Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.5.50 Printed on 14 December 2021 at 11:01:12

Project Information:

Assessed By: Jonathon Hill (STRO029949) **Building Type: Detached House**

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 161.78m²

Site Reference: **Plot Reference:** Beech Hill Stores PLOT 4_Type A2

PLOT 4 Beech Hill Stores, Eddeys Lane, Headley Down, BORDON, GU35 8HU Address:

Client Details:

Name: Cimbrone Developments Ltd

Address: 43-45 Wellington Crescent, New Malden, KT3 3NE

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Mains gas

Fuel factor: 1.00 (mains gas)

Target Carbon Dioxide Emission Rate (TER) 15.19 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 8.26 kg/m²

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 52.9 kWh/m² Dwelling Fabric Energy Efficiency (DFEE) 48.8 kWh/m²

2 Fabric U-values

Element **Average** Highest External wall 0.18 (max. 0.30) 0.20 (max. 0.70) OK Floor 0.20 (max. 0.25) 0.20 (max. 0.70) **OK** Roof 0.17 (max. 0.20) 0.18 (max. 0.35) OK 1.60 (max. 3.30) **Openings** 1.58 (max. 2.00) OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 5.00 (design value)

OK Maximum 10.0

4 Heating efficiency

Main Heating system: Database: (rev 486, product index 018821):

Boiler systems with radiators or underfloor heating - mains gas

Brand name: Worcester Model: Greenstar 2000

Model qualifier: GR2300iW 30 C NG

(Combi)

Efficiency 89.0 % SEDBUK2009

Minimum 88.0 %

Secondary heating system: Room heaters - wood

Closed room heater Efficiency 65.0 %

Minimum 65.0 % OK

OK

OK

OK

Regulations Compliance Report

| Cylinder insulation Hot water Storage: | No cylinder | | |
|--|-------------------------|--------------------|----|
| Controls | 140 cylinder | | |
| Controls | | | |
| | | | |
| Space heating controls | TTZC by plumbing and el | ectrical services | OK |
| Hot water controls: | No cylinder thermostat | | |
| Deiler interleek | No cylinder | | OK |
| Boiler interlock: Low energy lights | Yes | | OK |
| | lan an annu fittin na | 400.00/ | |
| Percentage of fixed lights with Minimum | n low-energy fittings | 100.0% | OK |
| • | | 75.0% | OK |
| Mechanical ventilation | | | |
| Not applicable | | | |
| Summertime temperature | | | |
| Overheating risk (Thames val | ley): | Slight | OK |
| ed on: | | | |
| Overshading: | | Average or unknown | |
| Windows facing: North | | 6.89m² | |
| Windows facing: South | | 12.17m² | |
| Windows facing: East | | 0.48m² 0.42m² | |
| Roof windows facing: North | | 0.42m² | |
| Roof windows facing: South Ventilation rate: | | 4.00 | |
| venulation fale. | | 4.00 | |
| | | | |
| Key features | | | |
| | | | |

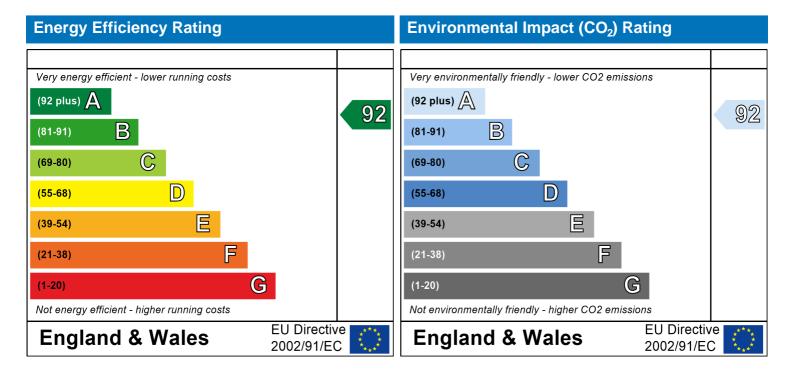
Predicted Energy Assessment



PLOT 4 Beech Hill Stores Eddeys Lane Headley Down BORDON GU35 8HU Dwelling type: Date of assessment: Produced by: Total floor area: Detached House 13 December 2021 Jonathon Hill 161.78 m²

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

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



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

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

| | | User Details: | | |
|---------------------------------------|--|-------------------------------------|---|------------------|
| Assessor Name: | Jonathon Hill | Stroma Nun | nber: STR | 0029949 |
| Software Name: | Stroma FSAP 2012 | Software Ve | ersion: Vers | sion: 1.0.5.50 |
| | Pi | operty Address: PLOT | 4_Type A2 | |
| Address : | PLOT 4 Beech Hill Stores, E | ddeys Lane, Headley [| Down, BORDON, GU35 | 8HU |
| 1. Overall dwelling dime | nsions: | | | |
| | | Area(m²) | Av. Height(m) | Volume(m³) |
| Ground floor | | 67.13 (1a) x | 2.6 (2a) = | = 174.54 (3a) |
| First floor | | 67.13 (1b) x | 2.6 (2b) = | = 174.54 (3b) |
| Second floor | | 27.52 (1c) x | 2.12 (2c) = | 58.34 (3c) |
| Total floor area TFA = (1 | a)+(1b)+(1c)+(1d)+(1e)+(1n |) 161.78 (4) | | |
| Dwelling volume | | (3a)+(3 | b)+ $(3c)+(3d)+(3e)+(3n) =$ | 407.42 (5) |
| 2. Ventilation rate: | | | | |
| | main secondar heating heating | y other | total | m³ per hour |
| Number of chimneys | | + 0 = | 0 x 40 = | 0 (6a) |
| Number of open flues | 0 + 0 | + 0 = | 0 x 20 = | 0 (6b) |
| Number of intermittent fa | ns | | 3 x 10 = | 30 (7a) |
| Number of passive vents | | Ī | 0 x 10 = | 0 (7b) |
| Number of flueless gas fi | res | [| 0 x 40 = | 0 (7c) |
| | | | Δir | changes per hour |
| Letter Const. | (Co) (Cb) (7 | o) (/7b) (/7o) | | |
| · · · · · · · · · · · · · · · · · · · | ys, flues and fans = $(6a)+(6b)+(7)$ ween carried out or is intended, proceed | | 30 | 0.07 |
| Number of storeys in the | | rto (17), otherwise continue | 110111 (9) 10 (10) | 0 (9) |
| Additional infiltration | io direiming (rio) | | [(9)-1]x0.1 : | |
| | .25 for steel or timber frame or | 0.35 for masonry const | | 0 (11) |
| if both types of wall are p | resent, use the value corresponding to | • | | 0 (1.7) |
| deducting areas of opening | ngs); if equal user 0.35 floor, enter 0.2 (unsealed) or 0. | 1 (sooled) also enter (| | (40) |
| · | , | (Sealed), else elller o | | 0 (12) |
| If no draught lobby, en | | | | 0 (13) |
| J | s and doors draught stripped | 0.25 - [0.2 x (14) ÷ | 100] - | 0 (14) |
| Window infiltration | | | (12) + (13) + (15) = | 0 (15) |
| Infiltration rate | .50 | , , , , , , | | 0 (16) |
| • | q50, expressed in cubic metre | | netre of envelope area | 5 (17) |
| • | ity value, then $(18) = [(17) \div 20] + (8)$ | | a to the term are all | 0.32 (18) |
| Number of sides sheltere | s if a pressurisation test has been don | e or a degree air permeability | / is being usea | - (40) |
| Shelter factor | :u | $(20) = 1 - [0.075 \times 10^{-3}]$ | (19)] = | 0 (19) 1 (20) |
| Infiltration rate incorporat | ing shelter factor | $(21) = (18) \times (20) =$ | , , , , | |
| • | | (2.) (10) x (20) = | | 0.32 (21) |
| Infiltration rate modified f | | lul Aug Car | Oot Nov Da | ิ |
| Jan Feb | Mar Apr May Jun | Jul Aug Sep | Oct Nov De | 1 |
| Monthly average wind sp | eed from Table 7 | | , , , , , , , , , , , , , , , , , , , | ¬ |

4.4

4.3

3.8

3.8

3.7

4.3

4

4.5

4.7

4.9

(22)m=

5.1

5

| Wind Factor (22 | a)m = | (22)m ÷ | 4 | | | | | | | | | | |
|---|--|--|---------------------------------------|--------------------------------------|--|--|---|---|--|-------------|--------------------|--------|--|
| (22a)m= 1.27 | 1.25 | 1.23 | 1.1 | 1.08 | 0.95 | 0.95 | 0.92 | 1 | 1.08 | 1.12 | 1.18 | | |
| A 1: 4 1: 5:14 4: | . , | , II . | | | | | (04.) | (00.) | | | | ı | |
| Adjusted infiltrati | on rate | e (allowi | ng for sr 0.36 | o.35 | 0.31 | speed) = 0.31 | (21a) x | (22a)m 0.32 | 0.35 | 0.36 | 0.38 | | |
| Calculate effecti | - | - | | | l | 1 | 0.3 | 0.32 | 0.35 | 0.36 | 0.36 | | |
| If mechanical | | - | | • • | | | | | | | | 0 | (23a) |
| If exhaust air heat | t pump ι | using Appe | endix N, (2 | 3b) = (23a | a) × Fmv (| equation (I | N5)) , othe | rwise (23b |) = (23a) | | | 0 | (23b) |
| If balanced with h | eat reco | very: effic | iency in % | allowing f | or in-use f | factor (fron | n Table 4h | ı) = | | | | 0 | (23c) |
| a) If balanced | mecha | anical ve | entilation | with he | at recov | ery (MVI | HR) (24a | a)m = (22) | 2b)m + (| (23b) × [| 1 – (23c) | ÷ 100] | |
| (24a)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24a) |
| b) If balanced | | | ı | | i | | - ^ ` ` - | í ` | | | 1 | I | (5.41.) |
| (24b)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24b) |
| c) If whole hou | | | | • | • | | | | E (22k | ۵۱ | | | |
| if (22b)m < (24c)m= 0 | 0.5 x | (23b), t | nen (240 | (23L) = (23L) |), otner | 0 | $C_0 = (22)$ | 0) III + 0. | .5 × (23L |) 0 | 0 | | (24c) |
| d) If natural ve | | | | | | | | | | | | | (= :0) |
| if (22b)m = | | | | | | | | | 0.5] | | | | |
| (24d)m= 0.59 | 0.58 | 0.58 | 0.56 | 0.56 | 0.55 | 0.55 | 0.54 | 0.55 | 0.56 | 0.57 | 0.57 | | (24d) |
| Effective air ch | nange | rate - er | nter (24a |) or (24b | o) or (24 | c) or (24 | d) in bo | x (25) | - | - | - | | |
| (25)m= 0.59 | 0.58 | 0.58 | 0.56 | 0.56 | 0.55 | 0.55 | 0.54 | 0.55 | 0.56 | 0.57 | 0.57 | | (25) |
| 3. Heat losses | and he | eat loss r | paramete | ōt. | | | | | | | | | |
| | a | at 1000 p | Jaiaiiiott | J | | | | | | | | | |
| ELEMENT | Gros area | SS | Openin m | gs | Net Ar A , | | U-val W/m2 | | A X U (W/ | | k-value kJ/m²-ł | | A X k kJ/K |
| | Gros | SS | Openin | gs | | m² | | | _ | K) | | | |
| ELEMENT | Gros | SS | Openin | gs | ı, A | m ² | W/m2 | 2K | (W/ | K) | | | kJ/K |
| ELEMENT Doors Type 1 | Gros area | SS | Openin | gs | A ,ı | m² x | W/m2 | 2K = | (W/ 3.285 | K) | | | kJ/K (26) |
| ELEMENT Doors Type 1 Doors Type 2 | Gros area | SS | Openin | gs | A ,ı 2.19 | m ² | 1.5 1.5 | 2K = = = 0.04] = | (W/ 3.285 2.34 | K) | | | kJ/K (26) (26) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 1 | Gros area | SS | Openin | gs | A ,1 2.19 1.56 6.89 | m ² x x x x 1 x 1 x 1 | W/m2 1.5 1.5 /[1/(1.6)+ | 2K = = = = = = = = = = | (W/ 3.285 2.34 10.36 | K) | | | (26) (26) (27) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 1 Windows Type 2 | Gros area | SS | Openin | gs | A ,1 2.19 1.56 6.89 | m ² | W/m ² 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ | = = = = = = = = = = = = = = = = = = = | (W/ 3.285 2.34 10.36 18.3 | K) | | | kJ/K (26) (26) (27) (27) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 1 Windows Type 2 Windows Type 3 | Gros area | SS | Openin | gs | A ,1 2.19 1.56 6.89 12.17 | m ² | W/m ² 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ | EK = = -0.04 = | (W/ 3.285 2.34 10.36 18.3 0.72 | K) | | | kJ/K (26) (26) (27) (27) (27) |
| Doors Type 1 Doors Type 2 Windows Type 1 Windows Type 2 Windows Type 3 Rooflights Type | Gros area | SS | Openin | gs | A ,1 2.19 1.56 6.89 12.17 0.48 | m² x x x1 x1 x1 x1 | W/m ² 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + | EK = = -0.04 = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 | K) | | | kJ/K (26) (26) (27) (27) (27) (27b) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 1 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type | Gros area | ss (m²) | Openin | gs ² | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 | m² x x x x x x x x x x x x x x x x x x x | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6)+ | eK = = = = = = = = = = = = = = = = = = = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 | K) | | | (26) (26) (27) (27) (27) (27b) (27b) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 1 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type Floor | Gros area | ss (m²) | Openin m | gs ² | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 67.13 | m² x x x x x x x x x x x x x x x x x x x | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6) + /[1/(1.6) + | 2K = = = = = = = = = = = = = = = = = = = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 1.792 | K) | | | (26) (26) (27) (27) (27) (27b) (28) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 1 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type Floor Walls Type 1 | Gros area 2 3 1 1 1 1 1 1 1 1 1 1 1 1 | ss (m²) | Openin m | gs ² | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 67.13 | m² x x x x x x x x x x x x x x x x x x x | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6) + /[1/(1.6) + 0.2 0.18 | 2K = = = = = = = = = = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 1.792 13.426 27.27 | K) | | | kJ/K (26) (26) (27) (27) (27b) (27b) (28) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 1 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type Floor Walls Type1 Walls Type2 | Gros area 2 3 1 1 1 1 1 1 1 1 1 1 1 1 | 77 4 9 | 23.29 0 | gs ² | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 67.13 151.4 | m² x x x x x x x x x x x x x x x x x x x | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6) + 0.2 0.18 | 2K = = = = = = = = = = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 1.792 13.426 27.27 3.95 | K) | | | kJ/K (26) (26) (27) (27) (27b) (27b) (28) (29) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type Floor Walls Type1 Walls Type2 Roof Type1 | Gros area 2 174.: 19.7 36.9 | 77 - 4 - 9 - 5 | 23.29 0 | gs ² | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 67.13 151.4 19.74 | m² | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6) + 0.2 0.18 0.2 | 2K = = = = = = = = = = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 1.792 13.426 27.27 3.95 5.92 | K) | | | kJ/K (26) (26) (27) (27) (27b) (27b) (28) (29) (29) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 2 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type Floor Walls Type1 Walls Type2 Roof Type1 Roof Type2 | Gros area 2 3 1 2 174.: 19.7 36.9 42.1 ments | 77 74 9 5 , m ² | 23.29 0 1.54 | gs 2 | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 67.13 151.4 19.74 36.99 40.66 340.7 | m² | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6) + /[1/(1.6) + 0.2 0.18 0.2 0.18 | EK = = = = = = = = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 1.792 13.426 27.27 3.95 5.92 7.31 | K) | kJ/m²-ŀ | | kJ/K (26) (27) (27) (27b) (27b) (28) (29) (30) (30) |
| Doors Type 1 Doors Type 2 Windows Type 2 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type Floor Walls Type1 Walls Type2 Roof Type1 Roof Type2 Total area of ele | Gros area 2 3 1 2 174.7 36.9 42.1 ments of windo | oss (m²) 77 4 9 5 ows, use esides of in | 23.29 0 1.54 effective winternal wall | gs 2 | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 67.13 151.4 19.74 36.99 40.66 340.7 | m² | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6) + /[1/(1.6) + 0.2 0.18 0.2 0.18 | 2K = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 1.792 13.426 27.27 3.95 5.92 7.31 | K) | kJ/m²-ŀ | | kJ/K (26) (27) (27) (27b) (27b) (28) (29) (30) (30) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type Floor Walls Type1 Walls Type2 Roof Type1 Roof Type2 Total area of ele * for windows and ro ** include the areas | Gros area 2 3 1 2 174.: 19.7 36.9 42.1 ments of windo on both , W/K = | 55 (m²) 77 4 9 5 5 5 6 6 7 7 7 7 8 9 7 8 9 9 10 10 10 10 10 10 10 10 | 23.29 0 1.54 effective winternal wall | gs 2 | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 67.13 151.4 19.74 36.99 40.66 340.7 | m² | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6) + /[1/(1.6) + 0.2 0.18 0.2 0.18 0.18 | 2K = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 1.792 13.426 27.27 3.95 5.92 7.31 | K) | kJ/m²-l | 3.2 | kJ/K (26) (27) (27) (27b) (27b) (28) (29) (30) (31) |
| ELEMENT Doors Type 1 Doors Type 2 Windows Type 2 Windows Type 2 Windows Type 3 Rooflights Type Rooflights Type Floor Walls Type1 Walls Type1 Walls Type2 Roof Type1 Roof Type2 Total area of ele * for windows and ro ** include the areas Fabric heat loss, | Gros area 2 3 174.7 36.9 42.1 ments of winder on both on both of winder on winder of winder on winder on winder on winder on | 5S (m²) 4 19 5 , m² cws, use e sides of in = S (A x A x k) | 23.29 0 1.54 effective winternal walk | gs 2 9 Indow U-vals and pan | A ,1 2.19 1.56 6.89 12.17 0.48 0.42 1.12 67.13 151.4 19.74 36.99 40.67 340.7 | m ² | W/m2 1.5 1.5 /[1/(1.6)+ /[1/(1.6)+ /[1/(1.6) + /[1/(1.6) + /[1/(1.6) + 0.2 0.18 0.2 0.18 0.18 | 2K = | (W/ 3.285 2.34 10.36 18.3 0.72 0.672 1.792 13.426 27.27 3.95 5.92 7.31 | K) | kJ/m²-l | 3.2 | kJ/K (26) (27) (27) (27b) (27b) (28) (29) (30) (31) |

| an be used ir | | | | | | | | | | | | | |
|--|---|--|--|---|---|--|---|---|--|--|--|---------|---|
| | ridges : S (L | | | | - | K | | | | | | 19.36 | (36 |
| | ermal bridging c heat loss | are not kn | own (36) = | = 0.05 x (3 | 1) | | | (33) + | (36) = | | | 444.50 | |
| | heat loss c | alculatod | l monthly | M | | | | ` ' | , , | 25)m x (5) | | 114.56 | (37 |
| Ja | | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | 1 | |
| 38)m= 78.6 | _ | 77.79 | 75.74 | 75.36 | 73.58 | 73.58 | 73.25 | 74.27 | 75.36 | 76.14 | 76.95 | | (38 |
| ′ | fer coefficie | | | | | | | <u> </u> | = (37) + (37) | <u> </u> | | J | |
| 39)m= 193. | | 192.35 | 190.3 | 189.92 | 188.14 | 188.14 | 187.81 | 188.82 | 189.92 | 190.69 | 191.5 | 1 | |
| 100. | 102.70 | 102.00 | 100.0 | 100.02 | 100.11 | 100.11 | 107.01 | <u> </u> | | Sum(39) ₁ . | | 190.3 | (39 |
| leat loss p | oarameter (l | HLP), W/ | /m²K | | | | | | = (39)m ÷ | | | | |
| 40)m= 1.1 | 19 1.19 | 1.19 | 1.18 | 1.17 | 1.16 | 1.16 | 1.16 | 1.17 | 1.17 | 1.18 | 1.18 | | _ |
| Jumber of | days in mo | nth (Tabl | le 1a) | | | | | | Average = | Sum(40) _{1.} | 12 /12= | 1.18 | (40 |
| Ja | - 1 | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |] | |
| 41)m= 31 | 1 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | | (41 |
| <u></u> | | | | | | | | | | | | - | |
| 4. Water h | heating ene | rav reaui | irement: | | | | | | | | kWh/ye | ear: | |
| | | | | | | | | | | | | | |
| ssumed o | occupancy. | N I | | | | | | | | | | | 11 |
| | | | [4 0)(0 | | 140 v /TI | - | \2\1 · 0 / | 1042 v / | TEA 42 | | 95 | J | (- |
| if TFA > 1 | 13.9, N = 1 | | [1 - exp | (-0.0003 | 349 x (TF | FA -13.9 |)2)] + 0.0 | 0013 x (| ΓFA -13. | | 95 | I | (4 |
| if TFA > 1 | 13.9, N = 1 13.9, N = 1 | + 1.76 x | | | | | | | ΓFA -13. | .9) | |] | |
| if TFA > 1 if TFA £ 1 nnual ave reduce the ar | 13.9, N = 1 13.9, N = 1 erage hot wannual average | + 1.76 x ater usag | ge in litre usage by | es per da 5% if the d | ay Vd,av Iwelling is | erage = | (25 x N) | + 36 | | 9) | 95 |] | |
| if TFA > 1 if TFA £ 1 nnual ave educe the ar | 13.9, N = 1 13.9, N = 1 erage hot w | + 1.76 x ater usag | ge in litre usage by | es per da 5% if the d | ay Vd,av Iwelling is | erage = | (25 x N) | + 36 | | 9) | |] | |
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| if TFA > 1 if TFA £ 1 innual ave reduce the ar of more that Ja reduction water usas 14)m= 114. | 13.9, N = 1 13.9, N = 1 erage hot wannual average 125 litres per an Feb age in litres pe | + 1.76 x ater usage hot water person per Mar r day for ear 106.38 | ge in litre usage by day (all w Apr ach month | es per da 5% if the d vater use, I May Vd,m = fac 98.04 | ay Vd,av lwelling is not and co Jun ctor from 1 | rerage = designed in did) Jul Table 1c x 93.87 | (25 x N) to achieve Aug (43) 98.04 | + 36 a water us Sep | Oct 106.38 Total = Su | 9) Nov 110.55 m(44)112 = | 4.3 Dec 114.73 | 1251.55 | (4 |
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| if TFA > f if TFA £ f nnual ave educe the are of more that Ja of water usa 4)m= 114. nergy conter 5)m= 170. instantaneou | 13.9, N = 1 148.8 148.8 148.8 | + 1.76 x ater usag hot water person per Mar r day for ea 106.38 used - calc 153.55 | ge in litre usage by day (all w Apr ach month 102.21 culated me 133.87 | es per da 5% if the day 5% if the day 5% if the day 5% 5% 5% 5% 5% 5% 5% 5% | y Vd,av welling is not and co Jun ctor from 7 93.87 190 x Vd,r | erage = designed to designed t | (25 x N) to achieve Aug (43) 98.04 07m / 3600 117.86 | + 36 a water us Sep 102.21 6 kWh/mor 119.27 | Oct 106.38 Total = Su 1th (see Ta | 9) Nov 110.55 m(44) ₁₁₂ = ables 1b, 1 151.73 | 4.3 Dec 114.73 c, 1d) 164.77 | | (4 |
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| Energy lost from wate | r storage | , kWh/ye | ear | | | (47) x (51) |) x (52) x (| 53) = | | 0 | | (54) |
|--|--|--|--|--|--|--|--|---|---|---|---------------|--|
| Enter (50) or (54) in (| 55) | | | | | | | | | 0 | | (55) |
| Water storage loss ca | lculated f | or each | month | | | ((56)m = (| (55) × (41)r | m | | | | |
| (56)m= 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (56) |
| If cylinder contains dedicate | ed solar stor | rage, (57)ı | m = (56)m | x [(50) – (| H11)] ÷ (5 | 0), else (5 | 7)m = (56) | m where (| H11) is fro | m Append | ix H | |
| (57)m= 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (57) |
| Primary circuit loss (a | nnual) fro | m Table | 3 | | | | | | | 0 | | (58) |
| Primary circuit loss ca | lculated f | or each | month (| 59)m = (| (58) ÷ 36 | 65 × (41) | m | | | | | |
| (modified by factor f | rom Tabl | e H5 if t | here is s | solar wat | ter heatii | ng and a | cylinde | thermo | stat) | | 1 | |
| (59)m = 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (59) |
| Combi loss calculated | for each | month (| (61)m = | (60) ÷ 36 | 65 × (41) |)m | | | | | | |
| (61)m= 23.6 21.29 | 23.51 | 22.68 | 23.38 | 22.55 | 23.25 | 23.33 | 22.61 | 23.44 | 22.77 | 23.57 | | (61) |
| Total heat required for | water he | eating ca | alculated | for eac | h month | (62)m = | 0.85 × (| 45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= 193.73 170.09 | 177.06 | 156.55 | 151.83 | 133.39 | 125.96 | 141.19 | 141.88 | 162.44 | 174.5 | 188.34 | | (62) |
| Solar DHW input calculated | l using Appe | endix G oı | Appendix | H (negati | ve quantity | /) (enter '0 | ' if no sola | r contribut | ion to wate | er heating) | | |
| (add additional lines if | FGHRS | and/or \ | WWHRS | applies | , see Ap | pendix (| 3) | | | | | |
| (63)m= 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output from water hea | ater | | - | - | - | - | - | | - | - | | |
| (64)m= 193.73 170.09 | 177.06 | 156.55 | 151.83 | 133.39 | 125.96 | 141.19 | 141.88 | 162.44 | 174.5 | 188.34 | | |
| | • | | | | | Outp | out from wa | ater heate | r (annual) ₁ | 12 | 1916.97 | (64) |
| Heat gains from water | heating, | kWh/m | onth 0.2 | 5 ′ [0.85 | × (45)m | + (61)m | nl + 0.8 x | (46)m | + (57)m | + (59)m | 1 | |
| | | | | | (, | (- , , . , | ., | . [() | () | () | 1 | |
| (65)m= 62.47 54.8 | 56.93 | 50.18 | 48.56 | 42.49 | 39.96 | 45.02 | 45.31 | 52.08 | 56.14 | 60.68 | 1 | (65) |
| (65)m= 62.47 54.8 include (57)m in cal | | | | 42.49 | 39.96 | 45.02 | 45.31 | 52.08 | 56.14 | 60.68 | | (65) |
| ` ' | culation c | of (65)m | only if c | 42.49 | 39.96 | 45.02 | 45.31 | 52.08 | 56.14 | 60.68 | | (65) |
| include (57)m in cal 5. Internal gains (se | culation of the Table 5 | of (65)m and 5a | only if c | 42.49 | 39.96 | 45.02 | 45.31 | 52.08 | 56.14 | 60.68 | | (65) |
| include (57)m in cal | culation of the Table 5 | of (65)m and 5a | only if c | 42.49 | 39.96 | 45.02 | 45.31 | 52.08 | 56.14 | 60.68 | | (65) |
| include (57)m in cal 5. Internal gains (se | culation ce Table 5 | of (65)m and 5a | only if c | 42.49 ylinder i | 39.96 s in the o | 45.02 dwelling | 45.31 or hot w | 52.08 ater is fr | 56.14 om com | 60.68 munity h | | (65) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 | culation ce Table 5 e 5), Watt Mar 177.08 | of (65)m and 5a ts Apr 177.08 | only if c): May 177.08 | Jun | 39.96 s in the o | 45.02 dwelling Aug 177.08 | 45.31 or hot w Sep 177.08 | 52.08 ater is fr | 56.14 om com | 60.68 munity h | | |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb | culation ce Table 5 e 5), Watt Mar 177.08 | of (65)m and 5a ts Apr 177.08 | only if c): May 177.08 | Jun | 39.96 s in the o | 45.02 dwelling Aug 177.08 | 45.31 or hot w Sep 177.08 | 52.08 ater is fr | 56.14 om com | 60.68 munity h | | |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calculate) (67)m= 77.9 69.19 | e Table 5 e 5), Watt Mar 177.08 ated in Ap | of (65)m and 5a ts Apr 177.08 opendix 42.6 | only if construction only if c | Jun 177.08 ion L9 0 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 | 45.02 dwelling Aug 177.08 lso see | 45.31 or hot w Sep 177.08 Table 5 50.68 | 52.08 ater is fr Oct 177.08 | 56.14 om com Nov 177.08 | 60.68 munity h | | (66) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calculate) (67)m= 77.9 69.19 Appliances gains (calculate) | e Table 5 e 5), Watt Mar 177.08 ated in Ap | and 5a and 5a as Apr 177.08 opendix 42.6 Append | only if construction only if construction only if construction on the construction of the construction on the construction of | Jun 177.08 ion L9 o 26.88 uation L | 39.96 s in the o Jul 177.08 r L9a), a 29.05 | 45.02 dwelling Aug 177.08 lso see 37.76 3a), also | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal | 52.08 ater is fr Oct 177.08 | 56.14 om com Nov 177.08 | 60.68 munity h | | (66) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calculate) (67)m= 77.9 69.19 Appliances gains (calculate) (68)m= 497.12 502.28 | culation of the Earth of the Ea | and 5a ts Apr 177.08 opendix 42.6 Append 461.6 | only if c May 177.08 L, equati 31.84 dix L, eq 426.67 | Jun 177.08 ion L9 o 26.88 uation L 393.84 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 13 or L1 371.9 | 45.02 dwelling 177.08 lso see 37.76 3a), also | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal 379.74 | 52.08 ater is fr Oct 177.08 64.35 ble 5 407.42 | 56.14 om com Nov 177.08 | 60.68 munity h | | (66) (67) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calculate) (67)m= 77.9 69.19 Appliances gains (calculate) (68)m= 497.12 502.28 Cooking gains (calculate) | culation of the culation of th | Apr 177.08 pendix 42.6 Append 461.6 ppendix | only if constructions only if constructions only if constructions on the construction of the construction on the construction of the construction on the construction on the construction of the construction on the construction of the construction on the construction on the construction on the construction on the construction of the construction | Jun 177.08 ion L9 o 26.88 uation L 393.84 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) | 45.02 dwelling 177.08 lso see 37.76 3a), also 366.74 | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tall 379.74 ee Table | 52.08 ater is fr Oct 177.08 64.35 ole 5 407.42 5 | 56.14 om com Nov 177.08 75.1 | 60.68 munity h Dec 177.08 80.06 | | (66) (67) (68) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calcula (67)m= 77.9 69.19 Appliances gains (calcula (68)m= 497.12 502.28 Cooking gains (calcula (69)m= 55.66 55.66 | culation of the culation of th | and 5a ts Apr 177.08 opendix 42.6 Append 461.6 opendix 55.66 | only if c May 177.08 L, equati 31.84 dix L, eq 426.67 | Jun 177.08 ion L9 o 26.88 uation L 393.84 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 13 or L1 371.9 | 45.02 dwelling 177.08 lso see 37.76 3a), also | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal 379.74 | 52.08 ater is fr Oct 177.08 64.35 ble 5 407.42 | 56.14 om com Nov 177.08 | 60.68 munity h | | (66) (67) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calculate) (67)m= 77.9 69.19 Appliances gains (calculate) (68)m= 497.12 502.28 Cooking gains (calculate) (69)m= 55.66 55.66 Pumps and fans gains | culation of the Earth of the Ea | and 5a ts Apr 177.08 opendix 42.6 Append 461.6 opendix 55.66 | only if construction only if c | Jun 177.08 ion L9 o 26.88 uation L 393.84 ion L15 55.66 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) 55.66 | 45.02 dwelling 177.08 lso see 37.76 3a), also 366.74), also se 55.66 | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal 379.74 ee Table 55.66 | 52.08 ater is fr Oct 177.08 64.35 ble 5 407.42 5 55.66 | 56.14 om com Nov 177.08 75.1 442.35 | Dec 177.08 80.06 475.18 | | (66) (67) (68) (69) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calcula (67)m= 77.9 69.19 Appliances gains (calcula (68)m= 497.12 502.28 Cooking gains (calcula (69)m= 55.66 55.66 Pumps and fans gains (70)m= 10 10 | culation of the culation of th | and 5a ts Apr 177.08 pendix 42.6 Append 461.6 pendix 55.66 ia) | only if construction only if c | Jun 177.08 ion L9 o 26.88 uation L 393.84 ion L15 55.66 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) | 45.02 dwelling 177.08 lso see 37.76 3a), also 366.74 | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tall 379.74 ee Table | 52.08 ater is fr Oct 177.08 64.35 ole 5 407.42 5 | 56.14 om com Nov 177.08 75.1 | 60.68 munity h Dec 177.08 80.06 | | (66) (67) (68) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calculate) (67)m= 77.9 69.19 Appliances gains (calculate) (68)m= 497.12 502.28 Cooking gains (calculate) (69)m= 55.66 55.66 Pumps and fans gains (70)m= 10 10 Losses e.g. evaporation | culation of the culation of th | and 5a an | only if construction only if c | Jun 177.08 ion L9 o 26.88 uation L 393.84 ion L15 55.66 | 39.96 s in the of Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) 55.66 | 45.02 dwelling 177.08 lso see 37.76 3a), also 366.74), also se 55.66 | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal 379.74 ee Table 55.66 | 52.08 ater is fr Oct 177.08 64.35 ble 5 407.42 5 55.66 | 56.14 om com Nov 177.08 75.1 442.35 55.66 | 60.68 munity h Dec 177.08 80.06 475.18 55.66 | | (66) (67) (68) (69) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calculate) (67)m= 77.9 69.19 Appliances gains (calculate) (68)m= 497.12 502.28 Cooking gains (calculate) (69)m= 55.66 55.66 Pumps and fans gains (70)m= 10 10 Losses e.g. evaporation (71)m= -118.06 -118.06 | culation of the English Coulation of the English Coulated in Applicated | and 5a an | only if construction only if c | Jun 177.08 ion L9 o 26.88 uation L 393.84 ion L15 55.66 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) 55.66 | 45.02 dwelling 177.08 lso see 37.76 3a), also 366.74), also se 55.66 | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal 379.74 ee Table 55.66 | 52.08 ater is fr Oct 177.08 64.35 ble 5 407.42 5 55.66 | 56.14 om com Nov 177.08 75.1 442.35 | Dec 177.08 80.06 475.18 | | (66) (67) (68) (69) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calcula (67)m= 77.9 69.19 Appliances gains (calcula (68)m= 497.12 502.28 Cooking gains (calcula (69)m= 55.66 55.66 Pumps and fans gains (70)m= 10 10 Losses e.g. evaporatic (71)m= -118.06 -118.06 Water heating gains (**) | culation of the culation of th | and 5a ts Apr 177.08 pendix 42.6 Append 461.6 opendix 55.66 (a) 10 ive valu | only if construction only if c | Jun 177.08 ion L9 o 26.88 uation L 393.84 ion L15 55.66 10 lle 5) | 39.96 s in the of Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) 55.66 | 45.02 dwelling 177.08 lso see 37.76 3a), also 366.74), also se 55.66 | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tall 379.74 ee Table 55.66 10 -118.06 | 52.08 ater is fr Oct 177.08 64.35 ole 5 407.42 5 55.66 10 | 56.14 om com Nov 177.08 75.1 442.35 55.66 10 | 60.68 munity h Dec 177.08 80.06 475.18 55.66 10 | | (66) (67) (68) (69) (70) (71) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table | culation of the Earth of the Ea | and 5a an | only if construction only if c | Jun 177.08 ion L9 o 26.88 uation L 393.84 ion L15 55.66 10 le 5) -118.06 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) 55.66 10 -118.06 | 45.02 dwelling 177.08 lso see 37.76 3a), also 366.74), also se 55.66 | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal 379.74 ee Table 55.66 10 -118.06 | 52.08 ater is fr Oct 177.08 64.35 ble 5 407.42 5 55.66 10 -118.06 | 56.14 om com Nov 177.08 75.1 442.35 55.66 10 -118.06 | 60.68 munity h Dec 177.08 80.06 475.18 55.66 10 -118.06 | | (66) (67) (68) (69) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table Jan Feb (66)m= 177.08 177.08 Lighting gains (calcula (67)m= 77.9 69.19 Appliances gains (calcula (68)m= 497.12 502.28 Cooking gains (calcula (69)m= 55.66 55.66 Pumps and fans gains (70)m= 10 10 Losses e.g. evaporation (71)m= -118.06 -118.06 Water heating gains ((72)m= 83.96 81.55 Total internal gains = | culation of the Earth of the Ea | and 5a ts Apr 177.08 pendix 42.6 Append 461.6 pendix 55.66 ia) 10 ive valu -118.06 | only if construction only if c | Jun 177.08 ion L9 o 26.88 uation L 393.84 tion L15 55.66 10 lle 5) -118.06 | 39.96 s in the of Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) 55.66 10 -118.06 | 45.02 dwelling Aug 177.08 lso see 37.76 3a), also 366.74), also se 55.66 10 -118.06 60.51 1 + (68)m - | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal 379.74 ee Table 55.66 10 -118.06 62.93 + (69)m + (| 52.08 ater is fr Oct 177.08 64.35 ole 5 407.42 5 55.66 10 -118.06 70 70)m + (7 | 56.14 om com Nov 177.08 75.1 442.35 55.66 10 -118.06 77.98 1)m + (72) | 60.68 munity h Dec 177.08 80.06 475.18 55.66 10 -118.06 81.56 m | | (66) (67) (68) (69) (70) (71) |
| include (57)m in cal 5. Internal gains (see Metabolic gains (Table | culation of the Earth of the Ea | and 5a ts Apr 177.08 pendix 42.6 Append 461.6 opendix 55.66 (a) 10 ive valu | only if construction only if c | Jun 177.08 ion L9 o 26.88 uation L 393.84 ion L15 55.66 10 le 5) -118.06 | 39.96 s in the o Jul 177.08 r L9a), a 29.05 13 or L1 371.9 or L15a) 55.66 10 -118.06 | 45.02 dwelling 177.08 lso see 37.76 3a), also 366.74), also se 55.66 | 45.31 or hot w Sep 177.08 Table 5 50.68 o see Tal 379.74 ee Table 55.66 10 -118.06 | 52.08 ater is fr Oct 177.08 64.35 ble 5 407.42 5 55.66 10 -118.06 | 56.14 om com Nov 177.08 75.1 442.35 55.66 10 -118.06 | 60.68 munity h Dec 177.08 80.06 475.18 55.66 10 -118.06 | | (66) (67) (68) (69) (70) (71) |

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

| Orientation: | Access Factor Table 6d | | Area m² | | Flux Table 6a | | g_ Table 6b | | FF Table 6c | | Gains (W) | |
|----------------|---------------------------|---|------------|---|------------------|---|----------------|---|----------------|----------|--------------|------|
| North 0.9 | x 0.77 | X | 6.89 | x | 10.63 | x | 0.63 | x | 0.7 |] = | 22.39 | (74) |
| North 0.9 | × 0.77 | X | 6.89 | x | 20.32 | х | 0.63 | х | 0.7 |] = | 42.79 | (74) |
| North 0.9 | × 0.77 | X | 6.89 | x | 34.53 | х | 0.63 | x | 0.7 |] = | 72.71 | (74) |
| North 0.9 | × 0.77 | X | 6.89 | x | 55.46 | x | 0.63 | x | 0.7 | = | 116.79 | (74) |
| North 0.9 | × 0.77 | X | 6.89 | x | 74.72 | х | 0.63 | x | 0.7 | = | 157.33 | (74) |
| North 0.9 | × 0.77 | X | 6.89 | x | 79.99 | х | 0.63 | x | 0.7 |] = | 168.42 | (74) |
| North 0.9 | × 0.77 | X | 6.89 | x | 74.68 | x | 0.63 | x | 0.7 | <u> </u> | 157.24 | (74) |
| North 0.9 | × 0.77 | X | 6.89 | x | 59.25 | x | 0.63 | x | 0.7 |] = | 124.75 | (74) |
| North 0.9 | x 0.77 | X | 6.89 | x | 41.52 | x | 0.63 | x | 0.7 |] = | 87.42 | (74) |
| North 0.9 | x 0.77 | X | 6.89 | x | 24.19 | x | 0.63 | X | 0.7 | = | 50.94 | (74) |
| North 0.9 | x 0.77 | X | 6.89 | x | 13.12 | X | 0.63 | X | 0.7 | = | 27.62 | (74) |
| North 0.9 | x 0.77 | X | 6.89 | x | 8.86 | x | 0.63 | x | 0.7 | = | 18.67 | (74) |
| East 0.9 | x 0.77 | X | 0.48 | x | 19.64 | X | 0.63 | x | 0.7 | = | 2.88 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 38.42 | X | 0.63 | x | 0.7 | = | 5.64 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 63.27 | x | 0.63 | x | 0.7 | = | 9.28 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 92.28 | X | 0.63 | x | 0.7 | = | 13.54 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 113.09 | X | 0.63 | X | 0.7 | = | 16.59 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 115.77 | x | 0.63 | x | 0.7 | = | 16.98 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 110.22 | X | 0.63 | X | 0.7 | = | 16.17 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 94.68 | X | 0.63 | X | 0.7 | = | 13.89 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 73.59 | x | 0.63 | x | 0.7 | = | 10.8 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 45.59 | x | 0.63 | X | 0.7 | = | 6.69 | (76) |
| East 0.9 | × 0.77 | X | 0.48 | x | 24.49 | x | 0.63 | x | 0.7 |] = | 3.59 | (76) |
| East 0.9 | x 0.77 | X | 0.48 | x | 16.15 | x | 0.63 | x | 0.7 | = | 2.37 | (76) |
| South 0.9 | × 0.77 | X | 12.17 | x | 46.75 | x | 0.63 | x | 0.7 |] = | 173.89 | (78) |
| South 0.9 | × 0.77 | X | 12.17 | x | 76.57 | x | 0.63 | X | 0.7 | = | 284.78 | (78) |
| South 0.9 | × 0.77 | X | 12.17 | x | 97.53 | x | 0.63 | x | 0.7 |] = | 362.76 | (78) |
| South 0.9 | × 0.77 | X | 12.17 | x | 110.23 | x | 0.63 | X | 0.7 | = | 410 | (78) |
| South 0.9 | × 0.77 | X | 12.17 | x | 114.87 | x | 0.63 | X | 0.7 |] = | 427.24 | (78) |
| South 0.9 | x 0.77 | X | 12.17 | x | 110.55 | x | 0.63 | x | 0.7 | = | 411.16 | (78) |
| South 0.9 | x 0.77 | X | 12.17 | x | 108.01 | x | 0.63 | x | 0.7 | = | 401.73 | (78) |
| South 0.9 | x 0.77 | X | 12.17 | x | 104.89 | x | 0.63 | x | 0.7 | = | 390.14 | (78) |
| South 0.9 | x 0.77 | X | 12.17 | x | 101.89 | x | 0.63 | x | 0.7 | = | 378.94 | (78) |
| South 0.9 | x 0.77 | X | 12.17 | x | 82.59 | x | 0.63 | x | 0.7 | = | 307.16 | (78) |
| South 0.9 | x 0.77 | X | 12.17 | x | 55.42 | x | 0.63 | x | 0.7 | = | 206.11 | (78) |
| South 0.9 | x 0.77 | X | 12.17 | x | 40.4 | x | 0.63 | x | 0.7 |] = | 150.25 | (78) |
| Rooflights 0.9 | x 1 | X | 0.42 | x | 18.63 | x | 0.63 | x | 0.7 |] = | 3.11 | (82) |
| Rooflights 0.9 | x 1 | X | 1.12 | x | 37.5 | x | 0.63 | x | 0.7 |] = | 16.67 | (82) |
| Rooflights 0.9 | x 1 | X | 0.42 | × | 36.69 | x | 0.63 | x | 0.7 | = | 6.12 | (82) |
| | | | | | | | | | | | | |

| Rooflights 0.9x | | _ | | | | | 7 | | _ | | | | (oo) |
|----------------------------|---------------|----------|-------------|----------|---------------|---|----------|----------------|--------|---------------|--------|-------|-------------|
| <u>L</u> | 1 | × | 1.1 | | X | 71.32 | X | 0.63 | × | 0.7 | = | 31.7 | (82) |
| Rooflights 0.9x | 1 | X | 0.4 | | X | 67.99 | X | 0.63 | × | 0.7 | = | 11.33 | (82) |
| Rooflights 0.9x | 1 | × | 1.1 | | X | 114.1 | X | 0.63 | × | 0.7 | = | 50.72 | (82) |
| Rooflights 0.9x | 1 | X | 0.4 | == | X | 121.67 | X | 0.63 | × | 0.7 | = | 20.28 | (82) |
| Rooflights 0.9x | 1 | X | 1.1 | 2 | X | 163.8 | X | 0.63 | X | 0.7 | = | 72.81 | (82) |
| Rooflights 0.9x | 1 | X | 0.4 | 2 | X | 175.93 | X | 0.63 | X | 0.7 | = | 29.33 | (82) |
| Rooflights 0.9x | 1 | X | 1.1 | 2 | X | 200.12 | X | 0.63 | X | 0.7 | = | 88.96 | (82) |
| Rooflights _{0.9x} | 1 | X | 0.4 | 2 | X | 193.56 | X | 0.63 | X | 0.7 | = | 32.27 | (82) |
| Rooflights _{0.9x} | 1 | X | 1.1 | 2 | X | 204.97 | X | 0.63 | X | 0.7 | = | 91.12 | (82) |
| Rooflights 0.9x | 1 | X | 0.4 | 2 | X | 178.64 | X | 0.63 | X | 0.7 | = | 29.78 | (82) |
| Rooflights _{0.9x} | 1 | X | 1.1 | 2 | X | 195.07 | X | 0.63 | X | 0.7 | = | 86.71 | (82) |
| Rooflights 0.9x | 1 | X | 0.4 | 2 | X | 134.3 | X | 0.63 | X | 0.7 | = | 22.39 | (82) |
| Rooflights 0.9x | 1 | X | 1.1 | 2 | X | 167.69 | X | 0.63 | X | 0.7 | = | 74.54 | (82) |
| Rooflights 0.9x | 1 | X | 0.4 | 2 | X | 85.46 | X | 0.63 | x | 0.7 | = | 14.25 | (82) |
| Rooflights 0.9x | 1 | X | 1.1 | 2 | X | 131.62 | X | 0.63 | x | 0.7 | | 58.51 | (82) |
| Rooflights 0.9x | 1 | × | 0.4 | 2 | X | 44.9 | X | 0.63 | x | 0.7 | = | 7.48 | (82) |
| Rooflights 0.9x | 1 | x | 1.1 | 2 | X | 83.59 | X | 0.63 | x | 0.7 | = | 37.16 | (82) |
| Rooflights 0.9x | 1 | x | 0.4 | 2 | X | 23.1 | X | 0.63 | x | 0.7 | = | 3.85 | (82) |
| Rooflights 0.9x | 1 | × | 1.1 | 2 | X | 46.35 | j x | 0.63 | x | 0.7 | _ | 20.61 | (82) |
| Rooflights 0.9x | 1 | × | 0.4 | 2 | X | 15.49 | X | 0.63 | × | 0.7 | _ | 2.58 | (82) |
| Rooflights 0.9x | 1 | × | 1.1 | 2 | X | 31.13 | X | 0.63 | × | 0.7 | = | 13.84 | (82) |
| L | | | | | | | _ | | | | | | |
| Solar gains in | watte calc | ulated | for each | n month | 1 | | (83)m | n = Sum(74)m . | (82)m | | | | |
| (83)m= 218.93 | | 06.81 | 633.42 | 719.44 | | 19.95 691.63 | 625 | | 409.4 | 3 261.78 | 187.71 | | (83) |
| Total gains – i | nternal and | d solar | (84)m = | : (73)m | + (| B3)m , watts | | <u>!</u> | | _! | ļ. | | |
| (84)m= 1002.6 | 1148.72 12 | 253.56 | 1332 | 1367.9 | 13 | 324.37 1270.99 | 121 | 5.41 1167.95 | 1075.8 | 7 981.9 | 949.19 | | (84) |
| 7. Mean inter | nal temper | aturo (| heating | 20220 | 2) | | <u> </u> | | | | | | |
| | | | | | | area from Tal | hla 0 | Th1 (°C) | | | | 21 | (85) |
| Utilisation fac | • | • | | | _ | | DIC 3 | , 1111 (0) | | | | 21 | (00) |
| Jan | | Mar | Apr | May | Ť | Jun Jul | ΤΛ | ug Sep | Oct | Nov | Dec | | |
| (86)m= 0.96 | | 0.92 | 0.88 | 0.81 | + | 0.69 0.56 | 0.5 | | 0.89 | 0.95 | 0.97 | | (86) |
| | <u> </u> | Ļ | ! | | | | | | 0.03 | 0.93 | 0.97 | | (00) |
| Mean interna | | | | <u> </u> | $\overline{}$ | i | 1 | | | | | 1 | (0=) |
| (87)m= 18.54 | 18.81 1 | 19.22 | 19.76 | 20.27 | 2 | 20.68 20.87 | 20. | 84 20.54 | 19.89 | 19.12 | 18.49 | | (87) |
| Temperature | during hea | ating pe | eriods in | rest of | dw | elling from Ta | able 9 | 9, Th2 (°C) | | | | | |
| (88)m= 19.92 | 19.93 1 | 19.93 | 19.94 | 19.94 | 1 | 9.95 19.95 | 19. | 95 19.95 | 19.94 | 19.94 | 19.93 | | (88) |
| Utilisation fac | ctor for gain | ns for r | est of dy | welling, | h2. | m (see Table | 9a) | | | | | | |
| (89)m= 0.96 | | 0.91 | 0.86 | 0.77 | $\overline{}$ | 0.62 0.45 | 0.4 | 19 0.7 | 0.87 | 0.94 | 0.96 | | (89) |
| Mean interna | l temnerati | ıre in t | he rest : | of dwel | lina | T2 (follow sta | one 3 | to 7 in Tahl | P 9c) | | | • | |
| (90)m= 16.65 | | 17.63 | 18.41 | 19.11 | Ť | 9.65 19.86 | 19. | | 18.6 | 17.5 | 16.58 | | (90) |
| (12) | 1 | | | | | 1 | 1 | | | ving area ÷ (| | 0.1 | (91) |
| | | | | | منالد | م/ ال ۸ T1 | . /4 | fl A) TO | | • | | | ` ′ |

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

| (92)m= | 16.83 | 17.2 | 17.78 | 18.54 | 19.22 | 19.74 | 19.96 | 19.93 | 19.59 | 18.72 | 17.65 | 16.76 | | (92) |
|-------------|--------------|-------------------|---------------------|-------------|----------|-----------|----------|------------|-----------------------|-----------------------|-------------------------|------------------------|----------|--------|
| Apply a | adjustm | ent to th | he mean | internal | temper | ature fro | m Table | 4e, whe | ere appro | priate | | | | |
| (93)m= | 16.68 | 17.05 | 17.63 | 18.39 | 19.07 | 19.59 | 19.81 | 19.78 | 19.44 | 18.57 | 17.5 | 16.61 | | (93) |
| 8. Spa | ce heat | ing requ | uirement | | | | | | | | | | | |
| | | | | | | ed at ste | ep 11 of | Table 9l | b, so tha | t Ti,m=(| 76)m an | d re-calc | ulate | |
| the util | isation | factor fo | or gains | using Ta | ble 9a | | | | | | , | | l | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| | - 1 | Ť | ains, hm | | | | | г | | | 1 | | l | |
| (94)m= | 0.93 | 0.91 | 0.88 | 0.82 | 0.73 | 0.59 | 0.44 | 0.47 | 0.67 | 0.83 | 0.91 | 0.94 | | (94) |
| | | | W = (94) | <u> </u> | | 1 | | 1 | | | | | 1 | (0-) |
| ` ' | | 1045.68 | 1098.36 | 1091.08 | 997.1 | 781.35 | 553.91 | 572.86 | 778.17 | 892.84 | 893.39 | 892.91 | | (95) |
| | | | rnal tem | | | | | 1 | | | | | 1 | (2.2) |
| (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) |
| _ | | | | | | i | -` / | | – (96)m | | 1 | | | (07) |
| ` ′ | | | 2141.68 | | 1400.58 | 939.56 | 603.2 | 635.19 | 1008 | 1513.7 | 1983.51 | 2377.03 | | (97) |
| | | | | | | | | |)m – (95 | | | | l | |
| (98)m= 1 | 1083.07 | 871.54 | 776.23 | 514.2 | 300.19 | 0 | 0 | 0 | 0 | 461.92 | 784.89 | 1104.19 | | _ |
| | | | | | | | | Tota | l per year | (kWh/yeai | r) = Sum(9 | 8) _{15,912} = | 5896.23 | (98) |
| Space | heating | g require | ement in | kWh/m² | /year | | | | | | | | 36.45 | (99) |
| 9a. Ene | rgy reg | uiremen | nts – Indi | vidual h | eating s | ystems i | ncluding | micro-C | CHP) | | | | | |
| | heatin | | | | <u> </u> | , | | | , | | | | | |
| • | | _ | it from se | econdar | y/supple | mentary | system | | | | | | 0.1 | (201) |
| Fractio | n of sp | ace hea | it from m | ain syst | em(s) | | | (202) = 1 | - (201) = | | | i | 0.9 | (202) |
| Fractio | n of tot | al heatir | ng from i | main sys | stem 1 | | | (204) = (2 | 02) × [1 – | (203)] = | | i | 0.9 | (204) |
| | | | ace heati | • | | | | | | | | i I | 92.9 | (206) |
| | • | • | ry/supple | | | a evetor | 0/- | | | | | l I | 65 | (208) |
| Г | ' | | | | | _ | | <u> </u> | | | T | | | ┛` |
| Ĺ | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | kWh/ye | ar |
| · - | | | ement (c | | | | | | | 404.00 | T 704.00 | | | |
| Ľ | 1083.07 | 871.54 | 776.23 | 514.2 | 300.19 | 0 | 0 | 0 | 0 | 461.92 | 784.89 | 1104.19 | | |
| ` ′ – | | | 4)] } x 1 | <u> </u> | | | | | | | 1 | | l | (211) |
| | 1049.26 | 844.34 | 752 | 498.14 | 290.82 | 0 | 0 | 0 | 0 | 447.5 | 760.39 | 1069.72 | | _ |
| | | | | | | | | Tota | I (kWh/yea | ar) =Sum(2 | 211) _{15,1012} | <u>=</u> | 5712.17 | (211) |
| • | • | , | econdar | , , . | month | | | | | | | | | |
| · · · · · · | <u> </u> | | 00 ÷ (20 | | | | | | | | , | | ı | |
| (215)m= | 166.63 | 134.08 | 119.42 | 79.11 | 46.18 | 0 | 0 | 0 | 0 | 71.06 | 120.75 | 169.87 | | _ |
| | | | | | | | | Tota | I (kWh/yea | ar) =Sum(2 | 215) _{15,1012} | <u>=</u> | 907.11 | (215) |
| Water h | _ | | | | | | | | | | | | | |
| | | | ter (calc | | | | | | | | T | | l | |
| | 193.73 | 170.09 | 177.06 | 156.55 | 151.83 | 133.39 | 125.96 | 141.19 | 141.88 | 162.44 | 174.5 | 188.34 | | ٦. |
| Efficiend | - | | | | | | | | | | 1 | | 88 | (216) |
| (217)m= | 89.58 | 89.56 | 89.51 | 89.41 | 89.21 | 88 | 88 | 88 | 88 | 89.36 | 89.52 | 89.59 | | (217) |
| | | 0. | kWh/mo | | | | | | | | | | | |
| (219)m= | | n x 100 189.93 |) ÷ (217) 197.82 | m 175.09 | 170.2 | 151.58 | 143.13 | 160.45 | 161.23 | 181.79 | 194.93 | 210.22 | | |
| (219)111= | Z10.Z1 | 103.33 | 131.02 | 175.09 | 170.2 | 131.38 | 143.13 | | 161.23 Il = Sum(21 | | 194.93 | 210.22 | 0.450.00 | 7(2(5) |
| | | | | | | | | rota | ıı – Suili(2 | (3a) ₁₁₂ = | | | 2152.63 | (219) |

| Annual totals | | kWh/war | kWb/roor |
|--|--|--|----------------------------|
| Space heating fuel used, main system | n 1 | kWh/year | kWh/year 5712.17 |
| Space heating fuel used, secondary | | | 907.11 |
| Water heating fuel used | | | 2152.63 |
| Electricity for pumps, fans and electric | keep-hot | | |
| central heating pump: | | 120 | (230c) |
| boiler with a fan-assisted flue | | 45 | (230e) |
| Total electricity for the above, kWh/ye | ar sum of (23 | 0a)(230g) = | 165 (231) |
| Electricity for lighting | | | 550.28 (232) |
| Electricity generated by PVs | | | -1727.24 (233) |
| Total delivered energy for all uses (21 | 1)(221) + (231) + (232)(237b) = | | 7759.95 (338) |
| 10a. Fuel costs - individual heating s | ystems: | | |
| | Fuel kWh/year | Fuel Price (Table 12) | Fuel Cost £/year |
| Space heating - main system 1 | (211) x | 3.48 x 0.01 = | 198.78 (240) |
| Space heating - main system 2 | (213) x | 0 x 0.01 = | 0 (241) |
| Space heating - secondary | (215) x | 4.23 × 0.01 = | 38.37 (242) |
| Water heating cost (other fuel) | (219) | 3.48 × 0.01 = | 74.91 (247) |
| Pumps, fans and electric keep-hot | (231) | 13.19 x 0.01 = | 21.76 (249) |
| (if off-peak tariff, list each of (230a) to Energy for lighting | (230g) separately as applicable and ap | oply fuel price according to 13.19 × 0.01 = | |
| Additional standing charges (Table 12 | 2) | | 120 (251) |
| | one of (233) to (235) x) | 13.19 × 0.01 = | -227.82 (252) |
| Appendix Q items: repeat lines (253) a | and (254) as needed | | |
| Total energy cost | (245)(247) + (250)(254) = | | 298.59 (255) |
| 11a. SAP rating - individual heating s | systems | | |
| Energy cost deflator (Table 12) | | | 0.42 (256) |
| Energy cost factor (ECF) | $[(255) \times (256)] \div [(4) + 45.0] =$ | | 0.61 (257) |
| SAP rating (Section 12) | | | 91.54 (258) |
| 12a. CO2 emissions – Individual hea | iting systems including micro-CHP | | |
| | Energy kWh/year | Emission factor kg CO2/kWh | Emissions kg CO2/year |
| Space heating (main system 1) | (211) x | 0.216 = | 1233.83 (261) |
| Space heating (secondary) | (215) x | 0.019 = | 17.24 (263) |
| Water heating | (219) x | 0.216 = | 464.97 (264) |
| Space and water heating | (261) + (262) + (263) + (264) = | = | 1716.03 (265) |

| Electricity for pumps, fans and electric keep-hot | (231) x | 0.519 = | 85.64 (267) |
|---|---------|---------------------|---------------|
| Electricity for lighting | (232) x | 0.519 = | 285.59 (268) |
| Energy saving/generation technologies Item 1 | | 0.519 = | -896.44 (269) |
| Total CO2, kg/year | | sum of (265)(271) = | 1190.82 (272) |
| CO2 emissions per m ² | | (272) ÷ (4) = | 7.36 (273) |
| EI rating (section 14) | | | 92 (274) |

13a. Primary Energy

| | Energy kWh/year | Primary factor | P. Energy kWh/year |
|---|---------------------------------|-----------------------|------------------------------|
| Space heating (main system 1) | (211) x | 1.22 | 6968.85 (261) |
| Space heating (secondary) | (215) x | 1.04 = | 943.4 (263) |
| Energy for water heating | (219) x | 1.22 | 2626.21 (264) |
| Space and water heating | (261) + (262) + (263) + (264) = | | 10538.45 (265) |
| Electricity for pumps, fans and electric keep-hot | (231) x | 3.07 | 506.55 (267) |
| Electricity for lighting | (232) x | 0 = | 1689.35 (268) |
| Energy saving/generation technologies | | | |
| Item 1 | | 3.07 | -5302.63 (269) |
| 'Total Primary Energy | sum | of (265)(271) = | 7431.72 (272) |
| Primary energy kWh/m²/year | (272 | ?) ÷ (4) = | 45.94 (273) |