | | | | | , | | | |
| a) If m | anufact | turer's de | eclared l | loss fact | or is kno | wn (kWł | n/day): | | | | (|) | | (48) |
| Tempe | erature f | actor fro | m Table | e 2b | | | | | | | (|) | | (49) |
| | | | • | e, kWh/y | | | I | (48) x (49) |) = | | (| 0 | | (50) |
| | | | | cylinder rom Tab | | | | | | | (|) | | (51) |
| | | neating s | | | - (| | <i></i> | | | | ` | <u> </u> | | |
| | | from Ta | | | | | | | | | (|) | | (52) |
| | | actor fro | | | | | | | | | (|) | | (53) |
| | | | • | e, kWh/y | ear | | | (47) x (51) |) x (52) x (| 53) = | | 0 | | (54) |
| | . , | (54) in (8 | , | for oach | month | | | ((EE))m = (| EE) ~ (44) | ~ | (|) | | (55) |
| | | | | for each | | | | ((56)m = (| | | | - | l | (EC) |
| (56)m= | 0 er contain | 0 s dedicate | 0 d solar sto | 0 prage (57) | 0 = (56)m | $0 \times [(50) - ($ | 0 H11)] ∸ (5 | 0 50) else (5 | 0 = (56) | 0 m where (| 0 (H11) is fro | 0 m Append | lix H | (56) |
| - | | | | - · · | | 1 | | 1 | · · · | | | | | (57) |
| (57)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | • | • | , | om Table | | E0) | | CE (44) | - | | (| 0 | | (58) |
| | • | | | | | | . , | 65 × (41) ing and a | | r thermo | ostat) | | | |
| (59)m= | 0 | 0 | 0 | | | | 0 | | 0 | 0 | | 0 | | (59) |
| | L | I | I | 1 | I | 1 | 1 | 1 | 1 | I | | | l | |

| Combi | loss ca | lculated | for eac | h month | (61)m = | (60 | D) ÷ 36 | 65 × (41) | m | | | | | | |
|---------|-----------------------|----------------------|----------|-------------|-------------|----------|-----------------|-------------|-------------------|---------------|------------|---------------|-------------|---------------|------|
| (61)m= | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |] | (61) |
| Total h | neat req | uired for | water h | neating | calculated | d fo | r eacl | n month | (62)m = | = 0.85 × | (45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= | 135.76 | 118.73 | 122.52 | 106.82 | 102.49 | 8 | 38.45 | 81.96 | 94.05 | 95.17 | 110.91 | 121.07 | 131.47 | | (62) |
| Solar D | - HW input | calculated | using Ap | pendix G | or Appendix | κΗ | (negati | ve quantity |) (enter 'C |)' if no sola | r contribu | tion to wate | er heating) | - | |
| (add a | dditiona | al lines if | FGHR | S and/or | WWHRS | S ap | oplies | , see Ap | pendix (| G) | | | | | |
| (63)m= | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Outpu | t from w | ater hea | ter | | | | | | | | | | | | |
| (64)m= | 135.76 | 118.73 | 122.52 | 106.82 | 102.49 | 8 | 38.45 | 81.96 | 94.05 | 95.17 | 110.91 | 121.07 | 131.47 | | |
| | | | • | | | | | | Out | put from w | ater heate | er (annual) | I12 | 1309.4 | (64) |
| Heat g | ains fro | m water | heating | , kWh/r | nonth 0.2 | 5 ′ | [0.85 | × (45)m | + (61)n | n] + 0.8 x | x [(46)m | ı + (57)m | + (59)m |] | |
| (65)m= | 33.94 | 29.68 | 30.63 | 26.7 | 25.62 | 2 | 22.11 | 20.49 | 23.51 | 23.79 | 27.73 | 30.27 | 32.87 | | (65) |
| inclu | ude (57) | m in calo | ulation | of (65)r | n only if c | ylir | nder i | s in the c | dwelling | or hot w | vater is f | rom com | munity h | heating | |
| | . , | ains (see | | . , | - | | | | U | | | | | Ū | |
| | | ns (Table | | | | | | | | | | | | | |
| Metab | Jan | Feb | Mar | Apr | May | Γ | Jun | Jul | Aug | Sep | Oct | Nov | Dec |] | |
| (66)m= | 134.12 | 134.12 | 134.12 | 134.12 | | - | 34.12 | 134.12 | 134.12 | 134.12 | 134.12 | | 134.12 | | (66) |
| Liahtir | | i (calcula | | | L, equat | | | (19a) a | | | | | | 1 | |
| (67)m= | 22.03 | 19.57 | 15.91 | 12.05 | 9.01 | - | 7.6 | 8.22 | 10.68 | 14.33 | 18.2 | 21.24 | 22.64 | 1 | (67) |
| | | | | | ndix L, eq | | | | | | | 1 | 1 | J | |
| (68)m= | 247.12 | 249.68 | 243.22 | 229.46 | | | 95.78 | 184.87 | 182.31 | 188.77 | 202.53 | 219.89 | 236.21 | 1 | (68) |
| | | | | | | | | | | | | 219.09 | 230.21 |] | (00) |
| | 36.41 | 36.41 | 36.41 | 36.41 | x L, equa | - | 1 L 15 36.41 | 36.41 | , also s 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 1 | (69) |
| (69)m= | | | | | 30.41 | 3 | 0.41 | 30.41 | 30.41 | 30.41 | 30.41 | 30.41 | 30.41 | J | (03) |
| - | | ns gains | r` | 1 | | - | - | | | | | | | 1 | (70) |
| (70)m= | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | J | (70) |
| | <u> </u> | <u> </u> | <u> </u> | | ues) (Tab | — | , | | | 1 | r | 1 | 1 | 1 | |
| (71)m= | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | | 107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | | (71) |
| Water | heating | gains (T | <u> </u> | | | | | | | | | | | 1 | |
| (72)m= | 45.62 | 44.17 | 41.17 | 37.09 | 34.44 | 3 | 30.71 | 27.54 | 31.6 | 33.05 | 37.27 | 42.04 | 44.18 |] | (72) |
| Total | interna | gains = | : | | | _ | (66) | m + (67)m | + (68)m | + (69)m + | (70)m + (| 71)m + (72 |)m | | |
| (73)m= | 378 | 376.66 | 363.54 | 341.84 | 318.78 | 2 | 97.33 | 283.86 | 287.83 | 299.39 | 321.23 | 346.41 | 366.27 | | (73) |
| | lar gain | | | | | | | | | | | | | | |
| | - | | Ũ | ar flux fro | n Table 6a | and | | • | tions to co | onvert to th | ne applica | | tion. | | |
| Orient | | Access F Table 6d | | Are m² | | | Flu | x ole 6a | - | g_ able 6b | - | FF able 6c | | Gains (W) | |
| | - | | | | | | 1 ai | | | | | | | (vv) | - |
| | ast <mark>0.9x</mark> | 0.77 |) | (2 | .74 | x | 1 | 1.28 | x | 0.5 | × | 0.8 | = | 8.57 | (75) |
| | ast <mark>0.9x</mark> | 0.77 |) | ۲ <u>۱</u> | .59 | x | 1 | 1.28 | x | 0.5 | × | 0.8 | = | 4.97 | (75) |
| Northe | ast <mark>0.9x</mark> | 0.77 |) | 2 | .74 | x | 2 | 2.97 | x | 0.5 | × [| 0.8 | = | 17.44 | (75) |
| Northe | ast <mark>0.9x</mark> | 0.77 |) | ۲ (L | .59 | x | 2 | 2.97 | x | 0.5 | x | 0.8 | = | 10.12 | (75) |
| Northe | ast <mark>0.9x</mark> | 0.77 |) | (2 | .74 | x | 4 | 1.38 | x | 0.5 | x | 0.8 | = | 31.43 | (75) |

| Northeast 0.9x | 0.77 |] × | 1.59 | × | 41.38 |] × | 0.5 | x | 0.8 | = | 18.24 | (75) |
|---------------------------|------|----------|-------|---|--------|----------|-----|---|-----|---|--------|------|
| Northeast 0.9x | 0.77 |] × | 2.74 | x | 67.96 |] × | 0.5 | x | 0.8 | = | 51.61 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 1.59 | × | 67.96 | 」 】 x | 0.5 | x | 0.8 | = | 29.95 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 2.74 | x | 91.35 |] x | 0.5 | x | 0.8 | = | 69.38 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 1.59 | x | 91.35 |] x | 0.5 | x | 0.8 | = | 40.26 | (75) |
| Northeast 0.9x | 0.77 |] × | 2.74 | x | 97.38 | x | 0.5 | x | 0.8 | = | 73.97 | (75) |
| Northeast 0.9x | 0.77 |] × | 1.59 | x | 97.38 | x | 0.5 | x | 0.8 | = | 42.92 | (75) |
| Northeast 0.9x | 0.77 |] x | 2.74 | x | 91.1 | x | 0.5 | x | 0.8 | = | 69.19 | (75) |
| Northeast 0.9x | 0.77 |] × | 1.59 | x | 91.1 | x | 0.5 | x | 0.8 | = | 40.15 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 72.63 | x | 0.5 | x | 0.8 | = | 55.16 | (75) |
| Northeast 0.9x | 0.77 | × | 1.59 | × | 72.63 | x | 0.5 | x | 0.8 | = | 32.01 | (75) |
| Northeast 0.9x | 0.77 | × | 2.74 | x | 50.42 | x | 0.5 | x | 0.8 | = | 38.3 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 50.42 | x | 0.5 | x | 0.8 | = | 22.22 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 28.07 | x | 0.5 | x | 0.8 | = | 21.32 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 28.07 | x | 0.5 | x | 0.8 | = | 12.37 | (75) |
| Northeast 0.9x | 0.77 | × | 2.74 | x | 14.2 | x | 0.5 | x | 0.8 | = | 10.78 | (75) |
| Northeast 0.9x | 0.77 | × | 1.59 | × | 14.2 | x | 0.5 | x | 0.8 | = | 6.26 | (75) |
| Northeast 0.9x | 0.77 | × | 2.74 | x | 9.21 | x | 0.5 | x | 0.8 | = | 7 | (75) |
| Northeast 0.9x | 0.77 | × | 1.59 | × | 9.21 | x | 0.5 | x | 0.8 | = | 4.06 | (75) |
| Southwest _{0.9x} | 0.77 | x | 2.74 | x | 36.79 |] | 0.5 | x | 0.8 | = | 27.95 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | x | 36.79 |] | 0.5 | x | 0.8 | = | 16.22 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | x | 36.79 |] | 0.5 | x | 0.8 | = | 29.78 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | x | 36.79 |] | 0.5 | x | 0.8 | = | 94.63 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.74 | x | 62.67 | | 0.5 | x | 0.8 | = | 47.6 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.59 | x | 62.67 | | 0.5 | x | 0.8 | = | 27.62 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | × | 62.67 |] | 0.5 | x | 0.8 | = | 50.73 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | × | 62.67 | | 0.5 | x | 0.8 | = | 161.19 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | × | 85.75 | ļ | 0.5 | x | 0.8 | = | 65.13 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | x | 85.75 | ļ | 0.5 | x | 0.8 | = | 37.8 | (79) |
| Southwest0.9x | 0.77 | × | 2.92 | x | 85.75 | ļ | 0.5 | x | 0.8 | = | 69.41 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | x | 85.75 | ļ | 0.5 | x | 0.8 | = | 220.55 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | x | 106.25 | ļ | 0.5 | x | 0.8 | = | 80.7 | (79) |
| Southwest0.9x | 0.77 | × | 1.59 | X | 106.25 | ļ | 0.5 | x | 0.8 | = | 46.83 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | x | 106.25 |] | 0.5 | x | 0.8 | = | 86 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | × | 106.25 |] | 0.5 | x | 0.8 | = | 273.27 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | X | 119.01 | ļ | 0.5 | x | 0.8 | = | 90.39 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | × | 119.01 |] | 0.5 | x | 0.8 | = | 52.45 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | × | 119.01 |] | 0.5 | x | 0.8 | = | 96.33 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | × | 119.01 |] | 0.5 | x | 0.8 | = | 306.08 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | × | 118.15 |] | 0.5 | x | 0.8 | = | 89.74 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | x | 118.15 | | 0.5 | x | 0.8 | = | 52.07 | (79) |

| Southwest _{0.9x} | 0.77 | x | 2.9 | 2 | x | 1. | 18.15 | 1 | <u> </u> | 0.5 | x | 0.8 | | = | 95.63 | (79) |
|---------------------------|-------------|-----------|------------|-----------|-------|----------|-----------|--------|----------|---------|----------|----------|------|-----|--------|------|
| Southwest _{0.9x} | 0.77 | ^ | 13. | | x | <u> </u> | 18.15 |] | | 0.5 | | 0.8 | | = | 303.87 | (79) |
| Southwest _{0.9x} | 0.34 | ^ | 2.7 | | x | r | 13.91 |] | | 0.5 | | 0.8 | | = | 86.52 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | | x | | 13.91 |] | | 0.5 | | 0.8 | | = | 50.21 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | | x | <u> </u> | 13.91 | 1 | | 0.5 | | 0.8 | | = | 92.2 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13. | | x | | 13.91 |] | | 0.5 | x | 0.8 | | = | 292.96 | (79) |
| Southwest0.9x | 0.77 | | 2.7 | | x | | 04.39 |] | | 0.5 | | 0.8 | | = | 79.29 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | | x | | 04.39 |] | | 0.5 | x | 0.8 | | = | 46.01 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | | x | | 04.39 |] | | 0.5 | | 0.8 | | = | 84.5 | (79) |
| Southwest0.9x | 0.54 | × | 13. | | x | | 04.39 |] | | 0.5 | × | 0.8 | | = | 268.48 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | | x | | 2.85 |] | | 0.5 | × | 0.8 | | = | 70.52 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.5 | | x | | 2.85 |] | | 0.5 | | 0.8 | | = | 40.92 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | | x | | 2.85 |] | | 0.5 | | 0.8 | | = | 75.16 | (79) |
| Southwest _{0.9x} | 0.54 | x | 13. | | x | | 2.85 |] | | 0.5 | | 0.8 | | = | 238.81 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | | x | | 9.27 |] | | 0.5 | | 0.8 | | = | 52.61 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.5 | | x | | 9.27 |] | | 0.5 | - x | 0.8 | | = | 30.53 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | | x | | 9.27 |] | | 0.5 | | 0.8 | | = | 56.07 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13. | | x | | 9.27 |] | | 0.5 | × | 0.8 | | = | 178.15 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | | x | | 4.07 |] | | 0.5 | - x | 0.8 | | = | 33.47 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.5 | | x | r | 4.07 | 1 | | 0.5 | × | 0.8 | | = | 19.42 | (79) |
| Southwest _{0.9x} | | × | 2.9 | | x | | 4.07 |] | | 0.5 | × | 0.8 | | = | 35.67 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13. | | x | | 4.07 |] | | 0.5 | - x | 0.8 | | = | 113.35 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.7 | | x | r | 1.49 |] | | 0.5 | | 0.8 | | = | 23.92 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.5 | | x | | 1.49 |] | | 0.5 | × | 0.8 | | = | 13.88 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.9 | | x | | 1.49 |] | | 0.5 | - x | 0.8 | | = | 25.49 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13. | | x | | 1.49 |] | | 0.5 | ۲ × ۲ | 0.8 | | = | 80.98 | (79) |
| l | | | | | | | | 1 | | | | | | | | |
| Solar gains in | watts, cal | lculated | l for eacl | n montl | h | | | (83)m | ו = Sו | um(74)m | (82)m | | | | | |
| (83)m= 182.12 | 314.71 | 442.55 | 568.37 | 654.9 | 6 | 58.21 | 631.23 | 565 | .45 | 485.93 | 351.0 | 5 218.95 | 155 | .32 | | (83) |
| Total gains – | internal ar | nd solar | (84)m = | - (73)m | + (| 83)m | , watts | | | | | | | | | |
| (84)m= 560.12 | 691.37 | 806.09 | 910.21 | 973.68 | 9 | 55.53 | 915.1 | 853 | .27 | 785.32 | 672.28 | 3 565.36 | 521 | .6 | | (84) |
| 7. Mean inte | rnal tempe | erature | (heating | seaso | n) | | | | | | | | | | | |
| Temperature | during he | eating p | eriods ir | n the liv | ving | area f | rom Tab | ole 9 | , Th | 1 (°C) | | | | | 21 | (85) |
| Utilisation fac | ctor for ga | ins for l | iving are | ea, h1,r | n (s | ee Ta | ble 9a) | | | | | | | | | _ |
| Jan | Feb | Mar | Apr | May | ' | Jun | Jul | A | ug | Sep | Oct | Nov | D | ес | | |
| (86)m= 0.97 | 0.95 | 0.91 | 0.85 | 0.75 | | 0.62 | 0.5 | 0.5 | 54 | 0.72 | 0.88 | 0.95 | 0.9 | 17 | | (86) |
| Mean interna | al tempera | ture in | living are | ea T1 (| follo | w ste | ps 3 to 7 | 7 in T | able | e 9c) | | | | | | |
| <mark>(87)m=</mark> 18.35 | 18.69 | 19.19 | 19.8 | 20.33 | 2 | 20.72 | 20.89 | 20. | 86 | 20.56 | 19.84 | 18.98 | 18. | 28 | | (87) |
| Temperature | during he | eating p | eriods ir | n rest o | f dw | elling | from Ta | able 9 | 9, Tł | n2 (°C) | | | | | | |
| (88)m= 19.86 | 19.87 | 19.87 | 19.88 | 19.88 | 1 | 9.89 | 19.89 | 19. | 89 | 19.89 | 19.88 | 19.88 | 19.8 | 87 | | (88) |
| Utilisation fa | ctor for ga | ins for I | rest of d | wellina. | , h2. | ,m (se | e Table | 9a) | | | | | | | | |
| (89)m= 0.96 | 0.94 | 0.9 | 0.83 | 0.71 | | 0.55 | 0.39 | 0.4 | 14 | 0.66 | 0.86 | 0.94 | 0.9 | 7 | | (89) |
| L | | | | | - | | | | | | | | | | I | |

| Mean | interna | l temper | ature in | the rest | of dwelli | ing T2 (fo | ollow ste | eps 3 to 7 | 7 in Tabl | e 9c) | | | | |
|--|---|--|---|---|--|--|--|---|--|--|---|--|------------------------|---|
| (90)m= | 17.45 | 17.79 | 18.28 | 18.88 | 19.38 | 19.72 | 19.84 | 19.82 | 19.59 | 18.93 | 18.09 | 17.39 | | (90) |
| I | | | | | | | | | f | LA = Livin | ig area ÷ (4 | 4) = | 0.38 | (91) |
| Moon | intorno | Itompor | oturo (fo | r tho wh | olo dwo | lling) – fl | Δ 🗸 Τ1 | + (1 – fL | A) v T2 | | | I | | _ |
| (92)m= | 17.8 | 18.13 | 18.63 | 19.23 | 19.74 | 20.1 | 20.24 | 20.22 | 19.96 | 19.28 | 18.43 | 17.74 | | (92) |
| | | | | | | | | 4e, whe | | | 10.10 | | | () |
| (93)m= | 17.8 | 18.13 | 18.63 | 19.23 | 19.74 | 20.1 | 20.24 | 20.22 | 19.96 | 19.28 | 18.43 | 17.74 | | (93) |
| | | ting requ | l | | 10.14 | 20.1 | 20.24 | 20.22 | 10.00 | 10.20 | 10.40 | 17.74 | | () |
| | | | | | re obtair | od at st | on 11 of | Table Of | a so tha | t Ti m_(' | 76)m an | d re-calc | ulato | |
| | | | | using Ta | | | ерттог | |), so ina | t 11,111–(| 70)III ali | u ie-caic | ulate | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Utilisa | ation fac | tor for g | | · · | , , , , , , , , , , , , , , , , , , , | | | <u> </u> | • | | | | | |
| (94)m= | 0.95 | 0.92 | 0.88 | 0.81 | 0.7 | 0.56 | 0.43 | 0.47 | 0.67 | 0.84 | 0.93 | 0.96 | | (94) |
| Usefu | I gains, | hmGm | , W = (9 | 4)m x (8- | 4)m | | | | | | | | | |
| (95)m= | 532.48 | 637.75 | 709.13 | 735.82 | 685.55 | 539.14 | 389.97 | 399.42 | 522.43 | 566.84 | 524.94 | 499.4 | | (95) |
| Month | nly avera | age exte | rnal tem | perature | e from Ta | able 8 | | | | | | | I | |
| (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 interr | al tempo | erature, | Lm , W = | - =[(39)m : | r [(93)m | – (96)m | 1 | | | | |
| (97)m= | | 1585.16 | i | · · · | 950.4 | 644.07 | 426.39 | 446.59 | 688.74 | 1025.6 | 1343.19 | 1611.33 | | (97) |
| Space | e heatin | g require | ement fo | r each n | nonth, k | Wh/mont | h = 0.02 | 24 x [(97) |)m – (95 |)m] x (4 ⁻ | 1)m | | | |
| (98)m= | 809.13 | 636.66 | 551 | 350.61 | 197.05 | 0 | 0 | 0 | 0 | 341.32 | , 589.15 | 827.28 | | |
| | | | | | | | | Tota | l per year | (kWh/year | r) = Sum(9 | 8)15,912 = | 4302.19 | (98) |
| Snac | a hoatin | a roquir | omont in | kWh/m² | 2 woor | | | | | | | | 45.50 | _](99) |
| | | | | | year | | | | | | | | 45.53 | (99) |
| | bace co | olina rec | wiremer | ht . | | | | | | | | | | |
| Calcu | | | | | | | | | | | | | | |
| Guida | | r June, J | July and | August. | | | Γ | | | | | | | |
| | Jan | r June, . Feb | July and Mar | August. Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Heat | Jan loss rate | r June, J Feb e Lm (ca | July and Mar Iculated | August. Apr using 2 | May 5°C inter | Jun nal temp | perature | and exte | ernal ten | nperatur | e from T | able 10) | | (100) |
| Heat (100)m= | Jan loss rate 0 | r June, C Feb e Lm (ca | July and Mar Iculated | August. Apr | May | Jun | perature | | | | | | | (100) |
| Heat (100)m= Utilisa | Jan loss rate 0 ation fac | r June, C Feb E Lm (ca 0 tor for lo | July and Mar Iculated 0 pss hm | August. Apr using 29 | May 5°C inter 0 | Jun nal temp 1100.83 | berature 866.61 | and exte 888.59 | ernal ten 0 | nperatur 0 | e from T | able 10) ⁰ | | |
| Heat (100)m= Utilisa (101)m= | Jan loss rate 0 ation fac | r June, C Feb E Lm (ca 0 ttor for lc | July and Mar Iculated 0 oss hm 0 | August. Apr using 25 0 | May 5°C inter 0 | Jun nal temp 1100.83 0.76 | perature | and exte | ernal ten | nperatur | e from T | able 10) | | (100) (101) |
| Heat (100)m= Utilisa (101)m= Usefu | Jan loss rate 0 ation fac 0 Il loss, h | r June, C Feb E Lm (ca 0 tor for lc 0 mLm (V | July and Mar Iculated 0 oss hm 0 /atts) = 0 | August. Apr using 29 0 (100)m > | May 5°C inter 0 (101)m | Jun nal temp 1100.83 0.76 | 0.82 | and exte 888.59 0.79 | o 0 0 | nperatur 0 0 | e from T 0 0 | able 10) 0 | | (101) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= | Jan loss rate 0 ation fac 0 Il loss, h 0 | r June, C Feb E Lm (ca 0 ttor for lo 0 mLm (W 0 | July and Mar Iculated 0 oss hm 0 /atts) = 0 | August. Apr using 29 0 (100)m > 0 | May 5°C inter 0 (101)m | Jun nal temp 1100.83 0.76 836.14 | 0.82 710.57 | and exte 888.59 0.79 706.03 | o 0 0 | nperatur 0 | e from T | able 10) ⁰ | | |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains | Jan loss rate 0 ation fac 0 Il loss, h 0 (solar g | r June, C Feb E Lm (ca o tor for lc 0 mLm (V 0 gains ca | July and Mar Iculated 0 oss hm 0 /atts) = 0 Iculated | August. Apr using 29 0 (100)m > 0 for appli | May 5°C inter 0 (101)m 0 cable we | Jun nal temp 1100.83 0.76 836.14 eather re | 0.82 710.57 2000, se | and exte 888.59 0.79 706.03 ee Table | o 0 0 10) | nperatur 0 0 | e from T 0 0 | able 10) 0 0 | | (101) (102) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= | Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 | r June, C Feb e Lm (ca o tor for lo o mLm (W 0 gains ca 0 | July and Mar Iculated 0 oss hm 0 /atts) = 0 Iculated 0 | August. Apr using 29 0 (100)m > 0 for appli | May 5°C inter 0 (101)m 0 cable we | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 | 0.82 710.57 9gion, se 1206.58 | and exte 888.59 0.79 706.03 ee Table 1132.96 | 0 0 0 10) 0 | nperatur 0 0 0 | e from T 0 0 | able 10) 0 0 | | (101) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> | Jan loss rate o ation fac 0 Il loss, h 0 s (solar s 0 e cooling | r June, C Feb e Lm (ca o tor for lo o mLm (W o gains ca o g require | July and Mar Iculated 0 oss hm 0 /atts) = 0 Iculated 0 ement fo | August. Apr using 29 0 (100)m > (100)m > for appli 0 <i>r month,</i> | May 5°C inter 0 (101)m 0 cable w 0 whole c | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 | 0.82 710.57 9gion, se 1206.58 | and exte 888.59 0.79 706.03 ee Table 1132.96 | 0 0 0 10) 0 | nperatur 0 0 0 | e from T 0 0 | able 10) 0 0 | | (101) (102) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 | Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 e cooling 04)m to | r June, C Feb E Lm (ca o tor for lo o mLm (W o gains ca o g require zero if (| July and Mar Iculated 0 pss hm 0 /atts) = 0 /culated 0 /atts) = 0 lculated 0 1culated 0 1culated 0 ament for 104)m | August. Apr using 29 0 (100)m > 0 for appli 0 r month, < 3 × (98 | May 5°C inter 0 (101)m cable we cable we 0 whole c)m | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 dwelling, | 2000 200 2000 2 | and exte 888.59 0.79 706.03 ee Table 1132.96 ous (kW | 0 0 10) 0 <i>(h) = 0.0,</i> | 0 0 0 24 x [(10 | e from T 0 0 0 0 03)m - (1 | able 10) 0 0 0 102)m]: | | (101) (102) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> | Jan loss rate o ation fac 0 Il loss, h 0 s (solar s 0 e cooling | r June, C Feb e Lm (ca o tor for lo o mLm (W o gains ca o g require | July and Mar Iculated 0 oss hm 0 /atts) = 0 Iculated 0 ement fo | August. Apr using 29 0 (100)m > (100)m > for appli 0 <i>r month,</i> | May 5°C inter 0 (101)m 0 cable w 0 whole c | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 | 0.82 710.57 9gion, se 1206.58 | and exte 888.59 0.79 706.03 ee Table 1132.96 | r r r a l ten 0 0 10) 0 (h) = 0.0. 0 | 0 0 0 24 x [(10 | e from T 0 0 0 0 0 0 3) <i>m</i> – (* | able 10) 0 0 0 102)m]: | x (41)m | (101) (102) (103) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= | Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar s 0 s (solar s 0 e coolins 04)m to 0 | r June, C Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (0 | July and Mar Iculated 0 pss hm 0 /atts) = 0 /culated 0 /atts) = 0 lculated 0 1culated 0 1culated 0 ament for 104)m | August. Apr using 29 0 (100)m > 0 for appli 0 r month, < 3 × (98 | May 5°C inter 0 (101)m cable we cable we 0 whole c)m | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 dwelling, | 2000 200 2000 2 | and exte 888.59 0.79 706.03 ee Table 1132.96 ous (kW | $\frac{1}{0}$ $\frac{1}{10}$ | 0 0 24 x [(10 0 = Sum(| e from T 0 0 0 03) <i>m</i> – (* 0 104) | able 10) 0 0 0 102)m] 2 0 = | x (41)m 989.99 | (101) (102) (103) (104) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolec | Jan loss rate ation fac 0 Il loss, h 0 s (solar g 0 s (solar g 0 e cooling 04)m to 0 | r June, C Feb E Lm (ca tor for lo o mLm (W 0 gains ca 0 g require zero if (0 | July and Mar Iculated 0 oss hm 0 /atts) = 0 /atts) = 0 Iculated 0 Iculated 0 ament fo 104)m < | August. Apr using 29 0 (100)m > 0 for appli 0 r month, 3 × (98 0 | May 5°C inter 0 (101)m cable we cable we 0 whole c)m | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 dwelling, | 2000 200 2000 2 | and exte 888.59 0.79 706.03 ee Table 1132.96 ous (kW | $\frac{1}{0}$ $\frac{1}{10}$ | 0 0 24 x [(10 0 = Sum(| e from T 0 0 0 0 0 0 3) <i>m</i> – (* | able 10) 0 0 0 102)m] 2 0 = | x (41)m | (101) (102) (103) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolec | Jan loss rate ation fac 0 Il loss, h 0 s (solar g 0 s (solar g 0 e cooling 04)m to 0 | r June, C Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 g require zero if (0 | July and Mar Iculated 0 oss hm 0 /atts) = 0 /atts) = 0 Iculated 0 Iculated 0 ament fo 104)m < | August. Apr using 29 0 (100)m > 0 for appli 0 r month, 3 × (98 0 | May 5°C inter 0 (101)m cable we cable we 0 whole c)m | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 dwelling, | 2000 200 2000 2 | and exte 888.59 0.79 706.03 ee Table 1132.96 ous (kW | $\frac{1}{0}$ $\frac{1}{10}$ | 0 0 24 x [(10 0 = Sum(| e from T 0 0 0 03) <i>m</i> – (* 0 104) | able 10) 0 0 0 102)m] 2 0 = | x (41)m 989.99 | (101) (102) (103) (104) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= <i>Space</i> set (1 (104)m= Coolece Intermi | Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 e cooling 04)m to 0 d fraction | r June, C Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 gains ca 0 g require zero if (0 n actor (Ta | July and Mar Iculated 0 0ss hm 0 /atts) = 0 /atts) = 0 lculated 0 | August. Apr using 29 0 (100)m > 0 (100)m > 0 for appli 0 or month, 3 × (98 0 | May 5°C inter 0 (101)m cable we 0 whole c)m 0 | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 <i>dwelling,</i> 303.32 | 2000 2000 2000 2000 2000 2000 2000 200 | and exte 888.59 0.79 706.03 ee Table 1132.96 ous (kW 317.64 | $0 \\ 0 \\ 0 \\ 0 \\ 10) \\ 0 \\ 0 \\ 10) \\ 0 \\ 0 \\ 0 \\ Total \\ f C = \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$ | 0 0 0 24 x [(10 0 = Sum(cooled a | e from T 0 0 0 0 0 0 0 0 0 0 0 1 0 4 1 0 4 1 0 4 0 0 1 0 4 0 0 0 0 | able 10) 0 0 0 102)m] : 0 = +) = | x (41)m 989.99 1 | (101) (102) (103) (104) (105) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermi (106)m= | Jan loss rate 0 ation fac 0 I loss, h 0 s (solar g 0 e cooling 04)m to 0 0 f fraction attency fr 0 | r June, C Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 gains ca 0 g require 2 ero if (0 n actor (Ta 0 | July and Mar Iculated 0 0ss hm 0 vatts) = 0 /atts) = 0 lculated 0 lculated 0 lculated 0 able 10b 0 | August. Apr using 29 0 (100)m > 0 (100)m > 0 for appli 0 or month, 3 × (98 0 | May 5°C inter 0 0 (101)m 0 cable wo 0 whole c)m 0 0 | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 <i>dwelling,</i> 303.32 | Derature 866.61 0.82 710.57 2gion, se 1206.58 continue 369.03 0.25 | and exte 888.59 0.79 706.03 ee Table 1132.96 ous (kW 317.64 | $0 \\ 0 \\ 0 \\ 0 \\ 10) \\ 0 \\ 0 \\ 10) \\ 0 \\ 0 \\ 0 \\ Total \\ f C = \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$ | 0 0 0 24 x [(10 0 = Sum(cooled a | e from T 0 0 0 0 0 0 0 0 0 0 0 1 0 4 1 0 4 1 0 4 0 0 1 0 4 0 0 0 0 | able 10) 0 0 0 102)m] : 0 = 4) = 0 | x (41)m 989.99 | (101) (102) (103) (104) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolec Intermi (106)m= | Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 s (solar g 0 e cooling 0 d fraction ittency fac 0 cooling | r June, C Feb Lm (ca 0 tor for lc 0 mLm (W 0 gains ca 0 gains ca 0 g require 2 ero if (0 n actor (Ta 0 | July and Mar Iculated 0 0ss hm 0 vatts) = 0 /atts) = 0 lculated 0 lculated 0 lculated 0 able 10b 0 | August. Apr using 29 0 (100)m > 0 for appli 0 r month, 3 × (98 0 | May 5°C inter 0 0 (101)m 0 cable wo 0 whole c)m 0 0 | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 <i>dwelling,</i> 303.32 | Derature 866.61 0.82 710.57 2gion, se 1206.58 continue 369.03 0.25 | and exte 888.59 0.79 706.03 ee Table 1132.96 ous (kW 317.64 | $0 \\ 0 \\ 0 \\ 0 \\ 10) \\ 0 \\ 0 \\ 10) \\ 0 \\ 0 \\ 0 \\ Total \\ f C = \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$ | 0 0 0 24 x [(10 0 = Sum(cooled a | e from T 0 0 0 0 0 0 0 0 0 0 0 1 0 4 1 0 4 1 0 4 0 0 1 0 4 0 0 0 0 | able 10) 0 0 0 102)m] : 0 = 4) = 0 | x (41)m 989.99 1 | (101) (102) (103) (104) (105) |
| Heat (100)m= Utilisa (101)m= Usefu (102)m= Gains (103)m= Space set (1 (104)m= Coolect Intermi (106)m= | Jan loss rate 0 ation fac 0 Il loss, h 0 s (solar g 0 s (solar g 0 e cooling 0 d fraction ittency fac 0 cooling | r June, C Feb E Lm (ca 0 tor for lo 0 mLm (W 0 gains ca 0 g require 2 ero if (0 n actor (Ta 0 requirer | July and Mar Iculated 0 pss hm 0 vatts) = 0 /atts) = 0 lculated 0 /atts) = 0 lculated 0 /atts) = 0 able 10b 0 able 10b 0 ment for | August. Apr using 2! 0 (100)m > (100)m > 0 for appli 0 r month, 3 × (98 0) 0 month = | May 5°C inter 0 (101)m 0 cable wo 0 whole c)m 0 : (104)m | Jun nal temp 1100.83 0.76 836.14 eather re 1257.41 dwelling, 303.32 0.25 × (105) | 0.82 710.57 29jon, se 1206.58 <i>continue</i> 369.03 0.25 × (106)r | and exte 888.59 0.79 706.03 ee Table 1132.96 ous (kW 317.64 | $\begin{array}{c} & & \\$ | 0 0 0 24 x [(10 0 = Sum(cooled = 0 1 = Sum(| $\begin{array}{c} e \text{ from T} \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $ | able 10) 0 0 0 102)m] : 0 = 4) = 0 = | x (41)m 989.99 1 | (101) (102) (103) (104) (105) |

| Space cooling requirement in kWh/m²/year | (107) ÷ (4) = | 2.62 | (108) |
|---|--|-------|-------|
| 8f. Fabric Energy Efficiency (calculated only u | nder special conditions, see section 11) | | |
| Fabric Energy Efficiency | (99) + (108) = | 48.14 | (109) |

| | | | User D | etails: | | | | | | |
|---|--|---------------------------------|----------------|---------------------------|--------------|------------------|---------------------|--------------|----------------------------|--------------|
| Assessor Name: Software Name: | Ross Boult Stroma FS | | | Stroma Softwa | | | | | 028068 on: 1.0.4.18 | |
| | | | Property | | | 5-07 | | | | |
| Address : | | , Flat Type 2- | 17A, Wimt | oledon, L | ondon | | | | | |
| 1. Overall dwelling dimer | isions: | | | () | | | | | | |
| Ground floor | | | | a(m²) 94.5 | (1a) x | Av. He i | ight(m) 6 | (2a) = | Volume(m³) 245.7 | (3a) |
| Total floor area TFA = (1a |)+(1b)+(1c)+(| 1d)+(1e)+(| (1n) | 94.5 | (4) | | | | | |
| Dwelling volume | | | | | (3a)+(3b) |)+(3c)+(3d |)+(3e)+ | .(3n) = | 245.7 | (5) |
| 2. Ventilation rate: | | | | | | | | | | |
| Number of chimneys Number of open flues | main heating | second heating + 0 + 0 | | 0 0 |] = [| total 0 0 | | 40 = 20 = | m ³ per hour | (6a) (6b) |
| Number of intermittent fan | | | | 0 | | | | 10 = | - | J`´ |
| | S | | | | | 0 | | | 0 | (7a) |
| Number of passive vents | | | | | | 0 | x ? | 10 = | 0 | (7b) |
| Number of flueless gas fire | es | | | | | 0 | x 4 | 40 = | 0 | (7c) |
| | | | | | | | | Air ch | anges per hou | ır |
| Infiltration due to chimney | | | | | continue fro | 0 om (9) to (| | ÷ (5) = | 0 | (8) |
| Number of storeys in the | | | | | | (0) (0) | | | 0 | (9) |
| Additional infiltration | | | | | | | [(9) | -1]x0.1 = | 0 | (10) |
| Structural infiltration: 0.2 if both types of wall are pre deducting areas of opening | esent, use the val gs); if equal user | ue corresponding 0.35 | g to the great | ter wall are | a (after | uction | | | 0 |](11) |
| If suspended wooden flo | | | 0.1 (seale | ed), else | enter 0 | | | | 0 | (12) |
| If no draught lobby, ente | | | | | | | | | 0 | (13) |
| Percentage of windows | and doors dra | aught stripped | 1 | 0.05 10.0 | | 0.01 | | | 0 | (14) |
| Window infiltration | | | | 0.25 - [0.2 (8) + (10) | | | (45) | | 0 | (15) |
| Infiltration rate Air permeability value, c | | d in cubic mo | trop por br | | | | | oroo | 0 | (16) |
| If based on air permeabilit | | | | | | | nvelope | alea | 5 | (17) |
| Air permeability value applies | | | | | | is being us | sed | | 0.25 | (18) |
| Number of sides sheltered | | | · | | | Ū | | | 2 | (19) |
| Shelter factor | | | | (20) = 1 - | [0.075 x (1 | 9)] = | | | 0.85 | (20) |
| Infiltration rate incorporation | ng shelter fac | tor | | (21) = (18) |) x (20) = | | | | 0.21 | (21) |
| Infiltration rate modified fo | r monthly win | d speed | | | | | | | | |
| Jan Feb M | Var Apr | May Jur | n Jul | Aug | Sep | Oct | Nov | Dec | | |
| Monthly average wind spe | ed from Table | e 7 | | | | | - | | L | |
| (22)m= 5.1 5 4 | 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 | | - | | · | [] | | | l | |
| (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 | | |

| Adjust | ed infiltr | ation rat | e (allowi | ng for sh | nelter an | d wind s | peed) = | (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 | | |
| | | <i>ctive air</i> al ventila | <i>change</i> ation: | rate for t | ne appli | cable ca | se | | | | | ſ | 0.5 | (23a) |
| | | | using Appe | endix N, (2 | 3b) = (23a | ı) × Fmv (e | equation (N | N5)) , othe | rwise (23b | o) = (23a) | | L [| 0.5 | (23b) |
| If bala | anced with | heat reco | overy: effic | iency in % | allowing f | or in-use fa | actor (from | n Table 4h |) = | | | L [| 0.0 | (23c) |
| a) If | balance | ed mecha | anical ve | entilation | with hea | at recove | ery (MVI | HR) (24a | a)m = (22 | 2b)m + (| (23b) × [| ו (23c) – 1 | - | , |
| , (24a)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | (24a) |
| b) If | balance | d mech | anical ve | entilation | without | heat rec | overy (N | и ЛV) (24b |)m = (22 | 1 2b)m + (| 23b) | | | |
| (24b)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24b) |
| c) If | whole h | ouse ex | tract ver | tilation of | or positiv | e input v | /entilatic | n from c | outside | | 1 | I | | |
| | | | (23b), t | | - | - | | | | .5 × (23k | o) | | | |
| (24c)m= | 0.52 | 0.52 | 0.51 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | (24c) |
| , | | | on or wh en (24d) | | | | | | | 0.5] | | | | |
| (24d)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24d) |
| Effe | ctive air | change | rate - er | nter (24a |) or (24b | o) or (240 | c) or (24 | d) in box | x (25) | | | | | |
| (25)m= | 0.52 | 0.52 | 0.51 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | (25) |
| 3. He | at losse | s and he | eat loss p | paramete | er: | | | | | | | | | |
| ELEN | | Gros | | Openin | | Net Ar | ea | U-val | ue | ΑXU | | k-value | · / | A X k |
| | | area | (m²) | . m | | A ,r | n² | W/m2 | K | (W/ | K) | kJ/m²∙ŀ | K | κJ/K |
| Windo | ws Type | e 1 | | | | 2.74 | /1 _X | [1/(1.35)- | + 0.04] ₌ | 3.51 | | | | (27) |
| Windo | ws Type | e 2 | | | | 1.59 | x1/ | [1/(1.35)- | ⊦ 0.04] ₌ | 2.04 | | | | (27) |
| Windo | ws Type | 93 | | | | 2.92 | /1 <u>x</u> | [1/(1.35)- | + 0.04] ₌ | 3.74 | | | | (27) |
| Windo | ws Type | e 4 | | | | 2.74 | ×1/ | [1/(1.35)- | + 0.04] ₌ | 3.51 | | | | (27) |
| Windo | ws Type | e 5 | | | | 1.59 | ×1/ | [1/(1.35)- | + 0.04] = | 2.04 | | | | (27) |
| Windo | ws Type | e 6 | | | | 13.23 | s x1/ | [1/(1.35)- | • 0.04] ₌ | 16.95 | | | | (27) |
| Walls | | 45.5 | 52 | 24.8 | 1 | 20.71 | x | 0.15 | | 3.11 | | | | (29) |
| Roof | | 94. | 5 | 0 | | 94.5 | x | 0.13 | | 12.28 | = i | | | (30) |
| Total a | area of e | lements | , m² | | | 140.0 | 2 | | | | | | | (31) |
| | | | ows, use e sides of ir | | | | ated using | formula 1 | /[(1/U-valı | ue)+0.04] a | as given in | n paragraph | 3.2 | |
| Fabric | heat los | ss, W/K : | = S (A x | U) | | | | (26)(30) |) + (32) = | | |] | 47.17 | (33) |
| Heat c | apacity | Cm = S(| (A x k) | | | | | | ((28). | (30) + (3 | 2) + (32a). | (32e) = | 1140.41 | (34) |
| Therm | al mass | parame | eter (TMF | ^o = Cm ÷ | - TFA) ir | ∩ kJ/m²K | | | Indica | ative Value | : Low | Ī | 100 | (35) |
| | - | | ere the de tailed calci | | constructi | ion are not | t known pr | ecisely the | e indicative | e values of | f TMP in T | able 1f | | |
| Therm | al bridg | es : S (L | x Y) cal | culated u | using Ap | pendix ł | < | | | | | [| 25.74 | (36) |
| | | | are not kn | own (36) = | = 0.05 x (3 | 1) | | | (00) | (0.0) | | г | | |
| | abric he | | -l !- <i>!</i> | I | _ | | | | | - (36) = | (05) (-) | , [| 72.91 | (37) |
| Ventila | | 1 | alculated | | | | | | r | 1 | (25)m x (5) | | | |
| (20) | Jan 42.24 | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | (38) |
| (38)m= | 42.24 | 41.81 | 41.38 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | 40.54 | | (30) |
| | r | | · · | 440 :- | 440 :- | 440.1- | 440 :- | 440.5- | | i = (37) + (| | | | |
| (39)m= | 115.15 | | 114.29 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 113.45 | 440 77 | (20) |
| Stroma | FSAP 201 | 2 Version | : 1.0.4.18 (| (SAP 9.92) | - http://ww | ww.stroma | .com | | | Average = | • Sum(39)₁ | 12 / 12= | Pag | <u>1e 2 o</u> f 39) |

| Heat lo | oss para | meter (H | HLP), W | /m²K | | | | | (40)m | = (39)m ÷ | · (4) | | | |
|------------------------|-------------|------------------------|--------------|--------------|-------------------------|------------------------|----------------------|------------------------|-----------------------|-------------|---------------------------------------|---------|---------|------|
| (40)m= | 1.22 | 1.21 | 1.21 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | | |
| Numbe | er of day | s in mo | nth (Tab | le 1a) | 1 | 1 | 1 | 1 | | Average = | Sum(40) ₁ | 12 /12= | 1.2 | (40) |
| Turner | 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 | ter heat | ting ene | rgy requ | irement: | | | | | | | | kWh/ye | ear: | |
| if TF | | | | : [1 - exp | (-0.0003 | 849 x (TF | - A -13.9 |)2)] + 0.(| 0013 x (⁻ | TFA -13. | | 68 | | (42) |
| Annua <i>Reduce</i> | l averag | e hot wa al average | hot water | usage by | | lwelling is | designed | (25 x N) to achieve | | se target o | 97 f | .91 | | (43) |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Hot wate | er usage il | n litres pei | r day for ea | ach month | Vd,m = fa | ctor from | Table 1c x | (43) | - | | | | | |
| (44)m= | 107.7 | 103.78 | 99.87 | 95.95 | 92.03 | 88.12 | 88.12 | 92.03 | 95.95 | 99.87 | 103.78 | 107.7 | | |
| Enerav | content of | hot water | used - cal | lculated m | onthly – 4 | 190 x Vd r | n y nm y [|)Tm / 360(| | | m(44) ₁₁₂ = ables 1b, 1 | | 1174.9 | (44) |
| (45)m= | 159.71 | 139.69 | 144.14 | 125.67 | 120.58 | 104.05 | 96.42 | 110.64 | 111.97 | 130.49 | 142.43 | 154.67 | | |
| (43)11= | 159.71 | 139.09 | 144.14 | 123.07 | 120.30 | 104.05 | 90.42 | 110.04 | | | m(45) ₁₁₂ = | | 1540.48 | (45) |
| lf instan | taneous w | ater heati | ng at point | t of use (no | o hot water | ^r storage), | enter 0 in | boxes (46 | | 10101 - 00 | | | 10-0.40 | () |
| (46)m= | 23.96 | 20.95 | 21.62 | 18.85 | 18.09 | 15.61 | 14.46 | 16.6 | 16.79 | 19.57 | 21.37 | 23.2 | | (46) |
| | storage | | | • | | | | | • | | | | | |
| - | | . , | | | | | - | within sa | ame ves | sei | | 0 | | (47) |
| | • | • | | | velling, e ncludes i | | | ombi boil | ers) ente | er '0' in (| 47) | | | |
| | storage | | | (| | | | | , | | , | | | |
| a) If m | anufact | urer's de | eclared I | oss facto | or is kno | wn (kWł | n/day): | | | | | 0 | | (48) |
| Tempe | erature f | actor fro | m Table | 2b | | | | | | | | 0 | | (49) |
| | | | - | e, kWh/ye | | | | (48) x (49) |) = | | 1 | 10 | | (50) |
| , | | | | • | loss fact le 2 (kW | | | | | | 0 | 02 | | (51) |
| | | - | see secti | | | ., | | | | | 0. | 02 | | (0.) |
| | | from Ta | | | | | | | | | 1. | 03 | | (52) |
| Tempe | erature f | actor fro | m Table | 2b | | | | | | | 0 | .6 | | (53) |
| ••• | | | - | e, kWh/ye | ear | | | (47) x (51) |) x (52) x (| 53) = | | 03 | | (54) |
| | . , | (54) in (5 | | (| | | | ((50) | | | 1. | 03 | | (55) |
| | | | | for each | | i | 1 | ((56)m = (| | | 1 | | | (==) |
| (56)m= | 32.01 | 28.92 | 32.01 | 30.98 | 32.01 | 30.98 | 32.01 | 32.01 | 30.98 | 32.01 | 30.98 H11) is fro | 32.01 | iv Ll | (56) |
| - | | | | - · · | | | | r | · · · | | - | | | |
| (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) |
| | - | • | , | om Table | | | (=0) - | | | | | 0 | | (58) |
| | • | | | | | | . , | 65 × (41) ng and a | | r tharma | stat) | | | |
| (1100 (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) |
| (| | | L | L | L | L | L | L_00 | L | L | | 0 | | × / |

| (6)m- 0 <th>Total heat require</th> <th></th> <th>0</th> <th>0</th> <th>0</th> <th></th> <th><u> </u></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> | Total heat require | | 0 | 0 | 0 | | <u> </u> | | | | | | |
|--|-----------------------|---------------------------------------|---------------|------------|-----------|-------------|--------------|--------------|-------------|--------------|---------------|---------------|------|
| (62)me 214.99 189.61 199.42 179.16 175.86 157.55 151.7 165.92 165.46 185.76 185.93 209.85 (62) Solar DPW input calculated using Appendix G or Appendix H (negative quantity) (netre '0' if no solar contribution to water heating) (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63) (63)me 0 <td>i</td> <td>d for water</td> <td></td> <td>Ŭ</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td></td> <td>(61)</td> | i | d for water | | Ŭ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (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) (63)m= 0 | | | heating c | alculated | for eac | h month | (62)m = | 0.85 × (| (45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (add additional lines if FGHRS and/or WWHRS applies, see Appendix G) (63) (63)m= 0 | (62)m= 214.99 18 | 9.61 199.42 | 2 179.16 | 175.86 | 157.55 | 151.7 | 165.92 | 165.46 | 185.76 | 195.93 | 209.95 | | (62) |
| (63)m= 0 <td>Solar DHW input calcu</td> <td>lated using A</td> <td>opendix G o</td> <td>r Appendix</td> <td>H (negati</td> <td>ve quantity</td> <td>/) (enter '0</td> <td>' if no sola</td> <td>r contribut</td> <td>ion to wate</td> <td>er heating)</td> <td></td> <td></td> | Solar DHW input calcu | lated using A | opendix G o | r Appendix | H (negati | ve quantity | /) (enter '0 | ' if no sola | r contribut | ion to wate | er heating) | | |
| Output from water heater (#4)m= 214.99 189.81 139.42 179.16 175.86 157.55 151.7 165.92 165.46 185.76 185.83 209.95 Output from water heating, kWh/month 0.25 ⁻ [0.85 x (45)m + (61)m] + 0.8 x [[46]m + (57)m + (59)m] (66)m = 97.33 86.39 92.15 84.58 44.32 77.39 76.28 81.01 80.02 87.61 90.15 95.65 (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): Matabolic gains (Table 5), Watts Quation L9 or L3a), also see Table 5 (67)m = 22.03 19.57 159.1 12.05 9.01 7.6 8.22 10.68 14.33 18.2 21.42 2.64 (67) Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (69)m 247.12 249.68 243.22 22.94.6 212.1 196.73 106.8 14.33 18.2 21.42 2.64 (67) Colking agains (calculated in Appendix L, equation L15 or L15a) | (add additional line | es if FGHR | S and/or V | WWHRS | applies | , see Ap | pendix (| G) | | | | | |
| | (63)m= 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output from water heating, kWh/month 0.25 ' $[0.85 \times (45)m + (61)m] + 0.8 \times [(46)m + (57)m + (59)m]$ (64) Heat gains from water heating, kWh/month 0.25 ' $[0.85 \times (45)m + (61)m] + 0.8 \times [(46)m + (57)m + (59)m]$ (65) (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 6 1 <td< td=""><td>Output from water</td><td>heater</td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td></td<> | Output from water | heater | | - | | | | | | - | | | |
| Heat gains from water heating, kWh/month 0.25 $'[0.85 \times (45)m + (61)m] + 0.8 \times [(46)m + (57)m + (59)m]$ (66)m= 97.33 86.39 92.15 84.58 84.32 77.39 76.28 81.01 80.02 87.61 90.15 95.65 (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 (66)m= 134.12 (134.12 134.12 134.12 134.12 134.12 (134.12 134.12 134.12 134.12 134.12 (134.12 134.12 134.12 134.12 134.12 (134.12 134.12 134.12 134.12 (134.12 134.12 134.12 (134.12 134.12 134.12 134.12 (134.12 134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 134.12 (134.12 (134.12 134.12 (134.12 134.12 (134.1 | (64)m= 214.99 18 | 9.61 199.42 | 2 179.16 | 175.86 | 157.55 | 151.7 | 165.92 | 165.46 | 185.76 | 195.93 | 209.95 | | |
| (65)m= 97.33 86.39 92.15 84.58 84.32 77.39 76.28 81.01 80.02 87.61 90.15 95.65 (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 | · · · · | | • | | | | Out | out from wa | ater heate | r (annual)₁ | 12 | 2191.32 | (64) |
| 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 | Heat gains from w | ater heatin | g, kWh/m | onth 0.2 | 5 ´ [0.85 | × (45)m | + (61)n | n] + 0.8 x | (46)m | + (57)m | + (59)m |] | |
| S. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts (66)m= 134.12 134.13 134.13 136.41 364. | (65)m= 97.33 86 | 6.39 92.15 | 84.58 | 84.32 | 77.39 | 76.28 | 81.01 | 80.02 | 87.61 | 90.15 | 95.65 | - - | (65) |
| S. Internal gains (see Table 5 and 5a): Metabolic gains (Table 5), Watts (66)m= 134.12 134.13 134.13 136.41 364. | include (57)m ir | calculation | n of (65)m | onlv if c | vlinder i | s in the c | dwellina | or hot w | ater is fr | om com | r munitv h | eating | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | . , | - | , | | | | | | , . | g | |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | | | |). | | | | | | | | | |
| (66)me 134.12 | | | | May | lup | lul | Δυσ | Son | Oct | Nov | Dec | l | |
| Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 (67)m= 22.03 19.57 15.91 12.05 9.01 7.6 8.22 10.68 14.33 18.2 21.24 22.64 (67) Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 247.12 249.68 243.22 229.46 212.1 195.78 184.87 182.31 188.77 202.53 219.89 236.21 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 36.41 36.41 36.41 36.41 36.41 36.41 36.41 36.41 36.41 36.41 36.41 36.41 36.41 36.41 (69) Pumps and fans gains (Table 5a) (70)m= $0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 \ 0 $ | | | · · | - | | | | | | | | | (66) |
| | | | | | | | | | 104.12 | 104.12 | 104.12 | | (00) |
| Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 (68)m= 247.12 249.68 243.22 229.46 212.1 195.78 184.87 182.31 188.77 202.53 219.89 236.21 (68) Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 36.41 36.4 | | | | · · | | | | i | 40.0 | 04.04 | 00.04 | I | (67) |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | _ | | | | | | | 21.24 | 22.64 | | (07) |
| Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 (69)m= 36.41 317.3 -107.3 $-$ | | · · · · · · · · · · · · · · · · · · · | | | | | · | · · · · · · | | | [| I | (22) |
| | (68)m= 247.12 24 | 9.68 243.22 | 2 229.46 | 212.1 | 195.78 | 184.87 | 182.31 | 188.77 | 202.53 | 219.89 | 236.21 | | (68) |
| Pumps and fans gains (Table 5a) (70)m= 0 0 0 0 0 0 0 0 0 0 | | Iculated in | Appendix | L, equat | ion L15 | or L15a) | , also se | e Table | 5 | | | L | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | (69)m= 36.41 36 | 5.41 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | | (69) |
| Losses e.g. evaporation (negative values) (Table 5) (71)m= $\frac{-107.3}{-107.3} \frac{-107.3}{-107.3} \frac{-107.3}{-107.3} \frac{-107.3}{-107.3} \frac{-107.3}{-107.3} \frac{-107.3}{-107.3} \frac{-107.3}{-107.3} \frac{-107.3}{-107.3}$ (71) Water heating gains (Table 5) (72)m= $\frac{130.82}{130.82} \frac{128.55}{123.86} \frac{117.47}{117.47} \frac{113.33}{107.49} \frac{102.53}{108.89} \frac{111.14}{117.75} \frac{117.5}{125.21} \frac{128.56}{128.56}$ (72) Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m (73)m= 463.2 461.04 446.23 422.22 397.67 374.11 358.85 365.11 377.48 401.72 429.58 450.66 (73) 6. Solar gains: Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation. Orientation: Access Factor Area Flux g_{-} FF Gains Table 6a Table 6b Table 6c (W) Northeast 0.9x 0.77 x 2.74 x 11.28 x 0.5 x 0.8 = 8.57 (75) | Pumps and fans g | ains (Table | e 5a) | | | - | | | | - | | | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | (70)m= 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (70) |
| Water heating gains (Table 5) (72)m= 130.82 128.55 123.86 117.47 113.33 107.49 102.53 108.89 111.14 117.75 125.21 128.56 (72) Total internal gains = (66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m (73)m= 463.2 461.04 446.23 422.22 397.67 374.11 358.85 365.11 377.48 401.72 429.58 450.66 (73) 6. Solar gains: Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation. Orientation: Access Factor Area m ² Flux g_ FF Gains Table 6c (W) Northeast 0.9x 0.77 x 2.74 x 11.28 x 0.5 x 0.8 = 8.57 (75) | Losses e.g. evapo | oration (neg | ative valu | es) (Tab | le 5) | | | | | | | | |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | (71)m= -107.3 -10 | 07.3 -107.3 | 3 -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | | (71) |
| Total internal gains = $(66)m + (67)m + (68)m + (69)m + (70)m + (71)m + (72)m$ $(73)m=$ 463.2 461.04 446.23 422.22 397.67 374.11 358.85 365.11 377.48 401.72 429.58 450.66 (73) 6. Solar gains: Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation. Orientation: Access Factor Area Flux g FF Gains Orientation: Access Factor Area Flux g FF Gains Northeast $0.9x$ 0.77 x 2.74 x 11.28 x 0.5 x 0.8 = 8.57 (75) | Water heating gai | ns (Table 5 |) | | | | | | | | | | |
| $\begin{array}{c} \text{(73)} \texttt{m} = & 463.2 & 461.04 & 446.23 & 422.22 & 397.67 & 374.11 & 358.85 & 365.11 & 377.48 & 401.72 & 429.58 & 450.66 & (73) \\ \hline \textbf{6. Solar gains:} \\ \textbf{Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation. \\ \textbf{Orientation:} & \textbf{Access Factor} & \textbf{Area} & Flux & \textbf{g} & FF & \textbf{Gains} \\ \textbf{Table 6d} & \textbf{m}^2 & \textbf{Table 6a} & \textbf{Table 6b} & \textbf{Table 6c} & (W) \\ \textbf{Northeast } \textbf{0.9x} & \textbf{0.77} & \textbf{x} & \textbf{2.74} & \textbf{x} & \textbf{11.28} & \textbf{x} & \textbf{0.5} & \textbf{x} & \textbf{0.8} & \textbf{=} & \textbf{8.57} & (75) \\ \textbf{Nertheast} \end{array}$ | (72)m= 130.82 12 | 8.55 123.80 | 6 117.47 | 113.33 | 107.49 | 102.53 | 108.89 | 111.14 | 117.75 | 125.21 | 128.56 | | (72) |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | Total internal gai | ns = | - | | (66) | m + (67)m | ı + (68)m · | + (69)m + (| (70)m + (7 | 1)m + (72) | m | | |
| Solar gains are calculated using solar flux from Table 6a and associated equations to convert to the applicable orientation.Orientation:Access Factor Table 6dArea m²Flux Table 6a g_{-} Table 6bFF Table 6cGains (W)Northeast 0.9x0.77x2.74x11.28x0.5x0.8=8.57(75) | <u>_</u> | | 3 422.22 | 397.67 | 374.11 | 358.85 | 365.11 | 377.48 | 401.72 | 429.58 | 450.66 | | (73) |
| Orientation:Access Factor Table 6dArea m²Flux Table 6a g_{-} Table 6bFF Table 6cGains (W)Northeast 0.9x0.77x2.74x11.28x0.5x0.8=8.57(75) | 6. Solar gains: | | | • | | | | | | | | | |
| Table 6d m^2 Table 6aTable 6bTable 6c(W)Northeast $0.9x$ 0.77 x 2.74 x 11.28 x 0.5 x 0.8 = 8.57 (75)North cost 0.77 x 2.74 x 11.28 x 0.5 x 0.8 = 8.57 (75) | Solar gains are calcu | lated using so | lar flux from | Table 6a a | and assoc | iated equa | tions to co | onvert to th | e applicat | ole orientat | ion. | | |
| Northeast $0.9x$ 0.77 x 2.74 x 11.28 x 0.5 x 0.8 = 8.57 (75) | Orientation: Acce | ess Factor | Area | | Flu | x | | g_ | | FF | | Gains | |
| | Tabl | e 6d | m² | | Tal | ole 6a | Т | able 6b | Т | able 6c | | (W) | |
| | Northeast 0.9x | 0.77 | x 2. | 74 | x 1 | 1.28 | x | 0.5 | x | 0.8 | = | 8.57 | (75) |
| Northeast $0.9x$ 0.77 X 1.59 X 11.28 X 0.5 X 0.8 = 4.97 (75) | Northeast 0.9x | 0.77 | × 1. | 59 | x 1 | 1.28 | x | 0.5 | | 0.8 | = | 4.97 | (75) |
| Northeast 0.9x 0.77 x 2.74 x 22.97 x 0.5 x 0.8 = 17.44 (75) | Northeast 0.9x | 0.77 | x 2. | 74 | x 2 | 2.97 | x | 0.5 | | 0.8 | = | 17.44 | (75) |
| Northeast 0.9x 0.77 x 1.59 x 22.97 x 0.5 x 0.8 = 10.12 (75) | Northeast 0.9x | | x 1.5 | 59 | | | × | 0.5 | <u></u> | 0.8 | = | 10.12 | (75) |
| | Northeast 0.9x | 0.77 | x 2. | | | 1.38 | x | 0.5 | | 0.8 | = | 31.43 | (75) |

| Northeast 0.9x | 0.77 |] × | 1.59 | × | 41.38 |] × | 0.5 | x | 0.8 | = | 18.24 | (75) |
|---------------------------|------|----------|-------|---|--------|----------|-----|---|-----|---|--------|------|
| Northeast 0.9x | 0.77 |] × | 2.74 | x | 67.96 |] x | 0.5 | x | 0.8 | = | 51.61 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 1.59 | × | 67.96 | 」 】 x | 0.5 | x | 0.8 | = | 29.95 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 2.74 | x | 91.35 |] x | 0.5 | x | 0.8 | = | 69.38 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 1.59 | x | 91.35 |] x | 0.5 | x | 0.8 | = | 40.26 | (75) |
| Northeast 0.9x | 0.77 |] × | 2.74 | x | 97.38 | x | 0.5 | x | 0.8 | = | 73.97 | (75) |
| Northeast 0.9x | 0.77 |] × | 1.59 | x | 97.38 | x | 0.5 | x | 0.8 | = | 42.92 | (75) |
| Northeast 0.9x | 0.77 |] x | 2.74 | x | 91.1 | x | 0.5 | x | 0.8 | = | 69.19 | (75) |
| Northeast 0.9x | 0.77 |] × | 1.59 | x | 91.1 | x | 0.5 | x | 0.8 | = | 40.15 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 72.63 | x | 0.5 | x | 0.8 | = | 55.16 | (75) |
| Northeast 0.9x | 0.77 | × | 1.59 | × | 72.63 | x | 0.5 | x | 0.8 | = | 32.01 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 50.42 | x | 0.5 | x | 0.8 | = | 38.3 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 50.42 | x | 0.5 | x | 0.8 | = | 22.22 | (75) |
| Northeast 0.9x | 0.77 | x | 2.74 | x | 28.07 | x | 0.5 | x | 0.8 | = | 21.32 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 28.07 | x | 0.5 | x | 0.8 | = | 12.37 | (75) |
| Northeast 0.9x | 0.77 | × | 2.74 | x | 14.2 | x | 0.5 | x | 0.8 | = | 10.78 | (75) |
| Northeast 0.9x | 0.77 | × | 1.59 | × | 14.2 | x | 0.5 | x | 0.8 | = | 6.26 | (75) |
| Northeast 0.9x | 0.77 | × | 2.74 | x | 9.21 | x | 0.5 | x | 0.8 | = | 7 | (75) |
| Northeast 0.9x | 0.77 | x | 1.59 | x | 9.21 | x | 0.5 | x | 0.8 | = | 4.06 | (75) |
| Southwest _{0.9x} | 0.77 | x | 2.74 | x | 36.79 |] | 0.5 | x | 0.8 | = | 27.95 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | x | 36.79 |] | 0.5 | x | 0.8 | = | 16.22 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.92 | x | 36.79 |] | 0.5 | x | 0.8 | = | 29.78 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | x | 36.79 |] | 0.5 | x | 0.8 | = | 94.63 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.74 | x | 62.67 | | 0.5 | x | 0.8 | = | 47.6 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.59 | x | 62.67 | | 0.5 | x | 0.8 | = | 27.62 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.92 | x | 62.67 | | 0.5 | x | 0.8 | = | 50.73 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | x | 62.67 | | 0.5 | x | 0.8 | = | 161.19 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | x | 85.75 | ļ | 0.5 | x | 0.8 | = | 65.13 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | x | 85.75 | ļ | 0.5 | x | 0.8 | = | 37.8 | (79) |
| Southwest0.9x | 0.77 | × | 2.92 | x | 85.75 | ļ | 0.5 | x | 0.8 | = | 69.41 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | x | 85.75 | ļ | 0.5 | x | 0.8 | = | 220.55 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | x | 106.25 | ļ | 0.5 | x | 0.8 | = | 80.7 | (79) |
| Southwest0.9x | 0.77 | × | 1.59 | X | 106.25 | ļ | 0.5 | x | 0.8 | = | 46.83 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | x | 106.25 |] | 0.5 | x | 0.8 | = | 86 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | × | 106.25 |] | 0.5 | x | 0.8 | = | 273.27 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | X | 119.01 | ļ | 0.5 | x | 0.8 | = | 90.39 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | × | 119.01 |] | 0.5 | x | 0.8 | = | 52.45 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.92 | × | 119.01 |] | 0.5 | x | 0.8 | = | 96.33 | (79) |
| Southwest _{0.9x} | 0.54 | × | 13.23 | × | 119.01 |] | 0.5 | x | 0.8 | = | 306.08 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.74 | × | 118.15 |] | 0.5 | x | 0.8 | = | 89.74 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.59 | x | 118.15 | | 0.5 | x | 0.8 | = | 52.07 | (79) |

| Southwesto as 0.54 × 13.23 × 118.15 0.5 × 0.8 = 03.87 (79) Southwesto as 0.77 × 2.74 × 113.91 0.5 × 0.8 = $0.62.$ (79) Southwesto as 0.77 × 2.74 × 113.91 0.5 × 0.8 = 0.22 (79) Southwesto as 0.77 × 2.74 × 113.91 0.5 × 0.8 = 0.22 (79) Southwesto as 0.77 × 2.74 × 113.91 0.5 × 0.8 = 0.22 (79) Southwesto as 0.77 × 2.74 × 110.391 0.5 × 0.8 = $0.22.79$ Southwesto as 0.77 × 2.74 × 104.39 0.5 × 0.8 = $0.22.79$ Southwesto as 0.77 × 2.74 × 104.39 0.5 × 0.8 = $0.22.79$ Southwesto as 0.77 × 2.74 × $0.04.39$ 0.5 × 0.8 = $0.22.79$ Southwesto as 0.77 × 2.74 × $0.04.39$ 0.5 × 0.8 = $0.22.79$ Southwesto as 0.77 × 2.74 × 0.225 0.5 × 0.8 = $0.22.79$ Southwesto as 0.77 × 2.74 × 0.225 0.5 × 0.8 = $0.228.49$ (79) Southwesto as 0.77 × 2.74 × 0.225 0.5 × 0.8 = $0.228.49$ (79) Southwesto as 0.77 × 2.74 × 0.225 0.5 × 0.8 = $0.226.9$ (79) Southwesto as 0.77 × 2.74 × 0.225 0.5 × 0.8 = $0.226.9$ (79) Southwesto as 0.77 × 2.74 × 0.225 0.5 × 0.8 = $0.226.9$ (79) Southwesto as 0.77 × 2.24 × 0.225 0.5 × 0.8 = $0.226.9$ (79) Southwesto as 0.77 × 2.24 × 0.225 0.5 × 0.8 = $0.26.9$ (79) Southwesto as 0.77 × 2.24 × 0.225 0.5 × 0.8 = $0.226.9$ (79) Southwesto as 0.77 × 2.24 × 0.225 0.5 × 0.8 = $0.226.9$ (79) Southwesto as 0.77 × 2.24 × 0.225 0.5 × 0.8 = $0.26.179$ Southwesto as 0.77 × 2.24 × 0.275 0.5 × 0.8 = $0.26.179$ Southwesto as 0.77 × 2.24 × 0.225 × 0.5 × 0.8 = $0.226.179$ Southwesto as 0.77 × 2.24 × 0.225 × 0.5 × 0.8 = $0.226.179$ Southwesto as 0.77 × 2.24 × $0.24.79$ 0.5 × 0.8 = $0.226.179$ Southwesto as 0.77 × 2.24 × $0.24.79$ 0.5 × 0.8 = $0.26.179$ Southwesto as 0.77 × 2.24 × $0.24.79$ 0.5 × 0.8 = $0.226.179$ Southwesto as 0.77 × 2.24 × $0.24.97$ 0.5 × 0.8 = $0.226.179$ Southwesto as 0.77 × 0.222 × $0.24.97$ 0.5 × 0.8 = $0.226.179$ | Couthurson | 4 | | | | г | | | 1 | | | - | | | | | - |
|---|------------|--------------------------|-----------|-----------|---------|------------|--------|---------|------------|----------|----------|----------|----------|-----|-----|--------|----------|
| Southwesto 3: Southwesto 3: South | | 0.11 | × | 2.9 | 2 | ×L | 1 | 18.15 | | | 0.5 | × | 0.8 | | = | 95.63 | (79) |
| Southwesto at $0, x$ $0, 77$ x 292 x 113.91 0.5 x 0.8 $=$ 60.21 (7) Southwesto $0, x$ 0.64 x 12.23 x 113.91 0.5 x 0.8 $=$ 92.2 (79) Southwesto $0, x$ 0.77 x 292 x 104.39 0.5 x 0.8 $=$ 79.29 (79) Southwesto $0, x$ 0.77 x 274 x 104.39 0.5 x 0.8 $=$ 79.29 (79) Southwesto $0, x$ 0.77 x 224 x 104.39 0.5 x 0.8 $=$ 79.29 (79) Southwesto $0, x$ 0.77 x 222 x 104.39 0.5 x 0.8 $=$ 79.29 (79) Southwesto $0, x$ 0.77 x 222 x 104.39 0.5 x 0.8 $=$ 79.29 (79) Southwesto $0, x$ 0.77 x 222 x 104.39 0.5 x 0.8 $=$ 46.01 (79) Southwesto $0, x$ 0.77 x 222 x 104.39 0.5 x 0.8 $=$ 70.52 (79) Southwesto $0, x$ 0.77 x 227 x 922.85 0.5 x 0.8 $=$ 70.52 (79) Southwesto $0, x$ 0.77 x 227 x 922.85 0.5 x 0.8 $=$ 70.52 (79) Southwesto $0, x$ 0.77 x 227 x 922.85 0.5 x 0.8 $=$ 223.81 (79) Southwesto $0, x$ 0.77 x 2274 x 922.85 0.5 x 0.8 $=$ 238.81 (79) Southwesto $0, x$ 0.77 x 222 x 892.7 0.5 x 0.8 $=$ 238.81 (79) Southwesto $0, x$ 0.77 x 227 x 892.7 0.5 x 0.8 $=$ 238.81 (79) Southwesto $0, x$ 0.77 x 227 x 892.7 0.5 x 0.8 $=$ 30.53 (79) Southwesto $0, x$ 0.77 x 227 x 4407 0.5 x 0.8 $=$ 172.16 (79) Southwesto $0, x$ 0.77 x 2292 x 892.7 0.5 x 0.8 $=$ 113.25 (79) Southwesto $0, x$ 0.77 x 2292 x 4407 0.5 x 0.8 $=$ 113.25 (79) Southwesto $0, x$ 0.77 x 2292 x 4407 0.5 x 0.8 $=$ 113.25 (79) Southwesto $0, x$ 0.77 x 2292 x 4407 0.5 x 0.8 $=$ 23.92 (79) Southwesto $0, x$ 0.77 x 2292 x 31.40 0.5 x 0.8 $=$ 23.92 (79) Southwesto $0, x$ 0.77 x 2292 x 31.40 0.5 x 0.8 $=$ 23.92 (79) Southwesto $0, x$ 0.77 x 2292 x 31.40 0.5 x 0.8 $=$ 23.92 (79) Southwesto $0, 0.77$ x 2.92 x 31.40 0.5 x 0.8 $=$ 23.92 | | | × | 13. | 23 | × | 1 | 18.15 | | | 0.5 | × | 0.8 | | = | 303.87 | (79) |
| Southwesto as 0.77 × 2.92 × (113.91) 0.5 × 0.8 = 292.96 (79) Southwesto as 0.77 × 2.74 × 104.39 0.5 × 0.8 = 72.2 (79) Southwesto as 0.77 × 2.74 × 104.39 0.5 × 0.8 = 292.96 (79) Southwesto as 0.77 × 2.92 × 104.39 0.5 × 0.8 = 46.01 (79) Southwesto as 0.77 × 2.92 × 104.39 0.5 × 0.8 = 46.01 (79) Southwesto as 0.77 × 2.92 × 104.39 0.5 × 0.8 = 46.01 (79) Southwesto as 0.77 × 2.92 × 104.39 0.5 × 0.8 = 208.48 (79) Southwesto as 0.77 × 2.92 × 104.39 0.5 × 0.8 = 208.48 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 75.16 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 75.16 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.841 (79) Southwesto as 0.77 × 2.92 × 44.07 0.5 × 0.8 = 33.47 (79) Southwesto as 0.77 × 2.92 × 44.07 0.5 × 0.8 = 33.47 (79) Southwesto as 0.77 × 2.92 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto as 0.77 × 1.59 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto as 0.77 × 1.59 × 31.49 0.5 × 0.8 = 25.40 (79) Southwesto as 0.77 × 1.59 × 10.92 1 0.27 1 0.5 × 0.8 = 25.40 (79) Southwesto as 0.77 × 1.59 × 10.97 10.98 30.90 30.98 80.341 52.7 7.7 88.7 83.9 83.9 83.91 | | • | x | 2.7 | '4 | × | 1 | 13.91 | | | 0.5 | x | 0.8 | | = | 86.52 | (79) |
| Southwesto as 0.54 × 13.23 × 13.91 0.5 × 0.8 = 292.92 (79) Southwesto as 0.77 × 1.59 × 104.39 0.5 × 0.8 = 46.01 (78) Southwesto as 0.77 × 1.59 × 104.39 0.5 × 0.8 = 46.01 (79) Southwesto as 0.77 × 2.92 × 104.39 0.5 × 0.8 = 266.48 (79) Southwesto as 0.77 × 2.92 × 104.39 0.5 × 0.8 = 266.48 (79) Southwesto as 0.77 × 2.92 × 104.39 0.5 × 0.8 = 70.52 (79) Southwesto as 0.77 × 2.92 × 22.85 0.5 × 0.8 = 70.52 (79) Southwesto as 0.77 × 2.92 × 22.85 0.5 × 0.8 = 70.52 (79) Southwesto as 0.77 × 2.92 × 22.85 0.5 × 0.8 = 75.16 (79) Southwesto as 0.77 × 2.92 × 22.85 0.5 × 0.8 = 70.52 (79) Southwesto as 0.77 × 2.92 × 22.85 0.5 × 0.8 = 75.16 (79) Southwesto as 0.77 × 2.92 × 82.85 0.5 × 0.8 = 75.16 (79) Southwesto as 0.77 × 2.74 × 68.27 0.5 × 0.8 = 75.16 (79) Southwesto as 0.77 × 2.74 × 68.27 0.5 × 0.8 = 52.61 (79) Southwesto as 0.77 × 2.92 × 89.27 0.5 × 0.8 = 75.16 (79) Southwesto as 0.77 × 2.92 × 44.07 0.5 × 0.8 = 173.15 (79) Southwesto as 0.77 × 2.92 × 44.07 0.5 × 0.8 = 173.15 (79) Southwesto as 0.77 × 2.92 × 44.07 0.5 × 0.8 = 113.25 (79) Southwesto as 0.77 × 2.92 × 44.07 0.5 × 0.8 = 113.25 (79) Southwesto as 0.77 × 2.92 × 31.49 0.5 × 0.8 = 113.25 (79) Southwesto as 0.77 × 2.92 × 31.49 0.5 × 0.8 = 113.26 (79) Southwesto as 0.77 × 2.92 × 31.49 0.5 × 0.8 = 2.322 (79) Southwesto as 0.77 × 2.92 × 31.49 0.5 × 0.8 = 2.322 (79) Southwesto as 0.77 × 2.92 × 31.49 0.5 × 0.8 = 2.322 (79) Southwesto as 0.54 × 13.23 × 31.49 0.5 × 0.8 = 2.322 (79) Southwesto as 0.54 × 13.23 × 31.49 0.5 × 0.8 = 2.322 (79) Southwesto as 0.54 × 13.23 × 31.49 0.5 × 0.8 = 2.322 (79) Southwesto as 0.54 × 13.23 × 31.49 0.5 × 0.8 = 2.322 (79) Southwesto as 0.54 × 0.563 × 0.8 = 2.322 (79) Southwesto as 0.54 × 0.323 0.54 0.563 0.56 0.56 0.66 | Southwes | t <mark>0.9x</mark> 0.77 | x | 1.5 | 9 | × | 1 | 13.91 | | | 0.5 | × | 0.8 | | = | 50.21 | (79) |
| Southwesto as 0.77 × 2.74 × 104.39 0.5 × 0.8 = 72.29 (°F) Southwesto as 0.77 × 2.24 × 104.39 0.5 × 0.8 = 46.01 (°9) Southwesto as 0.77 × 2.24 × 104.39 0.5 × 0.8 = 46.01 (°9) Southwesto as 0.77 × 2.24 × 104.39 0.5 × 0.8 = 226.46 (°9) Southwesto as 0.77 × 2.24 × 292 × 104.39 0.5 × 0.8 = 226.48 (°9) Southwesto as 0.77 × 2.74 × 292 × 292.85 0.5 × 0.8 = 40.92 (°9) Southwesto as 0.77 × 2.74 × 292 × 292.85 0.5 × 0.8 = 40.92 (°9) Southwesto as 0.77 × 2.24 × 292.85 0.5 × 0.8 = 223.81 (°9) Southwesto as 0.77 × 2.24 × 892.85 0.5 × 0.8 = 223.81 (°9) Southwesto as 0.77 × 2.24 × 892.85 0.5 × 0.8 = 223.81 (°9) Southwesto as 0.77 × 2.24 × 892.85 0.5 × 0.8 = 233.81 (°9) Southwesto as 0.77 × 2.24 × 892.7 0.5 × 0.8 = 233.81 (°9) Southwesto as 0.77 × 2.24 × 892.7 0.5 × 0.8 = 233.81 (°9) Southwesto as 0.77 × 2.24 × 892.7 0.5 × 0.8 = 233.81 (°9) Southwesto as 0.77 × 2.24 × 892.7 0.5 × 0.8 = 30.53 (°9) Southwesto as 0.77 × 2.24 × 4407 0.5 × 0.8 = 173.17 (°9) Southwesto as 0.77 × 2.24 × 4407 0.5 × 0.8 = 13.42 (°9) Southwesto as 0.77 × 2.24 × 4407 0.5 × 0.8 = 13.26 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 13.26 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 13.26 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 13.26 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 13.26 (°9) Southwesto as 0.77 × 2.24 × 13.23 × 4407 0.5 × 0.8 = 13.26 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 25.49 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 25.49 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 25.49 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 25.49 (°9) Southwesto as 0.77 × 2.24 × 31.49 0.5 × 0.8 = 25.49 (°9) Southwesto as 0.64 × 13.23 × | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.9 | 2 | × | 1 | 13.91 | | | 0.5 | x | 0.8 | | = | 92.2 | (79) |
| Southwesto g_{x} 0.77 × 2.92 × 104.39 0.5 × 0.8 = 46.01 (7) Southwesto g_{x} 0.77 × 2.92 × 104.39 0.5 × 0.8 = 268.49 (7) Southwesto g_{x} 0.77 × 2.74 × 32.85 0.5 × 0.8 = 276.24 (7) Southwesto g_{x} 0.77 × 2.74 × 32.85 0.5 × 0.8 = 70.52 (7) Southwesto g_{x} 0.77 × 2.92 × 32.85 0.5 × 0.8 = 75.16 (7) Southwesto g_{x} 0.77 × 2.92 × 32.85 0.5 × 0.8 = 238.81 (7) Southwesto g_{x} 0.77 × 2.92 × 32.85 0.5 × 0.8 = 238.81 (7) Southwesto g_{x} 0.77 × 2.92 × 39.265 0.5 × 0.8 = 238.81 (7) Southwesto g_{x} 0.77 × 2.74 × 69.27 0.5 × 0.8 = 238.81 (7) Southwesto g_{x} 0.77 × 2.74 × 69.27 0.5 × 0.8 = 30.53 (7) Southwesto g_{x} 0.77 × 2.92 × 69.27 0.5 × 0.8 = 30.53 (7) Southwesto g_{x} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 33.47 (7) Southwesto g_{x} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 33.47 (7) Southwesto g_{x} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 134.47 (7) Southwesto g_{x} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 134.47 (7) Southwesto g_{x} 0.77 × 2.92 × 44.07 0.5 × 0.8 = 134.47 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.47 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.87 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.87 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.87 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.87 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.98 (7) Southwesto g_{x} 0.77 × 2.92 × 34.407 0.5 × 0.8 = 134.88 (7) Southwesto g_{x} | Southwes | t <mark>0.9x</mark> 0.54 | x | 13. | 23 | x [| 1 | 13.91 | | | 0.5 | × | 0.8 | | = | 292.96 | (79) |
| Southwesto so 0.77 x 2.92 x 104.39 0.5 x 0.8 = 44.5 (79) Southwesto so 0.54 x 13.23 x 104.39 0.5 x 0.8 = 268.48 (79) Southwesto so 0.77 x 2.74 x 32.85 0.5 x 0.8 = 70.52 (79) Southwesto so 0.77 x 2.92 x 32.85 0.5 x 0.8 = 40.32 (79) Southwesto so 0.77 x 2.92 x 32.85 0.5 x 0.8 = 40.32 (79) Southwesto so 0.77 x 2.92 x 32.85 0.5 x 0.8 = 40.32 (79) Southwesto so 0.77 x 2.92 x 32.85 0.5 x 0.8 = 233.81 (79) Southwesto so 0.77 x 2.92 x 69.27 0.5 x 0.8 = 233.81 (79) Southwesto so 0.77 x 2.92 x 69.27 0.5 x 0.8 = 30.53 (79) Southwesto so 0.77 x 2.92 x 69.27 0.5 x 0.8 = 30.53 (79) Southwesto so 0.77 x 2.92 x 69.27 0.5 x 0.8 = 30.53 (79) Southwesto so 0.77 x 2.92 x 69.27 0.5 x 0.8 = 30.53 (79) Southwesto so 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.347 (79) Southwesto so 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.347 (79) Southwesto so 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.347 (79) Southwesto so 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.347 (79) Southwesto so 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.347 (79) Southwesto so 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.347 (79) Southwesto so 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.347 (79) Southwesto so 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.347 (79) Southwesto so 0.54 x 13.23 x 44.07 0.5 x 0.8 = 23.92 (79) Southwesto so 0.54 x 13.23 x 44.07 0.5 x 0.8 = 23.92 (79) Southwesto so 0.54 x 13.23 x 44.07 0.5 x 0.8 = 23.92 (79) Southwesto so 0.54 x 13.23 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto so 0.54 x 13.23 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto so 0.54 x 13.23 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto so 0.54 x 13.23 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto so 0.54 x 13.23 x 31.49 0.5 x 0.8 = 21.856 155.32 (83) Total gains – internal and solar (H4/m e (73)m + (83)m , mattic (84)m e45.32 (75.5 | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.7 | '4 | × | 1(| 04.39 | | | 0.5 | × | 0.8 | | = | 79.29 | (79) |
| Southwesto sk 0.54 x 13.23 x 104.39 0.5 x 0.8 = 268.48 (79) Southwesto sk 0.77 x 2.74 x 92.85 0.5 x 0.8 = 70.52 (79) Southwesto sk 0.77 x 1.59 x 92.85 0.5 x 0.8 = 40.92 (79) Southwesto sk 0.77 x 2.92 x 92.85 0.5 x 0.8 = 75.16 (79) Southwesto sk 0.77 x 2.92 x 92.85 0.5 x 0.8 = 75.16 (79) Southwesto sk 0.77 x 2.74 x 66.27 0.5 x 0.8 = 238.61 (79) Southwesto sk 0.77 x 2.74 x 66.27 0.5 x 0.8 = 238.61 (79) Southwesto sk 0.77 x 2.92 x 66.27 0.5 x 0.8 = 238.61 (79) Southwesto sk 0.77 x 2.92 x 66.27 0.5 x 0.8 = 30.53 (79) Southwesto sk 0.77 x 2.92 x 66.27 0.5 x 0.8 = 66.07 (79) Southwesto sk 0.77 x 2.92 x 66.27 0.5 x 0.8 = 178.15 (79) Southwesto sk 0.77 x 2.92 x 44.07 0.5 x 0.8 = 178.15 (79) Southwesto sk 0.77 x 2.74 x 44.07 0.5 x 0.8 = 19.42 (79) Southwesto sk 0.77 x 2.74 x 44.07 0.5 x 0.8 = 13.34 (79) Southwesto sk 0.77 x 2.74 x 31.49 0.5 x 0.8 = 13.34 (79) Southwesto sk 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.82 (79) Southwesto sk 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.26 (79) Southwesto sk 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.26 (79) Southwesto sk 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.82 (79) Southwesto sk 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.82 (79) Southwesto sk 0.77 x 2.92 x 31.49 0.5 x 0.8 = 23.82 (79) Southwesto sk 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto sk 0.57 x 0.54 x 0.32 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto sk 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto sk 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto sk 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto sk 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto sk 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto sk 0.77 x 2.92 x 31.49 0.5 x 0.8 = 23.69 (79) | Southwes | t <mark>0.9x</mark> 0.77 | x | 1.5 | 9 | × | 1(| 04.39 | | | 0.5 | x | 0.8 | | = | 46.01 | (79) |
| Southwesto g_{1} 0.77 × 2.74 × 92.85 0.5 × 0.8 = 70.52 (79) Southwesto g_{2} 0.77 × 1.59 × 92.85 0.5 × 0.8 = 40.92 (79) Southwesto g_{2} 0.77 × 2.92 × 92.85 0.5 × 0.8 = 23.88 (79) Southwesto g_{2} 0.77 × 2.74 × 69.27 0.5 × 0.8 = 52.61 (79) Southwesto g_{2} 0.77 × 2.74 × 69.27 0.5 × 0.8 = 30.63 (79) Southwesto g_{2} 0.77 × 2.92 × 69.27 0.5 × 0.8 = 30.63 (79) Southwesto g_{2} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 178.15 (79) Southwesto g_{2} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 30.63 (79) Southwesto g_{2} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 19.42 (79) Southwesto g_{2} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 30.63 (79) Southwesto g_{2} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 30.63 (79) Southwesto g_{2} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 31.33 (79) Southwesto g_{2} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 31.42 (79) Southwesto g_{2} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 30.67 (79) Southwesto g_{2} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 30.67 (79) Southwesto g_{2} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 30.67 (79) Southwesto g_{2} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 30.67 (79) Southwesto g_{2} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 40.82 (79) Southwesto g_{2} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto g_{2} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto g_{2} 0.77 × 0.55 (68.21 631.23 66.45 485.93 351.06 218.96 156.32 (79) Southwesto g_{2} 0.77 × 0.55 (68.9 (66) Mean internal temperature (heating season) Temperature during heating seriods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1, m (see Table 9a) (60) Mean internal temperature in living area, h1, m (see Table 9a) (61) Mean internal temperature in living area from Table 9, Th1 (°C) (62) (63) Mean internal temperature in living area from Table 9, Th2 (°C) (68) Mean internal temperature in living area from Table 9, Th2 (°C) (68) Mean internal temperature in living area from Table 9, Th2 (°C) (68) Mean internal temperature in living area for m Table 9, Th2 (°C) (68) Mean internal temper | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.9 | 2 | × | 1(| 04.39 | | | 0.5 | x | 0.8 | | = | 84.5 | (79) |
| Southwesto \mathfrak{s}_{0} 0.77 × 1.59 × 92.85 0.5 × 0.8 = 40.92 (7) Southwesto \mathfrak{s}_{0} 0.77 × 2.82 × 92.85 0.5 × 0.8 = 76.16 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.74 × 69.27 0.5 × 0.8 = 238.81 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.74 × 69.27 0.5 × 0.8 = 30.53 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.24 × 69.27 0.5 × 0.8 = 30.53 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.24 × 69.27 0.5 × 0.8 = 30.53 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.24 × 69.27 0.5 × 0.8 = 30.53 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 33.47 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 178.15 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 33.47 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 19.42 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 19.42 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 113.36 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.32 × 31.49 0.5 × 0.8 = 13.38 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.32 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.52 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.92 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.92 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.92 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto \mathfrak{s}_{0} 0.77 × 2.92 × 31.49 0.5 × 0.8 = 25.49 (79) Southwesto \mathfrak{s}_{0} 0.77 × 0.57 × 0.58 0.8 (84) (79) Southwesto \mathfrak{s}_{0} 0.77 × 0.59 × 0.59 (05.57 0.68) 0.8 (90) Southwesto \mathfrak{s}_{0} 0.77 × 0.52 (10.21) 0.51 0.51 0.68 0.8 (84) (79) Southwesto \mathfrak{s}_{0} 0.77 × 0.52 (10.21) 0.51 0.51 0.68 0.8 (65.98 (64) Themperature during heating second Themperature during heating second Themperature during heating second Themperature during heating second Themperature during heating second in the living area from Table 9, Th1 (°C) Utilisation factor for gains for living area, h1, m (see Table 9a) Mean internal temperature in living area 110 (50) 0.58 0.68 0.68 0.69 0.60 0.60 (66) Mean internal temperature in living area 110 (00) steps 3 to 7 in T | Southwes | t <mark>0.9x</mark> 0.54 | x | 13. | 23 | × | 1(| 04.39 | | | 0.5 | × | 0.8 | | = | 268.48 | (79) |
| Southwesto, at 0.77 x 2.92 x 92.85 0.5 x 0.8 = 75.16 (79) Southwesto, at 0.54 x 13.23 x 92.85 0.5 x 0.8 = 238.81 (79) Southwesto, at 0.77 x 2.74 x 69.27 0.5 x 0.8 = 30.53 (79) Southwesto, at 0.77 x 2.92 x 69.27 0.5 x 0.8 = 30.53 (79) Southwesto, at 0.77 x 2.92 x 69.27 0.5 x 0.8 = 178.15 (79) Southwesto, at 0.77 x 2.92 x 69.27 0.5 x 0.8 = 178.15 (79) Southwesto, at 0.77 x 2.92 x 69.27 0.5 x 0.8 = 178.15 (79) Southwesto, at 0.77 x 2.74 x 44.07 0.5 x 0.8 = 178.15 (79) Southwesto, at 0.77 x 1.59 x 44.07 0.5 x 0.8 = 178.15 (79) Southwesto, at 0.77 x 1.59 x 44.07 0.5 x 0.8 = 113.35 (79) Southwesto, at 0.77 x 1.59 x 44.07 0.5 x 0.8 = 113.35 (79) Southwesto, at 0.77 x 1.59 x 44.07 0.5 x 0.8 = 113.35 (79) Southwesto, at 0.77 x 2.74 x 31.49 0.5 x 0.8 = 113.35 (79) Southwesto, at 0.77 x 2.74 x 31.49 0.5 x 0.8 = 13.88 (79) Southwesto, at 0.77 x 1.59 x 31.49 0.5 x 0.8 = 13.88 (79) Southwesto, at 0.77 x 2.92 x 31.49 0.5 x 0.8 = 2549 (79) Southwesto, at 0.77 x 2.92 x 31.49 0.5 x 0.8 = 2549 (79) Southwesto, at 0.77 x 2.92 x 31.49 0.5 x 0.8 = 80.98 (79) Southwesto, at 0.77 x 2.92 x 31.49 0.5 x 0.8 = 80.98 (79) Southwesto, at 0.54 x 13.23 x 31.49 0.5 x 0.8 = 2549 (79) Southwesto, at 0.54 x 13.23 x 31.49 0.5 x 0.8 = 2549 (79) Southwesto, at 0.54 x 13.23 x 0.31 90.09 93.056 96.341 752.76 64.54 96.598 (84) Chaen internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (65) Utilisation factor for gains for living area, h1, m (see Table 9a) (66) mage 0.93 0.89 0.82 0.77 2 0.58 0.46 0.50 0.80 0.80 0.80 0.96 (86) Mean internal temperature in living area 11 (follow steps 3 to 7 in Table 9, Th2 (°C) (80) mage 19.91 19.91 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (82) Utilisation factor for gains for re | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.7 | '4 | × | 9 | 2.85 | | | 0.5 | × | 0.8 | | = | 70.52 | (79) |
| Southwesto 9x 0.54 x 13.23 x 92.85 0.5 x 0.8 = 238.81 (7) Southwesto 9x 0.77 x 2.74 x 69.27 0.5 x 0.8 = 25.61 (79) Southwesto 9x 0.77 x 1.59 x 69.27 0.5 x 0.8 = 30.53 (79) Southwesto 9x 0.77 x 2.92 x 69.27 0.5 x 0.8 = 56.07 (79) Southwesto 9x 0.77 x 2.74 x 44.07 0.5 x 0.8 = 178.15 (79) Southwesto 9x 0.77 x 2.74 x 44.07 0.5 x 0.8 = 13.47 (79) Southwesto 9x 0.77 x 2.74 x 44.07 0.5 x 0.8 = 19.42 (79) Southwesto 9x 0.77 x 2.92 x 44.07 0.5 x 0.8 = 19.42 (79) Southwesto 9x 0.77 x 2.92 x 44.07 0.5 x 0.8 = 19.42 (79) Southwesto 9x 0.77 x 2.92 x 44.07 0.5 x 0.8 = 113.35 (79) Southwesto 9x 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.88 (79) Southwesto 9x 0.77 x 2.92 x 44.07 0.5 x 0.8 = 13.88 (79) Southwesto 9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9x 0.77 x 1.59 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.77 x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.77 x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.54 x 13.23 x 0.149 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.54 x 13.23 x 0.149 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.54 x 13.23 x 0.149 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.54 x 13.23 x 0.149 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.54 x 13.23 x 0.149 0.5 x 0.8 = 80.98 (79) Southwesto 9x 0.54 x 13.23 x 0.149 0.5 x 0.8 = 80.98 (79) Mean internal and solar (84)m = (73)m + (83)m, watts (84)m 64.532 75.75 88.78 90.59 105.257 103.21 90.09 93.56 85.31 75.76 648.54 605.98 (84) Themperature during heating periods in the living area from Table 9 , Th1 (°C) Utilisation factor for gains for living area 11 (follow steps 3 to 7 in Table 9c) (87)m 18.91 18.91 19.91 19.91 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling from Table 9, Th2 (°C) (88)m 19.91 19.91 19.91 19.9 | Southwes | t <mark>0.9x</mark> 0.77 | x | 1.5 | 9 | × | 9 | 2.85 | | | 0.5 | × | 0.8 | | = | 40.92 | (79) |
| Southwesto $g_{X} = 0.77$ x 2.74 x 69.27 0.5 x 0.8 = 52.61 (79) Southwesto $g_{X} = 0.77$ x 2.74 x 69.27 0.5 x 0.8 = 560.7 (79) Southwesto $g_{X} = 0.77$ x 2.92 x 69.27 0.5 x 0.8 = 560.7 (79) Southwesto $g_{X} = 0.77$ x 2.92 x 69.27 0.5 x 0.8 = 178.15 (79) Southwesto $g_{X} = 0.77$ x 2.74 x 44.07 0.5 x 0.8 = 178.15 (79) Southwesto $g_{X} = 0.77$ x 2.74 x 44.07 0.5 x 0.8 = 192.7 (79) Southwesto $g_{X} = 0.77$ x 2.92 x 44.07 0.5 x 0.8 = 194.2 (79) Southwesto $g_{X} = 0.77$ x 2.92 x 44.07 0.5 x 0.8 = 194.2 (79) Southwesto $g_{X} = 0.77$ x 2.92 x 44.07 0.5 x 0.8 = 113.35 (79) Southwesto $g_{X} = 0.77$ x 2.74 x 31.49 0.5 x 0.8 = 113.35 (79) Southwesto $g_{X} = 0.77$ x 2.74 x 31.49 0.5 x 0.8 = 113.35 (79) Southwesto $g_{X} = 0.77$ x 2.74 x 31.49 0.5 x 0.8 = 13.38 (79) Southwesto $g_{X} = 0.77$ x 2.74 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto $g_{X} = 0.77$ x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.77$ x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ x 13.29 0.54 x 0.525 $0.56.37$ 0.58 0.6 $0.50.6$ 0.59 0.64 0.59 0.64 0.59 0.64 0.59 0.64 0.59 0.64 | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.9 | 2 | × | 9 | 2.85 | İ | | 0.5 | × | 0.8 | | = | 75.16 | (79) |
| Southwesto $gx = 0.77$ x 1.59 x 69.27 0.5 x 0.8 = 0.65 (79) Southwesto $gx = 0.77$ x 2.24 x 44.07 0.5 x 0.8 = 178.15 (79) Southwesto $gx = 0.77$ x 2.74 x 44.07 0.5 x 0.8 = 178.15 (79) Southwesto $gx = 0.77$ x 2.74 x 44.07 0.5 x 0.8 = 19.42 (79) Southwesto $gx = 0.77$ x 2.92 x 44.07 0.5 x 0.8 = 19.42 (79) Southwesto $gx = 0.54$ x 13.23 x 44.07 0.5 x 0.8 = 13.35 (79) Southwesto $gx = 0.54$ x 13.23 x 44.07 0.5 x 0.8 = 13.35 (79) Southwesto $gx = 0.54$ x 13.23 x 44.07 0.5 x 0.8 = 13.35 (79) Southwesto $gx = 0.54$ x 13.23 x 44.07 0.5 x 0.8 = 113.35 (79) Southwesto $gx = 0.54$ x 13.23 x 44.07 0.5 x 0.8 = 13.38 (79) Southwesto $gx = 0.54$ x 13.23 x 44.07 0.5 x 0.8 = 13.88 (79) Southwesto $gx = 0.77$ x 2.74 x 31.49 0.5 x 0.8 = 13.88 (79) Southwesto $gx = 0.77$ x 1.59 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $gx = 0.77$ x 1.59 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $gx = 0.77$ x 1.32 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $gx = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $gx = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $gx = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.54$ x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 = 25.49 (79) Southwesto $gx = 0.57$ x 0.8 (83) = 20.64 (84) (90) (80)m 18.21 21 | Southwes | t <mark>0.9x</mark> 0.54 | x | 13. | 23 | × | 9 | 2.85 | İ | | 0.5 | × | 0.8 | | = | 238.81 | (79) |
| Southwesto $g_{X} = 0.77$ × 2.92 × 4.07 Southwesto $g_{X} = 0.5$ × 0.8 = 56.07 (79) Southwesto $g_{X} = 0.57$ × 0.8 = 176.15 (79) Southwesto $g_{X} = 0.77$ × 2.74 × 44.07 0.5 × 0.8 = 176.15 (79) Southwesto $g_{X} = 0.77$ × 1.59 × 44.07 0.5 × 0.8 = 19.42 (79) Southwesto $g_{X} = 0.77$ × 2.92 × 44.07 0.5 × 0.8 = 19.42 (79) Southwesto $g_{X} = 0.77$ × 2.92 × 44.07 0.5 × 0.8 = 113.35 (79) Southwesto $g_{X} = 0.77$ × 2.74 × 31.49 0.5 × 0.8 = 13.88 (79) Southwesto $g_{X} = 0.77$ × 2.74 × 31.49 0.5 × 0.8 = 13.88 (79) Southwesto $g_{X} = 0.77$ × 2.92 × 31.49 0.5 × 0.8 = 23.92 (79) Southwesto $g_{X} = 0.77$ × 2.92 × 31.49 0.5 × 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwesto $g_{X} = 0.54$ × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Solar gains in watts, calculated for each month (83)m = Sun(74)m(82)m (83)m = 182.12 314.71 442.55 568.37 654.9 658.21 631.23 565.45 485.93 351.05 218.95 155.32 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 645.32 775.75 888.78 990.59 1052.57 1032.31 990.09 930.56 863.41 752.76 648.54 605.98 (84) 7.44 7.575 888.78 990.59 1052.57 1032.31 990.09 930.56 863.41 752.76 648.54 605.98 (84) 7.44 1.41 1.59 1.8.92 1.9.4 1.9.6 20.44 20.77 20.91 20.89 20.64 20 1.9.2 1.8.54 (67) Temperature during heating periods in the living area from Table 9. Th1 (°C) Utilisation factor for gains for living area T1 (follow steps 3 to 7 in Table 9c) (87)m 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (67) Temperature during heating periods in rest of dwelling from Table 9. Th2 (°C) (88)m 19.91 19.91 19.91 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling from Table 9. Th2 (°C) (89)m 19.91 19.91 19.91 19.92 19.92 19.92 19.92 19.92 19.92 (89) | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.7 | '4 | × | 6 | 9.27 | İ | | 0.5 | × | 0.8 | | = | 52.61 | (79) |
| Southwest _{0.94} 0.54 × 13.23 × 69.27 0.5 × 0.8 = 178.15 (79) Southwest _{0.94} 0.77 × 2.74 × 44.07 0.5 × 0.8 = 19.42 (79) Southwest _{0.94} 0.77 × 2.92 × 44.07 0.5 × 0.8 = 19.42 (79) Southwest _{0.94} 0.77 × 2.92 × 44.07 0.5 × 0.8 = 113.35 (79) Southwest _{0.94} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 113.35 (79) Southwest _{0.94} 0.77 × 2.74 × 31.49 0.5 × 0.8 = 23.92 (79) Southwest _{0.94} 0.77 × 2.92 × 31.49 0.5 × 0.8 = 13.88 (79) Southwest _{0.94} 0.77 × 2.92 × 31.49 0.5 × 0.8 = 23.92 (79) Southwest _{0.94} 0.77 × 2.92 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.77 × 2.92 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.54 × 13.23 × 31.49 0.5 × 0.8 = 25.49 (79) Southwest _{0.94} 0.55 × 0.8 = 25.49 (79) Southwest _{0.94} 0.55 × 0.8 = 25.49 (79) Southwest _{0.94} 0.55 × 0.8 = 25.49 (79) Southwest _{0.94} 0.55 × 0.8 = 25.49 (79) Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Wean internal temperature in living area 11 (follow steps 3 to 7 in Table 9c) (67)m 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m 19.91 19.91 19.91 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest o | Southwes | t <mark>0.9x</mark> 0.77 | x | 1.5 | 9 | × [| 6 | 9.27 | İ | | 0.5 | _ × | 0.8 | | = | 30.53 | (79) |
| Southwesto g_{x} 0.77 x 2.92 x 44.07 0.5 x 0.8 = 33.47 (7) Southwesto g_{x} 0.77 x 2.92 x 44.07 0.5 x 0.8 = 33.47 (7) Southwesto g_{x} 0.77 x 2.92 x 44.07 0.5 x 0.8 = 33.47 (7) Southwesto g_{x} 0.77 x 2.92 x 44.07 0.5 x 0.8 = 35.67 (7) Southwesto g_{x} 0.54 x 13.23 x 44.07 0.5 x 0.8 = 35.67 (7) Southwesto g_{x} 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.92 (7) Southwesto g_{x} 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.92 (7) Southwesto g_{x} 0.77 x 2.92 x 31.49 0.5 x 0.8 = 23.92 (7) Southwesto g_{x} 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (7) Southwesto g_{x} 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (7) Southwesto g_{x} 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (7) Southwesto g_{x} 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (7) Southwesto g_{x} 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (7) Southwesto g_{x} 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (7) Southwesto g_{x} 0.54 x 13.23 (64.9 65.12 631.23 566.45 46.99 (68.91 65.32 (63) Total gains - internal and solar (84)m = (73)m + (83)m , watts (84)m = [45.32 775.75 88.76 930.50 1052.57 1032.31 90.09 930.56 86.31 752.76 648.54 605.98 (64) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (65) Utilisation factor for gains for living area, h1,m (see Table 9a) (67)m = 18.59 18.32 19.4 19.36 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (67) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m = 19.91 19.91 19.91 19.91 19.92 19.92 19.92 19.92 19.92 19.92 (9.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.9 | 2 | ×Г | 6 | 9.27 | i | | 0.5 | × | 0.8 | | = | 56.07 | (79) |
| Southwesto 9, 0.77 x 1.59 x 4407 0.5 x 0.8 = 19.42 (79) Southwesto 9, 0.77 x 2.92 x 4407 0.5 x 0.8 = 35.67 (79) Southwesto 9, 0.54 x 13.23 x 4407 0.5 x 0.8 = 113.35 (79) Southwesto 9, 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto 9, 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto 9, 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9, 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9, 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9, 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9, 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto 9, 0.54 x 13.23 x 31.49 0.5 x 0.8 = 80.98 (79) Southwesto 9, 0.54 x 13.23 x 31.49 0.5 x 0.8 = 80.98 (79) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 182.12 314.71 442.55 568.37 654.9 658.21 631.23 565.45 485.93 351.05 218.95 155.32 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 645.32 775.75 88.78 99.59 1052.57 1032.31 99.00 930.56 863.41 752.76 648.54 605.98 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) 66 0.93 0.89 0.82 0.72 0.58 0.46 0.5 0.68 0.86 0.94 0.96 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (67)m = 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (67) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m = 19.91 19.91 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (98) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | Southwes | t <mark>0.9x</mark> 0.54 | × | 13. | 23 | ×「 | 6 | 9.27 | İ | | 0.5 | × | 0.8 | | = | 178.15 | (79) |
| Southwesto, 9x 0.77 x 2.92 x 4407 0.5 x 0.a = 35.67 (79) Southwesto, 9x 0.54 x 13.23 x 4407 0.5 x 0.8 = 113.35 (79) Southwesto, 9x 0.77 x 2.74 x 31.49 0.5 x 0.8 = 113.35 (79) Southwesto, 9x 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto, 9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto, 9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto, 9x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 23.92 (79) Southwesto, 9x 0.54 x 13.23 56.45 485.93 351.05 218.95 155.32 (83) </td <td>Southwes</td> <td>t<mark>0.9x</mark> 0.77</td> <td>x</td> <td>2.7</td> <td>'4</td> <td>×「</td> <td>4</td> <td>4.07</td> <td>1</td> <td></td> <td>0.5</td> <td>۲ × آ</td> <td>0.8</td> <td></td> <td>=</td> <td>33.47</td> <td>(79)</td> | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.7 | '4 | ×「 | 4 | 4.07 | 1 | | 0.5 | ۲ × آ | 0.8 | | = | 33.47 | (79) |
| Southwestq.9, $9, 0.77$ x 2.92 x 44.07 0.5 x 0.8 = 35.67 (7) Southwestq.9, $9, 0.54$ x 13.23 x 44.07 0.5 x 0.8 = 113.35 (7) Southwestq.9, $9, 0.77$ x 2.74 x 31.49 0.5 x 0.8 = 113.35 (7) Southwestq.9, $9, 0.77$ x 2.74 x 31.49 0.5 x 0.8 = 23.92 (7) Southwestq.9, 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (7) Southwestq.9, 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (7) Southwestq.9, 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (7) Solar gains in watts, calculated for each month (63)m = Sum(74)m(62)m (68)m (64)m = 64.5.21 (7), m (63)m = Sum(74)m(62)m (68)m (64)m = | Southwes | t <mark>0.9x</mark> 0.77 | x | 1.5 | 9 | хГ | 4 | 4.07 | | | 0.5 | × | 0.8 | | = | 19.42 | (79) |
| Southwest0.9x 0.54 x 13.23 x 44.07 0.5 x 0.8 = 113.35 (79) Southwest0.9x 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.92 (79) Southwest0.9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 23.92 (79) Southwest0.9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 23.92 (79) Southwest0.9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwest0.9x 0.54 x 13.23 856.45 485.93 351.05 218.95 155.32 (63) Solar gains in watts, calculated for each month $(83)m = Sum(74)m(82)m$ $(82)m$ $(84)m = (73)m + (83)m$, watts $(84)m = (75)m + (83)m$, watts $(84)m = (75.75, 75, 888.78) 90.59 1052.57 1032.31 90.09 930.56 863.41 $ | Southwes | ta a | x | 2.9 | 2 | хГ | 4 | 4.07 | | | 0.5 | × | 0.8 | | = | 35.67 | (79) |
| Southwest0, 9x 0.77 x 2.74 x 31.49 0.5 x 0.8 = 23.92 (79) Southwest0, 9x 0.77 x 1.59 x 31.49 0.5 x 0.8 = 23.92 (79) Southwest0, 9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwest0, 9x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwest0, 9x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 80.98 (79) Southwest0, 9x 0.54 x 13.23 565.45 485.93 351.05 218.95 155.32 (63) Total gains - internal and solar (84)m = (73)m + (83)m, watts (84)m = 645.32 775.78 88.78 90.59 1052.57 1032.31 90.09 930.56 863.41 752.76 648.54 605.98 (64) | Southwes | · | x | | | ×Г | | | 1 | | 0.5 | ۲ × ۲ | | | _ | | (79) |
| Southwest0, $9x$ 0.77 x 1.59 x 31.49 0.5 x 0.8 = 13.88 (79) Southwest0, $9x$ 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwest0, $9x$ 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwest0, $9x$ 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwest0, $9x$ 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwest0, $9x$ 0.54 x 13.23 31.49 0.5 x 0.8 = 25.49 (79) Southwest0, $9x$ 0.55 x 0.8 $0.512.57$ 0.83 $0.512.57$ 0.58 $0.645.54$ 485.93 351.05 218.95 155.32 (83) Temperature during hea | Southwes | t <mark>0.9x</mark> 0.77 | x | 2.7 | '4 | хГ | 3 | 1.49 | | | 0.5 | ۲ × ۲ | | | _ | | = |
| Southwesto.9x 0.77 x 2.92 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto.9x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto.9x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto.9x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto.9x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 25.49 (79) Southwesto.9x 0.55 x 0.83 x 31.49 0.55 x 0.82 0.72 (83) $0.51.25$ (83) $0.52.57$ 1032.31 990.09 930.56 863.41 752.76 648.54 605.98 (84) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) | Southwes | · | x | | | хГ | | | | | | ۲ × ۲ | | | _ | | (79) |
| Southwest0,9x 0.54 x 13.23 x 31.49 0.5 x 0.8 = 80.98 (79) Solar gains in watts, calculated for each month (83)m = Sum(74)m(82)m (83)m = 182.12 314.71 442.55 568.37 654.9 658.21 631.23 565.45 485.93 351.05 218.95 155.32 (83) Total gains - internal and solar (84)m = (73)m + (83)m , watts (84)m = 645.32 775.75 888.78 990.59 1052.57 1032.31 990.09 930.56 863.41 752.76 648.54 605.98 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) (86)m 0.96 0.93 0.89 0.82 0.72 0.58 0.46 0.5 0.68 0.86 0.94 0.96 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m 19.91 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | Southwes | 4 L | x | | | хГ | | | 1 | | | ۲ × ۲ | | | = | | = |
| Solar gains in watts, calculated for each month (83)m = Sum(74)m(62)m (83)m = 182.12 314.71 442.55 568.37 654.9 658.21 631.23 565.45 485.93 351.05 218.95 155.32 (83) Total gains – internal and solar (84)m = (73)m + (83)m , watts (84)m = 645.32 775.75 888.78 990.59 1052.57 1032.31 990.09 930.56 863.41 752.76 648.54 605.98 (84) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) Man Apr May Jun Jul Aug Sep Oct Nov Dec (86)m = 0.96 0.93 0.82 0.72 0.58 0.46 0.5 0.68 0.86 0.94 0.96 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m = 18.59 18.92 19.4 19.92 19.92 19.92 19.92 19.92 18.92 19.92 (87) Tempe | Southwes | | | | | F | | |] | | | 4 | | | _ | | |
| $ \begin{array}{c} (83)m= & 182.12 & 314.71 & 442.55 & 568.37 & 654.9 & 658.21 & 631.23 & 565.45 & 485.93 & 351.05 & 218.95 & 155.32 \\ \hline \text{Total gains} - \text{internal and solar } (84)m = (73)m + (83)m , watts \\ \hline (84)m= & 645.32 & 775.75 & 888.78 & 990.59 & 1052.57 & 1032.31 & 990.09 & 930.56 & 863.41 & 752.76 & 648.54 & 605.98 \\ \hline \textbf{Mean internal temperature (heating season)} \\ \hline \textbf{Temperature during heating periods in the living area from Table 9, Th1 (°C) \\ \hline \textbf{Utilisation factor for gains for living area, h1,m (see Table 9a)} \\ \hline \textbf{Mean internal temperature in living area, h1,m (see Table 9a)} \\ \hline \textbf{Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)} \\ \hline (87)m= & 18.59 & 18.92 & 19.4 & 19.96 & 20.44 & 20.77 & 20.91 & 20.89 & 20.64 & 20 & 19.2 & 18.54 \\ \hline Mean internal temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) \\ \hline (88)m= & 19.91 & 19.91 & 19.91 & 19.92 & 19.92 & 19.92 & 19.92 & 19.92 & 19.92 & 19.92 \\ \hline \textbf{Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) \\ \hline \textbf{Metan internal temperature form the there are there are the there are there are there are the there$ | | 0.01 | | | | L | | | J | | 0.0 | | 0.0 | | | 00.00 | |
| $ \begin{array}{c} (83)m= & 182.12 & 314.71 & 442.55 & 568.37 & 654.9 & 658.21 & 631.23 & 565.45 & 485.93 & 351.05 & 218.95 & 155.32 \\ \hline \text{Total gains} - \text{internal and solar } (84)m = (73)m + (83)m , watts \\ \hline (84)m= & 645.32 & 775.75 & 888.78 & 990.59 & 1052.57 & 1032.31 & 990.09 & 930.56 & 863.41 & 752.76 & 648.54 & 605.98 \\ \hline \textbf{Mean internal temperature (heating season)} \\ \hline \textbf{Temperature during heating periods in the living area from Table 9, Th1 (°C) \\ \hline \textbf{Utilisation factor for gains for living area, h1,m (see Table 9a)} \\ \hline \textbf{Mean internal temperature in living area, h1,m (see Table 9a)} \\ \hline \textbf{Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)} \\ \hline (87)m= & 18.59 & 18.92 & 19.4 & 19.96 & 20.44 & 20.77 & 20.91 & 20.89 & 20.64 & 20 & 19.2 & 18.54 \\ \hline Mean internal temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) \\ \hline (88)m= & 19.91 & 19.91 & 19.91 & 19.92 & 19.92 & 19.92 & 19.92 & 19.92 & 19.92 & 19.92 \\ \hline \textbf{Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) \\ \hline \textbf{Metan internal temperature form the there are there are the there are there are there are the there$ | Solar gai | ns in watts, ca | alculated | l for eac | n month | 1 | | | (83)m | 1 = SI | um(74)m | (82)m | | | | | |
| (84)m= 645.32 775.75 888.78 990.59 1052.57 1032.31 990.09 930.56 863.41 752.76 648.54 605.98 (84) 7. Mean internal temperature (heating season) Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85) Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m= 0.96 0.93 0.89 0.82 0.72 0.58 0.46 0.5 0.68 0.94 0.96 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88) (88) (88) (87) (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) 19.92 19.92 19. | Ŭ, | | | î | | - | 8.21 | | <u> </u> | | <u> </u> | | | 155 | .32 | | (83) |
| 7. Mean internal temperature (heating season)Temperature during heating periods in the living area from Table 9, Th1 (°C)21Utilisation factor for gains for living area, h1,m (see Table 9a)Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec(86)m=0.960.930.890.820.720.580.460.50.680.860.940.96(86)Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)(87)m=18.5918.9219.419.9620.4420.7720.9120.8920.642019.218.54(87)Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)(88)m=19.9119.9119.9219.9219.9219.9219.9219.9219.9219.92(88)Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | Total gair | ns – internal a | ind sola | r (84)m = | = (73)m | + (8 | 3)m | , watts | | | I | | | | | 1 | |
| Temperature during heating periods in the living area from Table 9, Th1 (°C)21(85)Utilisation factor for gains for living area, h1,m (see Table 9a)JanFebMarAprMayJunJulAugSepOctNovDec(86)m= 0.96 0.93 0.89 0.82 0.72 0.58 0.46 0.5 0.68 0.86 0.94 0.96 (86)Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)(87)m=18.5918.9219.419.9620.4420.7720.9120.8920.642019.218.54(87)Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)(88)m=19.9119.9119.9219.9219.9219.9219.9219.9219.92(88)Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | (84)m= 6 | 45.32 775.75 | 888.78 | 990.59 | 1052.57 | 103 | 32.31 | 990.09 | 930 | .56 | 863.41 | 752.7 | 6 648.54 | 605 | .98 | | (84) |
| Temperature during heating periods in the living area from Table 9, Th1 (°C)21(85)Utilisation factor for gains for living area, h1,m (see Table 9a)JanFebMarAprMayJunJulAugSepOctNovDec(86)m= 0.96 0.93 0.89 0.82 0.72 0.58 0.46 0.5 0.68 0.86 0.94 0.96 (86)Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c)(87)m=18.5918.9219.419.9620.4420.7720.9120.8920.642019.218.54(87)Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)(88)m=19.9119.9119.9219.9219.9219.9219.9219.9219.92(88)Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | 7 Mean | internal temr | erature | (heating | seasor |) 1) | | | | | | | • | | | , | |
| Utilisation factor for gains for living area, h1,m (see Table 9a) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m= 0.96 0.93 0.89 0.82 0.72 0.58 0.46 0.5 0.68 0.86 0.94 0.96 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | | | | · · · | | <i>′</i> | area f | rom Tab | ole 9. | Th | 1 (°C) | | | | | 21 | (85) |
| Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec (86)m= 0.96 0.93 0.89 0.82 0.72 0.58 0.46 0.5 0.68 0.86 0.94 0.96 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | • | • | • • | | | - | | | | , | (-) | | | | | | |
| (86)m= 0.96 0.93 0.89 0.82 0.72 0.58 0.46 0.5 0.68 0.86 0.94 0.96 (86) Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | | | | <u> </u> | | T È | | , | A | ua | Sep | Oct | Nov | D | ec |] | |
| Mean internal temperature in living area T1 (follow steps 3 to 7 in Table 9c) (87)m= 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | | | | <u> </u> | | | | | | <u> </u> | | | | | | | (86) |
| (87)m= 18.59 18.92 19.4 19.96 20.44 20.77 20.91 20.89 20.64 20 19.2 18.54 (87) Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.91 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 19.92 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | | tornal tompor | | | | | u oto | | 7 in T | | | | | | | 1 | |
| Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C) (88)m= 19.91 19.92 (88) Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) (88) | | | | 1 · · · | · · · | 1 | | | | | i | 20 | 19.2 | 18 | 54 | 1 | (87) |
| (88)m= 19.91 19.91 19.92 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>20</td><td>10.2</td><td>10.</td><td>57</td><td>J</td><td>(01)</td></t<> | | | | | | | | | | | | 20 | 10.2 | 10. | 57 | J | (01) |
| Utilisation factor for gains for rest of dwelling, h2,m (see Table 9a) | · · | | | î . | | 1 | | | | | | 40.00 | 10.00 | 40 | 00 | 1 | (00) |
| | | | | | | | | | | 92 | 19.92 | 19.92 | 19.92 | 19. | 92 | J | (00) |
| (89)m = 1 0.95 1 0.92 1 0.88 1 0.8 1 0.67 1 0.51 1 0.36 1 0.4 1 0.62 1 0.83 1 0.92 1 0.96 1 (89) | | | | I | | 1 | | | <u> </u> | | i | | | | | 1 | 10-23 |
| | (89)m= | 0.95 0.92 | 0.88 | 0.8 | 0.67 | 0 | .51 | 0.36 | 0.4 | 4 | 0.62 | 0.83 | 0.92 | 0.9 | 96 | J | (89) |

| Mean | interna | l temper | ature in | the rest | of dwelli | ng T2 (fe | ollow ste | eps 3 to 7 | 7 in Tabl | le 9c) | | | | |
|---------|-----------|------------|-------------------|----------------------|--------------------|---------------|------------|------------------------------------|---|-------------|---------------|--------------------|----------------------------|--------------|
| (90)m= | 16.7 | 17.18 | 17.87 | 18.66 | 19.31 | 19.71 | 19.86 | 19.84 | 19.57 | 18.74 | 17.59 | 16.64 | | (90) |
| | | | - | - | | | | - | 1 | fLA = Livin | ng area ÷ (4 | 4) = | 0.38 | (91) |
| Mean | interna | l temper | ature (fo | or the wh | ole dwe | lling) = fl | LA × T1 | + (1 – fL | .A) × T2 | | | | | |
| (92)m= | 17.43 | 17.85 | 18.45 | 19.16 | 19.75 | 20.12 | 20.27 | 20.24 | 19.98 | 19.22 | 18.21 | 17.37 | | (92) |
| Apply | adjustn | nent to t | he mear | n internal | temper | ature fro | m Table | 4e, whe | ere appro | opriate | | | | |
| (93)m= | 17.43 | 17.85 | 18.45 | 19.16 | 19.75 | 20.12 | 20.27 | 20.24 | 19.98 | 19.22 | 18.21 | 17.37 | | (93) |
| | | | uirement | | | | | | | | | | | |
| | | | | mperatui using Ta | | 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 | | |
| Utilisa | | | ains, hm | | | •••• | •••• | 7.0.9 | P | | | 200 | | |
| (94)m= | 0.93 | 0.9 | 0.85 | 0.77 | 0.66 | 0.53 | 0.39 | 0.43 | 0.62 | 0.8 | 0.9 | 0.94 | | (94) |
| Usefu | Il gains, | hmGm | , W = (94 | 4)m x (84 | 4)m | | | | | | | | | |
| (95)m= | 599.73 | 695.82 | 754.83 | 765.68 | 699.88 | 542.93 | 388 | 399.92 | 535.73 | 605.36 | 584.3 | 568.13 | | (95) |
| Montl | nly avera | age exte | rnal tem | perature | e 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) |
| | | | · · · · · · | · · · | | | <u> </u> | x [(93)m | <u>, </u> | i | | | l | () |
| (97)m= | | 1485.52 | 1366.25 | | 912.75 | 626.23 | 415.87 | 436.13 | 667.2 | 978.18 | 1260.33 | 1494.41 | | (97) |
| • | | | ement fo 454.9 | 286.9 | 10nth, k 158.38 | /Vh/moni 0 | h = 0.02 | 24 x [(97) 0 |)m – (95 0 | í - · | 1)m 486.74 | 690.45 | | |
| (98)m= | 678.38 | 530.68 | 404.9 | 200.9 | 100.00 | 0 | 0 | | | 277.37 | r) = Sum(9 | 689.15 | 3562.49 | (98) |
| 0 | | | | | | | | TULA | i per year | (KVVII/yeal | r) = 3um(9 | O)15,912 = | | 4 |
| Space | e neating | g require | ement in | kWh/m ² | /year | | | | | | | | 37.7 | (99) |
| | | | | mmunity | | | | | | | | | | |
| • | | • | | | | - | | ting prov (Table 1 ⁻ | • | | unity sch | neme. | 0 | (301) |
| | • | | | - | | | • | | 1) 0 111 | one | | | | |
| | | | | mmunity | - | | | | | | | | 1 | (302) |
| | | | | | | | | allows for See Appel | | up to four | other heat | sources; ti | he latter | |
| | | | Commun | | | ioni powei | 310110113. | | IUIX O. | | | | 0.67 | (303a) |
| Fractic | on of cor | nmunitv | heat fro | m heat s | ource 2 | | | | | | | | 0.33 | _](303b) |
| | | | | m Comn | | HP | | | | (3 | 02) x (303 | a) = | 0.67 |](304a) |
| | | | | m comm | • | | <u>م</u> 2 | | | | 602) x (303 | | 0.33 | (304b) |
| | | | | | | | | unity hea | ting eve | | (000) X (000 | 5) - | | (305) |
| | | | | | | , | | | ung sys | tem | | | 1 | |
| | | | (Table 1 | l2c) for c | commun | ity neatir | ng syste | m | | | | | 1.05 | (306) |
| - | heating | - | requiren | nent | | | | | | | | | kWh/year 3562.49 | 7 |
| | • | - | munity C | | | | | | (98) x (30 | 04a) x (30 | 5) x (306) : | = | 2491.25 | (307a) |
| • | | | source 2 | | | | | | | | 5) x (306) | | 1249.37 | (307b) |
| • | | | | | heating | system | in % (fro | om Table | | | | | 0 |](308 |
| | | , seriadar | , | | | -, | | | | - P STIGIN | -, | | v | , |

| Space heating requirement from sec | ondary/supplementary syste | m (98) x (301) | x 100 ÷ (308) = | : | 0 | (309) |
|---|-------------------------------|---------------------------|--------------------|------------|--------------------------|------------|
| Water heating Annual water heating requirement | | | | | 2191.32 | 7 |
| If DHW from community scheme: Water heat from Community CHP | | (64) x (303a |) x (305) x (306 |) = | 1532.39 | (310a) |
| Water heat from heat source 2 | | |) x (305) x (306 | | 768.49 | (310b) |
| Electricity used for heat distribution | | 0.01 × [(307a)(3 | | | 60.41 | (313) |
| Cooling System Energy Efficiency Ra | atio | | | (/) | 0 | (314) |
| Space cooling (if there is a fixed cool | | = (107) ÷ (3 ⁻ | 14) = | | 0 | (315) |
| Electricity for pumps and fans within mechanical ventilation - balanced, ex | dwelling (Table 4f): | | , | | 120.8 | (330a) |
| warm air heating system fans | | | | | 0 | (330b) |
| pump for solar water heating | | | | | 0 | (330g) |
| Total electricity for the above, kWh/ye | ear | =(330a) + (3 | 330b) + (330g) = | = | 120.8 | (331) |
| Energy for lighting (calculated in App | endix L) | | | | 389.07 | (332) |
| Electricity generated by PVs (Append | dix M) (negative quantity) | | | | -254.41 | (333) |
| Electricity generated by wind turbine | (Appendix M) (negative qua | ntity) | | | 0 | (334) |
| 12b. CO2 Emissions – Community h | eating scheme | | | | L | |
| Electrical efficiency of CHP unit | | | | | 32 | (361) |
| Heat efficiency of CHP unit | | | | | 50.4 | (362) |
| | | Energy kWh/year | Emissio kg CO2/ | | Emissions kg CO2/year | |
| Space heating from CHP) | 307a) × 100 ÷ (362) = | 4942.96 × | 0.22 | | 1067.68 | (363) |
| less credit emissions for electricity | -(307a) × (361) ÷ (362) = | 1581.75 × | 0.52 | | -820.93 | (364) |
| Water heated by CHP | 310a) × 100 ÷ (362) = | 3040.45 × | 0.22 | | 656.74 | (365) |
| less credit emissions for electricity | -(310a) × (361) ÷ (362) = | 972.94 × | 0.52 | | -504.96 | (366) |
| Efficiency of heat source 2 (%) | If there is CHP using t | wo fuels repeat (363) | to (366) for the | second fue | 95 | (367b) |
| CO2 associated with heat source 2 | [(307b)+(3 | 10b)] x 100 ÷ (367b) > | × 0.22 | = | 458.8 | (368) |
| Electrical energy for heat distribution | [(: | 313) x | 0.52 | = | = 31.36 | (372) |
| Total CO2 associated with communit | y systems (3 | 63)(366) + (368)(| 372) | = | 888.68 | (373) |
| CO2 associated with space heating (| secondary) (3 | 09) x | 0 | = | = 0 | (374) |
| CO2 associated with water from imm | ersion heater or instantaneo | us heater (312) | 0.22 | = | = 0 | (375) |
| Total CO2 associated with space and | d water heating (3 | 73) + (374) + (375) = | | | 888.68 | (376) |
| CO2 associated with electricity for pu | imps and fans within dwelling | g (331)) x | 0.52 | = | 62.7 | (378) |
| CO2 associated with electricity for lig | hting (3 | 32))) x | 0.52 | = | 201.93 | (379) |
| Energy saving/generation technologi Item 1 | es (333) to (334) as applicat | le | 0.52 | x 0.01 = | -132.04 | (380) |

Total CO2, kg/year Dwelling CO2 Emission Rate El rating (section 14) sum of (376)...(382) =

(383) ÷ (4) =

| 1021.27 | (383) |
|---------|-------|
| 10.81 | (384) |
| 90.19 | (385) |

| | | | User D | etails: | | | | | | |
|--|-------------------------|--------------------------|------------|----------------------|---------------|-------------------|----------------------|-----------|----------------------------|-------|
| Assessor Name: Software Name: | Ross Boult Stroma FS | | | Stroma Softwa | | | | | 028068 on: 1.0.4.18 | |
| | | | Property | Address: | B2A-10 | 5-07 | | | | |
| Address : | | , Flat Type 2- | 17A, Wimt | oledon, L | ondon | | | | | |
| 1. Overall dwelling dimer | isions: | | _ | | | | | | | |
| Ground floor | | | | a(m²) 94.5 | (1a) x | Av. He i | i ght(m) 6 | (2a) = | Volume(m³) 245.7 | (3a) |
| Total floor area TFA = (1a |)+(1b)+(1c)+(| 1d)+(1e)+(| (1n) | 94.5 | (4) | | | | | |
| Dwelling volume | | | | | (3a)+(3b) |)+(3c)+(3d |)+(3e)+ | .(3n) = | 245.7 | (5) |
| 2. Ventilation rate: | | | | | | | | | | |
| Number of chimneys | main heating | second heating + 0 | | other 0 |] = [| total 0 | | 40 = | m ³ per hour | (6a) |
| Number of open flues | 0 | + 0 | + | 0 | = | 0 | x 2 | 20 = | 0 | (6b) |
| Number of intermittent fan | S | | | | | 3 | x ′ | 10 = | 30 | (7a) |
| Number of passive vents | | | | | | 0 | x ′ | 10 = | 0 | (7b) |
| Number of flueless gas fire | es | | | | Ē | 0 | x 4 | 40 = | 0 | (7c) |
| | | | | | | | | Air ch | anges per hou | ır |
| Infiltration due to chimney | | | | | continue fro | 30 om (9) to (| | ÷ (5) = | 0.12 | (8) |
| Number of storeys in the | e dwelling (ns |) | | | | | | | 0 | (9) |
| Additional infiltration | | | | | | | [(9)- | -1]x0.1 = | 0 | (10) |
| Structural infiltration: 0.2 if both types of wall are pre- deducting areas of opening | esent, use the val | ue corresponding | | | • | uction | | | 0 |](11) |
| If suspended wooden flo | oor, enter 0.2 | (unsealed) or | 0.1 (seale | ed), else | enter 0 | | | | 0 | (12) |
| If no draught lobby, ente | er 0.05, else e | enter 0 | | | | | | | 0 | (13) |
| Percentage of windows | and doors dra | aught stripped | 1 | | | | | | 0 | (14) |
| Window infiltration | | | | 0.25 - [0.2 | | | (| | 0 | (15) |
| Infiltration rate | | | | (8) + (10) | | | | | 0 | (16) |
| Air permeability value, o | | | | | | etre of e | nvelope | area | 5 | (17) |
| If based on air permeabilit Air permeability value applies | | | | | | is heina us | ed | | 0.37 | (18) |
| Number of sides sheltered | | | | groo un por | inio abinty i | io boing ac | | | 2 | (19) |
| Shelter factor | | | | (20) = 1 - | [0.075 x (1 | 9)] = | | | 0.85 | (20) |
| Infiltration rate incorporation | ng shelter fac | tor | | (21) = (18) |) x (20) = | | | | 0.32 | (21) |
| Infiltration rate modified fo | r monthly win | d speed | | | | | | | | |
| Jan Feb M | Mar Apr | May Jur | n Jul | Aug | Sep | Oct | Nov | Dec | | |
| Monthly average wind spe | ed from Table | e 7 | | | | | | | _ | |
| (22)m= 5.1 5 4 | 1.9 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 | | |

| Adjuste | ed infiltr | ation rat | e (allowi | ng for sh | elter an | d wind s | peed) = | (21a) x | (22a)m | | | | | |
|----------|------------|-----------------------------------|------------|---------------------|-------------|-------------|-------------|---------------|--------------|---------------|-------------|-----------|-----------------------|-----------------|
| | 0.4 | 0.4 | 0.39 | 0.35 | 0.34 | 0.3 | 0.3 | 0.29 | 0.32 | 0.34 | 0.36 | 0.37 | | |
| | | c <i>tive air (</i> al ventila | - | rate for t | he appli | cable ca | se | | | | | | | (23a) |
| | | | | endix N, (2 | 3b) = (23a | i) x Fmv (e | equation (N | N5)), other | rwise (23b |) = (23a) | | | 0 | (23b) |
| | | | | iency in % | | | | | |) (200) | | | 0 | (230) (23c) |
| | | | - | - | - | | | | | 2h)m ± (| 23b) v [| 1 – (23c) | - | (230) |
| (24a)m= | 0 | | | 0 | 0 | 0 | | 0 | | | | 1 - (200) |] | (24a) |
| · · I | halance | - | - | entilation | - | heat rec | | /\/) (24b | 1 - (22) | $\frac{1}{1}$ | 23h) | | J | |
| (24b)m= | 0 | | | 0 | 0 | 0 | | | 0 | | 0 | 0 | 1 | (24b) |
| | whole h | | | ntilation c | or positiv | | | | l | | | |] | |
| , | | | | hen (24c | • | • | | | | .5 × (23b |)) | | | |
| (24c)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |] | (24c) |
| d) If | natural | ventilatio | on or wh | ole hous | e positiv | /e input v | ventilatio | on from I | oft | ! | | | 1 | |
| i | f (22b)n | n = 1, th | en (24d) | m = (22t |)m othe | rwise (2 | 4d)m = 0 | 0.5 + [(2 | 2b)m² x | 0.5] | - | - | | |
| (24d)m= | 0.58 | 0.58 | 0.58 | 0.56 | 0.56 | 0.55 | 0.55 | 0.54 | 0.55 | 0.56 | 0.56 | 0.57 | | (24d) |
| Effec | ctive air | change | rate - er | nter (24a |) or (24b | o) or (24 | c) or (24 | d) in boy | (25) | | | | | |
| (25)m= | 0.58 | 0.58 | 0.58 | 0.56 | 0.56 | 0.55 | 0.55 | 0.54 | 0.55 | 0.56 | 0.56 | 0.57 | | (25) |
| 3. Hea | at losse | s and he | eat loss i | paramete | er: | | | | | | | | | |
| ELEN | | Gros | | Openin | | Net Ar | ea | U-valı | Je | AXU | | k-value | e A | Xk |
| | | area | (m²) | . m | | A ,r | n² | W/m2 | K | (W/I | K) | kJ/m²·l | K k. | J/K |
| Window | ws Type | e 1 | | | | 2.61 | x1, | /[1/(1.4)+ | 0.04] = | 3.46 | | | | (27) |
| Window | ws Type | 2 | | | | 1.51 | x1, | /[1/(1.4)+ | 0.04] = | 2 | | | | (27) |
| Window | ws Type | e 3 | | | | 2.78 | x1, | /[1/(1.4)+ | 0.04] = | 3.69 | | | | (27) |
| Window | ws Type |) 4 | | | | 2.61 | x1, | /[1/(1.4)+ | 0.04] = | 3.46 | | | | (27) |
| Window | ws Type | e 5 | | | | 1.51 | x1, | /[1/(1.4)+ | 0.04] = | 2 | | | | (27) |
| Window | ws Type | e 6 | | | | 12.6 | | /[1/(1.4)+ | 0.04] = | 16.7 | = | | | (27) |
| Walls | | 45.5 | 52 | 23.62 | 2 | 21.9 | × | 0.18 | | 3.94 | = r | | | (29) |
| Roof | | 94.5 | | 0 | = | 94.5 | × | 0.13 | = = | 12.28 | = i | | \dashv | (30) |
| Total a | rea of e | lements | | | | 140.02 | 2 | | เ | | L | | | (31) |
| | | | | effective wil | ndow U-va | | | formula 1 | /[(1/U-valu | ıe)+0.04] a | as given in | paragraph | 1 3.2 | () |
| | | | | nternal wall | | | - | | | , - | - | | | |
| Fabric | heat los | ss, W/K = | = S (A x | U) | | | | (26)(30) | + (32) = | | | | 47.54 | (33) |
| Heat ca | apacity | Cm = S(| (Axk) | | | | | | ((28) | (30) + (32 | 2) + (32a). | (32e) = | 1157.07 | (34) |
| | | • | | ⁻ = Cm ÷ | , | | | | | tive Value | | | 250 | (35) |
| | - | sments wh ad of a dei | | tails of the | constructi | ion are not | t known pr | ecisely the | e indicative | e values of | TMP in T | able 1f | | |
| | | | | culated u | isina An | nendix k | < | | | | | | 15.97 | (36) |
| | • | • | , | own (36) = | • • | • | · · | | | | | | 15.97 | (30) |
| | abric he | | | () | | - / | | | (33) + | (36) = | | | 63.51 | (37) |
| Ventila | tion hea | at loss ca | alculated | d monthly | / | | | | (38)m | = 0.33 × (| 25)m x (5 |) | | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |] | |
| (38)m= | 47.13 | 46.88 | 46.63 | 45.45 | 45.23 | 44.2 | 44.2 | 44.01 | 44.6 | 45.23 | 45.67 | 46.14 | | (38) |
| Heat tr | ansfer o | coefficier | nt, W/K | | | | | | (39)m | = (37) + (3 | 38)m | | _ | |
| (39)m= | 110.64 | 110.39 | 110.13 | 108.96 | 108.74 | 107.71 | 107.71 | 107.52 | 108.1 | 108.74 | 109.18 | 109.65 | | |
| Stroma F | SAP 201 | 2 Version: | 1.0.4.18 | (SAP 9.92) | - http://ww | ww.stroma | .com | | - | Average = | Sum(39)1 | 12 /12= | 108.95 _{age} | <u>2 of 39)</u> |

| Heat lo | oss para | imeter (I | HLP), W | /m²K | | | | | (40)m | = (39)m ÷ | (4) | | | |
|-----------|------------|-----------------------|---------------------------------------|--------------------|----------------|-------------|------------|------------------------|-----------------------|-------------|---------------------------------------|----------|---------|-------|
| (40)m= | 1.17 | 1.17 | 1.17 | 1.15 | 1.15 | 1.14 | 1.14 | 1.14 | 1.14 | 1.15 | 1.16 | 1.16 | | |
| Numb | er of day | /s in mo | nth (Tab | le 1a) | | | | | , | Average = | Sum(40)1. | .12 /12= | 1.15 | (40) |
| Turno | 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 | ater hea | ting ene | rgy requ | irement: | | | | | | | | kWh/ye | ear: | |
| if TF | | | | (1 - exp | 0(-0.0003 | 349 x (TF | FA -13.9 |)2)] + 0.(| 0013 x (⁻ | TFA -13. | 2. 9) | 68 | | (42) |
| Reduce | the annua | al average | hot water | | 5% if the c | welling is | designed | (25 x N) to achieve | | se target o | 97 f | .91 | | (43) |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Hot wat | er usage i | - | r day for ea | ach month | Vd,m = fa | | | · · | | | | | I | |
| (44)m= | 107.7 | 103.78 | 99.87 | 95.95 | 92.03 | 88.12 | 88.12 | 92.03 | 95.95 | 99.87 | 103.78 | 107.7 | | |
| Energy | content of | hot water | used - cal | lculated m | onthly $= 4$. | 190 x Vd,r | m x nm x [| OTm / 3600 | | | m(44) ₁₁₂ = ables 1b, 1 | | 1174.9 | (44) |
| (45)m= | 159.71 | 139.69 | 144.14 | 125.67 | 120.58 | 104.05 | 96.42 | 110.64 | 111.97 | 130.49 | 142.43 | 154.67 | | |
| lf instan | taneous v | vater heati | ng at point | t of use (no | o hot wate | r storage), | enter 0 in | boxes (46 | | Total = Su | m(45) ₁₁₂ = | : | 1540.48 | (45) |
| (46)m= | 23.96 | 20.95 | 21.62 | 18.85 | 18.09 | 15.61 | 14.46 | 16.6 | 16.79 | 19.57 | 21.37 | 23.2 | | (46) |
| Water | storage | loss: | | | | | | | | | | | | |
| Storag | je volum | e (litres) | includir | ng any so | olar or W | /WHRS | storage | within sa | ame ves | sel | | 150 | | (47) |
| | • | - | | ank in dw | - | | | . , | ora) onto | or (0) in (| 47) | | | |
| | storage | | not wate | | iciuues i | nstantai | ieous cu | ombi boil | ers) erne | | 47) | | | |
| | - | | eclared I | oss facto | or is kno | wn (kWł | n/day): | | | | 1. | 39 | | (48) |
| Tempe | erature f | actor fro | m Table | 2b | | | | | | | 0. | 54 | | (49) |
| - | | | - | e, kWh/ye | | | | (48) x (49) |) = | | 0. | 75 | | (50) |
| , | | | | cylinder | | | | | | | | | ' I | (= .) |
| | | age loss leating s | | rom Tabl on 4.3 | ie z (kvv | n/iitre/da | iy) | | | | (|) | | (51) |
| | | from Ta | | | | | | | | | |) | | (52) |
| Tempe | erature f | actor fro | m Table | 2b | | | | | | | | 0 | | (53) |
| Energ | y lost fro | m water | storage | e, kWh/ye | ear | | | (47) x (51) |) x (52) x (| 53) = | (|) | | (54) |
| Enter | (50) or | (54) in (5 | 55) | | | | | | | | 0. | 75 | | (55) |
| Water | storage | loss cal | culated | for each | month | | | ((56)m = (| 55) × (41)ı | m | | | | |
| (56)m= | 23.33 | 21.07 | 23.33 | 22.58 | 23.33 | 22.58 | 23.33 | 23.33 | 22.58 | 23.33 | 22.58 | 23.33 | | (56) |
| If cylind | er contain | s dedicate | d solar sto | orage, (57) | m = (56)m | x [(50) – (| H11)] ÷ (5 | 0), else (5 | 7)m = (56) | m where (| H11) is fro | m Append | ix H | |
| (57)m= | 23.33 | 21.07 | 23.33 | 22.58 | 23.33 | 22.58 | 23.33 | 23.33 | 22.58 | 23.33 | 22.58 | 23.33 | | (57) |
| Prima | y circuit | loss (ar | nnual) fro | om Table | e 3 | | | | | | (| 0 | | (58) |
| | • | | | | | , | • • | 65 × (41) | | | | | | |
| | | · · · · · · | · · · · · · · · · · · · · · · · · · · | ı — | r | i | | ng and a | | i | · · · · · | | I | |
| (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 eacl | h month | (61)m = | (60) ÷ | - 365 × (41 |)m | | | | | | |
|----------|------------------------|-------------|-------------|--------------|------------|---------|----------------|---|---------------|-------------|--------------|-------------|---------------|------|
| (61)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (61) |
| Total h | eat req | uired for | water h | neating c | alculated | for e | ach month | (62)m : | = 0.85 × | (45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= | 206.31 | 181.77 | 190.74 | 170.76 | 167.18 | 149.1 | 15 143.02 | 157.24 | 157.06 | 177.08 | 187.53 | 201.27 | | (62) |
| Solar DH | W input | calculated | using Ap | pendix G o | r Appendix | H (ne | gative quantit | y) (enter ' | 0' if no sola | r contribut | ion to wate | er heating) | | |
| (add a | dditiona | al lines if | FGHRS | S and/or V | WWHRS | appli | es, see Ap | pendix | G) | | | | | |
| (63)m= | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output | from w | ater hea | ter | | - | | · | - | | | - | | - | |
| (64)m= | 206.31 | 181.77 | 190.74 | 170.76 | 167.18 | 149.1 | 15 143.02 | 157.24 | 157.06 | 177.08 | 187.53 | 201.27 | | |
| | | | | | | | | Out | tput from w | ater heate | r (annual)₁ | 12 | 2089.09 | (64) |
| Heat g | ains fro | m water | heating | , kWh/m | onth 0.2 | 5 ´ [0. | 85 × (45)m | n + (61)r | m] + 0.8 x | x [(46)m | + (57)m | + (59)m |] | |
| (65)m= | 90.38 | 80.11 | 85.2 | 77.86 | 77.37 | 70.6 | 7 69.34 | 74.07 | 73.3 | 80.66 | 83.43 | 88.71 | | (65) |
| inclu | de (57) | m in calo | culation | of (65)m | only if c | vlinde | er is in the | dwelling | or hot w | vater is fi | rom com | nunity h | eating | |
| | . , | | | 5 and 5a | - | , | | | , | | | , | Ū | |
| | Ŭ | ns (Table | | | /- | | | | | | | | | |
| Melabo | Jan Jan | Feb | Mar | Apr | May | Ju | n Jul | Aug | Sep | Oct | Nov | Dec | | |
| (66)m= | 134.12 | 134.12 | 134.12 | | 134.12 | 134. | | 134.12 | 134.12 | 134.12 | 134.12 | 134.12 | | (66) |
| | | | | | l | |) or L9a), a | | | | | | I | |
| (67)m= | 22.03 | 19.57 | 15.91 | 12.05 | | 7.6 | | 10.68 | 14.33 | 18.2 | 21.24 | 22.64 | 1 | (67) |
| | | | | | | | | | | | 21.24 | 22.04 | l | (0.) |
| | | <u>,</u> | · · · · · | T | | | 1 L13 or L1 | <u>, </u> | 1 | r | 040.00 | 000.04 | 1 | (69) |
| (68)m= | 247.12 | 249.68 | 243.22 | | 212.1 | 195. | | 182.31 | 188.77 | 202.53 | 219.89 | 236.21 | | (68) |
| | <u> </u> | <u> </u> | · · · · · · | 1 | · · | | 15 or L15a | í | 1 | 1 | | | 1 | (00) |
| (69)m= | 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 36.4 | 1 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | 36.41 | | (69) |
| Pumps | and fa | ns gains | (Table | 5a) | | | | | | | | | 1 | |
| (70)m= | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | (70) |
| Losses | s e.g. ev | /aporatic | on (nega | ative valu | es) (Tab | le 5) | | | | | | | | |
| (71)m= | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107 | .3 -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | -107.3 | | (71) |
| Water | heating | gains (T | able 5) | | | | | | | | | - | | |
| (72)m= | 121.48 | 119.22 | 114.52 | 108.14 | 103.99 | 98.1 | 5 93.19 | 99.55 | 101.81 | 108.42 | 115.88 | 119.23 | | (72) |
| Total i | nterna | gains = | : | | | | (66)m + (67)n | n + (68)m | + (69)m + | (70)m + (7 | (1)m + (72) | m | | |
| (73)m= | 456.86 | 454.7 | 439.89 | 415.88 | 391.33 | 367. | 77 352.52 | 358.77 | 371.15 | 395.38 | 423.25 | 444.32 | | (73) |
| 6. Sol | lar gain | s: | • | | | | | | | | | | | |
| Solar g | ains are | calculated | using sola | ar flux from | Table 6a a | and as | sociated equa | ations to c | onvert to th | ne applicat | ole orientat | ion. | | |
| Orienta | | Access F | | Area | l | | Flux | | g | _ | FF | | Gains | |
| | | Table 6d | | m² | | | Table 6a | | Table 6b | Т | able 6c | | (W) | |
| Northea | ast <mark>0.9x</mark> | 0.77 | X | 2.0 | 61 | x | 11.28 | x | 0.63 | x | 0.7 | = | 9 | (75) |
| Northea | ast <mark>0.9x</mark> | 0.77 | × | (1. | 51 | x | 11.28 | x | 0.63 | x | 0.7 | = | 5.21 | (75) |
| Northea | ast <mark>0.9</mark> x | 0.77 | × | 2.0 | 61 | x | 22.97 | x | 0.63 | x | 0.7 | = | 18.32 | (75) |
| Northea | ast <mark>0.9x</mark> | 0.77 | × | 1. | 51 | x | 22.97 | x | 0.63 | _ x [| 0.7 | = | 10.6 | (75) |
| Northea | ast <mark>0.9x</mark> | 0.77 | × | 2.0 | 61 | x | 41.38 | × | 0.63 | × [| 0.7 | = | 33.01 | (75) |

| Northeast 0.9x | 0.77 | x | 1.51 | × | 41.38 |) × | 0.63 | x | 0.7 | = | 19.1 | (75) |
|---------------------------|------|------------|------|---|--------|----------|------|---|-----|---|--------|------|
| Northeast 0.9x | 0.77 |] ^] x | 2.61 | x | 67.96 | ^ x | 0.63 | x | 0.7 | = | 54.2 | (75) |
| Northeast 0.9x | 0.77 | 」 ^] × | 1.51 | x | 67.96 | ^ x | 0.63 | x | 0.7 | = | 31.36 | (75) |
| Northeast 0.9x | 0.77 |] × | 2.61 | x | 91.35 | x | 0.63 | x | 0.7 | = | 72.86 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 1.51 | x | 91.35 |] x | 0.63 | x | 0.7 | = | 42.15 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 2.61 | x | 97.38 | x | 0.63 | x | 0.7 | = | 77.68 | (75) |
| Northeast 0.9x | 0.77 | 」 】 x | 1.51 | x | 97.38 | x | 0.63 | x | 0.7 | = | 44.94 | (75) |
| Northeast 0.9x | 0.77 | 」 】 × | 2.61 | x | 91.1 | x | 0.63 | x | 0.7 | = | 72.67 | (75) |
| Northeast 0.9x | 0.77 | x | 1.51 | x | 91.1 | × | 0.63 | x | 0.7 | = | 42.04 | (75) |
| Northeast 0.9x | 0.77 |] × | 2.61 | x | 72.63 | x | 0.63 | x | 0.7 | = | 57.93 | (75) |
| Northeast 0.9x | 0.77 |] × | 1.51 | × | 72.63 | × | 0.63 | x | 0.7 | = | 33.52 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | x | 50.42 | × | 0.63 | x | 0.7 | = | 40.22 | (75) |
| Northeast 0.9x | 0.77 | x | 1.51 | x | 50.42 | × | 0.63 | x | 0.7 | = | 23.27 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | x | 28.07 | × | 0.63 | x | 0.7 | = | 22.39 | (75) |
| Northeast 0.9x | 0.77 | x | 1.51 | x | 28.07 | × | 0.63 | x | 0.7 | = | 12.95 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | x | 14.2 | × | 0.63 | x | 0.7 | = | 11.32 | (75) |
| Northeast 0.9x | 0.77 | x | 1.51 | x | 14.2 | x | 0.63 | x | 0.7 | = | 6.55 | (75) |
| Northeast 0.9x | 0.77 | x | 2.61 | × | 9.21 | × | 0.63 | x | 0.7 | = | 7.35 | (75) |
| Northeast 0.9x | 0.77 | x | 1.51 | × | 9.21 | × | 0.63 | x | 0.7 | = | 4.25 | (75) |
| Southwest _{0.9x} | 0.77 | x | 2.61 | x | 36.79 |] | 0.63 | x | 0.7 | = | 29.35 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.51 | x | 36.79 |] | 0.63 | x | 0.7 | = | 16.98 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.78 | x | 36.79 | | 0.63 | x | 0.7 | = | 31.26 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12.6 | x | 36.79 | | 0.63 | x | 0.7 | = | 99.36 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.61 | x | 62.67 |] | 0.63 | x | 0.7 | = | 49.99 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.51 | x | 62.67 | | 0.63 | x | 0.7 | = | 28.92 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.78 | × | 62.67 | | 0.63 | x | 0.7 | = | 53.25 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12.6 | x | 62.67 | | 0.63 | x | 0.7 | = | 169.25 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.61 | x | 85.75 | | 0.63 | x | 0.7 | = | 68.4 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.51 | x | 85.75 | | 0.63 | x | 0.7 | = | 39.57 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.78 | x | 85.75 | | 0.63 | x | 0.7 | = | 72.86 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12.6 | x | 85.75 | | 0.63 | x | 0.7 | = | 231.58 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.61 | x | 106.25 | | 0.63 | x | 0.7 | = | 84.75 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.51 | x | 106.25 | | 0.63 | x | 0.7 | = | 49.03 | (79) |
| Southwest _{0.9x} | 0.77 | x | 2.78 | x | 106.25 | | 0.63 | x | 0.7 | = | 90.27 | (79) |
| Southwest _{0.9x} | 0.54 | x | 12.6 | x | 106.25 | | 0.63 | x | 0.7 | = | 286.93 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.61 | x | 119.01 | ļ | 0.63 | x | 0.7 | = | 94.93 | (79) |
| Southwest _{0.9x} | 0.77 | × | 1.51 | × | 119.01 | ļ | 0.63 | x | 0.7 | = | 54.92 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.78 | × | 119.01 | ļ | 0.63 | x | 0.7 | = | 101.11 | (79) |
| Southwest _{0.9x} | 0.54 | × | 12.6 | x | 119.01 | ļ | 0.63 | x | 0.7 | = | 321.39 | (79) |
| Southwest _{0.9x} | 0.77 | × | 2.61 | × | 118.15 |] | 0.63 | x | 0.7 | = | 94.24 | (79) |
| Southwest _{0.9x} | 0.77 | x | 1.51 | x | 118.15 | J | 0.63 | X | 0.7 | = | 54.52 | (79) |

| Southwest ₀ | 0 77 | , | | 70 | x | | 40.45 | 1 | <u> </u> | 0.00 | Тх | 0.7 | _ | _ | 400.00 | (79) |
|------------------------|------------------------|------------------|----------------|------------|----------|----------------|-------------|-----------|----------|---------|--------|----------|------|-----|--------|------|
| Southwesto | | | | | | <u> </u> | 18.15 |]] | | 0.63 | 4 | 0.7 | | | 100.38 | (79) |
| Southwesto | - | | | | x | <u> </u> | 18.15 |]] | | 0.63 | | 0.7 | | = | 319.07 | |
| Southwesto | | | | | x | <u> </u> | 13.91 |]] | | 0.63 | | 0.7 | | = | 90.86 | (79) |
| Southwesto | | | | | x | <u> </u> | 13.91 |] | | 0.63 | | 0.7 | | = | 52.57 | (79) |
| Southwesto | | | | | X | <u> </u> | 13.91 |] 1 | | 0.63 | | 0.7 | | = | 96.78 | (79) |
| Southwest | 0.01 | , | | | x | <u> </u> | 13.91 |] 1 | | 0.63 | | 0.7 | | = | 307.61 | (79) |
| Southwest | 0.11 | , | | | X | <u> </u> | 04.39 |] 1 | | 0.63 | _ × | 0.7 | | = | 83.27 | (79) |
| Southwest | - | , | | | X | <u> </u> | 04.39 |] 1 | | 0.63 | × | 0.7 | | = | 48.17 | (79) |
| | | , | | | x | <u> </u> | 04.39 |] 1 | | 0.63 | | 0.7 | | = | 88.69 | (79) |
| Southwesto | 0.01 | , , | | | x | <u> </u> | 04.39 |] | | 0.63 | | 0.7 | | = | 281.91 | (79) |
| Southwest ₀ | • | | | | x | 9 | 2.85 |] | | 0.63 | × | 0.7 | | = | 74.06 | (79) |
| Southwest ₀ | • | , | 1. | 51 | x | 9 | 2.85 |] | | 0.63 | × | 0.7 | | = | 42.85 | (79) |
| Southwest ₀ | | , | 2. | 78 | x | 9 | 2.85 |] | | 0.63 | × | 0.7 | | = | 78.89 | (79) |
| Southwest ₀ | 0.01 | , | 12 | .6 | x | 9 | 2.85 | | | 0.63 | × | 0.7 | | = | 250.75 | (79) |
| Southwest ₀ | • | , | 2. | 61 | x | 6 | 9.27 | ļ | | 0.63 | × | 0.7 | | = | 55.25 | (79) |
| Southwest ₀ | |) | 1. | 51 | x | 6 | 9.27 | ļ | | 0.63 | × | 0.7 | | = | 31.97 | (79) |
| Southwest ₀ | • |) | 2. | 78 | x | 6 | 9.27 | | | 0.63 | × | 0.7 | | = | 58.85 | (79) |
| Southwest ₀ | . <mark>9x</mark> 0.54 |) | 12 | 6 | x | 6 | 9.27 | | | 0.63 | × | 0.7 | | = | 187.06 | (79) |
| Southwest ₀ | .9x 0.77 |) | 2. | 51 | x | 4 | 4.07 |] | | 0.63 | x | 0.7 | | = | 35.15 | (79) |
| Southwest ₀ | .9x 0.77 |) | 1. | 51 | x | 4 | 4.07 |] | | 0.63 | × | 0.7 | | = | 20.34 | (79) |
| Southwest ₀ | .9x 0.77 |) | 2. | 78 | x | 4 | 4.07 |] | | 0.63 | × | 0.7 | | = | 37.44 | (79) |
| Southwest ₀ | . <mark>9x</mark> 0.54 |) | 12 | .6 | x | 4 | 4.07 |] | | 0.63 | x | 0.7 | | = | 119.01 | (79) |
| Southwest ₀ | .9x 0.77 |) | 2. | 61 | x | 3 | 31.49 |] | | 0.63 | x | 0.7 | | = | 25.12 | (79) |
| Southwest ₀ | .9x 0.77 |) | 1. | 51 | x | 3 | 31.49 |] | | 0.63 | × | 0.7 | | = | 14.53 | (79) |
| Southwest ₀ | .9x 0.77 |) | 2. | 78 | x | 3 | 31.49 |] | | 0.63 | × | 0.7 | | = | 26.75 | (79) |
| Southwest ₀ | .9x 0.54 |) | 12 | .6 | x | 3 | 1.49 | Ī | | 0.63 | × | 0.7 | | = | 85.03 | (79) |
| | | | | | | | | - | | | | | | | | |
| Solar gains | s in watts, ca | alculate | d for eac | h mont | h | | | (83)m | า = Sเ | um(74)m | .(82)m | | | | | |
| (83)m= 191 | | 464.51 | 596.55 | 687.37 | | 90.83 | 662.52 | 593 | .48 | 510.03 | 368.4 | 6 229.82 | 163 | .03 | | (83) |
| | s – internal a | | 1 | <u>т (</u> | <u> </u> | | · · · · · · | | | | | | | | 1 | |
| (84)m= 648 | 8.02 785.03 | 904.4 | 1012.44 | 1078.7 | 7 1 | 058.6 | 1015.04 | 952 | .26 | 881.18 | 763.8 | 4 653.07 | 607 | .35 | | (84) |
| 7. Mean i | nternal temp | erature | (heating | j seaso | n) | | | | | | | | | | | |
| Temperat | ure during h | eating | periods i | n the liv | /ing | area | from Tab | ole 9 | , Th | 1 (°C) | | | | | 21 | (85) |
| Utilisation | factor for ga | ains for | living ar | ea, h1, | m (s | ее Та | ble 9a) | | | | | | | | | _ |
| Ja | an Feb | Mar | Apr | May | / | Jun | Jul | A | ug | Sep | Oct | Nov | D | ес | | |
| (86)m= | 0.99 | 0.97 | 0.92 | 0.81 | | 0.62 | 0.46 | 0.5 | 51 | 0.76 | 0.95 | 0.99 | 1 | | | (86) |
| Mean inte | ernal tempera | ature ir | living ar | ea T1 (| follo | ow ste | ps 3 to 7 | 7 in T | able | e 9c) | | | - | | - | |
| (87)m= 19 | <u> </u> | 20.29 | 20.62 | 20.86 | <u> </u> | 20.97 | 20.99 | 20. | | 20.92 | 20.6 | 20.14 | 19. | 77 | | (87) |
| | ure during h | eating | - Deriode i | n rest c | f du | Alling | from Ta | | <u> </u> | 12 (°C) | | I | | | 1 | |
| (88)m= 19 | | 19.95 | 19.96 | 19.96 | | 19.97 | 19.97 | 19. | <u> </u> | 19.97 | 19.96 | 19.96 | 19.9 | 95 |] | (88) |
| | | | | | | | | | | | | | | | 1 | |
| (89)m= | factor for ga | ains for 0.96 | 0.9 | 0.75 | · · · · | ,m (se 0.53 | 0.36 | 9a) 0. | <u>4</u> | 0.68 | 0.93 | 0.99 | 1 | | 1 | (89) |
| (00)11- | 0.99 | 0.90 | 0.9 | 0.75 | | 0.00 | 0.00 | | - | 0.00 | 0.93 | 0.35 | | | J | |

| Mean | interna | l temper | ature in | the rest | of dwelli | na T2 (f | ollow ste | ens 3 to . | 7 in Tahl | e 9c) | | | | |
|----------|-----------|--------------------|---------------------|-----------|-----------------|-------------|-----------|-------------|---|------------|------------------------------|-------------|---------|----------|
| (90)m= | 18.37 | 18.66 | 19.06 | 19.53 | 19.83 | 19.95 | 19.97 | 19.97 | 19.91 | 19.51 | 18.85 | 18.32 | | (90) |
| (| | | | | | | | | | LA = Livin | | | 0.38 | (91) |
| | | | | | | | | | | | 9 4.04 . (| ., | 0.38 | |
| Mean | interna | l temper | ature (fo | or the wh | ole dwe | lling) = fl | _A × T1 | + (1 – fL | A) × T2 | | | | | |
| (92)m= | 18.92 | 19.18 | 19.53 | 19.95 | 20.22 | 20.34 | 20.36 | 20.36 | 20.3 | 19.93 | 19.35 | 18.88 | 1 | (92) |
| Apply | adjustr | nent to t | he mear | n interna | temper | ature fro | m Table | 4e, whe | ere appro | opriate | | | | |
| (93)m= | 18.92 | 19.18 | 19.53 | 19.95 | 20.22 | 20.34 | 20.36 | 20.36 | 20.3 | 19.93 | 19.35 | 18.88 | | (93) |
| 8. Spa | ace hea | iting requ | uiremen | t | | | | | | | | | | |
| Set Ti | to the | mean int | ternal te | mperatu | re obtain | ed at ste | ep 11 of | Table 9 | b, so tha | t Ti,m=(| 76)m an | d re-calc | ulate | |
| the ut | ilisation | factor fo | or gains | using Ta | ble 9a | | | | | | | | | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Utilisa | ation fac | tor for g | ains, hr | n: | | | | | | | | | | |
| (94)m= | 0.99 | 0.98 | 0.96 | 0.9 | 0.77 | 0.57 | 0.4 | 0.44 | 0.7 | 0.93 | 0.99 | 1 | | (94) |
| Usefu | Il gains, | hmGm | , W = (9 | 4)m x (8- | 4)m | | | | | | | | | |
| (95)m= | 643.82 | 772.44 | 868.49 | 907.96 | 825.24 | 600.83 | 402.77 | 421.76 | 620.2 | 708.41 | 643.7 | 604.42 | | (95) |
| Month | nly aver | age exte | ernal terr | perature | e 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 me | an interr | al tempe | erature, | Lm , W = | =[(39)m : | x [(93)m | – (96)m |] | | | | |
| (97)m= | 1617.78 | 1576.1 | 1435.56 | 1203.46 | 926.91 | 618.43 | 405.11 | 425.77 | 669.97 | 1014.24 | 1337 | 1609.52 | | (97) |
| Space | e heatin | a require | ement fo | r each n | nonth, k\ | Nh/mont | h = 0.02 | 24 x [(97 |)m – (95 |)m] x (4′ | 1)m | | | |
| (98)m= | 724.62 | 540.06 | 421.9 | 212.76 | 75.64 | 0 | 0 | 0 | 0 | 227.54 | , 499.18 | 747.79 | | |
| | | | | | | | | Tota | l per year | (kWh/vear | <u>.</u>) = Sum(9 | 8)1 59 12 = | 3449.49 | (98) |
| 0 | | | | | | | | | | | / (- | - , | |] |
| Space | e neatin | g require | ement in | kWh/m² | year | | | | | | | | 36.5 | (99) |
| 9a. En | ergy rea | quiremer | nts – Ind | ividual h | eating sy | ystems i | ncluding | micro-C | CHP) | | | | | |
| - | e heatiı | - | | | | | | | | | | | | - |
| Fracti | on of sp | bace hea | at from s | econdar | y/supple | mentary | system | | | | | | 0 | (201) |
| Fracti | on of sp | bace hea | at from n | nain syst | em(s) | | | (202) = 1 · | - (201) = | | | | 1 | (202) |
| Fracti | on of to | tal heati | ng from | main sys | stem 1 | | | (204) = (2 | 02) × [1 – | (203)] = | | - | 1 | (204) |
| Efficie | ency of | main spa | ace heat | ing syste | em 1 | | | | | | | | 93.5 | (206) |
| | | • | | 0, | | a ovotom | 0/ | | | | | | | <u> </u> |
| EIIICIE | | seconda | ry/suppi | ementar | y neating | y system | 1, 70 | | | | | | 0 | (208) |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | kWh/yea | ar |
| Space | e heatin | g require | ement (o | alculate | d above) |) | | | | | | | | |
| | 724.62 | 540.06 | 421.9 | 212.76 | 75.64 | 0 | 0 | 0 | 0 | 227.54 | 499.18 | 747.79 | 1 | |
| (211)m | n = {[(98 |)m x (20 | 04)] } x 1 | 00 ÷ (20 |)6) | | | | | | | | | (211) |
| | 775 | 577.6 | 451.23 | 227.55 | 80.9 | 0 | 0 | 0 | 0 | 243.35 | 533.88 | 799.78 | | |
| | | | | 1 | | | | Tota | l (kWh/yea | ar) =Sum(2 | 1 211) _{15,1012} | = | 3689.3 | (211) |
| Snace | a haatin | a fuel (s | econdar | y), kWh/ | month | | | | | | | I | |]``` |
| • | | 01)] } x 1 | | | monui | | | | | | | | | |
| (215)m= | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| (2.0) | | | | | Ů | Ů | Ū | | l (kWh/yea | - | | | 0 | (215) |
| \A/~ 4 | h a - 1 | _ | | | | | | | ,, , , , , , , , , , , , , , , , , , , | , | ∼ / 15,1012 | | | |
| | heating | - | tor (col- | uloted | hours) | | | | | | | | | |
| Juiput | 206.31 | ater nea 181.77 | ter (calc 190.74 | ulated a | bove) 167.18 | 149.15 | 143.02 | 157.24 | 157.06 | 177.08 | 187.53 | 201.27 | | |
| Efficier | | ater hea | | | 107.10 | 1-10.10 | 1-10.02 | 101.24 | 107.00 | 111.00 | 107.00 | 201.27 | 70.0 | (216) |
| | | | | | | | | | | | | | 79.8 | (210) |

| (217)m= 87.89 | 87.54 | 86.87 | 85.4 | 82.85 | 79.8 | 79.8 | 79.8 | 79.8 | 85.48 | 87.3 | 88 |] | (217) |
|---|------------------------|---------------------|-------------|----------|-----------|-----------------------|-------------|------------|------------|--------|-------------|---------|--------|
| Fuel for water | • | | | | | | | | | | | - | |
| (219)m = (64)m (219)m = 234.74 | m x 100 207.64 |) ÷ (217) 219.56 | m 199.95 | 201.78 | 186.9 | 179.22 | 197.04 | 196.81 | 207.15 | 214.8 | 228.72 | 1 | |
| (210) | 201101 | | | 200 | | | | l = Sum(2) | | | | 2474.31 | (219) |
| Annual totals | | | | | | | | kWh/year | | | kWh/year |], , | |
| Space heating fuel used, main system 1 | | | | | | | | | | - | | 3689.3 |] |
| Water heating fuel used | | | | | | | | | | | | 2474.31 |] |
| Electricity for p | oumps, fa | ans and | electric l | keep-ho | t | | | | | | | | - |
| 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 | | | | | | | | | | | 389.03 | (232) | |
| 12a. CO2 em | issions - | – Individ | ual heati | ng syste | ems inclu | uding mi | cro-CHF |) | | | | | _ |
| | Energy Emission factor | | | | | | | | Emissions | | | | |
| | | | | | kWh/year | | | kg CO2/kWh | | | kg CO2/year | | |
| Space heating | (main s | ystem 1 |) | | (211 | I) x | | | 0.2 | 16 | = | 796.89 | (261) |
| Space heating | (second | dary) | | | (218 | ō) x | | | 0.5 | 19 | = | 0 | (263) |
| Water heating | | | | | (219 | 9) x | | | 0.2 | 16 | = | 534.45 | (264) |
| Space and water heating | | | | | (261 | I) + (262) | + (263) + (| (264) = | | | | 1331.34 | (265) |
| Electricity for p | oumps, fa | ans and | electric l | keep-ho | t (231 | I) x | | | 0.5 | 19 | = | 38.93 | (267) |
| Electricity for li | ghting | | | | (232 | 2) x | | | 0.5 | 19 | = | 201.91 | (268) |
| Total CO2, kg/year | | | | | | | | sum o | of (265)(2 | 271) = | | 1572.17 | (272) |
| | | | | | | | | | | | | | _ |
| | | | | | | | | | | | | | |

TER =

16.64 (273)