Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.16 Printed on 10 October 2018 at 11:32:21

Project Information:

Assessed By: Carlos Melgar (STRO031596) Building Type: Mid-terrace Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 115.56m²Site Reference:Kings Mews Be GreenPlot Reference:Plot 001

Address: 1, 10-11 Kings Mews, WC1N 2ES

Client Details:

Name: James Taylor

Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 23.86 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

11.81 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 54.2 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 38.3 kWh/m²

OK

2 Fabric U-values

| Element | Average | Highest | |
|---------------|------------------|------------------|----|
| External wall | 0.13 (max. 0.30) | 0.16 (max. 0.70) | OK |
| Party wall | 0.00 (max. 0.20) | - | OK |
| Floor | 0.13 (max. 0.25) | 0.13 (max. 0.70) | OK |
| Roof | 0.16 (max. 0.20) | 0.16 (max. 0.35) | OK |
| Openings | 1.37 (max. 2.00) | 1.40 (max. 3.30) | OK |

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.50 (design value)

Maximum 10.0 OK

4 Heating efficiency

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

Direct acting electric boiler

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 0.93 kWh/day

Permitted by DBSCG: 1.03 kWh/day OK

Primary pipework insulated: Yes OK

Regulations Compliance Report

| Controls | | | |
|--|--|-----------------------------------|----------|
| Space heating controls Hot water controls: | TTZC by plumbing and e Cylinderstat | electrical services | OK OK |
| Low energy lights | | | |
| Percentage of fixed lights with Minimum | low-energy fittings | 100.0% 75.0% | ок |
| Mechanical ventilation | | | |
| Continuous supply and extrac | t system | | |
| Specific fan power: | | 0.69 | |
| Maximum | | 1.5 | OK |
| MVHR efficiency: | | 88% | |
| Minimum | | 70% | OK |
| Summertime temperature | | | |
| Overheating risk (Thames val | ey): | Slight | OK |
| ased on: | | | |
| Overshading: | | Average or unknown | |
| Windows facing: South West | | 6.12m² | |
| Windows facing: North East | | 6.12m² | |
| Roof windows facing: Horizon | tal | 7.45m² | |
| Ventilation rate: | | 4.00 | |
| Blinds/curtains: | | Dark-coloured curtain or roller b | olind |
| | | Closed 100% of daylight hours | |
| 0 Key features | | | |
| Air permeablility | | 2.5 m³/m²h | |
| Doors U-value | | 1.09 W/m²K | |
| External Walls U-value | | 0.12 W/m²K | |
| Party Walls U-value | | 0 W/m²K | |
| Photovoltaic array | | | |

Predicted Energy Assessment

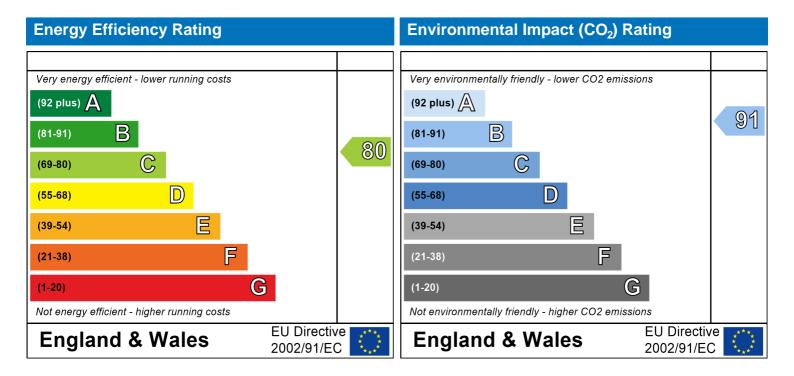


10-11 Kings Mews WC1N 2ES Dwelling type: Date of assessment: Produced by: Mid-terrace Ground floor Flat 19 July 2018 Carlos Melgar 115.56 m²

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.

Total floor area:

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 carbonn dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

| | | User | Details: | | | | | |
|---|---|------------------------|---------------------------|--------------------------|---------------|---------------|----------|--|
| Assessor Name: | Carlos Melgar | | Stroma N | umber: | STRO | 031596 | | |
| Software Name: | Stroma FSAP 2012 | <u>)</u> | Software | Version: | Versio | on: 1.0.4.16 | | |
| | | Property | Address: Plo | t 001 | | | | |
| Address : | 1, 10-11 Kings Mews | , WC1N 2ES | | | | | | |
| 1. Overall dwelling dime | ensions: | | | | | | | |
| Cround floor | | Are | ea(m²) | Av. Height | <u> </u> | Volume(m³ | <u>^</u> | |
| Ground floor | | | 72.89 (1a) | | (2a) = | 175.66 | (3a) | |
| First floor | | | 42.67 (1b) | х 3 | (2b) = | 128.01 | (3b) | |
| Total floor area TFA = (1 | a)+(1b)+(1c)+(1d)+(1e) | +(1n) | 115.56 (4) | | | | | |
| Dwelling volume | | | (3a) | +(3b)+(3c)+(3d)+(3d) | e)+(3n) = | 303.67 | (5) | |
| 2. Ventilation rate: | | | | 4-4-1 | | | | |
| | | condary eating | other | total | _ | m³ per hou | ır | |
| Number of chimneys | 0 + | 0 + | 0 | 0 | x 40 = | 0 | (6a) | |
| Number of open flues | 0 + | 0 + | 0 | 0 | x 20 = | 0 | (6b) | |
| Number of intermittent fa | ns | | | 0 | x 10 = | 0 | (7a) | |
| Number of passive vents | | | | 0 | x 10 = | 0 | (7b) | |
| Number of flueless gas fi | res | | | 0 | x 40 = | 0 | (7c) | |
| | | | | | | | | |
| 1.60 | (1) | . (0 .) . (7-) . (7 .) | (7-) | | , | nanges per ho | _ | |
| Infiltration due to chimne | ys, flues and fans = (6a, een carried out or is intended | | | 0 ue from (9) to (16) | ÷ (5) = | 0 | (8) | |
| Number of storeys in the | | , procedu to (17) | ouror wido corruir | ao | | 0 | (9) | |
| Additional infiltration | | | | | [(9)-1]x0.1 = | 0 | (10) | |
| | .25 for steel or timber fr | | , | | | 0 | (11) | |
| if both types of wall are pa deducting areas of openia | resent, use the value corresp ngs); if equal user 0.35 | onding to the grea | ater wall area (aft | er | | | | |
| = | floor, enter 0.2 (unseale | d) or 0.1 (sea | ed), else ente | er O | | 0 | (12) | |
| If no draught lobby, en | ter 0.05, else enter 0 | | | | | 0 | (13) | |
| <u> </u> | s and doors draught stri | pped | | | | 0 | (14) | |
| Window infiltration | | | 0.25 - [0.2 x (14 | | \ | 0 | (15) | |
| Infiltration rate | q50, expressed in cubic | n matrae nar h | . , , , , , | 0 + (12) + (13) + (15) | • | 0 | (16) | |
| If based on air permeabil | | | | e mene or enve | iope area | 2.5 0.12 | (17) | |
| • | s if a pressurisation test has | | | bility is being used | | 0.12 | (, | |
| Number of sides sheltered | ed | | | | | 4 | (19) | |
| Shelter factor | | | (20) = 1 - [0.07] | | | 0.7 | (20) | |
| Infiltration rate incorporat | | | $(21) = (18) \times (21)$ | J) = | | 0.09 | (21) | |
| Infiltration rate modified f | | Jun Jul | Aug | ep Oct 1 | Nov Dec |] | | |
| l l | | Jun Jul | Aug S | eh Oct I | Nov Dec | I | | |
| Monthly average wind sp | eed from Table / | | | | - | 1 | | |

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

| 2a)m = 0 | (22)m ÷ | 4 | | | | | | | | | | |
|----------------------------------|---|--|---------------------------------------|--|--|---|---|--|--|--|---|---|
| 1.25 | 1.23 | 1.1 | 1.08 | 0.95 | 0.95 | 0.92 | 1 | 1.08 | 1.12 | 1.18 | | |
| tion rate | e (allowi | na for st | nelter an | d wind s | speed) = | : (21a) x | (22a)m | | - | | | |
| 0.11 | 0.11 | 0.1 | 0.09 | 0.08 | 0.08 | 0.08 | 0.09 | 0.09 | 0.1 | 0.1 | | |
| | • | rate for t | he appli | cable ca | se | | | ļ . | <u>I</u> | | | _ |
| | | andiv N. (2 | 2h) _ (22a |) Em. (a | aguation (| NEV othou | auioo (22h | s) = (22a) | | | 0.5 | (23a) |
| | 0 | | , , | , | . ` | ,, . | , |)) = (23a) | | | | (23b) |
| | • | - | _ | | | | | 2h\m + (| 23P) ^ [| 1 (22a) | | (23c) |
| 0.24 | 0.23 | 0.22 | 0.22 | 0.21 | 0.21 | 0.21 | 0.21 | 0.22 | 0.22 | 0.23 | - 100] | (24a) |
| | | | | heat rec | coverv (I | MV) (24b |)m = (2 | 2b)m + (2 | L 23b) | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24b) |
| use ext | ract ven | tilation o | or positiv | re input v | ventilatio | on from c | utside | | | | | |
| < 0.5 × | (23b), t | hen (24 | c) = (23b |); other | vise (24 | c) = (22b |) m + 0 | .5 × (23b |) | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24c) |
| | | | • | • | | | | 0.51 | | | | |
| | <u>`</u> | · ` | | <u> </u> | | T | | - | 0 | 0 | | (24d) |
| | | | | | | | | | | | | ` , |
| 0.24 | 0.23 | 0.22 | 0.22 | 0.21 | 0.21 | 0.21 | 0.21 | 0.22 | 0.22 | 0.23 | | (25) |
| and he | at loss p | paramete | er: | | | | | | | | | |
| | _ | Openin | as | Net Ar | 00 | I I I | _ | | | | | V I. |
| area | (m²) | · m | | A,r | | U-valı W/m2 | | A X U (W/I | K) | k-value kJ/m²-ł | | |
| alea | (m²) | | | | | W/m2 | | | <) | | | |
| area (| (m²) | | | A ,r | m² x | W/m2 | K = | (W/I | <) | | | /K |
| | (m²) | | | A ,r | m² x x1 | W/m2 1.09 | K = 0.04] = | (W/l 2.289 | <) | | | /K (26) |
| 1 | (m²) | | | A ,r 2.1 6.12 | m² x x1 x1 | W/m2 1.09 1/[1/(1.4)+ | K = 0.04] = 0.04] = | (W/F 2.289 8.11 | <) | | | (26) (27) (27) |
| 1 | (m²) | | | A ,r 2.1 6.12 | m ² | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ | K = 0.04] = 0.04] = | (W/F 2.289 8.11 8.11 | | | | (26) (27) (27) (27b) |
| 1 | | | | A ,r 2.1 6.12 6.12 7.45 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + | K = 0.04] = 0.04] = 0.04] = | (W/F 2.289 8.11 8.11 10.43 | | kJ/m²-ŀ | (kJ, | (26) (27) (27) (27b) (28) |
| 1 | 8 | m | | A ,r 2.1 6.12 6.12 7.45 72.89 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + | K = 0.04] = 0.04] = 0.04] = = = = | (W/N 2.289 8.11 8.11 10.43 9.47569 | | kJ/m²-ŀ | (kJ, | (K (26) (27) (27) (27b) (28) (29) |
| 1 2 40.18 | 8 1 | 12.2 | | A ,r 2.1 6.12 6.12 7.45 72.89 | m ² | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 1/[1/(1.4) + 0.13 0.16 | K = 0.04] = 0.04] = 0.04] = = = = = = | (W/N 2.289 8.11 8.11 10.43 9.47569 4.47 | | 49.5 | 8017.9 1383.0 | (K (26) (27) (27) (27b) (28) (3 (29) (29) |
| 1 2 40.18 36.3 | 8 1 9 | 12.24 2.1 | 4 | A ,r 2.1 6.12 6.12 7.45 72.89 27.94 34.21 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.13 0.16 0.14 | K = 0.04] = 0.04] = = = = = = = = | (W/H 2.289 8.11 8.11 10.43 9.47569 4.47 4.84 | | 110 49.5 49.5 | 8017.9 1383.0 1693.4 | (K (26) (27) (27) (27b) (28) (3 (29) (29) |
| 1 2 40.18 36.3 59.79 | 8 1 9 | 12.2- 2.1 0 | 4 | A ,r 2.1 6.12 7.45 72.89 27.94 34.21 59.79 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.13 0.16 0.14 0.12 | K = 0.04] = 0.04] = = = = = = = = = | (W/N 2.289 8.11 8.11 10.43 9.47569 4.47 4.84 7.17 | | 110 49.5 49.5 | 8017.9 1383.0 1693.4 1016.4 | (K (26) (27) (27) (27b) (28) (3) (29) (30) |
| 1 2 40.18 36.3 59.79 | 8 1 9 1 | 12.2-2 2.1 0 7.45 | 4 | A ,r 2.1 6.12 7.45 72.89 27.94 34.21 59.79 2.76 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.13 0.16 0.14 0.12 | K = 0.04] = 0.04] = = = = = = = = = = | 2.289 8.11 8.11 10.43 9.47569 4.47 4.84 7.17 0.44 | | 110 49.5 49.5 17 | 8017.9 1383.0 1693.4 1016.4 24.84 | (K (26) (27) (27) (27b) (28) (3) (29) (30) |
| 1 2 40.18 36.3 59.79 10.2 23.02 | 8 1 9 1 | 12.2-2 2.1 0 7.45 | 4 | A ,r 2.1 6.12 7.45 72.89 27.94 34.21 59.79 2.76 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.13 0.16 0.14 0.12 | K = 0.04] = 0.04] = = = = = = = = = = | 2.289 8.11 8.11 10.43 9.47569 4.47 4.84 7.17 0.44 | | 110 49.5 49.5 17 | 8017.9 1383.0 1693.4 1016.4 24.84 | (K (26) (27) (27) (27b) (28) (39) (30) (31) |
| 1 2 40.18 36.3 59.79 10.2 23.02 | 8 1 9 1 | 12.2-2 2.1 0 7.45 | 4 | A ,r 2.1 6.12 7.45 72.89 27.94 34.21 59.79 2.76 23.02 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.13 0.16 0.14 0.12 0.16 0.16 | K = 0.04] = 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = = | (W/H 2.289 8.11 8.11 10.43 9.47569 4.47 4.84 7.17 0.44 3.68 | | 110 49.5 49.5 17 9 | 8017.9 1383.0 1693.4 1016.4 24.84 | (K (26) (27) (27b) (27b) (28) (39) (30) (31) (4 (32) |
| 1 2 40.18 36.3 59.79 10.2 23.02 | 8 1 9 1 | 12.2-2 2.1 0 7.45 | 4 | A ,r 2.1 6.12 7.45 72.89 27.94 34.21 59.79 2.76 23.02 242.4 78.12 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.13 0.16 0.14 0.12 0.16 0.16 | K = 0.04] = 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = = | (W/H 2.289 8.11 8.11 10.43 9.47569 4.47 4.84 7.17 0.44 3.68 | | 110 49.5 49.5 17 9 9 | 8017.9 1383.0 1693.4 1016.4 24.84 207.18 | (K (26) (27) (27b) (27b) (28) (30) (30) (31) (32b) |
| 1 2 40.18 36.3 59.79 10.2 23.02 | 8 1 9 1 | 12.2-2 2.1 0 7.45 | 4 | A ,r 2.1 6.12 7.45 72.89 27.94 34.21 59.79 2.76 23.02 242.4 78.12 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.13 0.16 0.14 0.12 0.16 0.16 | K = 0.04] = 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = = | (W/H 2.289 8.11 8.11 10.43 9.47569 4.47 4.84 7.17 0.44 3.68 | | 110 49.5 49.5 17 9 49.5 30 | 8017.9 1383.0 1693.4 1016.4 24.84 207.18 3866.9 | (K (26) (27) (27b) (28) (38) (39) (30) (31) (32b) (32c) |
| 1 2 40.18 36.3 59.79 10.2 23.02 | 8 1 9 1 | 12.2-2 2.1 0 7.45 | 4 | A ,r 2.1 6.12 7.45 72.89 27.94 34.21 59.79 2.76 23.02 242.4 78.12 42.67 | m ² | W/m2 1.09 /[1/(1.4)+ /[1/(1.4)+ /[1/(1.4) + 0.13 0.16 0.14 0.12 0.16 0.16 | K = 0.04] = 0.04] = = 0.04] = = = = = = = = = = = = = = = = = = = | (W/H 2.289 8.11 8.11 10.43 9.47569 4.47 4.84 7.17 0.44 3.68 | | 110 49.5 49.5 17 9 9 49.5 30 | 8017.9 1383.0 1693.4 1016.4 24.84 207.18 3866.9 1280.1 | (K (26) (27) (27b) (27b) (28) (39) (30) (31) (32b) (32c) (32c) |
| 7 1 - 1 | mecha 0.24 mecha 0.24 mecha 0 use ext < 0.5 × 0 entilatio = 1, the 0 hange 0.24 and he Gros | tion rate (allowing on the control of the control o | tion rate (allowing for shoots) 0.11 | tion rate (allowing for shelter and 0.11 | tion rate (allowing for shelter and wind solution) 0.11 0.11 0.1 0.09 0.08 0.09 0.08 0.09 0.08 0.09 0.08 0.09 0.09 0.08 0.09 | tion rate (allowing for shelter and wind speed) = 0.11 | tion rate (allowing for shelter and wind speed) = (21a) x 0.11 0.11 0.1 0.09 0.08 0.08 0.08 ive air change rate for the applicable case ventilation: In pump using Appendix N, (23b) = (23a) × Fmv (equation (N5)), otherwise recovery: efficiency in % allowing for in-use factor (from Table 4h) mechanical ventilation with heat recovery (MVHR) (24a 0.24 0.23 0.22 0.22 0.21 0.21 0.21 0.21 mechanical ventilation without heat recovery (MV) (24b 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | ion rate (allowing for shelter and wind speed) = $(21a) \times (22a)m$ 0.11 0.11 0.1 0.09 0.08 0.08 0.08 0.09 0.09 ive air change rate for the applicable case ventilation: In pump using Appendix N, $(23b) = (23a) \times \text{Fmv}$ (equation (N5)), otherwise (23th neat recovery: efficiency in % allowing for in-use factor (from Table 4h) = mechanical ventilation with heat recovery (MVHR) (24a)m = $(2ab) = (2ab) = (2$ | cion rate (allowing for shelter and wind speed) = (21a) x (22a)m 0.11 | tion rate (allowing for shelter and wind speed) = (21a) x (22a)m 0.11 | cion rate (allowing for shelter and wind speed) = (21a) x (22a)m 1.11 | ion rate (allowing for shelter and wind speed) = (21a) x (22a)m 0.11 |

(26)...(30) + (32) =

Fabric heat loss, $W/K = S (A \times U)$

58.48

(33)

| Heat capa | acity Cm | = S(A x k) | | | | | | ((28) | .(30) + (32 | 2) + (32a) | (32e) = | 20079.48 | (34) |
|--|---|--|--|---|---|--|--|--|---|---|--|----------|--|
| • | • | ameter (TM | IP = Cm - | ∸ TFA) ir | n k.J/m²K | - | | = (34) | ÷ (4) = | , , , | , , | 173.76 | (35) |
| | • | ts where the c | | , | | | ecisely the | ` ' | . , | TMP in Ta | able 1f | 175.70 | (00) |
| can be used | d instead of | a detailed cal | culation. | | | , | · | | | | | | |
| Thermal b | oridges : 3 | S (L x Y) ca | lculated | using Ap | pendix I | K | | | | | | 14.13 | (36) |
| | | lging are not l | nown (36) : | = 0.15 x (3 | 1) | | | | | | | | _ |
| Total fabr | | | | | | | | , , | (36) = | | | 72.61 | (37) |
| Ventilation | 1 | ss calculate | d monthl | i | | i | | | = 0.33 × (| 25)m x (5) | | 1 | |
| _ | | eb Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (38)m= 23 | 3.81 23. | .59 23.37 | 22.27 | 22.05 | 20.96 | 20.96 | 20.74 | 21.4 | 22.05 | 22.49 | 22.93 | | (38) |
| Heat trans | sfer coeff | icient, W/K | _ | | | | | (39)m | = (37) + (3 | 38)m | | _ | |
| (39)m= 9 | 6.41 96. | .19 95.97 | 94.88 | 94.66 | 93.56 | 93.56 | 93.34 | 94 | 94.66 | 95.1 | 95.54 | | _ |
| Heat loss | paramet | er (HLP), V | //m²K | | | | | | Average = = (39)m ÷ | , , | 12 /12= | 94.82 | (39) |
| | 0.83 | <u> </u> | 0.82 | 0.82 | 0.81 | 0.81 | 0.81 | 0.81 | 0.82 | 0.82 | 0.83 |] | |
| | ! | I | 1 | ! | ! | ! | | / | Average = | Sum(40) _{1.} | 12 /12= | 0.82 | (40) |
| Number o | of days in | month (Ta | ole 1a) | | | | | | | | | 1 | <u> </u> |
| | Jan F | eb Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (41)m= | 31 2 | 8 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | | (41) |
| | | | | | | | | | | | | | |
| 4. Water | heating | energy req | uirement: | | | | | | | | kWh/y | ear: | |
| Accumed | | | | | | | | | | | | | |
| if TFA > | | = 1 + 1.76 | х [1 - ехр | 0.0003 | 349 x (TF | FA -13.9 |)2)] + 0.0 | 0013 x (| ΓFA -13. | | 84 | | (42) |
| if TFA s if TFA s Annual av | > 13.9, N £ 13.9, N /erage hc | = 1 + 1.76 = 1 ot water usa | age in litre | es per da | ay Vd,av | erage = | (25 x N) | + 36 | | 9) | 1.75 |] | (42) |
| if TFA s if TFA s Annual av Reduce the | > 13.9, N E 13.9, N verage ho annual ave | = 1 + 1.76 = 1 ot water usa | age in litre r usage by | es per da 5% if the d | ay Vd,av Iwelling is | erage = designed t | (25 x N) | + 36 | | 9) | | | , , |
| if TFA s if TFA s Annual av Reduce the not more the | > 13.9, N £ 13.9, N /erage ho annual ave at 125 litres | = 1 + 1.76 = 1 of water usa rage hot water per person p | age in litre r usage by er day (all w | es per da 5% if the d vater use, l | ay Vd,av Iwelling is thot and co | erage = designed t ld) | (25 x N) to achieve | + 36 a water us | e target o | 9) | 1.75 |] | , , |
| if TFA sif TFA sif TFA sif TFA sif TFA sif Annual averaged the not more that | > 13.9, N E 13.9, N verage ho annual ave at 125 litres | = 1 + 1.76 = 1 of water usa erage hot water per person p | age in litre r usage by er day (all w | es per da 5% if the d vater use, l | ay Vd,av dwelling is hot and co | erage = designed t ld) Jul | (25 x N) to achieve | + 36 | | 9) | | | , , |
| if TFA sinf | > 13.9, N E 13.9, N verage ho annual ave at 125 litres Jan F sage in litre | = 1 + 1.76 = 1 of water usa grage hot water per person p eb Mar s per day for o | age in litre r usage by er day (all w Apr each month | es per da 5% if the d vater use, l May Vd,m = fa | ay Vd,av Iwelling is thot and co Jun ctor from | erage = designed id) Jul Table 1c x | (25 x N) to achieve Aug (43) | + 36 a water us Sep | e target of | 9) 10 ² Nov | 1.75 Dec | | , , |
| if TFA sinf | > 13.9, N E 13.9, N verage ho annual ave at 125 litres | = 1 + 1.76 = 1 of water usa grage hot water per person p eb Mar s per day for o | age in litre r usage by er day (all w Apr each month | es per da 5% if the d vater use, l | ay Vd,av dwelling is hot and co | erage = designed t ld) Jul | (25 x N) to achieve | + 36 a water us Sep 99.72 | Oct | 9) 10° Nov 107.86 | Dec 111.93 | 1221.05 | (43) |
| if TFA sif TFA sif TFA sif TFA sif TFA sif Annual average and the sif TFA sif | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre | = 1 + 1.76 = 1 of water usa grage hot water per person p eb Mar s per day for o | age in litre r usage by er day (all w Apr each month | es per da 5% if the d vater use, I May Vd,m = fa 95.65 | ay Vd,av Iwelling is hot and co Jun ctor from 1 | erage = designed to ld) Jul Table 1c x 91.58 | (25 x N) to achieve Aug (43) 95.65 | + 36 a water us Sep 99.72 | Oct 103.79 Total = Sur | 9) Nov 107.86 m(44)112 = | Dec 111.93 | 1221.05 | , , |
| if TFA sif TFA sif TFA sif TFA sif TFA sif Annual average the not more that the not more that the not water us (44)m= 11 Energy continued the sif TFA | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre | = 1 + 1.76 = 1 of water usage hot water per person p (eb) Mar s per day for a 7.86 103.79 water used - ca | age in litre r usage by er day (all w Apr each month 99.72 | es per da 5% if the ovater use, I May $Vd,m = fa$ 95.65 | ay Vd,av Iwelling is hot and co Jun ctor from 1 | erage = designed to ld) Jul Table 1c x 91.58 | (25 x N) to achieve Aug (43) 95.65 | + 36 a water us Sep 99.72 | Oct 103.79 Total = Sur | 9) Nov 107.86 m(44)112 = | Dec 111.93 | 1221.05 | (43) |
| if TFA sif TFA sif TFA sif TFA sif TFA sif Annual average the not more that the not more that the not water us (44)m= 11 Energy continues the sif TFA | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre | = 1 + 1.76 = 1 of water usage hot water per person p (eb) Mar s per day for a 7.86 103.79 water used - ca | age in litre r usage by er day (all w Apr each month | es per da 5% if the d vater use, I May Vd,m = fa 95.65 | ay Vd,av Iwelling is hot and co Jun ctor from 7 91.58 | erage = designed to ld) Jul Table 1c x 91.58 | (25 x N) to achieve Aug (43) 95.65 | + 36 a water us Sep 99.72 0 kWh/mon 116.36 | Oct 103.79 Fotal = Suith (see Tai | Nov 107.86 m(44) ₁₁₂ = 1bles 1b, 1148.03 | 1.75 Dec 111.93 c, 1d) 160.75 | 1221.05 | (43) |
| if TFA sif TFA sif TFA sif TFA sif TFA sif Annual average the not more that the not more that the sif TFA sif | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre 11.93 107 tent of hot v | = 1 + 1.76 = 1 of water usage hot water per person p (eb) Mar s per day for a 7.86 103.79 water used - ca | age in litre r usage by er day (all v Apr each month 99.72 alculated m 130.61 | es per da 5% if the of 5% is a sum of 5% if the of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% in 5 | ay Vd,av Iwelling is that and co Jun ctor from 7 91.58 190 x Vd,r | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 | + 36 a water us Sep 99.72 0 kWh/mon 116.36 | Oct 103.79 Fotal = Sur th (see Ta | Nov 107.86 m(44) ₁₁₂ = 1bles 1b, 1148.03 | 1.75 Dec 111.93 c, 1d) 160.75 | | (43) |
| if TFA sif TFA sif TFA sif TFA sif TFA sif TFA sif Annual average and the sif TFA sif | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre 11.93 107 tent of hot v | = 1 + 1.76 = 1 of water usa grage hot water per person p eb Mar s per day for a 7.86 103.79 vater used - ca 5.17 149.81 heating at poin | age in litre r usage by er day (all v Apr each month 99.72 alculated m 130.61 | es per da 5% if the of 5% is a sum of 5% if the of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% if the of 5% is a sum of 5% in 5 | ay Vd,av Iwelling is that and co Jun ctor from 7 91.58 190 x Vd,r | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 | + 36 a water us Sep 99.72 0 kWh/mon 116.36 | Oct 103.79 Fotal = Sur th (see Ta | Nov 107.86 m(44) ₁₁₂ = 1bles 1b, 1148.03 | 1.75 Dec 111.93 c, 1d) 160.75 | | (43) |
| if TFA sif TFA | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre 11.93 107 tent of hot v 65.99 145 eous water l | = 1 + 1.76 = 1 of water usa prage hot water per person p (eb) Mar s per day for a (7.86 103.79 (vater used - ca (5.17 149.81 theating at points (7.88 22.47 | age in litre r usage by er day (all v Apr each month 99.72 130.61 nt of use (no | es per da 5% if the day atter use, I May Vd,m = fa 95.65 onthly = 4. 125.32 o hot water 18.8 | ay Vd,av lwelling is hot and co Jun ctor from 1 91.58 190 x Vd,r 108.14 r storage), | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 enter 0 in 15.03 | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 boxes (46, | + 36 a water us Sep 99.72 0 kWh/mon 116.36 1 to (61) 17.45 | Oct 103.79 Fotal = Sunth (see Tail 135.61) Fotal = Sunth 20.34 | Nov 107.86 m(44) ₁₁₂ = sbles 1b, 1 148.03 m(45) ₁₁₂ = | 1.75 Dec 111.93 c, 1d) 160.75 | | (43) (44) (45) |
| if TFA sif TFA sif TFA sif TFA sif TFA sif TFA sif Annual average with the sif TFA sif | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre 11.93 107 tent of hot v 65.99 145 eous water v 24.9 21. rage loss rolume (lit | = 1 + 1.76 = 1 of water usa rage hot water per person p eb Mar s per day for of 7.86 103.79 vater used - ca 5.17 149.81 heating at poin 7.8 22.47 s: tres) includ | Apr each month 130.61 19.59 ang any sering a | es per da 5% if the of yater use, I May Vd,m = fa 95.65 onthly = 4. 125.32 o hot water 18.8 olar or W | ay Vd,av liwelling is that and co Jun ctor from 1 91.58 190 x Vd,r 108.14 r storage), 16.22 | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 enter 0 in 15.03 | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 boxes (46) 17.25 within sa | + 36 a water us Sep 99.72 0 kWh/mon 116.36 1 to (61) 17.45 | Oct 103.79 Fotal = Sunth (see Tail 135.61) Fotal = Sunth 20.34 | Nov 107.86 m(44) ₁₁₂ = 148.03 m(45) ₁₁₂ = 22.2 | 1.75 Dec 111.93 c, 1d) 160.75 | | (43) (44) (45) |
| if TFA sif TFA | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre 11.93 107 tent of hot w 65.99 145 eous water in rage loss rolume (litre) | = 1 + 1.76 = 1 of water usa prage hot water per person p eb Mar s per day for a 7.86 103.79 evater used - ca 5.17 149.81 theating at point 7.8 22.47 s: tres) including and no filter | age in litre r usage by er day (all v Apr each month 99.72 alculated m 130.61 19.59 and any se ank in dy | es per da 5% if the d yater use, I May Vd,m = fa 95.65 onthly = 4. 125.32 o hot water 18.8 olar or W yelling, e | ay Vd,av welling is that and co Jun ctor from 191.58 190 x Vd,r 108.14 r storage), 16.22 | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 enter 0 in 15.03 storage) litres in | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 boxes (46) 17.25 within sa (47) | + 36 a water us Sep 99.72 0 kWh/mon 116.36 17.45 ame vess | Oct 103.79 Fotal = Sur 135.61 Fotal = Sur 20.34 | Nov 107.86 m(44) ₁₁₂ = sbles 1b, 1 148.03 m(45) ₁₁₂ = 22.2 | 1.75 Dec 111.93 c, 1d) 160.75 | | (43) (44) (45) (46) |
| if TFA sif TFA | > 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre 11.93 107 tent of hot v 65.99 145 rous water i rage loss rolume (litre) e if no sto | = 1 + 1.76 = 1 of water usage hot water usage hot water person p eb Mar s per day for of the second person p vater used - constituting at point person person p eb Mar s per day for of the second person per | age in litre r usage by er day (all v Apr each month 99.72 alculated m 130.61 19.59 and any se ank in dy | es per da 5% if the d yater use, I May Vd,m = fa 95.65 onthly = 4. 125.32 o hot water 18.8 olar or W yelling, e | ay Vd,av welling is that and co Jun ctor from 191.58 190 x Vd,r 108.14 r storage), 16.22 | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 enter 0 in 15.03 storage) litres in | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 boxes (46) 17.25 within sa (47) | + 36 a water us Sep 99.72 0 kWh/mon 116.36 17.45 ame vess | Oct 103.79 Fotal = Sur 135.61 Fotal = Sur 20.34 | Nov 107.86 m(44) ₁₁₂ = sbles 1b, 1 148.03 m(45) ₁₁₂ = 22.2 | 1.75 Dec 111.93 c, 1d) 160.75 | | (43) (44) (45) (46) |
| if TFA and if TFA and if TFA and if TFA and | > 13.9, N E 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre 11.93 107 tent of hot v E 4.9 21. Tage loss volume (lit e if no sto brage loss rage loss | = 1 + 1.76 = 1 of water usa prage hot water per person p eb Mar s per day for of 7.86 103.79 vater used - ca 5.17 149.81 heating at poin 1.78 22.47 s: tres) including and no forced hot was s: | age in litre r usage by er day (all v Apr each month 99.72 alculated m 130.61 19.59 Ing any seank in dw ter (this in | es per da 5% if the of yater use, I May Vd,m = fa 95.65 onthly = 4. 125.32 o hot water 18.8 olar or W velling, e ncludes i | ay Vd,av liwelling is hot and co Jun ctor from 91.58 190 x Vd,r 108.14 r storage), 16.22 /WHRS nter 110 nstantar | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 enter 0 in 15.03 storage 0 litres in neous co | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 boxes (46) 17.25 within sa (47) | + 36 a water us Sep 99.72 0 kWh/mon 116.36 17.45 ame vess | Oct 103.79 Fotal = Sur 135.61 Fotal = Sur 20.34 | Nov 107.86 m(44) ₁₁₂ = bles 1b, 1 148.03 m(45) ₁₁₂ = 22.2 | 1.75 Dec 111.93 c, 1d) 160.75 24.11 | | (43) (44) (45) (46) (47) |
| if TFA and if | > 13.9, N E 13.9, N Verage hor annual average in litres Jan F Sage in litre 11.93 107 tent of hot v E 14.9 21. Trage loss rolume (litres In ity heating in stourage loss ufacturer | = 1 + 1.76 = 1 of water usage hot water usage hot water person p eb Mar s per day for of s. 7.86 103.79 vater used - c. 5.17 149.81 heating at point tres) including and no formed hot was: 's declared | Apr each month 99.72 alculated m 130.61 19.59 and any search in dviter (this in loss factions) | es per da 5% if the of yater use, I May Vd,m = fa 95.65 onthly = 4. 125.32 o hot water 18.8 olar or W velling, e ncludes i | ay Vd,av liwelling is hot and co Jun ctor from 91.58 190 x Vd,r 108.14 r storage), 16.22 /WHRS nter 110 nstantar | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 enter 0 in 15.03 storage 0 litres in neous co | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 boxes (46) 17.25 within sa (47) | + 36 a water us Sep 99.72 0 kWh/mon 116.36 17.45 ame vess | Oct 103.79 Fotal = Sur 135.61 Fotal = Sur 20.34 | Nov 107.86 m(44) ₁₁₂ = 12.2 47) 0. | 1.75 Dec 111.93 c, 1d) 160.75 24.11 | | (43) (44) (45) (46) (47) |
| if TFA sif TFA | > 13.9, N E 13.9, N E 13.9, N Verage ho annual ave at 125 litres Jan F sage in litre 11.93 107 tent of hot w 65.99 145 rage loss rolume (lit nity heatin e if no sto brage loss ufacturer ture facto | = 1 + 1.76 = 1 of water usage hot water usage hot water person pe | age in litre r usage by er day (all v Apr each month 99.72 alculated m 130.61 19.59 ang any se ank in dy ter (this in loss factor e 2b | es per da 5% if the of yater use, I May Vd,m = fa 95.65 onthly = 4. 125.32 o hot water 18.8 olar or W welling, e ncludes i or is kno | ay Vd,av liwelling is hot and co Jun ctor from 91.58 190 x Vd,r 108.14 r storage), 16.22 /WHRS nter 110 nstantar | erage = designed to ld) Jul Table 1c x 91.58 m x nm x E 100.21 enter 0 in 15.03 storage 0 litres in neous con/day): | (25 x N) to achieve Aug (43) 95.65 0Tm / 3600 114.99 boxes (46) 17.25 within sa (47) ombi boil | + 36 a water us Sep 99.72 116.36 17.45 ame vess ers) ente | Oct 103.79 Fotal = Sur 135.61 Fotal = Sur 20.34 | 9) Nov 107.86 m(44) ₁₁₂ = sbles 1b, 1 148.03 m(45) ₁₁₂ = 22.2 47) 0. | 1.75 Dec 111.93 c, 1d) 160.75 24.11 50 | | (43) (44) (45) (46) (47) (48) (49) |
| if TFA a annual average and a second and a second a if TFA a if TFA a if TFA annual average and a if TFA annual average a if TFA annual av | > 13.9, N E 13.9, N E 13.9, N Verage hor annual average in litres Jan F Sage in litre 11.93 107 tent of hot v 65.99 145 rage loss rolume (litres aringe loss rolume (litres aringe loss rufacturer ture facto st from w | = 1 + 1.76 = 1 of water usage hot water usage hot water person p eb Mar s per day for of s. 7.86 103.79 vater used - c. 5.17 149.81 heating at point tres) including and no formed hot was: 's declared | age in litre r usage by er day (all w Apr each month 99.72 alculated m 130.61 19.59 Ing any seank in dw ter (this ir loss factor e 2b e, kWh/y | es per da 5% if the of vater use, if the of vater use, if May $Vd,m = fa$ 95.65 $000000000000000000000000000000000000$ | ay Vd,av liwelling is that and co Jun ctor from 1 91.58 190 x Vd,r 108.14 r storage), 16.22 /WHRS enter 110 nstantar wn (kWh | erage = designed to designed t | (25 x N) to achieve Aug (43) 95.65 07m / 3600 114.99 boxes (46) 17.25 within sa (47) | + 36 a water us Sep 99.72 116.36 17.45 ame vess ers) ente | Oct 103.79 Fotal = Sur 135.61 Fotal = Sur 20.34 | 9) Nov 107.86 m(44) ₁₁₂ = sbles 1b, 1 148.03 m(45) ₁₁₂ = 22.2 47) 0. | 1.75 Dec 111.93 c, 1d) 160.75 24.11 | | (43) (44) (45) (46) (47) |

| Hot water storage loss factor fr | , | h/litre/da | ıy) | | | | | 0 | | (51) |
|---|---|--|--|---|---|-----------------------------|------------------------------------|------------------------------------|---------------|------------------------------|
| If community heating see section | on 4.3 | | | | | | | | | (==) |
| Volume factor from Table 2a Temperature factor from Table | 2h | | | | | | | 0 | | (52) (53) |
| • | | | | (47) (54) | (50) (1 | -0/ | | 0 | | ` ' |
| Energy lost from water storage Enter (50) or (54) in (55) | , kvvn/year | | | (47) x (51) | X (52) X (| 03) = | | 0 | | (54) |
| , , , , , , | for oook month | | | ((E6)m - (| EE) (44). | _ | 0 | .5 | | (55) |
| Water storage loss calculated t | | ı | | ((56)m = (| , , , | | | 1 | | (==) |
| (56)m= 15.57 14.06 15.57 If cylinder contains dedicated solar sto | 15.07 15.57 | 15.07 | 15.57 | 15.57 | 15.07 | 15.57 | 15.07 | 15.57 | iv LI | (56) |
| (57)m= 15.57 14.06 15.57 | 15.07 15.57 | 15.07 | 15.57 | 15.57 | 15.07 | 15.57 | 15.07 | 15.57 | | (57) |
| ` ' | | 15.07 | 15.57 | 15.57 | 13.07 | 15.57 | | | | ` ' |
| Primary circuit loss (annual) fro | | 50) (| (50) - 00 | · | | | | 0 | | (58) |
| Primary circuit loss calculated (modified by factor from Tab | • | , | ` ' | ` ' | | thormo | ctat) | | | |
| (59)m= 0 0 0 | | 0 | 0 | ig and a | 0 | 0 | 0 | 0 | | (59) |
| ` ' | | | | | Ů | Ü | _ ~ | Ů | | () |
| Combi loss calculated for each | <u> </u> | ì | ı i | | | | | ı | | (5.1) |
| (61)m = 0 0 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (61) |
| Total heat required for water he | eating calculated | for eacl | n month | (62)m = | 0.85 × (| 45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= 181.56 159.24 165.38 | 145.67 140.89 | 123.21 | 115.78 | 130.56 | 131.43 | 151.18 | 163.1 | 176.32 | | (62) |
| Solar DHW input calculated using App | endix G or Appendix | H (negati | ve quantity | v) (enter '0' | if no sola | contributi | on to wate | er heating) | | |
| (add additional lines if FGHRS | and/or WWHRS | applies | , see Ap | pendix C | 3) | | | | | |
| (63)m= 0 0 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output from water heater | | | | | | | | _ | | |
| (64)m= 181.56 159.24 165.38 | 145.67 140.89 | 123.21 | 115.78 | 130.56 | 131.43 | 151.18 | 163.1 | 176.32 | | _ |
| | | | | Outp | out from wa | ater heate | r (annual)₁ | 12 | 1784.3 | (64) |
| Heat gains from water heating, | kWh/month 0.29 | 5 ´ [0.85 | × (45)m | + (61)m | n] + 0.8 x | [(46)m | + (57)m | + (59)m |] | |
| (65)m= 67.65 59.52 62.27 | 55.48 54.12 | 48.01 | 45.77 | 50.69 | 50.74 | 57.55 | 61.27 | 65.9 | | (65) |
| include (57)m in calculation | of (65)m only if c | ylinder is | s in the ເ | dwelling | or hot w | ater is fr | om com | munity h | eating | |
| 5. Internal gains (see Table 5 | 5 and 5a): | | | | | | | | | |
| Metabolic gains (Table 5), Wat | ts | | | | | | | | | |
| Jan Feb Mar | | | | | | | | | | |
| | Apr May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (66)m= 170.66 170.66 170.66 | Apr May 170.66 170.66 | Jun 170.66 | Jul 170.66 | Aug 170.66 | Sep 170.66 | Oct | Nov 170.66 | Dec 170.66 | | (66) |
| ` ' | 170.66 170.66 | 170.66 | 170.66 | 170.66 | 170.66 | | | | | (66) |
| Lighting gains (calculated in Ap | 170.66 170.66 | 170.66 | 170.66 | 170.66 | 170.66 | | | | | (66) (67) |
| Lighting gains (calculated in Ap (67)m= 71.01 63.07 51.29 | 170.66 170.66 opendix L, equat 38.83 29.03 | 170.66 ion L9 oi 24.51 | 170.66 r L9a), a 26.48 | 170.66 lso see 34.42 | 170.66 Table 5 | 170.66 58.66 | 170.66 | 170.66 | | |
| Lighting gains (calculated in Ap (67)m= 71.01 63.07 51.29 Appliances gains (calculated in | 170.66 170.66 opendix L, equat 38.83 29.03 Appendix L, eq | 170.66 ion L9 or 24.51 uation L | 170.66 r L9a), a 26.48 13 or L1: | 170.66 lso see - 34.42 3a), also | 170.66 Table 5 46.2 see Tal | 170.66 58.66 ole 5 | 170.66 68.46 | 170.66 72.98 | | (67) |
| Lighting gains (calculated in Ap (67)m= 71.01 63.07 51.29 Appliances gains (calculated in (68)m= 416.89 421.21 410.31 | 170.66 170.66 opendix L, equat 38.83 29.03 Appendix L, eq 387.1 357.81 | 170.66 ion L9 or 24.51 uation L 330.28 | 170.66 r L9a), a 26.48 13 or L13 | 170.66 Iso see 34.42 3a), also | 170.66 Table 5 46.2 see Tal 318.46 | 58.66 ole 5 341.66 | 170.66 | 170.66 | | |
| Lighting gains (calculated in Ap (67)m= 71.01 63.07 51.29 Appliances gains (calculated in (68)m= 416.89 421.21 410.31 Cooking gains (calculated in Ap (19.01) 410.31 | 170.66 170.66 ppendix L, equat 38.83 29.03 Appendix L, eq 387.1 357.81 ppendix L, equat | 170.66 ion L9 or 24.51 uation L 330.28 ion L15 | 170.66 r L9a), a 26.48 13 or L13 311.88 or L15a) | 170.66 Iso see - 34.42 3a), also 307.56 | 170.66 Table 5 46.2 see Tal 318.46 ee Table | 58.66 ble 5 341.66 5 | 170.66 68.46 370.96 | 72.98 398.49 | | (67) (68) |
| Lighting gains (calculated in Ap (67)m= 71.01 63.07 51.29 Appliances gains (calculated in (68)m= 416.89 421.21 410.31 Cooking gains (calculated in Ap (69)m= 54.91 54.91 54.91 | 170.66 170.66 ppendix L, equat 38.83 29.03 Appendix L, eq 387.1 357.81 ppendix L, equat 54.91 54.91 | 170.66 ion L9 or 24.51 uation L 330.28 | 170.66 r L9a), a 26.48 13 or L13 | 170.66 Iso see 34.42 3a), also | 170.66 Table 5 46.2 see Tal 318.46 | 58.66 ole 5 341.66 | 170.66 68.46 | 170.66 72.98 | | (67) |
| Lighting gains (calculated in April (67)m= 71.01 63.07 51.29 Appliances gains (calculated in (68)m= 416.89 421.21 410.31 Cooking gains (calculated in April (69)m= 54.91 54.91 54.91 Pumps and fans gains (Table 5 | 170.66 170.66 ppendix L, equat 38.83 29.03 Appendix L, eq 387.1 357.81 ppendix L, equat 54.91 54.91 5a) | 170.66 ion L9 of 24.51 uation L 330.28 ion L15 54.91 | 170.66 r L9a), a 26.48 13 or L1: 311.88 or L15a) 54.91 | 170.66 Iso see - 34.42 3a), also 307.56 , also se 54.91 | 170.66 Table 5 46.2 see Tal 318.46 ee Table 54.91 | 58.66 ble 5 341.66 5 54.91 | 170.66 68.46 370.96 54.91 | 170.66 72.98 398.49 54.91 | | (67) (68) (69) |
| Lighting gains (calculated in April (67)m= 71.01 63.07 51.29 Appliances gains (calculated in (68)m= 416.89 421.21 410.31 Cooking gains (calculated in April (69)m= 54.91 54.91 54.91 Pumps and fans gains (Table 670)m= 3 3 3 | 170.66 170.66 ppendix L, equat 38.83 29.03 Appendix L, eq 387.1 357.81 ppendix L, equat 54.91 54.91 5a) 3 3 | 170.66 ion L9 or 24.51 uation L 330.28 ion L15 54.91 | 170.66 r L9a), a 26.48 13 or L13 311.88 or L15a) | 170.66 Iso see - 34.42 3a), also 307.56 | 170.66 Table 5 46.2 see Tal 318.46 ee Table | 58.66 ble 5 341.66 5 | 170.66 68.46 370.96 | 72.98 398.49 | | (67) (68) |
| Lighting gains (calculated in April (67)m= 71.01 63.07 51.29 Appliances gains (calculated in (68)m= 416.89 421.21 410.31 Cooking gains (calculated in April (69)m= 54.91 54.91 54.91 Pumps and fans gains (Table 54.91)m= 3 3 3 3 Losses e.g. evaporation (negative form) | 170.66 170.66 ppendix L, equat 38.83 29.03 Appendix L, eq 387.1 357.81 ppendix L, equat 54.91 54.91 5a) 3 3 tive values) (Tab | 170.66 ion L9 or 24.51 uation L 330.28 ion L15 54.91 3 | 170.66 r L9a), a 26.48 13 or L1: 311.88 or L15a) 54.91 | 170.66 Iso see 34.42 3a), also 307.56 , also se 54.91 | 170.66 Table 5 46.2 see Tal 318.46 ee Table 54.91 | 58.66 DIE 5 341.66 54.91 | 170.66 68.46 370.96 54.91 | 170.66 72.98 398.49 54.91 | | (67) (68) (69) (70) |
| Lighting gains (calculated in Ap (67)m= 71.01 63.07 51.29 Appliances gains (calculated in (68)m= 416.89 421.21 410.31 Cooking gains (calculated in Ap (69)m= 54.91 54.91 54.91 Pumps and fans gains (Table 5 (70)m= 3 3 3 Losses e.g. evaporation (negative) (71)m= -113.78 -113.78 -113.78 | 170.66 170.66 ppendix L, equat 38.83 29.03 Appendix L, eq 387.1 357.81 ppendix L, equat 54.91 54.91 5a) 3 3 | 170.66 ion L9 or 24.51 uation L 330.28 ion L15 54.91 | 170.66 r L9a), a 26.48 13 or L1: 311.88 or L15a) 54.91 | 170.66 Iso see - 34.42 3a), also 307.56 , also se 54.91 | 170.66 Table 5 46.2 see Tal 318.46 ee Table 54.91 | 58.66 ble 5 341.66 5 54.91 | 170.66 68.46 370.96 54.91 | 170.66 72.98 398.49 54.91 | | (67) (68) (69) |
| Lighting gains (calculated in April (67)m= 71.01 63.07 51.29 Appliances gains (calculated in (68)m= 416.89 421.21 410.31 Cooking gains (calculated in April (69)m= 54.91 54.91 54.91 Pumps and fans gains (Table 54.91)m= 3 3 3 3 Losses e.g. evaporation (negative form) | 170.66 170.66 ppendix L, equat 38.83 29.03 Appendix L, eq 387.1 357.81 ppendix L, equat 54.91 54.91 5a) 3 3 tive values) (Tab | 170.66 ion L9 or 24.51 uation L 330.28 ion L15 54.91 3 | 170.66 r L9a), a 26.48 13 or L1: 311.88 or L15a) 54.91 | 170.66 Iso see 34.42 3a), also 307.56 , also se 54.91 | 170.66 Table 5 46.2 see Tal 318.46 ee Table 54.91 | 58.66 DIE 5 341.66 54.91 | 170.66 68.46 370.96 54.91 | 170.66 72.98 398.49 54.91 | | (67) (68) (69) (70) |

| Total internal | | | l | l : | | 1 | | m + (69)m + (| | | | 1 | / - |
|----------------------------------|-------------|------------|----------------|------------|----------|-------------|------------------|----------------|----------|---------------|--------|--------|----------------|
| 73)m= 693.62 | 687.65 | 660.09 | 617.79 | 574.38 | 536.26 | 514.68 | 524.9 | 9 549.93 | 592.47 | 639.32 | 674.86 | | (73) |
| 6. Solar gains Solar gains are | | ueina eola | r flux from | Table 6a | and acco | ciated equa | tions to | convert to th | e applic | able orientat | ion | | |
| Orientation: | | • | Area | | | ux | tions to | | е аррііс | FF | ЮП. | Gains | |
| | Table 6d | actor | m ² | | | able 6a | | g_ Table 6b | • | Table 6c | | (W) | |
| Northeast 0.9x | 0.77 | × | 6. | 12 | х | 11.28 | l _x [| 0.51 | x | 1.11 | | 27.12 | (75) |
| ا Northeast _{0.9x} | 0.77 | x | 6. | | | 22.97 | x | 0.51 | x | 1.11 | = = | 55.2 | (75) |
| ا Northeast _{0.9x} | 0.77 | x | 6. | | <u> </u> | 41.38 | x | 0.51 | _ x | 1.11 | _ = | 99.45 | (75 |
| Northeast 0.9x | 0.77 | x | 6. | 12 | x | 67.96 | x | 0.51 | x | 1.11 | | 163.32 | (75 |
| lortheast 0.9x | 0.77 | × | 6. | 12 | x | 91.35 | x | 0.51 | × | 1.11 | | 219.53 | (75 |
| Northeast 0.9x | 0.77 | x | 6. | 12 | x | 97.38 | x | 0.51 | x | 1.11 | = | 234.05 | (75 |
| Northeast 0.9x | 0.77 | x | 6. | 12 | х | 91.1 | x | 0.51 | x | 1.11 | = | 218.95 | (75 |
| Northeast 0.9x | 0.77 | x | 6.1 | 12 | х | 72.63 | x | 0.51 | x | 1.11 | = | 174.55 | (75 |
| Northeast 0.9x | 0.77 | x | 6.1 | 12 | x | 50.42 | x | 0.51 | x | 1.11 | = | 121.18 | (75 |
| Northeast 0.9x | 0.77 | х | 6. | 12 | x | 28.07 | x | 0.51 | X | 1.11 | = | 67.45 | (75 |
| Northeast 0.9x | 0.77 | х | 6.1 | 12 | x | 14.2 | x | 0.51 | X | 1.11 | = | 34.12 | (75 |
| lortheast 0.9x | 0.77 | X | 6.1 | 12 | x | 9.21 | x | 0.51 | X | 1.11 | = | 22.14 | (75 |
| Southwest _{0.9x} | 0.77 | X | 6.1 | 12 | x | 36.79 | | 0.51 | X | 1.11 | = | 88.43 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.′ | 12 | x | 62.67 | | 0.51 | x | 1.11 | = | 150.62 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.′ | 12 | x | 85.75 | | 0.51 | X | 1.11 | = | 206.09 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.′ | 12 | x | 106.25 | | 0.51 | X | 1.11 | = | 255.36 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.1 | 12 | x | 119.01 | | 0.51 | x | 1.11 | = | 286.02 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.′ | 12 | x | 118.15 | | 0.51 | X | 1.11 | = | 283.95 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.′ | 12 | x | 113.91 | | 0.51 | X | 1.11 | = | 273.76 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.1 | 12 | x | 104.39 | | 0.51 | x | 1.11 | = | 250.88 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.′ | 12 | x | 92.85 | | 0.51 | X | 1.11 | = | 223.15 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.′ | 12 | x | 69.27 | | 0.51 | X | 1.11 | = | 166.47 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.′ | 12 | x | 44.07 | | 0.51 | X | 1.11 | = | 105.92 | (79 |
| Southwest _{0.9x} | 0.77 | X | 6.1 | 12 | x | 31.49 | | 0.51 | X | 1.11 | = | 75.68 | (79 |
| Rooflights 0.9x | 1 | X | 7.4 | 1 5 | x | 26 | x | 0.6 | X | 0 | = | 116.22 | (82 |
| Rooflights _{0.9x} | 1 | X | 7.4 | 1 5 | x | 54 | x | 0.6 | X | 1.11 | = | 241.38 | (82 |
| Rooflights _{0.9x} | 1 | X | 7.4 | 1 5 | x | 96 | x | 0.6 | X | 1.11 | = | 429.12 | (82 |
| Rooflights 0.9x | 1 | X | 7.4 | 1 5 | x | 150 | x | 0.6 | X | 1.11 | = | 670.5 | (82 |
| Rooflights _{0.9x} | 1 | х | 7.4 | 15 | x | 192 | x | 0.6 | X | 1.11 | = | 858.24 | (82 |
| Rooflights _{0.9x} | 1 | X | 7.4 | 1 5 | x | 200 | x | 0.6 | x | 1.11 | = | 894 | (82 |
| Rooflights _{0.9x} | 1 | х | 7.4 | 45 | x | 189 | x | 0.6 | X | 1.11 | = | 844.83 | (82 |
| Rooflights _{0.9x} | 1 | x | 7.4 | 15 | x | 157 | x | 0.6 | X | 1.11 | = | 701.79 | (82 |
| Rooflights _{0.9x} | 1 | X | 7.4 | 1 5 | x | 115 | x | 0.6 | x | 1.11 | = | 514.05 | (82 |
| Rooflights 0.9x | 1 | x | 7.4 | 15 | x | 66 | x | 0.6 | x | 1.11 | = | 295.02 | (82) |

| Rooflights 0.9x | 1 | х | 7.4 | 15 | х | 33 | х | 0.6 | х | 1.11 | = | 147.51 | (82) |
|---------------------|------------|------------|------------|--------------------|------------|----------------|--|-------------|---|-----------------|------------------------|---------|--------------|
| Rooflights 0.9x | 1 | X | 7.4 | 15 | х | 21 | х | 0.6 | _ x [| 1.11 | = | 93.87 | (82) |
| • | | | | | | | <u> </u> | | | | | | _ |
| Solar gains in | watts, ca | alculated | for eac | h month | | | ` | um(74)m . | (82)m | | | - | |
| (83)m= 231.76 | <u> </u> | 734.66 | 1089.18 | 1363.8 | 1412 | 1337.54 | 1127.22 | 858.38 | 528.95 | 287.55 | 191.69 |] | (83) |
| Total gains – | | | | <u> </u> | <u> </u> | | | | | | | 1 | 4 |
| (84)m= 925.38 | 1134.86 | 1394.75 | 1706.97 | 1938.18 | 1948.26 | 1852.22 | 1652.12 | 1408.31 | 1121.41 | 926.87 | 866.55 |] | (84) |
| 7. Mean inte | rnal temp | perature | (heating | season |) | | | | | | | | |
| Temperature | during h | neating p | eriods ir | the livi | ng area | from Tal | ole 9, Th | 11 (°C) | | | | 21 | (85) |
| Utilisation fac | ctor for g | ains for l | iving are | ea, h1,m | (see Ta | able 9a) | | | | • | | 1 | |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | _ | |
| (86)m= 0.97 | 0.93 | 0.83 | 0.64 | 0.45 | 0.31 | 0.22 | 0.26 | 0.46 | 0.77 | 0.94 | 0.98 |] | (86) |
| Mean interna | al temper | ature in | living are | ea T1 (fo | ollow ste | ps 3 to 7 | 7 in Tabl | e 9c) | _ | _ | _ | _ | |
| (87)m= 20.17 | 20.43 | 20.73 | 20.93 | 20.99 | 21 | 21 | 21 | 20.99 | 20.86 | 20.48 | 20.12 | | (87) |
| Temperature | during h | neating p | eriods ir | n rest of | dwelling | g from Ta | able 9, T | h2 (°C) | | | | | |
| (88)m= 20.22 | 20.23 | 20.23 | 20.24 | 20.24 | 20.24 | 20.24 | 20.25 | 20.24 | 20.24 | 20.23 | 20.23 | | (88) |
| Utilisation fac | ctor for a | ains for | rest of d | welling, | h2,m (se | ee Table | 9a) | | • | • | | • | |
| (89)m= 0.96 | 0.92 | 0.81 | 0.6 | 0.41 | 0.27 | 0.18 | 0.22 | 0.41 | 0.74 | 0.93 | 0.97 |] | (89) |
| Mean interna | al temper | ature in | the rest | of dwelli | ina T2 (f | follow ste | ens 3 to | 7 in Tabl | le 9c) | ! | ļ. | | |
| (90)m= 19.13 | 19.49 | 19.9 | 20.16 | 20.23 | 20.24 | 20.24 | 20.25 | 20.23 | 20.09 | 19.57 | 19.06 |] | (90) |
| ` ′ | <u> </u> | | | | <u> </u> | | <u> </u> | 1 | L fLA = Livin | l g area ÷ (| 4) = | 0.21 | (91) |
| Mean interna | al tampar | atura (fo | r the wh | ole dwe | lling) – f | ΊΔ ν Τ1 | ⊥ (1 _ fl | Δ) ~ T2 | | | | | |
| (92)m= 19.36 | 19.69 | 20.07 | 20.33 | 20.39 | 20.41 | 20.41 | 20.41 | 20.4 | 20.25 | 19.77 | 19.29 | 1 | (92) |
| Apply adjusti | ment to t | he mear | interna | L I temper | ature fro | m Table | 4e, whe | ere appro | opriate | l | |] | |
| (93)m= 19.21 | 19.54 | 19.92 | 20.18 | 20.24 | 20.26 | 20.26 | 20.26 | 20.25 | 20.1 | 19.62 | 19.14 |] | (93) |
| 8. Space hea | ating requ | uirement | | | • | · | • | • | | | | | |
| Set Ti to the | | | | | ned at st | ep 11 of | Table 9 | b, so tha | nt Ti,m=(| 76)m an | d re-cald | culate | |
| the utilisation | | | | | Γ. | | | | | | | 1 | |
| Jan Utilisation fac | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |] | |
| (94)m= 0.95 | 0.91 | 0.8 | 0.6 | 0.41 | 0.27 | 0.18 | 0.22 | 0.41 | 0.73 | 0.92 | 0.96 | 1 | (94) |
| Useful gains | Į | | | ļ | J 0.2. | 1 00 | J | | 00 | 0.02 | 0.00 | J | ` ' |
| (95)m= 883.33 | 1 | | 1026.99 | 801.92 | 528.54 | 342.03 | 359.92 | 573.63 | 817.27 | 849.04 | 835.23 |] | (95) |
| Monthly ave | age exte | ernal tem | perature | from T | able 8 | ! | ! | ! | ! | ! | <u>l</u> | 1 | |
| (96)m= 4.3 | 4.9 | 6.5 | 8.9 | 11.7 | 14.6 | 16.6 | 16.4 | 14.1 | 10.6 | 7.1 | 4.2 | | (96) |
| Heat loss rat | e for me | an intern | al tempe | erature, | Lm , W | =[(39)m | x [(93)m | – (96)m |] | | | • | |
| (97)m= 1437.05 | 1408.38 | 1288.39 | 1069.77 | 808.29 | 529.13 | 342.09 | 360.06 | 577.77 | 899.63 | 1190.16 | 1426.87 | | (97) |
| Space heatir | Ť | 1 | 1 | ī | T . | 1 | | i i | í | r | ı | 1 | |
| (98)m= 411.96 | 255.93 | 133.32 | 30.81 | 4.74 | 0 | 0 | 0 | 0 | 61.28 | 245.61 | 440.18 | | – , . |
| | | | | | | | Tota | al per year | (kWh/yea | r) = Sum(9 | 8) _{15,912} = | 1583.82 | (98) |
| Space heatir | ng require | ement in | kWh/m² | ² /year | | | | | | | | 13.71 | (99) |
| 9a. Energy re | quiremer | nts – Indi | ividual h | eating s | ystems | including | micro-C | CHP) | | | | | |
| Space heati | • | | | | | | | | | | | | _ |
| Fraction of s | pace hea | at from s | econdar | y/supple | ementary | / system | | | | | | 0 | (201) |

| | | | | | | | | | | | | _ |
|--|---------------------|-------------------|-----------|-----------|------------|-------------|------------|------------|------------------------|-------------------|-----------|------------|
| Fraction of space hea | at from m | nain syst | em(s) | | | (202) = 1 - | - (201) = | | | | 1 | (202) |
| Fraction of total heati | ng from | main sys | stem 1 | | | (204) = (2 | 02) × [1 – | (203)] = | | | 1 | (204) |
| Efficiency of main spa | ace heat | ing syste | em 1 | | | | | | | | 100 | (206) |
| Efficiency of seconda | ry/suppl | ementar | y heating | g systen | າ, % | | | | | | 0 | (208) |
| Jan Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | kWh/yea | ar |
| Space heating requir | | | i i | | | | | | | 140.40 | 1 | |
| 411.96 255.93 | 133.32 | 30.81 | 4.74 | 0 | 0 | 0 | 0 | 61.28 | 245.61 | 440.18 |] | (5.4.1) |
| $(211)m = \{[(98)m \times (204)] + (211)m = \{[(98)m \times (204)] + (211)m = (211)m \times (204) + (210)m $ | 133.32 | 00 ÷ (20 30.81 | 4.74 | 0 | 0 | 0 | 0 | 61.28 | 245.61 | 440.18 | 1 | (211) |
| 411.00 200.00 | 100.02 | 00.01 | 7.77 | | | | | ar) =Sum(2 | | | 1583.82 | (211) |
| Space heating fuel (s | econdar | v). kWh/ | month | | | | | | 1 | - | | 」` ′ |
| $= \{[(98)m \times (201)]\} \times 1$ | | • • • | | | | | | | | | | |
| (215)m= 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | _ |
| | | | | | | Tota | I (kWh/yea | ar) =Sum(2 | 215) _{15,101} | 12= | 0 | (215) |
| Water heating | | | | | | | | | | | | |
| Output from water hea | 165.38 | 145.67 | 140.89 | 123.21 | 115.78 | 130.56 | 131.43 | 151.18 | 163.1 | 176.32 |] | |
| Efficiency of water hea | ater | | | | | | | l | | | 100 | (216) |
| (217)m= 100 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | | (217) |
| Fuel for water heating | | | | | | | | | | | | |
| (219)m = (64) m x $100(219)$ m = 181.56 159.24 | 0 ÷ (217) 165.38 | m 145.67 | 140.89 | 123.21 | 115.78 | 130.56 | 131.43 | 151.18 | 163.1 | 176.32 | 1 | |
| (210)111-101.00 100.24 | 100.00 | 140.07 | 140.00 | 120.21 | 110.70 | | I = Sum(2 | | 100.1 | 170.02 | 1784.3 | (219) |
| Annual totals | | | | | | | | | Wh/yea | r | kWh/year |](= 10) |
| Space heating fuel use | ed, main | system | 1 | | | | | | - | | 1583.82 |] |
| Water heating fuel use | ed | | | | | | | | | | 1784.3 | 7 |
| Electricity for pumps, f | ans and | electric | keep-ho | t | | | | | | | | _ |
| mechanical ventilatio | n - balan | ced, ext | ract or p | ositive i | nput fron | n outside | 9 | | | 319.54 |] | (230a) |
| central heating pump | : | | | | | | | | | 30 | , | (230c) |
| Total electricity for the | | «Wh/vea | r | | | sum | of (230a). | (230g) = | : | | 349.54 | (231) |
| Electricity for lighting | , | , , | | | | | | | | | 501.63 |] (232) |
| Electricity generated b | v P\/e | | | | | | | | | | -2140.5 | (233) |
| 10a. Fuel costs - indi | | ating ev | etome: | | | | | | | | 2140.0 |](200) |
| Toa. Tuel costs - Illul | viduai ric | ating sy | oterno. | | | | | | | | | |
| | | | | Fu | | | | Fuel P | | | Fuel Cost | |
| O a see Leading and | 4 | | | | /h/year | | | (Table | | v 0.04 | £/year | ٦ |
| Space heating - main | system 1 | | | (21 | 1) x | | | 13. | 19 | | 208.91 | (240) |
| | | | | | 21 | | | | | | | 1 (0 4 4) |
| Space heating - main | • | 2 | | | 3) x | | | 0 | | x 0.01 = | 0 | (241) |
| Space heating - main Space heating - secon | • | 2 | | (21 | 5) x | | | 13. | | x 0.01 = x 0.01 = | 0 | (241) |
| | idary | | | | 5) x | | | | 19 | | | _ |
| Space heating - secon | ndary her fuel) | | | (21 | 5) x 9) | | | 13. | 19 | x 0.01 = | 0 | (242) |

| (if off-peak tariff, list each of (230a) to (2 | 30g) separately as applicable an | d apply fuel price according to | Table 12a |
|--|--|---------------------------------|---------------------------------|
| Energy for lighting | (232) | 13.19 × 0.01 = | |
| Additional standing charges (Table 12) | | | 0 (251) |
| | one of (233) to (235) x) | 13.19 x 0.01 = | 0 (252) |
| Appendix Q items: repeat lines (253) and | d (254) as needed | | |
| Total energy cost | (245)(247) + (250)(254) = | | 556.52 (255) |
| 11a. SAP rating - individual heating sys | stems | | |
| Energy cost deflator (Table 12) | | | 0.42 (256) |
| Energy cost factor (ECF) | $[(255) \times (256)] \div [(4) + 45.0] =$ | | 1.46 (257) |
| SAP rating (Section 12) | | | 79.69 (258) |
| 12a. CO2 emissions – Individual heating | ng systems including micro-CHP | | |
| | Energy kWh/year | Emission factor kg CO2/kWh | Emissions kg CO2/year |
| Space heating (main system 1) | (211) x | 0.519 = | 822 (261) |
| Space heating (secondary) | (215) x | 0.519 = | 0 (263) |
| Water heating | (219) x | 0.519 = | 926.05 (264) |
| Space and water heating | (261) + (262) + (263) + (263) | 64) = | 1748.05 (265) |
| Electricity for pumps, fans and electric k | eep-hot (231) x | 0.519 = | 181.41 (267) |
| Electricity for lighting | (232) x | 0.519 = | 260.35 (268) |
| Energy saving/generation technologies Item 1 | | 0.519 = | -1110.92 (269) |
| Total CO2, kg/year | | sum of (265)(271) = | 1078.89 (272) |
| CO2 emissions per m ² | | (272) ÷ (4) = | 9.34 (273) |
| El rating (section 14) | | | 91 (274) |
| 13a. Primary Energy | | | , , |
| , | Energy kWh/year | Primary factor | P. Energy kWh/year |
| Space heating (main system 1) | (211) x | 3.07 | 4862.32 (261) |
| Space heating (secondary) | (215) x | 3.07 | 0 (263) |
| Energy for water heating | (219) x | 3.07 | 5477.79 (264) |
| Space and water heating | (261) + (262) + (263) + (263) | 64) = | 10340.11 (265) |
| Electricity for pumps, fans and electric k | eep-hot (231) x | 3.07 | 1073.09 (267) |
| Electricity for lighting | (232) x | 0 = | 1540 (268) |
| Energy saving/generation technologies Item 1 | | 3.07 = | -6571.35 (269) |
| 'Total Primary Energy | | sum of (265)(271) = | 6381.86 (272) |
| Primary energy kWh/m²/year | | (272) ÷ (4) = | 55.23 (273) |
| | | | |

Regulations Compliance Report

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Project Information:

Assessed By: Carlos Melgar (STRO031596) Building Type: Mid-terrace Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 116.75m²Site Reference:Kings Mews Be GreenPlot Reference:Plot 002

Address: 2, 10-11 Kings Mews, WC1N 2ES

Client Details:

Name: James Taylor

Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 23.21 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 10.79 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.0 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 37.4 kWh/m²

OK

2 Fabric U-values

Element Highest Average External wall 0.13 (max. 0.30) 0.16 (max. 0.70) OK Party wall 0.00 (max. 0.20) **OK** Floor 0.13 (max. 0.25) 0.13 (max. 0.70) OK Roof 0.16 (max. 0.20) 0.16 (max. 0.35) OK **Openings** 1.37 (max. 2.00) 1.40 (max. 3.30) OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.50 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

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

Direct acting electric boiler

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 0.93 kWh/day

Permitted by DBSCG: 1.03 kWh/day OK

Primary pipework insulated: Yes OK

Regulations Compliance Report

| 6 Controls | | | |
|--|-----------------------|---|----------|
| · • | TZC by plumbing and c | electrical services | OK OK |
| 7 Low energy lights | | | |
| Percentage of fixed lights with low- Minimum | energy fittings | 100.0% 75.0% | OK |
| 8 Mechanical ventilation | | | |
| Continuous supply and extract systems Specific fan power: Maximum MVHR efficiency: Minimum | tem | 0.69 1.5 88% 70% | ок ок |
| 9 Summertime temperature | | 70% | UK |
| Overheating risk (Thames valley): Based on: Overshading: Windows facing: South West Windows facing: North East Roof windows facing: Horizontal Ventilation rate: | | Slight Average or unknown 8.38m² 6.07m² 9.22m² 4.00 Closed 0% of daylight hours | ОК |
| 10 Key features | | | |
| Air permeablility Doors U-value External Walls U-value Party Walls U-value Photovoltaic array | | 2.5 m³/m²h 1.09 W/m²K 0.12 W/m²K 0 W/m²K | |

Predicted Energy Assessment



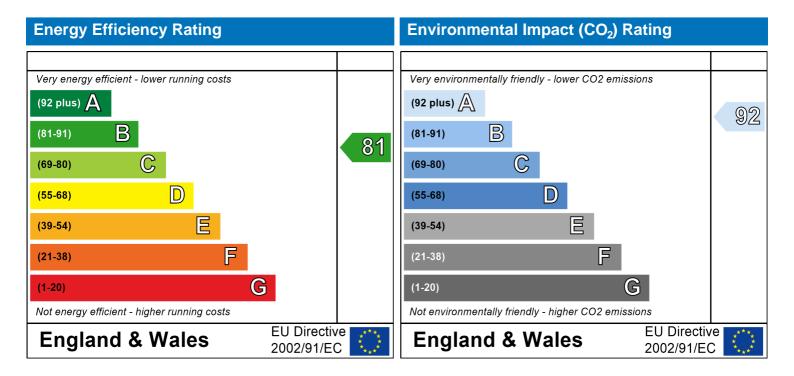
10-11 Kings Mews WC1N 2ES Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Mid-terrace Ground floor Flat 19 July 2018 Carlos Melgar

116.75 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 carbonn dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

| | | | 5 | | | | | | | |
|--|--|-------------------------|-------------------------|----------------|--------------|--------------|--------------|-----------|--------------|---------------|
| | | | User D | etails: | | | | | | |
| Assessor Name: | Carlos Melgar | | | Strom | a Num | ber: | | | 031596 | |
| Software Name: | Stroma FSAP | | | Softwa | Versio | n: 1.0.4.16 | | | | |
| | | | · · | Address | : Plot 00 | 2 | | | | |
| Address : | 2, 10-11 Kings N | lews, WC1N | 2ES | | | | | | | |
| Overall dwelling dimensional | nsions: | | _ | | | | | | | |
| Ground floor | | | | a(m²) 66.62 | (1a) x | Av. Hei | ght(m) 41 | (2a) = | Volume(m³) | (3a) |
| First floor | | | | 50.13 | (1b) x | | 3 | | 150.39 |](3b) |
| Total floor area TFA = (1a |)_(1b)_(1c)_(1d)\ | -(10)+ (1n) | | |] • | | <u> </u> | (20) - | 150.39 | (3D) |
| | ()+(10)+(10)+(1u)+ | r(1 6)+(111 | ′ | 16.75 | (4) |) (O) (O) | \ | (0.) | | _ |
| Dwelling volume | | | | | (3a)+(3b |)+(3c)+(3d |)+(3e)+ | (3n) = | 310.94 | (5) |
| 2. Ventilation rate: | | | _ | -41: - | | 4-4-1 | | | | |
| | main heating | secondary heating | / | other | | total | | | m³ per hour | |
| Number of chimneys | 0 + | 0 | + | 0 | _ = [| 0 | X | 40 = | 0 | (6a) |
| Number of open flues | 0 + | 0 |] + [| 0 | = [| 0 | X | 20 = | 0 | (6b) |
| Number of intermittent far | ns | | | | | 0 | X | 10 = | 0 | (7a) |
| Number of passive vents | | | | | | 0 | X | 10 = | 0 | (7b) |
| Number of flueless gas fir | es | | | | | 0 | х | 40 = | 0 | (7c) |
| | | | | | _ | | <u>_</u> | A * I | | _ |
| | | (0.) (01.) (7. | \ (-1) \ (| - \ | _ | | | ı | anges per ho | _ |
| Infiltration due to chimney If a pressurisation test has be | • | | | | oontinus fi | 0 | | ÷ (5) = | 0 | (8) |
| Number of storeys in th | | епаеа, ргосееа | 10 (17), (| Juiei Wise (| conunue n | om (9) to (| 10) | | 0 | (9) |
| Additional infiltration | o a.v.og (v.o) | | | | | | [(9) | -1]x0.1 = | 0 | (10) |
| Structural infiltration: 0. | 25 for steel or timb | per frame or | 0.35 fo | r mason | ry consti | ruction | , | _ | 0 | (11) |
| if both types of wall are pro deducting areas of openin | | orresponding to | the great | er wall are | ea (after | | | | | _ |
| If suspended wooden fl | | sealed) or 0. | 1 (seale | ed), else | enter 0 | | | | 0 | (12) |
| If no draught lobby, ent | er 0.05, else ente | . 0 | | | | | | | 0 | (13) |
| Percentage of windows | and doors draugh | nt stripped | | | | | | | 0 | (14) |
| Window infiltration | | | | 0.25 - [0.2 | 2 x (14) ÷ 1 | 00] = | | | 0 | (15) |
| Infiltration rate | | | | (8) + (10) | + (11) + (1 | 12) + (13) + | - (15) = | | 0 | (16) |
| Air permeability value, | q50, expressed in | cubic metres | s per ho | our per s | quare m | etre of e | nvelope | area | 2.5 | (17) |
| If based on air permeabili | ty value, then (18) | = [(17) ÷ 20]+(8 |), otherwi | ise (18) = | (16) | | | | 0.12 | (18) |
| Air permeability value applies | | t has been done | e or a deg | gree air pe | rmeability | is being us | sed | | | _ |
| Number of sides sheltered | b | | | (20) 4 | [0.07E v./ | 10)] | | | 4 | (19) |
| Shelter factor | | | | | [0.075 x (* | 19)] = | | | 0.7 | <u> </u> (20) |
| Infiltration rate incorporati | | | | (21) = (18 |) X (20) = | | | | 0.09 | (21) |
| Infiltration rate modified fo | - | 1 1 | | | - | _ | | | Ī | |
| <u> </u> | <u> </u> | ay Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Monthly average wind spe | eed from Table 7 | | | | | | | | • | |

4.9

4.4

4.3

3.8

3.8

3.7

4

4.3

4.5

4.7

(22)m=

| Wind Factor (| (22a)m = | (22)m ÷ | 4 | | | | | | | | | |
|--|--|---|-------------------------------|----------------|---|--|--|--|--|----------|--|--|
| (22a)m= 1.27 | 1.25 | 1.23 | 1.1 | 1.08 | 0.95 | 0.95 | 0.92 | 1 | 1.08 | 1.12 | 1.18 | |
| Adjusted infilt | tration rat | e (allowi | ng for sl | nelter an | d wind s | speed) = | = (21a) x | (22a)m | | | | |
| 0.11 | 0.11 | 0.11 | 0.1 | 0.09 | 0.08 | 0.08 | 0.08 | 0.09 | 0.09 | 0.1 | 0.1 | |
| Calculate effe | | • | rate for t | he appli | cable ca | se | • | • | | | | (05 |
| If exhaust air h | | | endix N (2 | (23a) = (23a | a) × Fmv (e | equation (| N5)) other | rwise (23h | n) = (23a) | | | 0.5 (23 |
| If balanced wi | | | | | | | | |) = (20a) | | | 0.5 (23 74.8 (23 |
| a) If balanc | | • | - | _ | | | | | 2h)m + (| 23h) 🗴 [| ا 1 <i>– (2</i> 3c) | |
| (24a)m = 0.24 | 0.24 | 0.23 | 0.22 | 0.22 | 0.21 | 0.21 | 0.21 | 0.21 | 0.22 | 0.22 | 0.23 | (24 |
| b) If balanc | ed mech | anical ve | ntilation | without | heat red | covery (| MV) (24b |)m = (2 | 2b)m + (2 | 23b) | | l |
| (24b)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | (24 |
| c) If whole I | house ex | tract ver | tilation o | or positiv | re input v | ventilati | on from c | outside | | l . | | l |
| if (22b) | m < 0.5 × | (23b), t | hen (24 | c) = (23b |); other | wise (24 | lc) = (22b | o) m + 0 | .5 × (23b |) | | |
| (24c)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | (24 |
| d) If natural | | | | • | • | | | | 0.51 | | | |
| (24d)m = 0 | $\frac{m = 1, th}{0}$ | en (24a) 0 | $\mathbf{m} = (221)$ | o)m otne | erwise (2 | (4a)m = | $\frac{0.5 + [(2)]}{0.5}$ | 2b)m² x | 0.5] | 0 | 0 | (24 |
| () | | | | <u> </u> | | | | | | 0 | | (2- |
| Effective ai (25)m= 0.24 | 0.24 | 0.23 | 0.22 | 0.22 | 0.21 | 0.21 | 0.21 | 0.21 | 0.22 | 0.22 | 0.23 | (25 |
| 3. Heat losse | os and ha | oot loog r | ooromot | or: | | | | | | | | |
| ELEMENT | es and ne Gros | · | Openin | | Net Ar | .ea | U-valı | IA | AXU | | k-value | e AXk |
| ELEIVIEINI | area | _ | • | • | 110171 | ca | | | | | | |
| Doors | | () | m |) ² | A ,r | m² | W/m2 | | (W/I | K) | kJ/m²-ł | |
| D0013 | | () | m | l ² | A ,r | m² x | W/m2 | | | K) | | |
| Windows Typ | e 1 | () | m |) ² | | x | W/m2 | = = | (W/I | K) | | K kJ/K |
| | | () | m |) ² | 2.1 | x x1 | W/m2 | = 0.04] = | (W/I 2.289 | K) | | K kJ/K |
| Windows Typ | | () | m | 2 | 8.38 | x x1 x1 | W/m2 1.09 1/[1/(1.4)+ | 0.04] = | (W/l 2.289 11.11 | | | K kJ/K (26 |
| Windows Typ | | () | m | 2 | 2.1 8.38 6.07 | x1 x1 x1 x1 | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ | 0.04] = | (W/I 2.289 11.11 8.05 | | | K kJ/K (26 (27 (27 |
| Windows Typ Windows Typ Rooflights | | | 14.4 | | 2.1 8.38 6.07 9.22 | x x x x x x x x x x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ | eK = 0.04] = 0.04] = 0.04] = | (W/I 2.289 11.11 8.05 12.908 | | kJ/m²-ŀ | K kJ/K (26 (27 (27 |
| Windows Typ Windows Typ Rooflights Floor | pe 2 | 01 | | | 2.1 8.38 6.07 9.22 66.62 | x1 x1 x1 x1 x1 x2 x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 1/[1/(1.4) + 0.13 | 0.04] = 0.04] = 0.04] = = | (W/I 2.289 11.11 8.05 12.908 8.6606 | | kJ/m²-ŀ | (28 (27 (27 (27 (27 (28) |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 | 29.0 | 01 06 | 14.4 | | 2.1 8.38 6.07 9.22 66.62 14.56 | x x1 x1 x1 x1 x1 x2 x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 0.13 0.16 | 0.04] = 0.04] = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 | | 110 49.5 | (kJ/K (26 (27 (27 (27 (27 (28 (28 (28 (28 (28 (28 (28 (28 (28 (28 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 | 29.0 44.3 | 01 36 58 | 14.4 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 | x x1 x1 x1 x1 x1 x2 x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 1/[1/(1.4) + 0.13 0.16 0.14 | 0.04] = 0.04] = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 | | 110 49.5 49.5 | (kJ/K (26 (27 (27 (27 (27 (28 (28 (28 (28 (28 (28 (28 (28 (28 (28 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Walls Type3 | 29.0 44.3 52.5 | 01 36 58 | 14.4 2.1 0 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 42.26 | x x1 x1 x1 x1 x2 x x x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 0.13 0.16 0.14 0.12 | 0.04] = 0.04] = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 6.31 | | 110 49.5 49.5 | (kJ/K (26 (27 (27 (27 (27 (27 (28 (28 (28 (28 (28 (28 (28 (28 (28 (28 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Walls Type3 Roof Type1 | 29.0 44.3 52.5 11.4 | 01 06 58 14 | 14.4 2.1 0 9.22 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 42.26 52.58 | x x1 x1 x1 x1 x1 x1 x2 x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 0.13 0.16 0.14 0.12 | (K) = 0.04] = 0.04] = = = = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 6.31 0.36 | | 110 49.5 49.5 17 | (kJ/K (26 (27 (27 (27 (27 (27 (28 (29 (28 (28 (28 (28 (28 (28 (28 (28 (28 (28 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Walls Type3 Roof Type1 Roof Type2 | 29.0 44.3 52.5 11.4 | 01 06 58 14 | 14.4 2.1 0 9.22 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 42.26 52.58 2.22 7.17 | x x1 x1 x1 x1 x1 x2 x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 0.13 0.16 0.14 0.12 | (K) = 0.04] = 0.04] = = = = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 6.31 0.36 | | 110 49.5 49.5 17 | (kJ/K (26 (27 (27 (27 (27 (27 (27 (28 (28 (28 (28 (28 (28 (28 (28 (28 (28 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Walls Type3 Roof Type1 Roof Type2 Total area of | 29.0 44.3 52.5 11.4 | 01 06 58 14 | 14.4 2.1 0 9.22 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 42.26 52.58 2.22 7.17 211.1 | x x1 x1 x1 x1 x1 x2 x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 1/[1/(1.4) + 0.13 0.16 0.14 0.12 0.16 0.16 | eK = 0.04] = 0.04] = = = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 6.31 0.36 1.15 | | 110 49.5 49.5 17 9 | (kJ/K (26 (27 (27 (27 (27 (27 (28 (28 (28 (28 (28 (28 (28 (28 (28 (28 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Walls Type3 Roof Type1 Roof Type2 Total area of Party wall | 29.0 44.3 52.5 11.4 7.1 elements | 01 06 58 14 | 14.4 2.1 0 9.22 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 42.26 52.58 2.22 7.17 211.1 | x x1 x1 x1 x1 x2 x x x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 1/[1/(1.4) + 0.13 0.16 0.14 0.12 0.16 0.16 | eK = 0.04] = 0.04] = = = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 6.31 0.36 1.15 | | 110 49.5 49.5 17 9 9 | (kJ/K (26 (27 (27 (27 (27 (27 (28 (28 (28 (28 (28 (28 (28 (28 (28 (28 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Walls Type3 Roof Type1 Roof Type2 Total area of Party wall Party ceiling | 29.0 44.3 52.5 11.4 7.1 elements | 01 06 58 14 | 14.4 2.1 0 9.22 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 42.26 52.58 2.22 7.17 211.1 107.1 50.13 | x x1 x1 x1 x1 x1 x2 x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 1/[1/(1.4) + 0.13 0.16 0.14 0.12 0.16 0.16 | eK = 0.04] = 0.04] = = = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 6.31 0.36 1.15 | | 110 49.5 49.5 17 9 49.5 100 | (kJ/K (26 (27 (27 (27 (27 (27 (27 (27 (29 (29 (29 (29 (29 (29 (29 (29 (29 (29 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Walls Type3 Roof Type1 Roof Type2 Total area of Party wall Party ceiling Internal wall * | 29.0 44.3 52.5 11.4 7.1' elements | 01 06 58 14 | 14.4 2.1 0 9.22 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 42.26 52.58 2.22 7.17 211.1 107.1 50.13 | x x1 x1 x1 x1 x2 x x x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 1/[1/(1.4) + 0.13 0.16 0.14 0.12 0.16 0.16 | eK = 0.04] = 0.04] = = = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 6.31 0.36 1.15 | | 110 49.5 49.5 17 9 9 49.5 100 | (kJ/K (26 (27 (27 (27 (27 (27 (28 (28 (28 (28 (28 (28 (28 (28 (28 (28 |
| Windows Typ Windows Typ Rooflights Floor Walls Type1 Walls Type2 Walls Type3 Roof Type1 Roof Type2 Total area of Party wall Party ceiling Internal wall * Internal floor | 29.0 44.3 52.5 11.4 7.1' elements | 01 36 58 14 7 , m ² ows, use e | 14.4 2.1 0 9.22 0 | 5 | 2.1 8.38 6.07 9.22 66.62 14.56 42.26 52.58 2.22 7.17 211.1 107.1 50.13 148.7 50.13 alue calcul | x x x x x x x x x x x x x x x x x x x | W/m2 1.09 1/[1/(1.4)+ 1/[1/(1.4)+ 0.13 0.16 0.14 0.12 0.16 0.16 | EK = 0.04] = 0.04] = = = = = = = = = = = = = = = = = = = | (W/I 2.289 11.11 8.05 12.908 8.6606 2.33 5.98 6.31 0.36 1.15 | | 110 49.5 49.5 17 9 49.5 100 9 18 | K kJ/K (26 (27 (27 (27 (27 (28 720.72 (29 2091.87 (29 893.86 (29 19.98 (30 64.53 (30 5303.925 (32 5013 (32 1339.02 (32 902.34 (32 451.17 (32 |

(26)...(30) + (32) =

Fabric heat loss, $W/K = S (A \times U)$

58.45

(33)

| Heat capac | itv Cm = S | (Axk) | | | | | | ((28) | .(30) + (32 | !) + (32a) | (32e) = | 24128.62 | (34) |
|--|--|--|--|---|---|--|--|---|--|--|--|----------|--|
| Thermal ma | • | ` ' | = Cm - | : TFA) ir | n kJ/m²K | | | = (34) | ÷ (4) = | , , , | , , | 206.67 | (35) |
| For design ass | • | ` | | , | | | ecisely the | ` ' | . , | TMP in Ta | able 1f | 200.01 | |
| can be used ir | stead of a de | tailed calc | ulation. | | | | | | | | | | _ |
| Thermal bri | • | • | | • . | • | K | | | | | | 15.61 | (36) |
| if details of the Total fabric | 0 0 | are not kn | own (36) = | = 0.15 x (3 | 1) | | | (33) + | (36) - | | | 74.00 | 7(07) |
| Ventilation | | alculated | l monthly | M | | | | . , | $= 0.33 \times (30)$ | 25\m v (5) | | 74.06 | (37) |
| Ja | i | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (38)m= 24.3 | | 23.93 | 22.81 | 22.58 | 21.46 | 21.46 | 21.23 | 21.91 | 22.58 | 23.03 | 23.48 | | (38) |
| Heat transfe | | | | | | | | | = (37) + (3 | | | | (==) |
| (39)m= 98.4 | | 97.99 | 96.86 | 96.64 | 95.52 | 95.52 | 95.29 | 95.97 | 96.64 | 97.09 | 97.54 | | |
| (00) | | | | | | | | | Average = | | | 96.81 | (39) |
| Heat loss p | arameter (I | HLP), W | /m²K | | _ | | | | = (39)m ÷ | | | | |
| (40)m= 0.8 | 4 0.84 | 0.84 | 0.83 | 0.83 | 0.82 | 0.82 | 0.82 | 0.82 | 0.83 | 0.83 | 0.84 | | _ |
| Number of | dave in mo | nth (Tah | la 1a) | | | | | A | Average = | Sum(40) _{1.} | 12 /12= | 0.83 | (40) |
| Ja | - | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (41)m= 31 | - | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | | (41) |
| | | | ļ. | ļ. | | ļ. | | | | | | | |
| 4. Water h | eating ene | rav reaui | irement: | | | | | | | | kWh/y | ear: | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Assumed o | | | · [1 - exn | (<u>-</u> 0 0003 | 849 v (TF | -Δ -13 Q | 12)] + 0 (|)013 x (1 | Γ F Δ -13 | | 85 | | (42) |
| if TFA > 1 | ccupancy, I3.9, N = 1 I3.9, N = 1 | | [1 - exp | (-0.0003 | 349 x (TF | FA -13.9 |)2)] + 0.0 |)013 x (T | ΓFA -13. | | 85 | | (42) |
| if TFA > 1 if TFA £ 1 Annual ave | 13.9, N = 1 13.9, N = 1 rage hot wa | + 1.76 x ater usaç | ge in litre | es per da | ay Vd,av | erage = | (25 x N) | + 36 | | 9) | 85 | | (42) |
| if TFA > 1 if TFA £ 1 | 13.9, N = 1 13.9, N = 1 rage hot wannual average | + 1.76 x ater usag | ge in litre usage by | es per da 5% if the a | ay Vd,av Iwelling is | erage = designed t | (25 x N) | + 36 | | 9) | | | , , |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that | 13.9, N = 1 13.9, N = 1 rage hot wannual average 125 litres per | + 1.76 x ater usag hot water person per | ge in litre usage by r day (all w | es per da 5% if the d vater use, I | ay Vd,av Iwelling is thot and co | erage = designed t ld) | (25 x N) to achieve | + 36 a water us | e target of | 9) | 1.88 | | , , |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar | 13.9, N = 1 13.9, N = 1 rage hot wanual average 125 litres per | + 1.76 x ater usage hot water person per | ge in litre usage by r day (all w | es per da 5% if the d vater use, I | ay Vd,av welling is not and co | erage = designed t ld) Jul | (25 x N) to achieve | + 36 | | 9) | | | , , |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per n Feb ge in litres per | + 1.76 x ater usage hot water person per | ge in litre usage by r day (all w | es per da 5% if the d vater use, I | ay Vd,av welling is not and co | erage = designed t ld) Jul | (25 x N) to achieve | + 36 a water us | e target of | 9) | 1.88 | | , , |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usage | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per n Feb ge in litres per | + 1.76 x ater usage hot water person per Mar r day for ea | ge in litre usage by day (all w Apr ach month | es per da 5% if the a vater use, I May Vd,m = fa | ay Vd,av Iwelling is that and co Jun ctor from | erage = designed in the light state of the light st | (25 x N) to achieve Aug (43) | + 36 a water us Sep | e target of | 9) 10 ² Nov 108 | Dec 112.07 | 1222.6 | , , |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usage | 13.9, N = 1 13.9, N = 1 13.9 | + 1.76 x ater usage hot water person per Mar r day for ear | ge in litre usage by r day (all w Apr ach month 99.85 | es per da 5% if the d vater use, I May Vd,m = fa 95.77 | ay Vd,av Iwelling is not and co Jun ctor from 1 | erage = designed to ld) Jul Table 1c x 91.7 | (25 x N) o achieve Aug (43) 95.77 | + 36 a water us Sep 99.85 | Oct 103.92 Total = Sur | 9) Nov 108 m(44) ₁₁₂ = | Dec 112.07 | 1222.6 | (43) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usag (44)m= 112. | 13.9, N = 1 13.9, N = 1 rage hot wanual average 125 litres per n Feb ge in litres per 107 108 | + 1.76 x ater usage hot water person per Mar r day for ear | ge in litre usage by r day (all w Apr ach month 99.85 | es per da 5% if the d vater use, I May Vd,m = fa 95.77 | ay Vd,av Iwelling is not and co Jun ctor from 1 | erage = designed to ld) Jul Table 1c x 91.7 | (25 x N) o achieve Aug (43) 95.77 | + 36 a water us Sep 99.85 | Oct 103.92 Total = Sur | 9) Nov 108 m(44) ₁₁₂ = | Dec 112.07 | 1222.6 | (43) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usas (44)m= 112. Energy conter (45)m= 166 | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per per in Feb ge in litres per 107 108 It of hot water 12 145.36 | + 1.76 x ater usage hot water person per Mar r day for ear 103.92 | ge in litre usage by day (all w Apr ach month 99.85 culated me 130.77 | es per da 5% if the orater use, I May $Vd,m = fa$ 95.77 $ponthly = 4$. | ay Vd,av lwelling is not and co Jun ctor from 7 91.7 190 x Vd,r | erage = designed to ld) Jul Table 1c x 91.7 m x nm x E 100.34 | (25 x N) to achieve Aug (43) 95.77 97m / 3600 115.14 | + 36 a water us Sep 99.85 0 kWh/mon 116.51 | Oct 103.92 Fotal = Sur th (see Ta | Nov 108 m(44) ₁₁₂ = bles 1b, 1148.22 | 1.88 Dec 112.07 c, 1d) 160.96 | 1222.6 | (43) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usas (44)m= 112. Energy conter (45)m= 166 If instantaneous | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per pe in litres per 107 | + 1.76 x ater usage hot water person per Mar r day for ear 103.92 used - call 150 | ge in litre usage by r day (all w Apr ach month 99.85 culated me 130.77 | es per da 5% if the orater use, I May $Vd,m = fa$ 95.77 $onthly = 4$. | ay Vd,av lwelling is not and co Jun ctor from 7 91.7 190 x Vd,r 108.28 | erage = designed to ld) Jul Table 1c x 91.7 m x nm x E 100.34 enter 0 in | (25 x N) to achieve Aug (43) 95.77 97m / 3600 115.14 boxes (46) | + 36 a water us Sep 99.85 0 kWh/mon 116.51 | Oct 103.92 Fotal = Sur th (see Ta 135.78 | Nov 108 m(44) ₁₁₂ = bles 1b, 1 148.22 m(45) ₁₁₂ = | 1.88 Dec 112.07 c, 1d) 160.96 | | (43) (44) (45) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usas (44)m= 112. Energy conter (45)m= 166 | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per per in litres per 107 | + 1.76 x ater usage hot water person per Mar r day for ear 103.92 | ge in litre usage by day (all w Apr ach month 99.85 culated me 130.77 | es per da 5% if the orater use, I May $Vd,m = fa$ 95.77 $ponthly = 4$. | ay Vd,av lwelling is not and co Jun ctor from 7 91.7 190 x Vd,r | erage = designed to ld) Jul Table 1c x 91.7 m x nm x E 100.34 | (25 x N) to achieve Aug (43) 95.77 97m / 3600 115.14 | + 36 a water us Sep 99.85 0 kWh/mon 116.51 | Oct 103.92 Fotal = Sur th (see Ta 135.78 | Nov 108 m(44) ₁₁₂ = bles 1b, 1148.22 | 1.88 Dec 112.07 c, 1d) 160.96 | | (43) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usa; (44)m= 112. Energy conter (45)m= 166 If instantaneous (46)m= 24.9 | I 3.9, N = 1 I 3.9, N = 1 rage hot wanual average 125 litres per 107 | + 1.76 x ater usage hot water person per Mar r day for each 103.92 150 150 ing at point 22.5 | ge in litre usage by day (all w Apr ach month 99.85 culated mo 130.77 for use (no | es per da 5% if the a rater use, I May Vd,m = fa 95.77 | ay Vd,av lwelling is not and co Jun ctor from 1 91.7 190 x Vd,r 108.28 | erage = designed to ld) Jul Table 1c x 91.7 m x nm x E 100.34 enter 0 in | (25 x N) to achieve Aug (43) 95.77 07m / 3600 115.14 boxes (46) 17.27 | + 36 a water us Sep 99.85 0 kWh/mon 116.51 0 to (61) 17.48 | Oct 103.92 Fotal = Sur 135.78 Fotal = Sur 20.37 | Nov 108 m(44) ₁₁₂ = bles 1b, 1 148.22 m(45) ₁₁₂ = 22.23 | 1.88 Dec 112.07 c, 1d) 160.96 | | (43) (44) (45) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per per in litres per 107 | + 1.76 x ater usage hot water person per Mar r day for ear 103.92 150 150 ing at point 22.5 including the column of the co | ge in litre usage by day (all w Apr ach month 99.85 culated me 130.77 f of use (no | es per da 5% if the of | ay Vd,av welling is that and co | erage = designed to ld) Jul Table 1c x 91.7 m x nm x E 100.34 enter 0 in 15.05 | (25 x N) to achieve Aug (43) 95.77 97m / 3600 115.14 boxes (46) 17.27 within sa | + 36 a water us Sep 99.85 0 kWh/mon 116.51 0 to (61) 17.48 | Oct 103.92 Fotal = Sur 135.78 Fotal = Sur 20.37 | Nov 108 m(44) ₁₁₂ = bles 1b, 1 148.22 m(45) ₁₁₂ = 22.23 | 1.88 Dec 112.07 c, 1d) 160.96 | | (43) (44) (45) (46) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usage (44)m= 112. Energy conter (45)m= 166 If instantaneous (46)m= 24.5 Water stora Storage vol If communit Otherwise in | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per 107 | ater usage hot water person per Mar r day for ear 103.92 150 150 150 ing at point and no ta | ge in litre usage by day (all w Apr ach month 99.85 culated mo 130.77 for use (no 19.62 and any so ank in dw | es per da 5% if the of rater use, I May Vd,m = far 95.77 onthly = 4. 125.48 o hot water 18.82 olar or W velling, e | ay Vd,av welling is not and co Jun ctor from 1 91.7 190 x Vd,r 108.28 storage), 16.24 /WHRS | erage = designed to ld) Jul Table 1c x 91.7 m x nm x E 100.34 enter 0 in 15.05 storage) litres in | (25 x N) to achieve Aug (43) 95.77 07m / 3600 115.14 boxes (46) 17.27 within sa (47) | + 36 a water us Sep 99.85 0 kWh/mon 116.51 0 to (61) 17.48 ame vess | Oct 103.92 Fotal = Sur 135.78 Fotal = Sur 20.37 | Nov 108 m(44) ₁₁₂ = bles 1b, 1 148.22 m(45) ₁₁₂ = 22.23 | 1.88 Dec 112.07 c, 1d) 160.96 | | (43) (44) (45) (46) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the armot more that Hot water usage (44)m= 112. Energy conter (45)m= 166 If instantaneous (46)m= 24.5 Water stora Storage vol If communit Otherwise in Water stora | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per 125 litres per 13 | + 1.76 x ater usage hot water person per Mar r day for ear 103.92 150 150 ing at point 22.5) including and no tall hot water 103.92 | ge in litre usage by day (all w Apr ach month 99.85 culated me 130.77 for use (no | es per da 5% if the of yater use, I May Vd,m = fact 95.77 onthly = 4. 125.48 o hot water 18.82 olar or Water yelling, each of the color of water yelling, each of the color of the | ay Vd,av welling is not and co Jun ctor from 91.7 190 x Vd,r 108.28 storage), 16.24 /WHRS nter 110 nstantar | erage = designed to ld) Jul Table 1c x 91.7 m x nm x E 100.34 enter 0 in 15.05 storage 0 litres in neous co | (25 x N) to achieve Aug (43) 95.77 07m / 3600 115.14 boxes (46) 17.27 within sa (47) | + 36 a water us Sep 99.85 0 kWh/mon 116.51 0 to (61) 17.48 ame vess | Oct 103.92 Fotal = Sur 135.78 Fotal = Sur 20.37 | Nov 108 m(44) ₁₁₂ = bles 1b, 1 148.22 m(45) ₁₁₂ = 22.23 | 1.88 Dec 112.07 c, 1d) 160.96 24.14 | | (43) (44) (45) (46) (47) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usage (44)m= 112. Energy conter (45)m= 166 If instantaneous (46)m= 24.5 Water stora Storage vol If communit Otherwise in Water stora a) If manual | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per 107 | ater usage hot water person per Mar r day for ear 103.92 150 150 150 ing at point 22.5 1 including and no talk hot water eclared less that the color of the color | ge in litre usage by day (all w Apr ach month 99.85 culated mo 130.77 for use (no 19.62 and any so ank in dw er (this in | es per da 5% if the of yater use, I May Vd,m = fact 95.77 onthly = 4. 125.48 o hot water 18.82 olar or Water yelling, each of the color of water yelling, each of the color of the | ay Vd,av welling is not and co Jun ctor from 91.7 190 x Vd,r 108.28 storage), 16.24 /WHRS nter 110 nstantar | erage = designed to ld) Jul Table 1c x 91.7 m x nm x E 100.34 enter 0 in 15.05 storage 0 litres in neous co | (25 x N) to achieve Aug (43) 95.77 07m / 3600 115.14 boxes (46) 17.27 within sa (47) | + 36 a water us Sep 99.85 0 kWh/mon 116.51 0 to (61) 17.48 ame vess | Oct 103.92 Fotal = Sur 135.78 Fotal = Sur 20.37 | Nov 108 m(44) ₁₁₂ = bles 1b, 1. 148.22 m(45) ₁₁₂ = 22.23 | 1.88 Dec 112.07 c, 1d) 160.96 24.14 | | (43) (44) (45) (46) (47) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usag (44)m= 112. Energy conter (45)m= 166 If instantaneous (46)m= 24.5 Water stora Storage vol If communit Otherwise i Water stora a) If manuf Temperatur | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per 107 | ater usage hot water person per Mar r day for ear 103.92 150 150 including at point and no tale hot water eclared lem Table | ge in litre usage by day (all w Apr ach month 99.85 culated mo 130.77 for use (no 19.62 and any so ank in dw er (this in oss facto 2b | es per da 5% if the of water use, I May Vd,m = fact 95.77 onthly = 4. 125.48 o hot water 18.82 olar or W welling, e ncludes i | ay Vd,av welling is not and co Jun ctor from 91.7 190 x Vd,r 108.28 storage), 16.24 /WHRS nter 110 nstantar | erage = designed to ld) Jul Table 1c x 91.7 100.34 enter 0 in 15.05 storage 0 litres in neous con/day): | (25 x N) to achieve Aug (43) 95.77 07m / 3600 115.14 boxes (46) 17.27 within sa (47) ombi boil | + 36 a water us Sep 99.85 0 kWh/mon 116.51 17.48 ame vess ers) ente | Oct 103.92 Fotal = Sur 135.78 Fotal = Sur 20.37 | Nov 108 m(44) ₁₁₂ = bles 1b, 1 148.22 m(45) ₁₁₂ = 22.23 | 1.88 Dec 112.07 c, 1d) 160.96 24.14 50 93 | | (43) (44) (45) (46) (47) (48) (49) |
| if TFA > 1 if TFA £ 1 Annual ave Reduce the ar not more that Ja Hot water usage (44)m= 112. Energy conter (45)m= 166 If instantaneous (46)m= 24.5 Water stora Storage vol If communit Otherwise in Water stora a) If manual | I3.9, N = 1 I3.9, N = 1 rage hot wanual average 125 litres per 107 | ater usage hot water person per Mar r day for ear 103.92 150 150 150 ing at point 22.5 1 including and no tale hot water eclared lear storage | ge in litre usage by day (all w Apr ach month 99.85 culated mo 130.77 for use (no 19.62 and in dw er (this in oss facto 2b e, kWh/ye | es per da 5% if the of water use, I May Vd,m = far 95.77 onthly = 4. 125.48 o hot water 18.82 olar or W velling, e oncludes i or is knowear | ay Vd,av lwelling is not and co Jun ctor from 1 91.7 190 x Vd,r 108.28 storage), 16.24 /WHRS nter 110 nstantar wn (kWh | erage = designed to designed t | (25 x N) to achieve Aug (43) 95.77 07m / 3600 115.14 boxes (46) 17.27 within sa (47) | + 36 a water us Sep 99.85 0 kWh/mon 116.51 17.48 ame vess ers) ente | Oct 103.92 Fotal = Sur 135.78 Fotal = Sur 20.37 | Nov 108 m(44) ₁₁₂ = bles 1b, 1 148.22 m(45) ₁₁₂ = 22.23 | 1.88 Dec 112.07 c, 1d) 160.96 24.14 | | (43) (44) (45) (46) (47) |

| Hot water storage loss factor | from Table 2 (kW | /h/litre/da | ay) | | | | | 0 | | (51) |
|--|--|--|-------------|--------------|-------------|-------------|-------------|------------|--------------------|------|
| If community heating see sec | tion 4.3 | | | | | | | | • | |
| Volume factor from Table 2a | | | | | | | - | 0 | | (52) |
| Temperature factor from Tab | | | | | | | | 0 | | (53) |
| Energy lost from water storage | je, kWh/year | | | (47) x (51) | x (52) x (| 53) = | | 0 | | (54) |
| Enter (50) or (54) in (55) | | | | | | | 0 | .5 | | (55) |
| Water storage loss calculated | for each month | | | ((56)m = (| 55) × (41)ı | m | | | | |
| (56)m= 15.57 14.06 15.57 | 15.07 15.57 | 15.07 | 15.57 | 15.57 | 15.07 | 15.57 | 15.07 | 15.57 | | (56) |
| If cylinder contains dedicated solar s | torage, (57)m = (56)n | n x [(50) – (| [H11)] ÷ (5 | 0), else (5 | 7)m = (56) | m where (| H11) is fro | m Append | ix H | |
| (57)m= 15.57 14.06 15.57 | 15.07 15.57 | 15.07 | 15.57 | 15.57 | 15.07 | 15.57 | 15.07 | 15.57 | | (57) |
| Primary circuit loss (annual) f | rom Table 3 | | | | | | | 0 | | (58) |
| Primary circuit loss calculated | d for each month | (59)m = 0 | (58) ÷ 36 | 65 × (41) | m | | | | | |
| (modified by factor from Ta | ble H5 if there is | solar wat | ter heatii | ng and a | cylinde | r thermo | stat) | | | |
| (59)m = 0 0 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (59) |
| Combi loss calculated for each | ch month (61)m = | (60) ÷ 30 | 65 × (41) |)m | | | | | | |
| (61)m= 0 0 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (61) |
| Total heat required for water | heating calculate | d for eac | h month | (62)m = | 0.85 × (| 45)m + | (46)m + | (57)m + | ı (59)m + (61)m | |
| (62)m= 181.77 159.42 165.57 | | | 115.9 | 130.7 | 131.58 | 151.35 | 163.28 | 176.52 | | (62) |
| Solar DHW input calculated using A | ppendix G or Appendi | x H (negati | ve quantity | /) (enter '0 | if no sola | r contribut | ion to wate | r heating) | l | |
| (add additional lines if FGHR | | | | | | | | | | |
| (63)m= 0 0 0 | 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output from water heater | ! | | | | | | | | | |
| (64)m= 181.77 159.42 165.57 | 7 145.84 141.05 | 123.34 | 115.9 | 130.7 | 131.58 | 151.35 | 163.28 | 176.52 | | |
| | 1 1 | | | Outp | out from wa | ater heate | r (annual)₁ | 12 | 1786.33 | (64) |
| Heat gains from water heatin | g, kWh/month 0.2 | 25 ´ [0.85 | × (45)m | + (61)m | 1] + 0.8 > | ((46)m | + (57)m | + (59)m | 1 | |
| (65)m= 67.72 59.58 62.33 | 55.53 54.18 | 48.06 | 45.82 | 50.74 | 50.79 | 57.6 | 61.34 | 65.97 | | (65) |
| include (57)m in calculation | of (65)m only if | cvlinder i | s in the o | dwellina | or hot w | ater is fr | om com | munity h | ı ıeating | |
| 5. Internal gains (see Table | ` , | -, | | - 3 | | | | | | |
| | , | | | | | | | | | |
| Metabolic gains (Table 5), W. Jan Feb Mai | | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (66)m= 170.99 170.99 170.99 | + | 170.99 | 170.99 | 170.99 | 170.99 | 170.99 | 170.99 | 170.99 | | (66) |
| Lighting gains (calculated in A | <u> </u> | | l | l | | | | | | ` , |
| (67)m= 69.02 61.3 49.86 | 1 1 | 23.82 | 25.74 | 33.45 | 44.9 | 57.01 | 66.54 | 70.94 | | (67) |
| Appliances gains (calculated | <u> </u> | ļ. | ļ | ļ | | | 00.01 | 7 0.0 1 | | (- / |
| (68)m= 419.28 423.63 412.63 | | 332.17 | 313.67 | 309.32 | 320.29 | 343.63 | 373.09 | 400.78 | I | (68) |
| ` ' | | | | | | | 373.09 | 400.76 | | (00) |
| Cooking gains (calculated in | | | | | | | 54.05 | 54.05 | 1 | (60) |
| (69)m= 54.95 54.95 54.95 | | 54.95 | 54.95 | 54.95 | 54.95 | 54.95 | 54.95 | 54.95 | | (69) |
| Pumps and fans gains (Table | - | | 1 | | | | 1 | | I | |
| (70)m= 3 3 3 | 3 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | (70) |
| Losses e.g. evaporation (neg | | - | | | | | | | 1 | |
| (71)m= -113.99 -113.99 -113.99 | 9 -113.99 -113.99 | -113.99 | -113.99 | -113.99 | -113.99 | -113.99 | -113.99 | -113.99 | | (71) |
| Water heating gains (Table 5 |) | | , | | | | | 1 | • | |
| (72)m= 91.02 88.66 83.78 | 77.13 72.82 | 66.74 | 61.58 | 68.2 | 70.55 | 77.42 | 85.19 | 88.67 | | (72) |
| | | | | | | | | | | |

| Total internal | gains = | | | | | (66)n | n + (67)m | + (68 | 3)m + | (69)m + (| 70)m + | (71)m + (72) | m | | | |
|----------------------------|-------------|------------|-------------|----------|-------|--------|-----------|---------|-------|--------------|----------|---------------|----------|---|---------|------|
| (73)m= 694.27 | 688.55 | 661.25 | 619.15 | 575.84 | 537 | 7.68 | 515.94 | 525. | .92 | 550.68 | 593.0 | 1 639.77 | 675.34 | | | (73) |
| 6. Solar gains | : | | | | | | | | | | | | | | | |
| Solar gains are ca | alculated (| using sola | r flux from | Table 6a | and a | ssocia | ited equa | tions t | to co | nvert to the | e applic | able orientat | ion. | | | |
| Orientation: A | | actor | Area | | | Flux | | | т. | g_ | | FF | | G | ains | |
| | able 6d | | m² | | _ | rab | le 6a | | 1 6 | able 6b | _ | Table 6c | | | (W) | _ |
| Northeast _{0.9x} | 0.77 | X | 6.0 |)7 | x | 11 | .28 | X | | 0.51 | X | 1.11 | = | | 26.9 | (75) |
| Northeast 0.9x | 0.77 | X | 6.0 |)7 | X | 22 | 2.97 | X | | 0.51 | X | 1.11 | = | | 54.75 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 | 07 | x | 41 | .38 | X | | 0.51 | X | 1.11 | = | | 98.63 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 |)7 | x | 67 | '.96 | X | | 0.51 | X | 1.11 | = | | 161.99 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 | 07 | x | 91 | .35 | X | | 0.51 | X | 1.11 | = | | 217.74 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 | 07 | x | 97 | '.38 | X | | 0.51 | X | 1.11 | = | | 232.13 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 |)7 | x | 9 | 1.1 | X | | 0.51 | X | 1.11 | = | | 217.16 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 |)7 | X | 72 | 2.63 | X | | 0.51 | X | 1.11 | = | | 173.12 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 | 07 | X | 50 |).42 | X | | 0.51 | X | 1.11 | = | | 120.19 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 | 07 | x | 28 | 3.07 | X | | 0.51 | X | 1.11 | = | | 66.9 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 | 07 | x | 14 | 4.2 | X | | 0.51 | X | 1.11 | = | | 33.84 | (75) |
| Northeast _{0.9x} | 0.77 | X | 6.0 | 07 | x | 9. | .21 | X | | 0.51 | X | 1.11 | = | | 21.96 | (75) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | x | 36 | 5.79 | | | 0.51 | X | 1.11 | = | | 121.08 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | X | 62 | 2.67 | | | 0.51 | X | 1.11 | = | | 206.25 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | X | 85 | 5.75 | | | 0.51 | X | 1.11 | = | | 282.2 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | X | 10 | 6.25 | | | 0.51 | X | 1.11 | = | | 349.66 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | x | 119 | 9.01 | | | 0.51 | X | 1.11 | = | | 391.64 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | x | 11 | 8.15 | | | 0.51 | X | 1.11 | = | | 388.81 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | X | 11: | 3.91 | | | 0.51 | X | 1.11 | = | | 374.86 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | x | 10 | 4.39 | | | 0.51 | X | 1.11 | = | | 343.53 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | x | 92 | 2.85 | | | 0.51 | X | 1.11 | = | | 305.56 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | x | 69 |).27 | | | 0.51 | X | 1.11 | = | | 227.95 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | x | 44 | .07 | | | 0.51 | X | 1.11 | = | | 145.03 | (79) |
| Southwest _{0.9x} | 0.77 | X | 8.3 | 38 | x | 31 | .49 | | | 0.51 | X | 1.11 | = | | 103.62 | (79) |
| Rooflights 0.9x | 1 | X | 9.2 | 22 | x | 2 | 26 | x | | 0.6 | X | 0 | = | | 143.83 | (82) |
| Rooflights _{0.9x} | 1 | X | 9.2 | 22 | x | į | 54 | x | | 0.6 | X | 1.11 | = | | 298.73 | (82) |
| Rooflights _{0.9x} | 1 | X | 9.2 | 22 | x | (| 96 | x | | 0.6 | X | 1.11 | = | | 531.07 | (82) |
| Rooflights 0.9x | 1 | X | 9.2 | 22 | x | 1 | 50 | x | | 0.6 | x | 1.11 | = | | 829.8 | (82) |
| Rooflights _{0.9x} | 1 | X | 9.2 | 22 | x | 1 | 92 | х | | 0.6 | x | 1.11 | = | | 1062.14 | (82) |
| Rooflights _{0.9x} | 1 | X | 9.2 | 22 | x | 2 | 00 | X | | 0.6 | x | 1.11 | = | | 1106.4 | (82) |
| Rooflights _{0.9x} | 1 | X | 9.2 | 22 | x [| 1 | 89 | x | | 0.6 | × | 1.11 | <u> </u> | | 1045.55 | (82) |
| Rooflights _{0.9x} | 1 | X | 9.2 | 22 | x [| 1 | 57 | x | | 0.6 | × | 1.11 | <u> </u> | | 868.52 | (82) |
| Rooflights _{0.9x} | 1 | X | 9.2 | 22 | x [| 1 | 15 | х | | 0.6 | × | 1.11 | <u> </u> | | 636.18 | (82) |
| Rooflights _{0.9x} | 1 | x | 9.2 | 22 | x [| - (| 66 | x | | 0.6 | x | 1.11 | _ = | | 365.11 | (82) |
| _ | | | | | _ | | | ' | | | _ | - | | | | _ |

| Rooflight | ts _{0.9x} | 1 | х | 9.2 | 22 | x | | 33 | x | 0.6 | | x | 1.11 | = | 182.56 | (82) |
|------------|--------------------|------------|------------|-----------|-----------|---------------|----------|-----------|---------------------|-------------|--------|-----------|--|------------------------|---------|-----------|
| Rooflight | ts _{0.9x} | 1 | x | 9.2 | 22 | x [| | 21 | x | 0.6 | | | 1.11 | | 116.17 | (82) |
| | _ | | | | | | | | _ | | | | | | | |
| Solar ga | ains in v | watts, ca | alculated | I for eac | h month | 1 | | | (83)m = | Sum(74 | 4)m | .(82)m | | | | |
| Ť | 291.81 | 559.72 | 911.9 | | | $\overline{}$ | 27.35 | 1637.56 | 1385.1 | 7 106 | 1.93 | 659.96 | 361.43 | 241.76 | | (83) |
| Total ga | ains – ir | nternal a | nd solar | (84)m = | = (73)m | + (8 | 33)m | , watts | | | - ! | | | | | |
| (84)m= | 986.07 | 1248.27 | 1573.15 | 1960.59 | 2247.37 | 220 | 65.03 | 2153.5 | 1911.0 | 9 1612 | 2.61 | 1252.97 | 1001.19 | 917.1 | | (84) |
| 7 Mea | an inter | nal temp | erature | (heating | seasor |) | | | | | • | | | | | |
| | | | eating p | | | | area f | rom Tah | ole 9. ⁻ | - ከ1 (°(| 2) | | | | 21 | (85) |
| • | | • | ains for I | | | • | | | , | (| , | | | | | ` |
| Г | Jan | Feb | Mar | Apr | May | Ť | Jun | Jul | Aug | , | ер | Oct | Nov | Dec | | |
| (86)m= | 0.98 | 0.93 | 0.8 | 0.58 | 0.4 | + |).27 | 0.2 | 0.23 | 0.4 | | 0.74 | 0.94 | 0.98 | | (86) |
| (80)111= | 0.90 | 0.93 | 0.8 | 0.56 | 0.4 | |).21 | 0.2 | 0.23 | 0.2 | • | 0.74 | 0.94 | 0.90 | | (00) |
| Mean i | | temper | ature in | living ar | ea T1 (f | ollo | w ste | ps 3 to 7 | in Ta | ble 9c) |) | | | | 1 | |
| (87)m= | 20.32 | 20.58 | 20.84 | 20.97 | 21 | | 21 | 21 | 21 | 2 | 1 | 20.93 | 20.6 | 20.26 | | (87) |
| Tempe | erature | during h | eating p | eriods i | n rest of | dw | elling | from Ta | ıble 9, | Th2 (° | C) | | | | | |
| (88)m= | 20.22 | 20.22 | 20.22 | 20.23 | 20.23 | 20 | 0.24 | 20.24 | 20.24 | 20. | 23 | 20.23 | 20.23 | 20.22 | | (88) |
| L Itilicat | tion fac | tor for a | ains for ı | ract of d | welling | h2 i | m (sc | o Table | 02) | | | | | | l | |
| (89)m= | 0.97 | 0.91 | 0.77 | 0.55 | 0.37 | _ |).24 | 0.16 | 9a) 0.19 | 0.3 | 36 | 0.7 | 0.93 | 0.98 | | (89) |
| ` ′ L | | | | | <u>!</u> | | | | | | ! | | 0.55 | 0.50 | | (00) |
| Г | - 1 | | ature in | | 1 | Ť | <u> </u> | | · | 1 | | | | | ı | |
| (90)m= | 19.33 | 19.69 | 20.03 | 20.2 | 20.23 | 20 | 0.24 | 20.24 | 20.24 | 20. | | 20.15 | 19.72 | 19.25 | | (90) — |
| | | | | | | | | | | | fL | _A = Livi | ng area ÷ (4 | 4) = | 0.25 | (91) |
| Mean i | internal | temper | ature (fo | r the wh | ole dwe | lling | g) = fl | _A × T1 | + (1 – | fLA) × | T2 | | | | | |
| (92)m= | 19.58 | 19.91 | 20.24 | 20.39 | 20.42 | 20 | 0.43 | 20.43 | 20.43 | 20. | 43 | 20.35 | 19.94 | 19.5 | | (92) |
| Apply a | adjustm | nent to th | he mean | interna | l temper | atu | re fro | m Table | 4e, w | here a | ppro | priate | | | _ | |
| (93)m= | 19.43 | 19.76 | 20.09 | 20.24 | 20.27 | $\overline{}$ | 0.28 | 20.28 | 20.28 | | | 20.2 | 19.79 | 19.35 | | (93) |
| 8. Spa | ice heat | ting requ | uirement | | | | | | | | | | | | | |
| | | | | | re obtair | ned | at ste | ep 11 of | Table | 9b, so | that | Ti,m= | (76)m an | d re-calc | culate | |
| | | | or gains | • | | | | <u> </u> | | | | | <u>, </u> | | | |
| L | Jan | Feb | Mar | Apr | May | L. | Jun | Jul | Auç | ı s | ер | Oct | Nov | Dec | | |
| Utilisat | tion fac | tor for g | ains, hm | : | | | | | | | | | _ | | • | |
| (94)m= | 0.96 | 0.91 | 0.77 | 0.55 | 0.37 | 0 |).24 | 0.16 | 0.19 | 0.3 | 37 | 0.7 | 0.92 | 0.97 | | (94) |
| Useful | gains, | hmGm , | , W = (94 | 4)m x (8 | 4)m | | | | | | | | _ | | • | |
| (95)m= | 949.64 | 1129.9 | 1209.76 | 1079.74 | 826.36 | 54 | 12.36 | 351.46 | 369.7 | 59 | 1.3 | 876.09 | 922.61 | 891.75 | | (95) |
| Month | ly avera | age exte | rnal tem | perature | from T | able | e 8 | | | | | | | | | |
| (96)m= | 4.3 | 4.9 | 6.5 | 8.9 | 11.7 | 1 | 4.6 | 16.6 | 16.4 | 14 | .1 | 10.6 | 7.1 | 4.2 | | (96) |
| Heat lo | oss rate | for mea | an intern | al temp | erature, | Lm | , W = | =[(39)m : | x [(93) | m- (96 | 3)m] | | | | | |
| (97)m= | 1488.94 | 1459.61 | 1331.36 | 1098.89 | 828.27 | 54 | 12.49 | 351.47 | 369.8 | 2 592 | .61 | 927.49 | 1232.41 | 1478.16 | | (97) |
| Space | heating | g require | ement fo | r each n | nonth, k | Wh/ | /mont | h = 0.02 | 24 x [(9 | 7)m – | (95) | m] x (4 | ·1)m | | | |
| (98)m= | 401.24 | 221.56 | 90.47 | 13.79 | 1.42 | | 0 | 0 | 0 | |) | 38.24 | 223.05 | 436.29 | | |
| _ | | | | | • | | | | To | tal per | year (| kWh/yea | r) = Sum(9 | 8) _{15,912} = | 1426.06 | (98) |
| Space | heating | a require | ement in | kWh/m² | ²/vear | | | | | | | | | | 12.21 | (99) |
| · | · · | · . | | | • | e.t. | · · · · | o o l d' | | CLID | | | | | 12.21 | |
| | | | nts – Indi | vidual h | eating s | yste | ems ii | ncluding | micro | -CHP) | | | | | | |
| Space | heatin | ıg: | | | | | | | | | | | | | | |
| E | on of ar | 000 60- | at from se | 00000- | / | · m - | nto- | overte es | | | | | | | 0 | (201) |

| Fraction of space heat from main system(s) | | | (202) = 1 | - (201) = | | | | 1 | (202) |
|--|-------------------------|--------------------------------------|------------|---------------------|-------------------------|-------------------------|--------------------------------------|--|---|
| Fraction of total heating from main system 1 | | | (204) = (2 | 02) x [1 – | (203)] = | | | 1 | (204) |
| Efficiency of main space heating system 1 | | | | | | | | 100 | (206) |
| Efficiency of secondary/supplementary heati | ng system | າ, % | | | | | | 0 | (208) |
| Jan Feb Mar Apr May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | kWh/ye | ar |
| Space heating requirement (calculated above | i – | | | | | | | I | |
| 401.24 221.56 90.47 13.79 1.42 | 0 | 0 | 0 | 0 | 38.24 | 223.05 | 436.29 | | |
| $(211)m = \{[(98)m \times (204)] \} \times 100 \div (206)$ | | | | | 00.04 | 000.05 | 400.00 | | (211) |
| 401.24 221.56 90.47 13.79 1.42 | 0 | 0 | 0 Tota | 0 I (kWh/yea | 38.24 ar) =Sum(2 | 223.05 | 436.29 | 1426.06 | (211) |
| Space heating fuel (secondary), kWh/month | | | 1010 | ii (ittiii) yoo | ar) =0am(2 | - ' '/15,1012 | 2 | 1420.00 | (211) |
| $= \{[(98) \text{m x } (201)] \} \times 100 \div (208)$ | | | | | | | | | |
| (215)m= 0 0 0 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | • | • | Tota | l (kWh/yea | ar) =Sum(2 | 215) _{15,1012} | F | 0 | (215) |
| Water heating | | | | | | | ' | | _ |
| Output from water heater (calculated above) 181.77 159.42 165.57 145.84 141.05 | 123.34 | 115.9 | 130.7 | 131.58 | 151.35 | 163.28 | 176.52 | | |
| Efficiency of water heater | 123.34 | 113.9 | 130.7 | 131.30 | 131.33 | 103.20 | 170.32 | 100 | (216) |
| (217)m= 100 100 100 100 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | (217) |
| Fuel for water heating, kWh/month | 1 | | | | | | | | |
| (219) m = (64) m × $100 \div (217)$ m | | | | | | | | 1 | |
| (219)m= 181.77 159.42 165.57 145.84 141.05 | 123.34 | 115.9 | 130.7 | 131.58 I = Sum(2 | 151.35 | 163.28 | 176.52 | /= | 7, |
| | | | | 1 - Juiii(2 | 1301, | | | 1786.33 | (219) |
| Annual totals | | | | • | | Wh/vear | • | | |
| Annual totals Space heating fuel used, main system 1 | | | | · · | | Wh/year | • | kWh/yea 1426.06 | |
| Space heating fuel used, main system 1 | | | | | | Wh/year | • | kWh/yea | |
| Space heating fuel used, main system 1 Water heating fuel used | ot | | | · | | Wh/year | | kWh/yea 1426.06 | |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h | | oput from | | | | Wh/year | | kWh/yea 1426.06 | |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or | | nput fron | | | | Wh/year | 327.19 | kWh/yea 1426.06 | (230a) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: | | nput fron | n outside | Э | k¹ | | | kWh/yea 1426.06 1786.33 | (230a) (230c) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or | | nput fron | n outside | | k¹ | | 327.19 | kWh/yea 1426.06 | (230a) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: | | nput fron | n outside | Э | k¹ | | 327.19 | kWh/yea 1426.06 1786.33 | (230a) (230c) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: Total electricity for the above, kWh/year | | nput fron | n outside | Э | k¹ | | 327.19 | kWh/yea 1426.06 1786.33 | (230a) (230c) (231) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: Total electricity for the above, kWh/year Electricity for lighting | | nput fron | n outside | Э | k¹ | | 327.19 | kWh/yea 1426.06 1786.33 357.19 487.57 | (230a) (230c) (231) (232) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs | positive in | | n outside | Э | k 1 | | 327.19 | kWh/yea 1426.06 1786.33 357.19 487.57 -2162.55 | (230a) (230c) (231) (232) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs | positive in | | n outside | Э | k¹ | rice | 327.19 | kWh/yea 1426.06 1786.33 357.19 487.57 | (230a) (230c) (231) (232) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs | positive in Fu kW | el | n outside | Э | (230g) = | rice 12) | 327.19 | kWh/year 1426.06 1786.33 357.19 487.57 -2162.55 | (230a) (230c) (231) (232) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating systems: | Fu kW (211 | el /h/year | n outside | Э | (230g) = | Price 12) | 327.19 | kWh/year 1426.06 1786.33 357.19 487.57 -2162.55 Fuel Cost £/year | (230a) (230c) (231) (232) (233) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating systems: Space heating - main system 1 Space heating - main system 2 | Fu kW (211 | el /h/year | n outside | Э | (230g) = Fuel P (Table | rice 12) | 327.19 30 x 0.01 = x 0.01 = | kWh/year 1426.06 1786.33 357.19 487.57 -2162.55 Fuel Cost £/year 188.1 | (230a) (230c) (231) (232) (233) (240) (241) |
| Space heating fuel used, main system 1 Water heating fuel used Electricity for pumps, fans and electric keep-h mechanical ventilation - balanced, extract or central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating systems: | Fu kW (211 | el /h/year 1) × 3) × | n outside | Э | (230g) = Fuel P (Table | Price 12) | 327.19 30 x 0.01 = | kWh/year 1426.06 1786.33 357.19 487.57 -2162.55 Fuel Cost £/year | (230a) (230c) (231) (232) (233) |

(231)

Pumps, fans and electric keep-hot

47.11

(249)

x 0.01 =

13.19

| (if off-peak tariff, list each of (230a) to (230g) s | separately as applicable and | d apply fuel price according to | n Table 12a |
|--|--------------------------------|---------------------------------|---------------------------------|
| Energy for lighting | (232) | 13.19 × 0.01 = | |
| Additional standing charges (Table 12) | | | 0 (251) |
| | one of (233) to (235) x) | 13.19 x 0.01 = | 0 (252) |
| Appendix Q items: repeat lines (253) and (254 | as needed | | |
| | .(247) + (250)(254) = | | 535.14 (255) |
| 11a. SAP rating - individual heating systems | | | |
| Energy cost deflator (Table 12) | | | 0.42 (256) |
| Energy cost factor (ECF) [(255) | $x (256)] \div [(4) + 45.0] =$ | | 1.39 (257) |
| SAP rating (Section 12) | | | 80.62 (258) |
| 12a. CO2 emissions – Individual heating syst | tems including micro-CHP | | |
| | Energy kWh/year | Emission factor kg CO2/kWh | Emissions kg CO2/year |
| Space heating (main system 1) | (211) x | 0.519 = | 740.13 (261) |
| Space heating (secondary) | (215) x | 0.519 = | 0 (263) |
| Water heating | (219) x | 0.519 = | 927.1 (264) |
| Space and water heating | (261) + (262) + (263) + (26 | 64) = | 1667.23 (265) |
| Electricity for pumps, fans and electric keep-he | ot (231) x | 0.519 = | 185.38 (267) |
| Electricity for lighting | (232) x | 0.519 = | 253.05 (268) |
| Energy saving/generation technologies Item 1 | | 0.519 | -1122.36 (269) |
| Total CO2, kg/year | | sum of (265)(271) = | 983.3 (272) |
| CO2 emissions per m² | | (272) ÷ (4) = | 8.42 (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 | 3.07 | 4378.02 (261) |
| Space heating (secondary) | (215) x | 3.07 | 0 (263) |
| Energy for water heating | (219) x | 3.07 | 5484.02 (264) |
| Space and water heating | (261) + (262) + (263) + (26 | 64) = | 9862.04 (265) |
| Electricity for pumps, fans and electric keep-he | ot (231) x | 3.07 | 1096.58 (267) |
| Electricity for lighting | (232) x | 0 = | 1496.84 (268) |
| Energy saving/generation technologies Item 1 | | 3.07 | -6639.02 (269) |
| 'Total Primary Energy | | sum of (265)(271) = | 5816.44 (272) |
| Primary energy kWh/m²/year | | (272) ÷ (4) = | 49.82 (273) |

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.16 Printed on 10 October 2018 at 11:31:55

Project Information:

Assessed By: Carlos Melgar (STRO031596) Building Type: Mid-Terrace Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE

Total Floor Area: 67.21m²

Site Reference: Kings Mews Be Green

Plot Reference: Plot 003

Address: 3, 10-11 Kings Mews, WC1N 2ES

Client Details:

Name: James Taylor

Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 30.27 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

23.72 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 62.8 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.7 kWh/m²

OK

2 Fabric U-values

Element Highest Average External wall 0.15 (max. 0.30) 0.16 (max. 0.70) OK Party wall 0.00 (max. 0.20) **OK** Floor 0.14 (max. 0.25) 0.14 (max. 0.70) OK Roof 0.16 (max. 0.20) 0.16 (max. 0.35) OK **Openings** 1.37 (max. 2.00) 1.40 (max. 3.30) OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.50 (design value)

Maximum 10.0 **OK**

4 Heating efficiency

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

Direct acting electric boiler

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 0.93 kWh/day

Permitted by DBSCG: 1.03 kWh/day OK

Primary pipework insulated: Yes OK

Regulations Compliance Report

| 6 Controls | | | |
|---|------------------------|---|----------|
| Space heating controls Hot water controls: | TTZC by plumbing and e | electrical services | OK OK |
| 7 Low energy lights | | | |
| Percentage of fixed lights with Minimum 8 Mechanical ventilation | n low-energy fittings | 100.0% 75.0% | ок |
| Continuous extract system (d | ecentralised) | | |
| Specific fan power: Maximum | ecentralisedy | 0.19 0.18 0.7 | ок |
| 9 Summertime temperature | | | |
| Overheating risk (Thames val Based on: Overshading: | ley): | Medium Average or unknown | OK |
| Windows facing: South West Windows facing: North East Ventilation rate: | | 8.18m ² 11.23m ² 6.00 | |
| Blinds/curtains: | | Closed 0% of daylight hours | |
| 10 Key features | | | |
| Air permeablility Doors U-value Party Walls U-value Photovoltaic array | | 2.5 m³/m²h 1.09 W/m²K 0 W/m²K | |

Predicted Energy Assessment



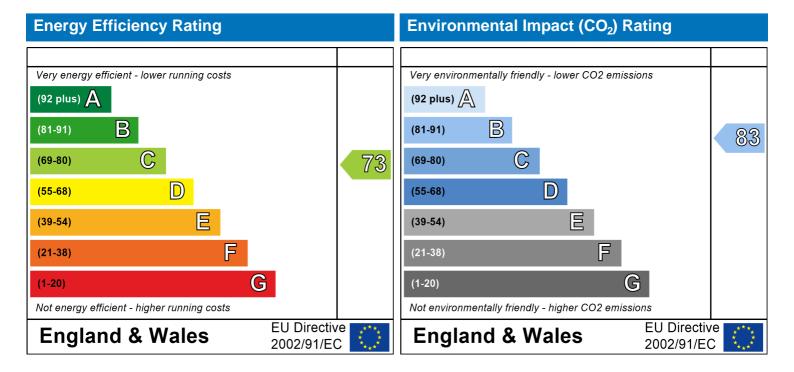
10-11 Kings Mews WC1N 2ES Dwelling type:
Date of assessment:
Produced by:

Mid-Terrace Mid floor Flat 19 July 2018 Carlos Melgar

Total floor area: 67.21 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 carbonn dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

| | | User I | Details: | | | | | | |
|---|---|-------------|-------------------------|---------------|----------------|----------|-----------|------------------------|----------|
| Assessor Name: Software Name: | Carlos Melgar Stroma FSAP 2012 | | Strom Softwa | | | | | 031596 on: 1.0.4.16 | |
| Address | | Property | Address | : Plot 00 | 3 | | | | |
| Address: 1. Overall dwelling dime | 3, 10-11 Kings Mews, WC | IN ZES | | | | | | | |
| The Contain diversing diffic | | Are | a(m²) | | Av. He | ight(m) | | Volume(m ³ | 3) |
| Ground floor | | | | (1a) x | 2 | 2.42 | (2a) = | 162.65 | (3a) |
| Total floor area TFA = (1 | a)+(1b)+(1c)+(1d)+(1e)+(1 | In) (| 67.21 | (4) | | | - | | |
| Dwelling volume | | | | (3a)+(3b |)+(3c)+(3c | d)+(3e)+ | (3n) = | 162.65 | (5) |
| 2. Ventilation rate: | | | | | | | | | |
| | main seconda heating heating | | other | | total | | | m³ per hou | ır |
| Number of chimneys | 0 + 0 | + | 0 | = [| 0 | X · | 40 = | 0 | (6a) |
| Number of open flues | 0 + 0 | + [| 0 | = | 0 | x | 20 = | 0 | (6b) |
| Number of intermittent fa | ins | | | | 0 | × | 10 = | 0 | (7a) |
| Number of passive vents | 3 | | | Ī | 0 | x | 10 = | 0 | (7b) |
| Number of flueless gas f | ires | | | Ī | 0 | x | 40 = | 0 | (7c) |
| | | | | _ | | | | | |
| | | | | _ | | | | nanges per ho | our — |
| | ys, flues and fans = (6a)+(6b)+ neen carried out or is intended, proce | | | continue f | 0 mm (9) to | | ÷ (5) = | 0 | (8) |
| Number of storeys in t | | ca 10 (11), | ouror wise t | continue n | 0111 (3) 10 | (10) | | 0 | (9) |
| Additional infiltration | | | | | | [(9) | -1]x0.1 = | 0 | (10) |
| | .25 for steel or timber frame of | | | • | ruction | | | 0 | (11) |
| if both types of wall are p deducting areas of openi | resent, use the value corresponding ngs); if equal user 0.35 | to tne grea | ter wall are | ea (atter | | | | | |
| If suspended wooden | floor, enter 0.2 (unsealed) or | 0.1 (seale | ed), else | enter 0 | | | | 0 | (12) |
| If no draught lobby, en | · | | | | | | | 0 | (13) |
| - | s and doors draught stripped | | 0.05 [0.0 |) v (4.4) v 4 | 1001 | | | 0 | (14) |
| Window infiltration Infiltration rate | | | 0.25 - [0.2] (8) + (10) | | _ | + (15) = | | 0 | (15) |
| | q50, expressed in cubic metr | es ner h | | | | | area | 2.5 | (16) |
| | lity value, then $(18) = [(17) \div 20] + (18)$ | • | • | • | 0110 01 0 | лиоюро | aroa | 0.12 | (18) |
| • | es if a pressurisation test has been de | | | | is being u | sed | | | ` ′ |
| Number of sides sheltered | ed | | (0.0) | (| . = \ = | | | 0 | (19) |
| Shelter factor | | | (20) = 1 - | | 19)] = | | | 1 | (20) |
| Infiltration rate incorpora | • | | (21) = (18 | 6) X (20) = | | | | 0.12 | (21) |
| Infiltration rate modified f | - 1 | Jul | Aug | Sep | Oct | Nov | Dec |] | |
| | 1 ' 1 ' 1 | Jul | Aug | Ј Зер | 1 001 | INOV | Dec | | |
| Monthly average wind sp (22)m= 5.1 5 | 4.9 4.4 4.3 3.8 | 3.8 | 3.7 | 4 | 4.3 | 4.5 | 4.7 | | |
| . , | 1 1 1 1 1 1 1 1 1 1 1 1 1 | 1 | 1 | <u> </u> | L | <u> </u> | <u> </u> | I | |
| Wind Factor (22a)m = (2 | | 1 | | | | | | 1 | |
| (22a)m= 1.27 1.25 | 1.23 1.1 1.08 0.95 | 0.95 | 0.92 | 1 | 1.08 | 1.12 | 1.18 | | |

| 0.16 | ation rate (a | .15 | 0.14 | 0.13 | 0.12 | 0.12 | 0.12 | 0.12 | 0.13 | 0.14 | 0.15 |] | |
|---------------------------------------|---------------------------------|------------|-------------|------------|----------------|-------------|---------------|-------------------------|---------------------|---------------|-------------------|---------|---------------|
| Calculate effec | ctive air cha | nge ra | ate for t | | cable ca | se | <u> </u> | ! | ļ | | | J | |
| If mechanica | | | | | | | | | | | | 0.5 | (2 |
| If exhaust air he | | | | | | | | | o) = (23a) | | | 0.5 | (2 |
| If balanced with | heat recovery | /: efficie | ency in % | allowing f | for in-use f | actor (fron | n Table 4h |) = | | | | 0 | (2 |
| a) If balance | d mechanic | al ver | ntilation | with he | at recov | ery (MVI | HR) (24a | a)m = (2) | 2b)m + (| 23b) × [| [1 – (23c) | ÷ 100] | |
| 24a)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |] | (2 |
| b) If balance | d mechanic | al ver | ntilation | without | heat red | covery (I | ЛV) (24b | m = (22) | 2b)m + (2 | 23b) | i | 1 | |
| 24b)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |] | (2 |
| c) If whole h | ouse extrac n < 0.5 × (2 | | | • | • | | | | .5 × (23b |) | | _ | |
| 24c)m= 0.5 | 0.5 |).5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | (2 |
| d) If natural if (22b)n | ventilation on $n = 1$, then (| | | • | | | | | 0.5] | | | _ | |
| 24d)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (2 |
| Effective air | change rate | e - ent | ter (24a |) or (24b | o) or (24 | c) or (24 | d) in box | x (25) | | | | _ | |
| 5)m= 0.5 | 0.5 |).5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | (2 |
| 3. Heat losse | s and heat l | oss pa | aramete | er: | | | | | | | | | |
| LEMENT | Gross area (m² | | Openin m | gs | Net Ar A ,r | | U-val W/m2 | | A X U (W/I | <) | k-value kJ/m²- | | A X k xJ/K |
| oors | | | | | 2.1 | X | 1.09 | = | 2.289 | | | | (|
| /indows Type | : 1 | | | | 8.18 | x1 | /[1/(1.4)+ | 0.04] = | 10.84 | $\overline{}$ | | | (|
| /indows Type | 2 | | | | 11.23 | x1 | /[1/(1.4)+ | 0.04] = | 14.89 | \equiv | | | (: |
| loor Type 1 | | | | | 7.01 | X | 0.14 | = i | 0.9814 | | 75 | 525. | 75 (|
| loor Type 2 | | | | | 8.43 | x | 0.14 | <u> </u> | 1.1802 | = | 75 | 632.2 | 25 (2 |
| /alls Type1 | 49 | 7 | 19.4 | 1 | 29.59 |) x | 0.16 | | 4.73 | | 49.5 | 1464 | .71 (2 |
| /alls Type2 | 21.38 | i | 2.1 | | 19.28 | = | 0.14 | = | 2.73 | = | 49.5 | 954.3 | = |
| oof | 31.3 | - | 0 | | 31.3 | = | 0.16 | = | 5.01 | = | 9 | 281. | = ` |
| otal area of e | L | 2 | | | 117.1 | = | 00 | | 0.0. | | | | ··(; |
| arty wall | • | | | | 54.2 | = | 0 | | 0 | \neg | 49.5 | 2682 | ` |
| arty ceiling | | | | | 35.91 | _ | | | U | | 30 | 1077 | = |
| nternal wall ** | | | | | | = | | | | | | = = | |
| for windows and | roof windows | uso off | factiva wi | ndow II v | 85.76 | | ı formula 1 | /[/1/ L val | (0) (0 0 0 1 0 | ns aivon ir | 9 naragrant | 771.8 | 84 (|
| include the area | | | | | | atou using | i ioimula i | 7[(17 0 - va it | 10)+0.0+ <u>J</u> a | 3 giveii ii | rparagrapi | 7 3.2 | |
| abric heat los | ss, W/K = S | (A x l | J) | | | | (26)(30) |) + (32) = | | | | 42.65 | (|
| eat capacity | Cm = S(A x | k) | | | | | | ((28). | (30) + (32 | 2) + (32a) | (32e) = | 8390.81 | (|
| nermal mass | parameter | (TMP | = Cm ÷ | - TFA) ir | n kJ/m²K | | | = (34) | ÷ (4) = | | | 124.84 | (|
| icimai mass | | | | | ion oro no | 4 lana a | | indiaatii. | a valuon of | TMD in 7 | Table 1f | - | |
| or design assess on be used instea | | | | construct | ion are no | t known pi | ecisely the | e iriuicative | e values of | TIVIPINI | аріе П | | |

| Total fabria basellasa | | | | | (00) | (0.0) | | ı | | – |
|--|-------------------------|----------------|------------|-------------|------------|----------------|------------------------|---------|---------|--------------|
| Total fabric heat loss Ventilation heat loss calculated | d monthly | | | | | (36) = | 25)m x (5) | | 57.18 | (37) |
| Jan Feb Mar | Apr Ma | y Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (38)m= 26.84 26.84 26.84 | 26.84 26.8 ⁴ | | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 | | (38) |
| Heat transfer coefficient, W/K | | | 1 | | | = (37) + (37) | <u> </u> | | | , , |
| (39)m= 84.02 84.02 84.02 | 84.02 84.02 | 2 84.02 | 84.02 | 84.02 | 84.02 | 84.02 | 84.02 | 84.02 | | |
| | ļ ļ | ! | | | , | L Average = | Sum(39) ₁ . | 12 /12= | 84.02 | (39) |
| Heat loss parameter (HLP), W | /m²K | | | | (40)m | = (39)m ÷ | (4) | | | |
| (40)m= 1.25 1.25 1.25 | 1.25 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | | - |
| Number of days in month (Tab | le 1a) | | | | , | Average = | Sum(40) ₁ . | 12 /12= | 1.25 | (40) |
| Jan Feb Mar | Apr Ma | y Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (41)m= 31 28 31 | 30 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | | (41) |
| | | | | | | | | | | |
| 4. Water heating energy requ | irement: | | | | | | | kWh/ye | ear: | |
| Accompany N | | | | | | | | | | (10) |
| Assumed occupancy, N if TFA > 13.9, N = $1 + 1.76 \times 10^{-1}$ | ([1 - exp(-0.00 | 0349 x (TI | FA -13.9 |)2)] + 0.0 | 0013 x (| TFA -13. | | 18 | | (42) |
| if TFA £ 13.9, N = 1 | | , | | , ,, | , | | | | | |
| Annual average hot water usage Reduce the annual average hot water | | | _ | ` , | | se target o | | .89 | | (43) |
| not more that 125 litres per person pe | • • | - | - | to domeve | a water at | sc larger o | ı | | | |
| Jan Feb Mar | Apr Ma | y Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Hot water usage in litres per day for ea | <u> </u> | - | 1 | | СОР | | 1101 | | | |
| (44)m= 94.48 91.05 87.61 | 84.17 80.74 | 77.3 | 77.3 | 80.74 | 84.17 | 87.61 | 91.05 | 94.48 | | |
| | <u> </u> | | • | | - | Total = Su | m(44) ₁₁₂ = | | 1030.71 | (44) |
| Energy content of hot water used - cal | lculated monthly = | 4.190 x Vd,i | m x nm x [| OTm / 3600 | kWh/mor | nth (see Ta | ables 1b, 1 | c, 1d) | | |
| (45)m= 140.11 122.54 126.45 | 110.25 105.7 | 8 91.28 | 84.59 | 97.07 | 98.22 | 114.47 | 124.95 | 135.69 | | _ |
| If instantaneous water heating at point | t of use (no hot wa | nter storage), | enter 0 in | boxes (46) | | Total = Su | m(45) ₁₁₂ = | = | 1351.43 | (45) |
| (46)m= 21.02 18.38 18.97 | 16.54 15.87 | 7 13.69 | 12.69 | 14.56 | 14.73 | 17.17 | 18.74 | 20.35 | | (46) |
| Water storage loss: | | | | | | <u> </u> | | | | |
| Storage volume (litres) includir | ng any solar or | WWHRS | storage | within sa | ame ves | sel | | 50 | | (47) |
| If community heating and no ta | _ | | | , , | | | | | | |
| Otherwise if no stored hot water | er (this include | s instantar | neous co | ombi boil | ers) ente | er '0' in (| 47) | | | |
| Water storage loss: a) If manufacturer's declared l | loss factor is ki | nown (k\// | h/day)· | | | | | 93 | | (48) |
| Temperature factor from Table | | iowii (itti | i "day". | | | | | 54 | | (49) |
| Energy lost from water storage | | | | (48) x (49) | . = | | | | | (50) |
| b) If manufacturer's declared | • | ctor is not | known: | (40) X (40) | _ | | 0 | .5 | | (30) |
| Hot water storage loss factor for | • | | | | | | | 0 | | (51) |
| If community heating see secti | on 4.3 | | | | | | | | | |
| Volume factor from Table 2a | 2h | | | | | | | 0 | | (52) |
| Temperature factor from Table | | | | /A=\ | (50) | 50) | | 0 | | (53) |
| Energy lost from water storage Enter (50) or (54) in (55) | e, kvvn/year | | | (47) x (51) | x (52) x (| 53) = | - | .5 | | (54) (55) |
| No. (00) or (0+) in (00) | | | | | | | . () | | | (00) |

| Water storage | loss cal | culated f | for each | month | | | ((56)m = (| 55) × (41)ı | m | | | | |
|--|--|--|---|--|---|--|---|---|--|--|---------------------------------|---------------|--|
| (56)m= 15.57 | 14.06 | 15.57 | 15.07 | 15.57 | 15.07 | 15.57 | 15.57 | 15.07 | 15.57 | 15.07 | 15.57 | | (56) |
| If cylinder contain | s dedicate | d solar sto | rage, (57)ı | m = (56)m | x [(50) – (| H11)] ÷ (5 | 0), else (5 | 7)m = (56) | m where (| H11) is fro | m Append | ix H | |
| (57)m= 15.57 | 14.06 | 15.57 | 15.07 | 15.57 | 15.07 | 15.57 | 15.57 | 15.07 | 15.57 | 15.07 | 15.57 | | (57) |
| Primary circuit | t loss (ar | nnual) fro | m Table | 3 | | | | | | | 0 | | (58) |
| Primary circuit | t loss cal | culated t | for each | month (| 59)m = (| (58) ÷ 36 | 65 × (41) | m | | | | | |
| (modified by | factor f | rom Tab | le H5 if t | here is s | solar wat | er heatii | ng and a | cylinde | r thermo | stat) | | | |
| (59)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (59) |
| Combi loss ca | lculated | for each | month (| (61)m = | (60) ÷ 36 | 65 × (41) |)m | | | | | | |
| (61)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (61) |
| Total heat req | uired for | water he | eating ca | alculated | l for eacl | h month | (62)m = | 0.85 × (| (45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= 155.68 | 136.61 | 142.02 | 125.31 | 121.35 | 106.35 | 100.16 | 112.63 | 113.29 | 130.04 | 140.02 | 151.26 | | (62) |
| Solar DHW input | calculated | using App | endix G oı | Appendix | H (negati | ve quantity | /) (enter '0 | ' if no sola | r contribut | ion to wate | er heating) | | |
| (add additiona | I lines if | FGHRS | and/or \ | vwhrs | applies | , see Ap | pendix (| 3) | | | | | |
| (63)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output from w | ater hea | ter | | | | | | | | | | | |
| (64)m= 155.68 | 136.61 | 142.02 | 125.31 | 121.35 | 106.35 | 100.16 | 112.63 | 113.29 | 130.04 | 140.02 | 151.26 | | |
| | | | | | | | Outp | out from wa | ater heate | r (annual)₁ | 12 | 1534.73 | (64) |
| Heat gains fro | m water | heating, | kWh/m | onth 0.2 | 5 ´ [0.85 | × (45)m | + (61)m | n] + 0.8 x | ((46)m | + (57)m | + (59)m | 1 | _ |
| (65)m= 59.04 | 52 | 54.5 | 48.71 | 47.63 | 42.4 | 40.58 | <u> </u> | _ | | ` | `` | - | (65) |
| | | 07.0 | 40.71 | 47.03 | 42.4 | 40.56 | 44.73 | 44.71 | 50.52 | 53.6 | 57.57 | | (65) |
| ` ' | m in cal | | <u> </u> | | ! | <u> </u> | <u> </u> | <u> </u> | | <u> </u> | <u> </u> | eating | (00) |
| include (57) | | culation o | of (65)m | only if c | ! | <u> </u> | <u> </u> | <u> </u> | | <u> </u> | <u> </u> | eating | (03) |
| include (57) 5. Internal ga | ains (see | culation of Table 5 | of (65)m and 5a | only if c | ! | <u> </u> | <u> </u> | <u> </u> | | <u> </u> | <u> </u> | eating | (03) |
| include (57) 5. Internal g | ains (see | culation of Table 5 | of (65)m and 5a | only if c | ylinder i | s in the o | dwelling | or hot w | ater is fr | om com | munity h | eating | (03) |
| include (57) 5. Internal ga | ains (see | culation of Table 5 | of (65)m and 5a | only if c | ! | <u> </u> | <u> </u> | <u> </u> | | <u> </u> | <u> </u> | eating | (66) |
| include (57) 5. Internal gain Metabolic gain Jan (66)m= 130.59 | rs (Table Feb 130.59 | culation of Table 5 (a) Wat Mar | of (65)m 5 and 5a ts Apr 130.59 | only if constant of the consta | ylinder is Jun 130.59 | Jul 130.59 | Aug 130.59 | or hot w Sep 130.59 | ater is fr | om com | munity h | eating | |
| include (57) 5. Internal gain Metabolic gain Jan | rs (Table Feb 130.59 | culation of Table 5 (a) Wat Mar | of (65)m 5 and 5a ts Apr 130.59 | only if constant of the consta | ylinder is Jun 130.59 | Jul 130.59 | Aug 130.59 | or hot w Sep 130.59 | ater is fr | om com | munity h | eating | |
| include (57) 5. Internal games Metabolic gain Jan (66)m= 130.59 Lighting gains (67)m= 42.5 | res (Table Feb 130.59 (calcula | E Table 5 E 5), Wat Mar 130.59 ted in Ap 30.7 | of (65)m 6 and 5a ts Apr 130.59 opendix 23.24 | May 130.59 L, equat | Jun 130.59 ion L9 o | Jul 130.59 r L9a), a | Aug 130.59 Iso see | Sep 130.59 Table 5 27.65 | Oct 130.59 | Nov | Dec | eating | (66) |
| include (57) 5. Internal graph of the following serior of the following serio | res (Table Feb 130.59 (calcula 37.75 | culation of Table 5 2 5), Wat Mar 130.59 ted in Ap 30.7 | of (65)m and 5a ts Apr 130.59 ppendix 23.24 Append | May 130.59 L, equat 17.37 dix L, eq | Jun 130.59 ion L9 o | Jul 130.59 r L9a), a 15.85 | Aug 130.59 Iso see 20.6 3a), also | Sep 130.59 Table 5 27.65 | Oct 130.59 35.11 ble 5 | Nov 130.59 | Dec 130.59 | eating | (66) |
| include (57) 5. Internal gain Metabolic gain Jan (66)m= 130.59 Lighting gains (67)m= 42.5 Appliances gains (68)m= 284.63 | res (Table Feb 130.59 (calcula 37.75 ins (calcula 287.58 | culation of Table 5 (a) Wat Mar 130.59 ted in Ap 30.7 culated in 280.14 | of (65)m 5 and 5a ts Apr 130.59 opendix 23.24 Appendix 264.29 | May 130.59 L, equat 17.37 dix L, eq | Jun 130.59 ion L9 o 14.67 uation L 225.49 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 | Aug 130.59 Iso see 20.6 3a), also 209.98 | Sep 130.59 Table 5 27.65 see Tal 217.42 | Oct 130.59 35.11 ble 5 233.27 | Nov | Dec | eating | (66) (67) |
| include (57) 5. Internal graph of the following serior of the following serio | res (Table Feb 130.59 (calcula 37.75 ins (calcula 287.58 | culation of Table 5 (a) Wat Mar 130.59 ted in Ap 30.7 culated in 280.14 | of (65)m 5 and 5a ts Apr 130.59 opendix 23.24 Appendix 264.29 | May 130.59 L, equat 17.37 dix L, eq | Jun 130.59 ion L9 o 14.67 uation L 225.49 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 | Aug 130.59 Iso see 20.6 3a), also 209.98 | Sep 130.59 Table 5 27.65 see Tal 217.42 | Oct 130.59 35.11 ble 5 233.27 | Nov 130.59 | Dec 130.59 | eating | (66) (67) |
| include (57) 5. Internal graph of the following distribution of t | res (Table Feb 130.59 (calcula 37.75 ins (calcula 287.58 (calcula 50.24 | culation of Table 5 2 5), Wat Mar 130.59 ted in Ap 30.7 culated in 280.14 ated in A 50.24 | of (65)m 5 and 5a ts Apr 130.59 opendix 23.24 Appendix 264.29 opendix 50.24 | May 130.59 L, equat 17.37 dix L, eq 244.29 L, equat | Jun 130.59 ion L9 o 14.67 uation L 225.49 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 or L15a) | Aug 130.59 Iso see 20.6 3a), also 209.98 | Sep 130.59 Table 5 27.65 See Tal 217.42 ee Table | Oct 130.59 35.11 ble 5 233.27 5 | Nov 130.59 40.98 | Dec 130.59 43.68 | eating | (66) (67) (68) |
| include (57) 5. Internal games Metabolic gain Jan (66)m= 130.59 Lighting gains (67)m= 42.5 Appliances games (68)m= 284.63 Cooking gains | res (Table Feb 130.59 (calcula 37.75 ins (calcula 287.58 (calcula 50.24 | culation of Table 5 2 5), Wat Mar 130.59 ted in Ap 30.7 culated in 280.14 ated in A 50.24 | of (65)m 5 and 5a ts Apr 130.59 opendix 23.24 Appendix 264.29 opendix 50.24 | May 130.59 L, equat 17.37 dix L, eq 244.29 L, equat | Jun 130.59 ion L9 o 14.67 uation L 225.49 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 or L15a) | Aug 130.59 Iso see 20.6 3a), also 209.98 | Sep 130.59 Table 5 27.65 See Tal 217.42 ee Table | Oct 130.59 35.11 ble 5 233.27 5 | Nov 130.59 40.98 | Dec 130.59 43.68 | eating | (66) (67) (68) |
| include (57) 5. Internal graph of the following gains (66)m= 130.59 Lighting gains (67)m= 42.5 Appliances gains (68)m= 284.63 Cooking gains (69)m= 50.24 Pumps and fair (70)m= 3 | res (Table Feb 130.59 (calcula 37.75 ins (calcula 287.58 (calcula 50.24 rs gains 3 | culation of Table 5 2 5), Wat Mar 130.59 ted in Ap 30.7 culated in 280.14 ated in A 50.24 (Table 5 | of (65)m and 5a ts Apr 130.59 ppendix 23.24 Appendix 264.29 ppendix 50.24 5a) 3 | only if constructions only if constructions only if constructions on the construction of the construction | Jun 130.59 ion L9 of 14.67 uation L 225.49 ion L15 50.24 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 or L15a) 50.24 | Aug 130.59 Iso see 20.6 3a), also 209.98), also se 50.24 | Sep 130.59 Table 5 27.65 see Tal 217.42 ee Table 50.24 | Oct 130.59 35.11 ble 5 233.27 5 | Nov 130.59 40.98 253.27 | Dec 130.59 43.68 272.07 | eating | (66) (67) (68) (69) |
| include (57) 5. Internal gains (66)m= 130.59 Lighting gains (67)m= 42.5 Appliances gains (68)m= 284.63 Cooking gains (69)m= 50.24 Pumps and fa | res (Table Feb 130.59 (calcula 37.75 ins (calcula 287.58 (calcula 50.24 rs gains 3 | culation of Table 5 2 5), Wat Mar 130.59 ted in Ap 30.7 culated in 280.14 ated in A 50.24 (Table 5 | of (65)m and 5a ts Apr 130.59 ppendix 23.24 Appendix 264.29 ppendix 50.24 5a) 3 | only if constructions only if constructions only if constructions on the construction of the construction | Jun 130.59 ion L9 of 14.67 uation L 225.49 ion L15 50.24 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 or L15a) 50.24 | Aug 130.59 Iso see 20.6 3a), also 209.98), also se 50.24 | Sep 130.59 Table 5 27.65 see Tal 217.42 ee Table 50.24 | Oct 130.59 35.11 ble 5 233.27 5 | Nov 130.59 40.98 253.27 | Dec 130.59 43.68 272.07 | eating | (66) (67) (68) (69) |
| include (57) 5. Internal graph of the following spans (66)m= 130.59 Lighting gains (67)m= 42.5 Appliances gares (68)m= 284.63 Cooking gains (69)m= 50.24 Pumps and fares (70)m= 3 Losses e.g. even (71)m= -87.06 | reportion (see land) (| culation of the Europe Solution of the Europe | of (65)m s and 5a ts Apr 130.59 ppendix 23.24 Append 264.29 ppendix 50.24 5a) 3 tive valu | only if construction only if c | Jun 130.59 ion L9 o 14.67 uation L 225.49 ion L15 50.24 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 or L15a) 50.24 | Aug 130.59 Iso see 20.6 3a), also 209.98 0, also se 50.24 | Sep 130.59 Table 5 27.65 see Tal 217.42 ee Table 50.24 | Oct 130.59 35.11 ble 5 233.27 5 50.24 | Nov 130.59 40.98 253.27 50.24 | Dec 130.59 43.68 272.07 | eating | (66) (67) (68) (69) |
| include (57) 5. Internal graph of the following spans (66)m= 130.59 Lighting gains (67)m= 42.5 Appliances gains (68)m= 284.63 Cooking gains (69)m= 50.24 Pumps and fains (70)m= 3 Losses e.g. expenses (57) | reportion (see land) (| culation of the Europe Solution of the Europe | of (65)m s and 5a ts Apr 130.59 ppendix 23.24 Append 264.29 ppendix 50.24 5a) 3 tive valu | only if construction only if c | Jun 130.59 ion L9 o 14.67 uation L 225.49 ion L15 50.24 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 or L15a) 50.24 | Aug 130.59 Iso see 20.6 3a), also 209.98 0, also se 50.24 | Sep 130.59 Table 5 27.65 see Tal 217.42 ee Table 50.24 | Oct 130.59 35.11 ble 5 233.27 5 50.24 | Nov 130.59 40.98 253.27 50.24 | Dec 130.59 43.68 272.07 | eating | (66) (67) (68) (69) |
| include (57) 5. Internal gram Jan (66)m= 130.59 Lighting gains (67)m= 42.5 Appliances ga (68)m= 284.63 Cooking gains (69)m= 50.24 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -87.06 Water heating (72)m= 79.36 | res (Table Feb 130.59 (calcula 37.75 ins (calcula 50.24 res gains 3 raporatio 77.37 | culation of the culation of th | of (65)m c and 5a ts Apr 130.59 ppendix 23.24 Appendix 50.24 50.24 c and 5a | only if constructions only if constructions only if constructions on the construction of the construction | Jun 130.59 ion L9 o 14.67 uation L 225.49 ion L15 50.24 3 le 5) -87.06 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 or L15a) 50.24 | Aug 130.59 Iso see 20.6 3a), also 209.98 3, also se 50.24 3 | Sep 130.59 Table 5 27.65 see Tal 217.42 ee Table 50.24 | Oct 130.59 35.11 ble 5 233.27 5 50.24 3 -87.06 | Nov 130.59 40.98 253.27 50.24 3 | Dec 130.59 43.68 272.07 50.24 3 | eating | (66) (67) (68) (69) (70) (71) |
| include (57) 5. Internal graph of the following distribution distribution of the following distribution of the following dist | res (Table Feb 130.59 (calcula 37.75 ins (calcula 50.24 res gains 3 raporatio 77.37 | culation of the culation of th | of (65)m c and 5a ts Apr 130.59 ppendix 23.24 Appendix 50.24 50.24 c and 5a | only if constructions only if constructions only if constructions on the construction of the construction | Jun 130.59 ion L9 o 14.67 uation L 225.49 ion L15 50.24 3 le 5) -87.06 | Jul 130.59 r L9a), a 15.85 13 or L1 212.93 or L15a) 50.24 | Aug 130.59 Iso see 20.6 3a), also 209.98 3, also se 50.24 3 | Sep 130.59 Table 5 27.65 see Tal 217.42 ee Table 50.24 3 -87.06 | Oct 130.59 35.11 ble 5 233.27 5 50.24 3 -87.06 | Nov 130.59 40.98 253.27 50.24 3 | Dec 130.59 43.68 272.07 50.24 3 | eating | (66) (67) (68) (69) (70) (71) |

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

| Orientation: | Access Fa Table 6d | ictor | Area m² | | | Flu Tal | x ole 6a | | T | g_ able 6b | | FF Table 6c | | | Gains (W) | |
|-------------------------------|--|------------|------------|----------------|-------------|------------|-------------|--------------|------------|-------------------|----------------|--|-------|-----|--------------|------|
| Northeast 0.9 | 0.77 | x | 11.: | 23 | X | 1 | 1.28 | x | | 0.51 | x | 1.11 | | = [| 49.76 | (75) |
| Northeast 0.9 | 0.77 | X | 11.: | 23 | x | 2 | 2.97 | x | | 0.51 | x | 1.11 | | = [| 101.28 | (75) |
| Northeast 0.9 | 0.77 | X | 11.: | 23 | x | 4 | 1.38 | x | | 0.51 | X | 1.11 | | = [| 182.48 | (75) |
| Northeast 0.9 | 0.77 | X | 11. | 23 | x | 6 | 7.96 | x | | 0.51 | X | 1.11 | | = [| 299.69 | (75) |
| Northeast 0.9 | 0.77 | X | 11.: | 23 | x | 9 | 1.35 | X | | 0.51 | X | 1.11 | | = [| 402.84 | (75) |
| Northeast 0.9 | 0.77 | X | 11. | 23 | x | 9 | 7.38 | X | | 0.51 | X | 1.11 | | = [| 429.47 | (75) |
| Northeast 0.9 | 0.77 | X | 11. | 23 | x | 9 | 91.1 | x | | 0.51 | X | 1.11 | | = [| 401.76 | (75) |
| Northeast 0.9 | 0.77 | X | 11. | 23 | x | 7 | 2.63 | X | | 0.51 | X | 1.11 | | = [| 320.29 | (75) |
| Northeast 0.9 | 0.77 | X | 11.: | 23 | x | 5 | 0.42 | X | | 0.51 | X | 1.11 | | = [| 222.36 | (75) |
| Northeast 0.9 | 0.77 | X | 11.: | 23 | x | 2 | 8.07 | x | | 0.51 | X | 1.11 | | = [| 123.78 | (75) |
| Northeast 0.9 | 0.77 | X | 11.: | 23 | x | | 14.2 | X | | 0.51 | X | 1.11 | | = [| 62.61 | (75) |
| Northeast 0.9 | 0.77 | X | 11.: | 23 | x | 9 | 9.21 | x | | 0.51 | X | 1.11 | | = [| 40.63 | (75) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 3 | 6.79 |] | | 0.51 | X | 1.11 | | = [| 118.19 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 6 | 2.67 |] | | 0.51 | X | 1.11 | | = [| 201.33 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 8 | 35.75 |] | | 0.51 | X | 1.11 | | = [| 275.46 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 10 | 06.25 | | | 0.51 | X | 1.11 | | = [| 341.31 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 1 | 19.01 | | | 0.51 | X | 1.11 | | = [| 382.3 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 1 | 18.15 |] | | 0.51 | X | 1.11 | | = [| 379.53 | (79) |
| Southwest _{0.9} | 0.77 | x | 8.1 | 8 | x | 1 | 13.91 | Ī | | 0.51 | x | 1.11 | | = [| 365.91 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 10 | 04.39 | ĺ | | 0.51 | X | 1.11 | | = [| 335.33 | (79) |
| Southwest _{0.9} | 0.77 | x | 8.1 | 8 | x | 9 | 2.85 | ĺ | | 0.51 | x | 1.11 | | = [| 298.27 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 6 | 9.27 | Ī | | 0.51 | x | 1.11 | | = [| 222.51 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 4 | 4.07 | | | 0.51 | X | 1.11 | | = [| 141.57 | (79) |
| Southwest _{0.9} | 0.77 | X | 8.1 | 8 | x | 3 | 1.49 |] | | 0.51 | X | 1.11 | | = [| 101.15 | (79) |
| 0 1 | | | , | | | | | - (0.0) | | | | | | | | |
| Solar gains i (83)m= 167.9 | - | 457.94 | for each | 785.13 | \neg | 809 | 767.67 | (83)n 655 | | um(74)m 520.62 | (82)m 346.2 | | 141.7 | 78 | | (83) |
| Total gains - | | | - | | | | | | | 020.02 | 0 10.2 | 0 20 10 | 1 | ٽ | | () |
| (84)m= 671.2 | | | <u> </u> | <u> </u> | | | 1147.76 | 104 | 3.09 | 924.56 | 779.3 | 3 669.63 | 631.6 | 88 | | (84) |
| 7. Mean int | ornal tompo | roturo (| hoating | 60260 | n) | | | <u> </u> | | | | | | | | |
| Temperatui | | , | | | | area f | from Tak | nle 9 | Th | 1 (°C) | | | | Г | 21 | (85) |
| Utilisation fa | _ | • | | | _ | | | 510 5 | , | 1 (0) | | | | L | | |
| Jan | Ť | Mar | Apr | May | T | Jun | Jul | ΙΑ | ug | Sep | Oc | t Nov | De | c | | |
| (86)m= 0.93 | + | 0.83 | 0.71 | 0.57 | + | 0.42 | 0.31 | 0.3 | Ť | 0.55 | 0.78 | + | 0.94 | _ | | (86) |
| Mean interr | al temperat | ture in li | ving are | ea T1 <i>(</i> | follo | w ste | ns 3 to 7 | 7 in 1 | I Fable | - 9c) | | | | _ | | |
| (87)m= 19.25 | | 20.01 | 20.47 | 20.78 | | 20.93 | 20.98 | 20. | | 20.85 | 20.4 | 19.73 | 19.17 | 7 | | (87) |
| Temperatu | e during he | ating pe | eriods ir | rest o | f dw | /elling | from Ta | able s | 9, Tł | n2 (°C) | | • | • | | | |
| (88)m= 19.88 | | 19.88 | 19.88 | 19.88 | _ | 19.88 | 19.88 | 19. | | 19.88 | 19.88 | 3 19.88 | 19.88 | 8 | | (88) |
| Utilisation fa | actor for gai | ins for re | est of d | welling | , h2 | ,m (se | e Table | 9a) | | | | | | | | |
| (89)m= 0.92 | - | 0.8 | 0.67 | 0.51 | | 0.35 | 0.24 | 0.2 | 27 | 0.48 | 0.74 | 0.88 | 0.93 | 3 | | (89) |
| | | Į. | | | | | | | | I | | <u>. </u> | • | _ | | |

| (90)m= 17.61 | ıaı tempei | ature in | the rest | of dwelli | ng T2 (f | ollow ste | ps 3 to | 7 in Tabl | e 9c) | | | | |
|---|---|---|--|--|---------------------|----------------|--------------------------|-----------------------------------|---------------------------------|---|-------------|-------------------------|--|
| ` ' | 18.06 | 18.66 | 19.27 | 19.66 | 19.83 | 19.87 | 19.86 | 19.75 | 19.21 | 18.29 | 17.48 | | (90) |
| | • | • | | | | • | | f | LA = Livin | g area ÷ (4 | 4) = | 0.49 | (91) |
| Mean interr | al temper | aturo (fo | r the wh | olo dwol | lling) – f | ΙΛ ν Τ1 | ⊥ /1 _ fl | ۸) ی T2 | | | ' | | |
| (92)m= 18.42 | | 19.32 | 19.86 | 20.21 | 20.37 | 20.41 | 20.41 | 20.29 | 19.8 | 19 | 18.31 | | (92) |
| Apply adjus | | | | | | | | | | 13 | 10.51 | | (02) |
| (93)m= 18.27 | | 19.17 | 19.71 | 20.06 | 20.22 | 20.26 | 20.26 | 20.14 | 19.65 | 18.85 | 18.16 | | (93) |
| 8. Space he | | | | 20.00 | 20.22 | 20:20 | 20.20 | 20.11 | 10.00 | 10.00 | 10.10 | | () |
| Set Ti to the | | | | o obtain | and at st | on 11 of | Table O | n so tha | t Ti m=/ | 76)m an | d ro-calc | ulato | |
| the utilisation | | | • | | ieu ai sii | ер п ог | i abie 3i | J, 50 IIIa | it 11,111—(| r Ojiii aii | u re-caic | uiaie | |
| Jan | | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Utilisation fa | | | <u> </u> | | | ! | | | | | | | |
| (94)m= 0.9 | 0.86 | 0.78 | 0.67 | 0.52 | 0.37 | 0.26 | 0.3 | 0.5 | 0.73 | 0.86 | 0.91 | | (94) |
| Useful gain | s, hmGm | . W = (94 | 4)m x (8 [,] | 4)m | l . | · | | l | l | l | | | |
| (95)m= 605.0 | -i | 736.85 | 730.5 | 630.79 | 451.63 | 302.49 | 315.84 | 461.35 | 569.7 | 577.75 | 576.63 | | (95) |
| Monthly ave | erage exte | rnal tem | perature | from Ta | able 8 | ! | | <u> </u> | <u> </u> | <u> </u> | | | |
| (96)m= 4.3 | 4.9 | 6.5 | 8.9 | 11.7 | 14.6 | 16.6 | 16.4 | 14.1 | 10.6 | 7.1 | 4.2 | | (96) |
| Heat loss ra | ate for me | an intern | al tempe | erature, l | Lm,W: | =[(39)m : | x [(93)m | – (96)m | 1 | <u> </u> | | | |
| (97)m= 1173.6 | | 1064.9 | 908.19 | 702.44 | 472.07 | 307.82 | 323.91 | 507.31 | 760.33 | 987.34 | 1173.03 | | (97) |
| Space heat | ina reauir | ement fo | r each n | nonth. k\ | Nh/mon [.] | th = 0.02 | 24 x [(97 | ı <u> </u> |)ml x (4 | 1)m | | | |
| (98)m= 423.0 | | 244.07 | 127.94 | 53.31 | 0 | 0 | 0 | 0 | 141.83 | 294.9 | 443.72 | | |
| ` ' | | | | | <u> </u> | 1 | Tota | l per year | (kWh/vear |) = Sum(9 | 8)1 59 12 = | 2043.49 | (98) |
| Cooss book | | | Ls\A/lb /soc | 1/100 | | | | | (, , | ,(- | - / | | = |
| Space heat | ing require | ement in | KVVII/III- | year | | | | | | | l | 30.4 | (99) |
| 9a. Energy r | equiremer | nts – Indi | vidual h | eating sy | ystems i | ncluding | micro-C | CHP) | | | | | |
| Space hea | • | | | | | | | | | | | | |
| Fraction of | space hea | | | | | | | | | | ı | | _ |
| Fraction of space heat from main system(s) (202) = 1 - (201) = | | | | | | | | | | | | 0 | (201) |
| Fraction of | space hea | | - | | mentary | • | (202) = 1 | - (201) = | | | | 0 | (201) |
| Fraction of Fraction of | • | at from m | nain syst | em(s) | mentary | · | . , | - (201) = 02) × [1 - | (203)] = | | | | ╡ ` |
| | total heati | at from m | nain syst main sys | em(s) stem 1 | mentary | · | . , | | (203)] = | | | 1 | (202) |
| Fraction of Efficiency of | total heati f main spa | at from ming from take | nain syst main sys ing syste | em(s) stem 1 em 1 | · | | . , | | (203)] = | | | 1 1 100 | (202) |
| Fraction of Efficiency of | total heati f main spa f seconda | at from mag from ace heat | nain syst main sys ing syste | em(s) stem 1 em 1 y heating | g systen | n, % | (204) = (2 | 02) × [1 – | • | L | | 1 1 100 0 | (202) (204) (206) (208) |
| Fraction of Efficiency of Efficiency of | total heati f main spa f seconda Feb | at from m ng from ace heat ry/supple Mar | nain syst main sys ing syste ementar | em(s) stem 1 em 1 y heating | g systen Jun | | . , | | (203)] = | Nov | Dec | 1 1 100 | (202) (204) (206) (208) |
| Efficiency of Efficiency of Jan Space heat | total heati f main spa f seconda Feb ing require | at from m ng from ace heat ry/suppl Mar ement (c | nain systemain systemain systementary Apr | em(s) stem 1 em 1 y heating May d above) | g system Jun | n, % | (204) = (2 Aug | 02) × [1 – | Oct | | | 1 1 100 0 | (202) (204) (206) (208) |
| Efficiency of Efficiency of Jan Space heat | total heati f main spa f seconda Feb ing require 4 314.69 | at from mager from mager heat ary/supplement (compared to 244.07 | main systemain systemain systementary Apr calculated | em(s) stem 1 em 1 y heating May d above) 53.31 | g systen Jun | n, % | (204) = (2 | 02) × [1 – | • | Nov 294.9 | Dec 443.72 | 1 1 100 0 | (202) (204) (206) (208) |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(9) | total heati f main spa f seconda Feb ing require 314.69 88)m x (20 | at from ming from mace heat ary/supplement (color) 244.07 | main systemain systemain systemantar: Apr calculated 127.94 00 ÷ (20 | em(s) stem 1 em 1 y heating May d above) 53.31 | g system Jun | n, % | (204) = (2 Aug | 02) × [1 - Sep | Oct 141.83 | 294.9 | 443.72 | 1 1 100 0 | (202) (204) (206) (208) ear |
| Efficiency of Efficiency of Jan Space heat | total heati f main spa f seconda Feb ing require 314.69 88)m x (20 | at from mager from mager heat ary/supplement (compared to 244.07 | main systemain systemain systementary Apr calculated | em(s) stem 1 em 1 y heating May d above) 53.31 | g system Jun | n, % | (204) = (2 Aug 0 | 02) × [1 – Sep 0 | Oct 141.83 | 294.9 | 443.72 | 1 1 100 0 | (202) (204) (206) (208) ear |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(9) | total heati f main spa f seconda Feb ing require 314.69 88)m x (20 | at from ming from mace heat ary/supplement (color) 244.07 | main systemain systemain systemantar: Apr calculated 127.94 00 ÷ (20 | em(s) stem 1 em 1 y heating May d above) 53.31 | g system Jun 0 | n, % Jul 0 | (204) = (2 Aug 0 | 02) × [1 - Sep | Oct 141.83 | 294.9 | 443.72 | 1 1 100 0 | (202) (204) (206) (208) |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(9) | total heati f main spa f seconda Feb ing require 314.69 8)m x (20 4 314.69 | at from mage from mage heat ary/supplement (compared and compared and | main systemain systemain systementary Apr calculated 127.94 00 ÷ (20 127.94 | em(s) stem 1 em 1 y heating May d above) 53.31 66) 53.31 | g system Jun 0 | n, % Jul 0 | (204) = (2 Aug 0 | 02) × [1 – Sep 0 | Oct 141.83 | 294.9 | 443.72 | 1 100 0 kWh/ye | (202) (204) (206) (208) ear |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(9) 423.0 | total heati f main spa f seconda Feb ing require 314.69 88)m x (20 4 314.69 | mat from many from mace heat sury/supplement (compared 244.07) and a sury/supplement (compared 244.07) | main systemain systemain systemantary Apr calculated 127.94 00 ÷ (20 127.94 | em(s) stem 1 em 1 y heating May d above) 53.31 66) 53.31 | g system Jun 0 | n, % Jul 0 | (204) = (2 Aug 0 | 02) × [1 – Sep 0 | Oct 141.83 | 294.9 | 443.72 | 1 100 0 kWh/ye | (202) (204) (206) (208) ear |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(9) 423.0 Space heat | total heati f main spa f seconda Feb ing require 314.69 88)m x (20 4 314.69 | mat from many from mace heat sury/supplement (compared 244.07) and a sury/supplement (compared 244.07) | main systemain systemain systemantary Apr calculated 127.94 00 ÷ (20 127.94 | em(s) stem 1 em 1 y heating May d above) 53.31 66) 53.31 | g system Jun 0 | n, % Jul 0 | (204) = (2 Aug 0 Tota | 02) × [1 – Sep 0 0 I (kWh/yea | Oct 141.83 141.83 ar) =Sum(2 | 294.9 294.9 211) _{15,1012} | 443.72 | 1 100 0 kWh/ye | (202) (204) (206) (208) ear |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(98)m x (98)m | total heati f main spa f seconda Feb ing require 314.69 8)m x (20 4 314.69 ing fuel (s | mat from mace heat ary/supplement (compared 244.07) 244.07 econdar 00 ÷ (20) | main systemain systemain systematary Apr alculated 127.94 00 ÷ (20 127.94 y), kWh/ | em(s) stem 1 em 1 y heating May d above) 53.31 66) 53.31 | g system Jun 0 | n, % Jul 0 | (204) = (2 Aug 0 Tota | 02) × [1 – Sep 0 0 I (kWh/yea | Oct 141.83 141.83 ar) =Sum(2 | 294.9 294.9 211) _{15,1012} | 443.72 | 1 100 0 kWh/ye | (202) (204) (206) (208) ear |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(98)m x (98)m | total heati f main spa f seconda Feb ing require 314.69 8)m x (20 4 314.69 ing fuel (second)] } x 1 | mat from mace heat ary/supplement (compared 244.07) 244.07 econdar 00 ÷ (20) | main systemain systemain systematary Apr alculated 127.94 00 ÷ (20 127.94 y), kWh/ | em(s) stem 1 em 1 y heating May d above) 53.31 66) 53.31 | g system Jun 0 | n, % Jul 0 | (204) = (2 Aug 0 Tota | 02) × [1 – Sep 0 0 I (kWh/yea | Oct 141.83 141.83 ar) =Sum(2 | 294.9 294.9 211) _{15,1012} | 443.72 | 1 100 0 kWh/ye | (202) (204) (206) (208) ear (211) |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(98) m x (215)m=0]} | total heati f main spa f seconda Feb ing require 4 314.69 88)m x (20 4 314.69 ing fuel (s 201)] } x 1 | mat from mace heat ary/supplement (compared 244.07) 244.07 | main systemain systemain systematary Apr calculated 127.94 00 ÷ (20 127.94 y), kWh/98) 0 | em(s) stem 1 em 1 y heating May d above) 53.31 06) 53.31 | g system Jun 0 | n, % Jul 0 | (204) = (2 Aug 0 Tota | 02) × [1 – Sep 0 0 I (kWh/yea | Oct 141.83 141.83 ar) =Sum(2 | 294.9 294.9 211) _{15,1012} | 443.72 | 1 100 0 kWh/ye | (202) (204) (206) (208) ear (211) |
| Fraction of Efficiency of Efficiency of Jan Space heat 423.0 (211)m = {[(98) m x ((215)m=0]] | total heati f main spa f seconda Feb ing require 314.69 8)m x (20 4 314.69 ing fuel (s 201)] } x 1 0 | mat from mace heat ary/supplement (compared 244.07) 244.07 | main systemain systemain systematary Apr calculated 127.94 00 ÷ (20 127.94 y), kWh/98) 0 | em(s) stem 1 em 1 y heating May d above) 53.31 06) 53.31 | g system Jun 0 | n, % Jul 0 | (204) = (2 Aug 0 Tota | 02) × [1 – Sep 0 0 I (kWh/yea | Oct 141.83 141.83 ar) =Sum(2 | 294.9 294.9 211) _{15,1012} | 443.72 | 1 100 0 kWh/ye | (202) (204) (206) (208) ear (211) |

| (217)m= 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |] | (217) |
|-----------------------------------|-------------|------------|-----------|-----------|-------------|------------------------|------------|------------|-----------------------|-------------------------|----------|-------------------------|-------------|
| Fuel for water h | | | | | | | | | | | | | |
| (219)m = (64)r (219)m = 155.68 | 136.61 | 142.02 | 125.31 | 121.35 | 106.35 | 100.16 | 112.63 | 113.29 | 130.04 | 140.02 | 151.26 |] | |
| <u> </u> | | | l. | | | | Tota | I = Sum(2 | 19a) ₁₁₂ = | l | | 1534.73 | (219) |
| Annual totals | | | | | | | | | k\ | Wh/yeaı | r | kWh/year | _ _ |
| Space heating | | • | system | 1 | | | | | | | | 2043.49 | ╛ |
| Water heating | fuel use | ed | | | | | | | | | | 1534.73 | |
| Electricity for p | umps, f | ans and | electric | keep-ho | t | | | | | | | _ | |
| mechanical ve | entilatio | n - balan | ced, ext | ract or p | ositive ir | nput fron | n outside | 9 | | | 48.03 | | (230a) |
| central heating | g pump | : | | | | | | | | | 30 | | (230c) |
| Total electricity | for the | above, I | kWh/yea | r | | | sum | of (230a). | (230g) = | | | 78.03 | (231) |
| Electricity for lig | ghting | | | | | | | | | | | 300.24 | (232) |
| Electricity gene | erated b | y PVs | | | | | | | | | | -1244.92 | (233) |
| 10a. Fuel cos | ts - indi | vidual he | eating sy | stems: | | | | | | | | | |
| | | | | | Fu | el | | | Fuel P | rice | | Fuel Cost | |
| | | | | | | /h/year | | | (Table | | | £/year | |
| Space heating | - main | system 1 | | | (211 | I) x | | | 13. | 19 | x 0.01 = | 269.54 | (240) |
| Space heating | - main | system 2 | 2 | | (213 | 3) x | | | 0 | | x 0.01 = | 0 | (241) |
| Space heating | - secor | ndary | | | (215 | 5) x | | | 13. | 19 | x 0.01 = | 0 | (242) |
| Water heating | cost (ot | her fuel) | | | (219 | 9) | | | 13. | 19 | x 0.01 = | 202.43 | (247) |
| Pumps, fans ar | nd elect | tric keep- | -hot | | (231 | 1) | | | 13. | 19 | x 0.01 = | 10.29 | (249) |
| (if off-peak tarif | ff, list ea | ach of (2 | 30a) to (| 230g) se | eparately | as app | licable a | nd apply | fuel pri | ce accor | rding to | Table 12a | _ |
| Energy for light | ting | | | | (232 | 2) | | | 13. | 19 | x 0.01 = | 39.6 | (250) |
| Additional stan | ding ch | arges (T | able 12) | | | | | | | | | 0 | (251) |
| | | | | | one | of (233) to | o (235) x) | | 13. | 19 | x 0.01 = | 0 | (252) |
| Appendix Q ite | ms: rep | eat lines | (253) a | nd (254) | as need | ded | | | | | | | _ |
| Total energy | y cost | t | | (245)(| (247) + (25 | 0)(254) | = | | | | | 521.86 | (255) |
| 11a. SAP ratir | ng - ind | ividual h | eating sy | /stems | | | | | | | | | |
| Energy cost de | flator (| Table 12) |) | | | | | | | | | 0.42 | (256) |
| Energy cost fac | ctor (EC | CF) | | [(255) x | (256)] ÷ [(| 4) + 45.0] | = | | | | | 1.95 | (257) |
| SAP rating (Se | ection ' | 12) | | | | | | | | | | 72.75 | (258) |
| 12a. CO2 emi | issions | – Individ | ual heat | ing syste | ems inclu | uding mi | cro-CHF | • | | | | | |
| | | | | | | ergy /h/year | | | Emiss kg CO | ion fac 2/kWh | tor | Emissions kg CO2/yea | |
| Space heating | (main s | system 1 |) | | (211 | I) x | | | 0.5 | 19 | = | 1060.57 | (261) |
| Space heating | • | | | | (215 | 5) x | | | 0.5 | | = | 0 | (263) |
| | , | , | | | | | | | | - | | | 」 、/ |

| Water heating | (219) x | 0.519 | = | 796.52 | (264) |
|---|---------------------------------|-------------------|---|---------|-------|
| Space and water heating | (261) + (262) + (263) + (264) = | | | 1857.1 | (265) |
| Electricity for pumps, fans and electric keep-hot | (231) x | 0.519 | = | 40.5 | (267) |
| Electricity for lighting | (232) x | 0.519 | = | 155.83 | (268) |
| Energy saving/generation technologies Item 1 | | 0.519 | = | -646.12 | (269) |
| Total CO2, kg/year | sum | n of (265)(271) = | | 1407.31 | (272) |
| CO2 emissions per m ² | (272 | 2) ÷ (4) = | | 20.94 | (273) |
| El rating (section 14) | | | | 83 | (274) |

13a. Primary Energy

| | Energy kWh/year | Primary factor | P. Energy kWh/year |
|---|---------------------------------|-----------------------|------------------------------|
| Space heating (main system 1) | (211) x | 3.07 | 6273.52 (261) |
| Space heating (secondary) | (215) x | 3.07 | 0 (263) |
| Energy for water heating | (219) x | 3.07 | 4711.62 (264) |
| Space and water heating | (261) + (262) + (263) + (264) = | | 10985.14 (265) |
| Electricity for pumps, fans and electric keep-hot | (231) x | 3.07 = | 239.55 (267) |
| Electricity for lighting | (232) x | 0 = | 921.75 (268) |
| Energy saving/generation technologies | | | |
| Item 1 | | 3.07 | -3821.91 (269) |
| 'Total Primary Energy | sum | of (265)(271) = | 8324.52 (272) |
| Primary energy kWh/m²/year | (272 | 2) ÷ (4) = | 123.86 (273) |

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.16 *Printed on 10 October 2018 at 11:31:42*

Project Information:

Assessed By: Carlos Melgar (STRO031596) Building Type: Mid-terrace Flat

Dwelling Details:

NEW DWELLING DESIGN STAGETotal Floor Area: 54.34m²Site Reference:Kings Mews Be GreenPlot Reference:Plot 004

Address: 4, 10-11 Kings Mews, WC1N 2ES

Client Details:

Name: James Taylor

Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 29.24 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER)

22.15 kg/m²

OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 53.6 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 38.4 kWh/m²

OK

2 Fabric U-values

| Element | Average | Highest | |
|---------------|------------------|------------------|----|
| External wall | 0.15 (max. 0.30) | 0.16 (max. 0.70) | OK |
| Party wall | 0.00 (max. 0.20) | - | OK |
| Floor | 0.14 (max. 0.25) | 0.14 (max. 0.70) | OK |
| Roof | 0.16 (max. 0.20) | 0.16 (max. 0.35) | OK |
| Openings | 1.34 (max. 2.00) | 1.40 (max. 3.30) | OK |

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals 2.50 (design value)

Maximum 10.0 OK

4 Heating efficiency

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

Direct acting electric boiler

Secondary heating system: None

5 Cylinder insulation

Hot water Storage: Measured cylinder loss: 0.80 kWh/day

Permitted by DBSCG: 1.03 kWh/day OK

Primary pipework insulated: Yes OK

Regulations Compliance Report

| 6 Controls | | | |
|---|--|--|----------|
| Space heating controls Hot water controls: | TTZC by plumbing and e Cylinderstat | electrical services | OK OK |
| 7 Low energy lights | | | |
| Percentage of fixed lights wit Minimum | n low-energy fittings | 100.0% 75.0% | ОК |
| 8 Mechanical ventilation | | | |
| Continuous extract system (c Specific fan power: Maximum | ecentralised) | 0.19 0.7 | ок |
| 9 Summertime temperature | | | |
| Overheating risk (Thames va Based on: Overshading: Windows facing: South West Windows facing: North East Ventilation rate: | lley): | Slight Average or unknown 4.09m² 4.6m² 6.00 Closed 0% of daylight hours | ОК |
| 10 Key features Air permeablility Doors U-value Party Walls U-value Photovoltaic array | | 2.5 m³/m²h 1.09 W/m²K 0 W/m²K | |

Predicted Energy Assessment



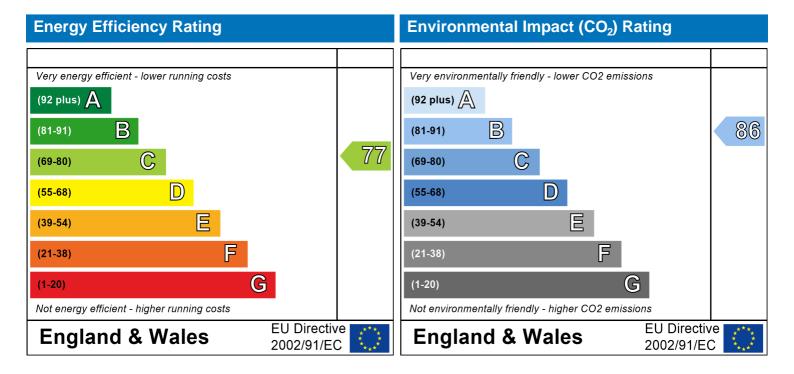
10-11 Kings Mews WC1N 2ES Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Mid-terrace Mid floor Flat 19 July 2018 Carlos Melgar

54.34 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 carbonn dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

| | | | User D | etails: | | | | | | |
|--|----------------------------|---------------------|------------|-------------------|------------|----------------|--------------|-----------|-------------|---------------|
| Assessor Name: | Carlos Melgar | | | Strom | a Num | ber: | | STRO | 031596 | |
| Software Name: | Stroma FSAP 2 | 012 | | Softwa | are Ve | rsion: | | Versio | n: 1.0.4.16 | |
| | | | i í | Address | Plot 00 | 4 | | | | |
| Address : | 4, 10-11 Kings Me | ews, WC1I | N 2ES | | | | | | | |
| 1. Overall dwelling dime | ensions: | | | | | | | | | |
| 0 | | | | a(m²) | | | eight(m) | ٦ | Volume(m | <u> </u> |
| Ground floor | | | 5 | 4.34 | (1a) x | 2 | 2.42 | (2a) = | 131.5 | (3a) |
| Total floor area TFA = (1 | a)+(1b)+(1c)+(1d)+(| 1e)+(1r | າ) 5 | 4.34 | (4) | | | | | |
| Dwelling volume | | | | | (3a)+(3b |)+(3c)+(3c | d)+(3e)+ | (3n) = | 131.5 | (5) |
| 2. Ventilation rate: | | | | | | | | | | |
| | main heating | secondar heating | у | other | | total | | | m³ per hou | ır |
| Number of chimneys | 0 + | 0 | + [| 0 |] = [| 0 | X | 40 = | 0 | (6a) |
| Number of open flues | 0 + | 0 | ī + F | 0 | i - F | 0 | X | 20 = | 0 | (6b) |
| Number of intermittent fa | ans | | | | | 0 | x | 10 = | 0 | (7a) |
| | | | | | Ļ | | = | 10 = | | = `` |
| Number of passive vents | | | | | <u> </u> | 0 | | | 0 | (7b) |
| Number of flueless gas f | ires | | | | | 0 | X | 40 = | 0 | (7c) |
| | | | | | | | | Air ch | anges per h | our |
| Infiltration due to chimne | ove flues and fans – | (6a)+(6b)+(7 | 7a)+(7b)+(| 7c) = | Г | | | ÷ (5) = | _ | (8) |
| If a pressurisation test has | • | | | | ontinue fr | 0 om (9) to | | ÷ (5) = | 0 | (0) |
| Number of storeys in t | | ,,, | , , , | | | (-) | (-) | | 0 | (9) |
| Additional infiltration | | | | | | | [(9) | -1]x0.1 = | 0 | (10) |
| Structural infiltration: (| 0.25 for steel or timbe | er frame or | 0.35 fo | r masonr | y constr | uction | | | 0 | (11) |
| | present, use the value con | responding to | the great | er wall are | a (after | | | | | |
| deducting areas of open If suspended wooden | | aalad) or 0 | 1 (coale | معام (امد | antar N | | | | | — (12) |
| If no draught lobby, er | • | • | . i (Scale | <i>iu)</i> , eise | enter o | | | | 0 | (12) |
| Percentage of window | | | | | | | | | 0 | (14) |
| Window infiltration | o and doors araagin | ompped | | 0.25 - [0.2 | x (14) ÷ 1 | 001 = | | | 0 | (15) |
| Infiltration rate | | | | (8) + (10) | | | + (15) = | | 0 | (16) |
| Air permeability value | . a50. expressed in a | ubic metre | s per ho | our per s | guare m | etre of e | envelope | area | 2.5 | (17) |
| If based on air permeabi | | | • | | • | 00 | J 0.0p 0 | | 0.12 | (18) |
| Air permeability value appli | • | | | | | is being u | sed | | 0.12 | () |
| Number of sides shelter | ed | | | | | | | | 2 | (19) |
| Shelter factor | | | | (20) = 1 - | 0.075 x (1 | 19)] = | | | 0.85 | (20) |
| Infiltration rate incorpora | ting shelter factor | | | (21) = (18) | x (20) = | | | | 0.11 | (21) |
| Infiltration rate modified | for monthly wind spe | ed | | | | | | | _ | |
| Jan Feb | Mar Apr Ma | y Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Monthly average wind sp | peed from Table 7 | | | | | | | | | |
| (22)m= 5.1 5 | 4.9 4.4 4.3 | 3.8 | 3.8 | 3.7 | 4 | 4.3 | 4.5 | 4.7 | | |
| Wind Factor (02.) | | | | | | | | | | |
| Wind Factor $(22a)m = (2a)m =$ | 22)m ÷ 4 | 0.05 | 0.05 | | | | | ı | 1 | |

1.1

1.08

0.95

0.95

0.92

1.08

1.12

1.18

1.23

(22a)m=

1.27

1.25

| Adjusted infiltr | ration rat | e (allowi | ng for sh | nelter an | nd wind s | speed) = | : (21a) x | (22a)m | | | | | |
|----------------------------|-----------------------|---------------------------|--------------------------|------------|----------------|-----------|---------------|--------------------------|----------------------------------|------------------|------------------|----------|------------|
| 0.14 | 0.13 | 0.13 | 0.12 | 0.11 | 0.1 | 0.1 | 0.1 | 0.11 | 0.11 | 0.12 | 0.12 | | |
| Calculate effe | | _ | rate for t | he appli | cable ca | se | 1 | 1 | 1 | <u>I</u> | 1 | _ | |
| If mechanic | | | | | | | | | | | | 0.5 | (238 |
| If exhaust air h | | 0 | | , , | , | . , | ,, . | , | o) = (23a) | | | 0.5 | (23b |
| If balanced wit | | - | - | _ | | | | | | | | 0 | (230 |
| a) If balance | ed mech | anical ve | entilation | with he | at recov | ery (MV | HR) (24a | a)m = (2) | 2b)m + (| 23b) × [| 1 – (23c) |) ÷ 100] | |
| (24a)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24a |
| b) If balance | ed mech | anical ve | entilation | without | heat red | covery (I | MV) (24k | p)m = (2x) | 2b)m + (2 | 23b) | 1 | - | |
| (24b)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24h |
| c) If whole h if (22b)r | nouse ex m < 0.5 > | | | • | • | | | | .5 × (23b | o) | | | |
| (24c)m= 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | (240 |
| d) If natural | ventilation | | | | | | | | 0.51 | | | _ | |
| (24d)m = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 1 [(2 | 0 | 0.5 | 0 | 0 | 1 | (240 |
| Effective air | | | <u> </u> | | ļ | | | | | | | _ | ` |
| (25)m= 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 7 | (25) |
| ` ′ | 1 | I | ı | | 1 0.0 | 1 0.0 | 1 0.0 |] "" | 1 0.0 | 0.0 | 1 0.0 | | (- / |
| 3. Heat losse | es and he | eat loss p | | | | | | | | | | | |
| ELEMENT | Gros area | | Openin m | | Net Ar A ,r | | U-val W/m2 | | A X U (W/I | K) | k-valu kJ/m²• | | X k J/K |
| Doors | | | | | 2.1 | X | 1.09 | = | 2.289 | | | | (26) |
| Windows Type | e 1 | | | | 4.09 | х1 | /[1/(1.4)+ | - 0.04] = | 5.42 | | | | (27) |
| Windows Type | e 2 | | | | 4.6 | x1 | /[1/(1.4)+ | - 0.04] = | 6.1 | | | | (27) |
| Floor Type 1 | | | | | 3.76 | x | 0.14 | = | 0.5264 | | 75 | 282 | (28) |
| Floor Type 2 | | | | | 7.44 | x | 0.14 | = | 1.0416 | $\overline{}$ | 75 | 558 | (28) |
| Walls Type1 | 23. | 5 | 8.69 | | 14.8 | 1 x | 0.16 | _ = | 2.37 | T i | 49.5 | 733.0 |)9 (29) |
| Walls Type2 | 21.1 | 14 | 2.1 | | 19.04 | 1 x | 0.14 | = | 2.69 | i i | 49.5 | 942.4 | l8 (29) |
| Roof | 17.0 |)3 | 0 | = | 17.03 | 3 x | 0.16 | | 2.72 | F i | 9 | 153.2 | 27 (30) |
| Total area of e | | | | | 72.87 | = | | | | | | | (31) |
| Party wall | | , | | | 62.97 | = | 0 | = | 0 | _ [| 49.5 | 3117.0 | ` <i>`</i> |
| Party ceiling | | | | | 37.3 | = | | | | | 20 | 746. | = |
| Internal wall * | * | | | | | = | | | | [[| 9 | 456.1 | = |
| * for windows and | | OWS USE 6 | effective wi | ndow I I-v | 50.68 | | a formula 1 | 1/[(1/ -va | ue)±0 041 a |] os aiven in | - | | (32) |
| ** include the are | | | | | | atou donn | g rormana . | n _L (n o van | <i>30)</i> 10.0 1 ₁ 0 | io givoir iii | , paragrapi | | |
| Fabric heat lo | ss, W/K | = S (A x | U) | | | | (26)(30 |) + (32) = | | | | 23.17 | (33) |
| | Cm = S | (Axk) | | | | | | ((28). | (30) + (32 | 2) + (32a) | (32e) = | 6988.18 | (34) |
| Heat capacity | | | | | | | | _ (24) | . (4) | | | 400.0 | (25) |
| Heat capacity Thermal mass | s parame | eter (TMF | P = Cm ÷ | - TFA) ir | n kJ/m²K | | | = (34) | $) \div (4) =$ | | | 128.6 | (33) |
| | ssments wh | ere the de | tails of the | , | | | recisely the | ` ' | | TMP in T | able 1f | 128.6 | (35) |
| Thermal mass | ssments wh | ere the de tailed calc | tails of the ulation. | construct | ion are no | t known p | recisely the | ` ' | | TMP in T | ¯able 1f | 11.05 | (36) |

| Total fabric heat loss | (33) + (36) = | (27) |
|--|---|---------------|
| Ventilation heat loss calculated monthly | $(38)m = 0.33 \times (25)m \times (5)$ | 34.21 (37) |
| Jan Feb Mar Apr May Jun Ju | | Dec |
| (38)m= 21.7 21.7 21.7 21.7 21.7 21.7 21.7 21.7 | | 1.7 (38) |
| Heat transfer coefficient, W/K | (39)m = (37) + (38) m | |
| (39)m= 55.91 55.91 55.91 55.91 55.91 55.91 55.91 | | .91 |
| | Average = Sum(39) ₁₁₂ /12 | 2= 55.91 (39) |
| Heat loss parameter (HLP), W/m²K | (40) m = (39) m \div (4) | |
| (40)m= 1.03 1.03 1.03 1.03 1.03 1.03 1.03 | | 03 |
| Number of days in month (Table 1a) | Average = $Sum(40)_{112}/12$ | 2= 1.03 (40) |
| Jan Feb Mar Apr May Jun Ju | Aug Sep Oct Nov D |)ec |
| (41)m= 31 28 31 30 31 30 31 | 31 30 31 30 3 | 31 (41) |
| | | |
| 4. Water heating energy requirement: | kV | /h/year: |
| Assumed occupancy N | 4.00 | (42) |
| Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp(-0.000349 x (TFA -1) | 3.9)2)] + 0.0013 x (TFA -13.9) | (42) |
| if TFA £ 13.9, N = 1 | | |
| Annual average hot water usage in litres per day Vd, average Reduce the annual average hot water usage by 5% if the dwelling is design | , , | (43) |
| not more that 125 litres per person per day (all water use, hot and cold) | | |
| Jan Feb Mar Apr May Jun Ju | Aug Sep Oct Nov D | Dec |
| Hot water usage in litres per day for each month Vd,m = factor from Table 1 | c x (43) | |
| (44)m= 85.12 82.02 78.92 75.83 72.73 69.64 69.6 | 4 72.73 75.83 78.92 82.02 85 | .12 |
| Francisco content of had written and a calculated monthly 4400 w Vel as were | Total = Sum(44) ₁₁₂ = | 928.53 (44) |
| Energy content of hot water used - calculated monthly = 4.190 x Vd,m x nm | · · · · · · · · · · · · · · · · · · · | |
| (45)m= 126.22 110.4 113.92 99.32 95.3 82.23 76. | | 2.24 |
| If instantaneous water heating at point of use (no hot water storage), enter | Total = $Sum(45)_{112}$ = 0 in boxes (46) to (61) | 1217.45 (45) |
| (46)m= 18.93 16.56 17.09 14.9 14.29 12.34 11.4 | 3 13.12 13.27 15.47 16.89 18 | .34 (46) |
| Water storage loss: | | <u></u> |
| Storage volume (litres) including any solar or WWHRS stora | ge within same vessel 50 | (47) |
| If community heating and no tank in dwelling, enter 110 litres | • • | |
| Otherwise if no stored hot water (this includes instantaneous Water storage loss: | combi bollers) enter '0' in (47) | |
| a) If manufacturer's declared loss factor is known (kWh/day | : 0.8 | (48) |
| Temperature factor from Table 2b | 0.54 | (49) |
| Energy lost from water storage, kWh/year | (48) x (49) = 0.43 | (50) |
| b) If manufacturer's declared cylinder loss factor is not know | n: | <u> </u> |
| Hot water storage loss factor from Table 2 (kWh/litre/day) | 0 | (51) |
| If community heating see section 4.3 Volume factor from Table 2a | 0 | (52) |
| Temperature factor from Table 2b | 0 | (52) |
| Energy lost from water storage, kWh/year | (47) x (51) x (52) x (53) = 0 | (54) |
| Enter (50) or (54) in (55) | 0.43 | (55) |
| | <u></u> | |

| | loss cal | culated f | or each | month | | | ((56)m = (| 55) × (41)ı | m | | | | |
|--|--|---|--|---|--|---|---|---|---|---|---|---------------|--------------------------------------|
| (56)m= 13.39 | 12.1 | 13.39 | 12.96 | 13.39 | 12.96 | 13.39 | 13.39 | 12.96 | 13.39 | 12.96 | 13.39 | | (56) |
| If cylinder contain | s dedicated | d solar sto | rage, (57) | m = (56)m | x [(50) – (| H11)] ÷ (5 | 0), else (5 | 7)m = (56) | m where (| H11) is fro | m Append | ix H | |
| (57)m= 13.39 | 12.1 | 13.39 | 12.96 | 13.39 | 12.96 | 13.39 | 13.39 | 12.96 | 13.39 | 12.96 | 13.39 | | (57) |
| Primary circuit | loss (an | nual) fro | om Table | 3 | | | | | | | 0 | | (58) |
| Primary circuit | • | • | | | 59)m = (| (58) ÷ 36 | 55 × (41) | m | | | | • | |
| (modified by | factor fr | rom Tabl | le H5 if t | here is s | solar wat | ter heatii | ng and a | cylinde | r thermo | stat) | | | |
| (59)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (59) |
| Combi loss ca | lculated | for each | month (| (61)m = | (60) ÷ 36 | 65 × (41) |)m | | | | | | |
| (61)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (61) |
| Total heat req | uired for | water he | eating ca | alculated | for eac | h month | (62)m = | 0.85 × (| (45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= 139.62 | 122.49 | 127.31 | 112.28 | 108.69 | 95.19 | 89.59 | 100.83 | 101.45 | 116.52 | 125.53 | 135.63 | | (62) |
| Solar DHW input | calculated | using App | endix G oı | Appendix | H (negati | ve quantity | /) (enter '0 | ' if no sola | r contribut | ion to wate | er heating) | 1 | |
| (add additiona | I lines if | FGHRS | and/or \ | vwhrs | applies | , 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= 139.62 | 122.49 | 127.31 | 112.28 | 108.69 | 95.19 | 89.59 | 100.83 | 101.45 | 116.52 | 125.53 | 135.63 | | |
| | | | | | | | Outp | out from wa | ater heate | r (annual)₁ | 12 | 1375.13 | (64) |
| Heat gains fro | m water | heating, | kWh/m | onth 0.2 | 5 ´ [0.85 | × (45)m | + (61)m | n] + 0.8 x | (46)m | + (57)m | + (59)m |] | _ |
| (65)m= 52.68 | 46.38 | 48.59 | 43.39 | 42.4 | 37.71 | 36.05 | 39.79 | 39.79 | 45 | 47.8 | 51.36 | | (65) |
| include (57) | m in calc | culation (| of (65)m | only if c | ylinder i | s in the o | dwelling | or hot w | ater is fr | om com | munity h | eating | |
| 5. Internal ga | | | | • | • | | | | | | • | | |
| Metabolic gair | , | | | , | | | | | | | | | |
| Jan | Feb | J), vvai | | | | | | | | | | | |
| | 1 1 50 1 | Mar | | Mav | Jun | Jul | Aua | Sep | Oct | Nov | Dec | | |
| (66)m= 109.08 | 109.08 | Mar 109.08 | Apr 109.08 | May 109.08 | Jun 109.08 | Jul 109.08 | Aug 109.08 | Sep | Oct | Nov 109.08 | Dec 109.08 | | (66) |
| ` / | 109.08 | 109.08 | Apr 109.08 | 109.08 | 109.08 | 109.08 | 109.08 | 109.08 | | | | | (66) |
| Lighting gains | 109.08 | 109.08 | Apr 109.08 | 109.08 | 109.08 | 109.08 | 109.08 | 109.08 | | | | | (66) (67) |
| Lighting gains (67)m= 36.85 | 109.08 (calculat 32.73 | 109.08 ted in Ap 26.62 | Apr 109.08 opendix 20.15 | 109.08 L, equat | 109.08 ion L9 o 12.72 | 109.08 r L9a), a 13.74 | 109.08 Iso see | 109.08 Table 5 23.98 | 109.08 30.44 | 109.08 | 109.08 | | ` ' |
| Lighting gains (67)m= 36.85 Appliances ga | 109.08 (calculat 32.73 ins (calc | 109.08 ted in Ap 26.62 ulated in | Apr 109.08 opendix 20.15 | 109.08 L, equat 15.07 dix L, eq | 109.08 ion L9 o 12.72 uation L | 109.08 r L9a), a 13.74 13 or L1 | 109.08 Iso see 17.86 3a), also | 109.08 Table 5 23.98 see Tal | 109.08 30.44 ble 5 | 109.08 35.53 | 109.08 37.88 | | (67) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 | 109.08 (calculat 32.73 ins (calculated) | 109.08 ted in Ap 26.62 ulated in 232.81 | Apr 109.08 ppendix 20.15 Append 219.64 | 109.08 L, equat 15.07 dix L, eq | 109.08 ion L9 of 12.72 uation L | 109.08 r L9a), a 13.74 13 or L1 176.96 | 109.08 Iso see 17.86 3a), also | 109.08 Table 5 23.98 see Tal 180.69 | 30.44 ble 5 193.86 | 109.08 | 109.08 | | ` ' |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains | 109.08 (calculat 32.73 ins (calculated) 239 (calculated) | 109.08 ted in Ap 26.62 ulated in 232.81 ated in Ap | Apr 109.08 ppendix 20.15 Append 219.64 | 109.08 L, equat 15.07 dix L, eq | 109.08 ion L9 of 12.72 uation L 187.4 ion L15 | 109.08 r L9a), a 13.74 13 or L1 176.96 | 109.08 Iso see 17.86 3a), also 174.51 | 109.08 Table 5 23.98 see Tal 180.69 | 30.44 ble 5 193.86 | 109.08 35.53 | 109.08 37.88 | | (67) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains (69)m= 47.73 | 109.08 (calculat 32.73 ins (calculated) 239 (calculated) 47.73 | 109.08 ted in Ap 26.62 ulated in 232.81 tted in Ap 47.73 | Apr 109.08 ppendix 20.15 Append 219.64 ppendix 47.73 | 109.08 L, equat 15.07 dix L, eq 203.02 L, equat | 109.08 ion L9 of 12.72 uation L | 109.08 r L9a), a 13.74 13 or L1 176.96 or L15a) | 109.08 Iso see 17.86 3a), also | 109.08 Table 5 23.98 See Tal 180.69 ee Table | 30.44 ble 5 193.86 5 | 109.08 35.53 210.48 | 109.08 37.88 226.11 | | (67) (68) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and fail | 109.08 (calculat 32.73 ins (calculated) 239 (calculated) 47.73 | 109.08 ted in Ap 26.62 ulated in 232.81 tted in Ap 47.73 | Apr 109.08 ppendix 20.15 Append 219.64 ppendix 47.73 | 109.08 L, equat 15.07 dix L, eq 203.02 L, equat | 109.08 ion L9 of 12.72 uation L 187.4 ion L15 | 109.08 r L9a), a 13.74 13 or L1 176.96 or L15a) | 109.08 Iso see 17.86 3a), also 174.51 1, also se 47.73 | 109.08 Table 5 23.98 See Tal 180.69 ee Table | 30.44 ble 5 193.86 5 47.73 | 109.08 35.53 210.48 47.73 | 109.08 37.88 226.11 | | (67) (68) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and fa (70)m= 3 | 109.08 (calculated 32.73) ins (calculated 239) (calculated 47.73) ns gains 3 | 109.08 ted in Ap 26.62 ulated in 232.81 ted in Ap 47.73 (Table 5 | Apr 109.08 ppendix 20.15 Append 219.64 ppendix 47.73 5a) | 109.08 L, equat 15.07 dix L, eq 203.02 L, equat 47.73 | 109.08 ion L9 of 12.72 uation L 187.4 tion L15 47.73 | 109.08 r L9a), a 13.74 13 or L1 176.96 or L15a) 47.73 | 109.08 Iso see 17.86 3a), also 174.51 | 109.08 Table 5 23.98 see Tal 180.69 ee Table 47.73 | 30.44 ble 5 193.86 5 | 109.08 35.53 210.48 | 109.08 37.88 226.11 47.73 | | (67) (68) (69) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and fail | 109.08 (calculated 32.73) ins (calculated 239) (calculated 47.73) ns gains 3 | 109.08 ted in Ap 26.62 ulated in 232.81 ted in Ap 47.73 (Table 5 | Apr 109.08 ppendix 20.15 Append 219.64 ppendix 47.73 5a) | 109.08 L, equat 15.07 dix L, eq 203.02 L, equat 47.73 | 109.08 ion L9 of 12.72 uation L 187.4 tion L15 47.73 | 109.08 r L9a), a 13.74 13 or L1 176.96 or L15a) 47.73 | 109.08 Iso see 17.86 3a), also 174.51 1, also se 47.73 | 109.08 Table 5 23.98 see Tal 180.69 ee Table 47.73 | 30.44 ble 5 193.86 5 47.73 | 109.08 35.53 210.48 47.73 | 109.08 37.88 226.11 47.73 | | (67) (68) (69) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and fa (70)m= 3 Losses e.g. ev (71)m= -72.72 | 109.08 (calculations) | 109.08 ted in Ap 26.62 ulated in 232.81 ted in Ap 47.73 (Table 5 3 on (negat | Apr 109.08 ppendix 20.15 Appendix 219.64 ppendix 47.73 5a) 3 tive valu | 109.08 L, equat 15.07 dix L, eq 203.02 L, equat 47.73 3 es) (Tab | 109.08 ion L9 of 12.72 uation L 187.4 ion L15 47.73 | 109.08 r L9a), a 13.74 13 or L1 176.96 or L15a) 47.73 | 109.08 Iso see 17.86 3a), also 174.51 , also se 47.73 | 109.08 Table 5 23.98 See Tal 180.69 ee Table 47.73 | 30.44 ble 5 193.86 5 47.73 | 109.08 35.53 210.48 47.73 | 109.08 37.88 226.11 47.73 | | (67) (68) (69) (70) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and fat (70)m= 3 Losses e.g. ev (71)m= -72.72 Water heating | 109.08 (calculations) | 109.08 ted in Ap 26.62 ulated in 232.81 ted in Ap 47.73 (Table 5 3 on (negat | Apr 109.08 ppendix 20.15 Appendix 219.64 ppendix 47.73 5a) 3 tive valu | 109.08 L, equat 15.07 dix L, eq 203.02 L, equat 47.73 3 es) (Tab | 109.08 ion L9 of 12.72 uation L 187.4 ion L15 47.73 | 109.08 r L9a), a 13.74 13 or L1 176.96 or L15a) 47.73 | 109.08 Iso see 17.86 3a), also 174.51 , also se 47.73 | 109.08 Table 5 23.98 See Tal 180.69 ee Table 47.73 | 30.44 ble 5 193.86 5 47.73 | 109.08 35.53 210.48 47.73 | 109.08 37.88 226.11 47.73 | | (67) (68) (69) (70) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and fai (70)m= 3 Losses e.g. ev (71)m= -72.72 Water heating (72)m= 70.81 | 109.08 (calculated 32.73) ins (calculated 239) (calculated 47.73) ns gains 3 (caporation 2.72.72) gains (Temporation 69.02) | 109.08 ted in Ap 26.62 ulated in 232.81 ted in Ap 47.73 (Table 5 3 on (negat -72.72 Table 5) 65.31 | Apr 109.08 ppendix 20.15 Append 219.64 ppendix 47.73 5a) 3 tive valu | 109.08 L, equat 15.07 dix L, eq 203.02 L, equat 47.73 3 es) (Tab | 109.08 ion L9 of 12.72 uation L 187.4 ion L15 47.73 3 lle 5) -72.72 | 109.08 r L9a), a 13.74 13 or L1 176.96 or L15a) 47.73 | 109.08 Iso see 17.86 3a), also 174.51 , also se 47.73 3 | 109.08 Table 5 23.98 See Tal 180.69 EE Table 47.73 3 -72.72 | 30.44 ble 5 193.86 5 47.73 3 -72.72 60.49 | 109.08 35.53 210.48 47.73 3 -72.72 | 109.08 37.88 226.11 47.73 3 -72.72 | | (67) (68) (69) (70) (71) |
| Lighting gains (67)m= 36.85 Appliances ga (68)m= 236.54 Cooking gains (69)m= 47.73 Pumps and fat (70)m= 3 Losses e.g. ev (71)m= -72.72 Water heating | 109.08 (calculated 32.73) ins (calculated 239) (calculated 47.73) ns gains 3 (caporation 2.72.72) gains (Temporation 69.02) | 109.08 ted in Ap 26.62 ulated in 232.81 ted in Ap 47.73 (Table 5 3 on (negat -72.72 Table 5) 65.31 | Apr 109.08 ppendix 20.15 Append 219.64 ppendix 47.73 5a) 3 tive valu | 109.08 L, equat 15.07 dix L, eq 203.02 L, equat 47.73 3 es) (Tab | 109.08 ion L9 of 12.72 uation L 187.4 ion L15 47.73 3 lle 5) -72.72 | 109.08 r L9a), a 13.74 13 or L1 176.96 or L15a) 47.73 | 109.08 Iso see 17.86 3a), also 174.51 , also se 47.73 3 | 109.08 Table 5 23.98 2 see Tal 180.69 2 ee Table 47.73 3 | 30.44 ble 5 193.86 5 47.73 3 -72.72 60.49 | 109.08 35.53 210.48 47.73 3 -72.72 | 109.08 37.88 226.11 47.73 3 -72.72 | | (67) (68) (69) (70) (71) |

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

| Orientation: Access Fa Table 6d | ctor | Area m² | | | Flu Tal | x ole 6a | | g₋ Tab | _ le 6b | | FF Table 60 | ; | | Gains (W) | |
|--|-------------------|--------------------|-------------------|--------------|-------------|-------------|--------------|-------------|----------------|----------------------------|----------------|----------|---------|--------------|-------|
| Northeast _{0.9x} 0.77 | x | 4.6 | 3 | x | 1 | 1.28 | x | 0. | .51 | X | 1.11 | | _ [| 20.38 | (75) |
| Northeast _{0.9x} 0.77 | x | 4.6 | 5 | X | 2 | 2.97 | x | 0. | .51 | X | 1.11 | | = | 41.49 | (75) |
| Northeast 0.9x 0.77 | x | 4.6 | 5 | X | 4 | 1.38 | x | 0. | .51 | X | 1.11 | | = | 74.75 | (75) |
| Northeast 0.9x 0.77 | x | 4.6 | 5 | X | 6 | 7.96 | x | 0. | .51 | i x | 1.11 | | = | 122.76 | (75) |
| Northeast 0.9x 0.77 | x | 4.6 | 5 | X | 9 | 1.35 | x | 0. | .51 | X | 1.11 | | - İ | 165.01 | (75) |
| Northeast 0.9x 0.77 | x | 4.6 | 5 | X | 9 | 7.38 | x | 0. | .51 | X | 1.11 | | = | 175.92 | (75) |
| Northeast 0.9x 0.77 | X | 4.6 | 5 | X | 9 | 91.1 | x | 0. | .51 | X | 1.11 | | = | 164.57 | (75) |
| Northeast 0.9x 0.77 | x | 4.6 | 5 | X | 7 | 2.63 | x | 0. | .51 | X | 1.11 | | - İ | 131.19 | (75) |
| Northeast 0.9x 0.77 | x | 4.6 | 5 | X | 5 | 0.42 | x | 0. | .51 | i x | 1.11 | | = | 91.08 | (75) |
| Northeast 0.9x 0.77 | X | 4.6 | 5 | X | 2 | 8.07 | x | 0. | .51 | X | 1.11 | | = | 50.7 | (75) |
| Northeast 0.9x 0.77 | X | 4.6 | 5 | X | | 14.2 | x | 0. | .51 | X | 1.11 | | = | 25.65 | (75) |
| Northeast _{0.9x} 0.77 | x | 4.6 | 5 | X | 9 | 9.21 | x | 0. | .51 | i x | 1.11 | | = | 16.64 | (75) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 3 | 6.79 | j | 0. | .51 | X | 1.11 | | = | 59.1 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 6 | 2.67 | ĺ | 0. | .51 | X | 1.11 | | = | 100.66 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 8 | 5.75 | j | 0. | .51 | X | 1.11 | | = | 137.73 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 10 | 06.25 | j | 0. | .51 | X | 1.11 | | = | 170.66 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 1 | 19.01 | ĺ | 0. | .51 | X | 1.11 | | = | 191.15 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 1 | 18.15 | į | 0. | .51 | X | 1.11 | | = | 189.77 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 1 | 13.91 | j | 0. | .51 | X | 1.11 | | = | 182.95 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 10 | 04.39 | j | 0. | .51 | X | 1.11 | | = | 167.67 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 9 | 2.85 | j | 0. | .51 | X | 1.11 | | = | 149.13 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 6 | 9.27 | j | 0. | .51 | X | 1.11 | | = | 111.25 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 4 | 4.07 | j | 0. | .51 | X | 1.11 | | = | 70.78 | (79) |
| Southwest _{0.9x} 0.77 | x | 4.0 | 9 | X | 3 | 1.49 | i | 0. | .51 | X | 1.11 | | = | 50.57 | (79) |
| | | | | | | | | | | | | | | | |
| Solar gains in watts, cald (83)m= 79.48 142.15 | culated 212.48 | for each 293.41 | n montl 356.16 | \neg | 65.68 | 347.52 | (83)m 298 | n = Sum | (74)m 40.21 | <mark>(82)</mark> 161.9 | | 67 | .22 | | (83) |
| Total gains – internal an | | | | | | | 290 | .00 2 | +0.21 | 101.8 | 3 90.43 | 1 67 | .22 | | (00) |
| | 624.31 | 680.56 | 718.32 | ~ | 05.26 | 673.77 | 63 | 1.8 58 | 87.23 | 533.8 | 3 495.91 | 487 | 7.32 | | (84) |
| , | | | | | 00.20 | 0.0 | | | | - | | | | | (- / |
| 7. Mean internal tempe | | | | | | ivana Tah | -l- 0 | Th4 / | ۰۵۱ | | | | ı | | 7(05) |
| Temperature during he | ٠. | | | · | | | ле э | , 1111 (| C) | | | | | 21 | (85) |
| Utilisation factor for gai | | | | Ť | | | | | Son | Oc | t Nov | , _ |)oc | | |
| Jan Feb | Mar 0.86 | Apr 0.77 | May 0.63 | + | Jun 0.48 | Jul 0.36 | 0.3 | | Sep | 0.8 | t Nov | + | 94 | | (86) |
| , , | ! | | | | | | | | | 0.0 | 0.9 | 0. | 94 | | (00) |
| Mean internal temperat | - 1 | | | | | i | 1 | | | 20.5 | - 1 00 04 | 1 4 | | | (07) |
| (87)m= 19.67 19.88 | 20.2 | 20.55 | 20.81 | | 20.94 | 20.98 | 20. | 98 2 | 0.89 | 20.5 | 5 20.04 | 18 | 9.6 | | (87) |
| Temperature during he | | | | _ | | | | | <u> </u> | | | | | l | |
| (88)m= 20.06 20.06 | 20.06 | 20.06 | 20.06 | 2 | 20.06 | 20.06 | 20. | 06 2 | 0.06 | 20.0 | 20.06 | 20 | .06 | | (88) |
| Utilisation factor for gai | ns for r | est of d | welling, | , h2 | ,m (se | e Table | 9a) | | | | | | | i | |
| (89)m= 0.92 0.89 | 0.84 | 0.73 | 0.59 | | 0.42 | 0.28 | 0.3 | 32 (| 0.53 | 0.76 | 0.89 | 0. | 93 | | (89) |
| | | | | | | | | | | | | | | | |

| Mean intern | al temper | ature in | the rest | of dwelli | ng T2 (f | ollow ste | eps 3 to 1 | 7 in Tabl | le 9c) | | | | |
|--|--|--|--|--|----------------------------|------------------------|--|---------------------------------------|---------------------------------------|--|--------------------------|------------------------------|--|
| (90)m= 18.32 | 18.62 | 19.05 | 19.53 | 19.86 | 20.01 | 20.05 | 20.05 | 19.96 | 19.54 | 18.85 | 18.22 | | (90) |
| | _ ! | | | | | | | f | LA = Livin | g area ÷ (4 | 4) = | 0.51 | (91) |
| Moon intorn | al tampar | oturo (fo | r tho wh | olo durol | lling) — f | I A 54 T4 | . /1 fl | ۸) ی. T2 | | | | | |
| Mean intern (92)m= 19.01 | 19.27 | 19.64 | 20.05 | 20.35 | 20.49 | 20.53 | + (1 – 1L 20.52 | 20.43 | 20.06 | 19.46 | 18.93 | | (92) |
| ` ' | | | | | | l | | | | 19.46 | 10.93 | | (32) |
| Apply adjust (93)m= 18.86 | 19.12 | 19.49 | 19.9 | 20.2 | 20.34 | 20.38 | 20.37 | 20.28 | · | 10.21 | 10.70 | | (93) |
| ` ' | | | | 20.2 | 20.34 | 20.38 | 20.37 | 20.28 | 19.91 | 19.31 | 18.78 | | (90) |
| 8. Space he | · | | | | | 44 6 | T | | . —: | 70) | | 1.4 | |
| Set Ti to the the utilisatio | | | • | | ed at st | ep 11 of | Table 9 | o, so tha | t II,m=(| 76)m an | d re-calc | ulate | |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| Utilisation fa | | | | iviay | Juli | 1 Jui | Aug | Оер | Oct | 1400 | Dec | | |
| (94)m= 0.91 | 0.88 | 0.82 | 0.73 | 0.59 | 0.44 | 0.31 | 0.34 | 0.54 | 0.76 | 0.87 | 0.92 | | (94) |
| Useful gains | | | | | 0.11 | 0.01 | 0.01 | 0.01 | 0.70 | 0.07 | 0.02 | | (0.7) |
| (95)m= 463.93 | 1 | 513.62 | 495.49 | 426.04 | 307.67 | 208.24 | 217.67 | 318.44 | 404.94 | 433.1 | 447.37 | | (95) |
| Monthly ave | | | | | | 200.24 | 217.07 | 310.44 | 404.54 | 400.1 | 447.57 | | (00) |
| (96)m= 4.3 | 4.9 | 6.5 | 8.9 | 11.7 | 14.6 | 16.6 | 16.4 | 14.1 | 10.6 | 7.1 | 4.2 | | (96) |
| | | | | | | | | | | /.1 | 4.2 | | (50) |
| Heat loss ra | 1 | 726.46 | 615.22 | 475.2 | 320.99 | 211.37 | 222.23 | 345.8 | 520.68 | 682.92 | 045 04 | | (97) |
| (97)m= 814.25 | | | | l . | | l | l | l | l | l | 815.24 | | (97) |
| Space heati | | | | | | 1 | | <u>`</u> | í - ` | r e | 070.7 | | |
| (98)m= 260.64 | 198.42 | 158.35 | 86.21 | 36.57 | 0 | 0 | 0 | 0 | 86.11 | 179.87 | 273.7 | | – 1 |
| | | | | | | | Tota | l per year | (kWh/yeaı | r) = Sum(9 | 8) _{15,912} = | 1279.88 | (98) |
| Space heati | ng requir | ement in | kWh/m² | ²/year | | | | | | | | 23.55 | (99) |
| 9a. Energy re | | | | | | | | | | | | | |
| | auiremer | nts – Indi | vidual h | eating sv | vstems i | including | micro-C | CHP) | | | | | |
| Space heat | | nts – Indi | vidual h | eating sy | ystems i | including | micro-C | CHP) | | | | | |
| Space heat Fraction of s | ing: | | | | | | | CHP) | | | | 0 | (201) |
| Fraction of s | ing: space hea | at from se | econdar | y/supple | | | | , | | | | | = ' ' |
| Fraction of s | ing: space hea space hea | at from so at from m | econdar nain syst | y/supple em(s) | | system | (202) = 1 | - (201) = | (203)] - | | | 1 | (202) |
| Fraction of s Fraction of s Fraction of t | ing: space hea space hea otal heati | at from so at from m | econdar nain syst main sys | y/supple em(s) stem 1 | | system | | - (201) = | (203)] = | | | 1 | (202) |
| Fraction of s | ing: space hea space hea otal heati | at from so at from m | econdar nain syst main sys | y/supple em(s) stem 1 | | system | (202) = 1 | - (201) = | (203)] = | | | 1 | (202) |
| Fraction of s Fraction of s Fraction of t | ing: space hea space hea otal heati main spa | at from se at from m ng from l ace heati | econdar nain syst main sys ing syste | y/supple em(s) stem 1 em 1 | mentary | system | (202) = 1 | - (201) = | (203)] = | | | 1 | (202) |
| Fraction of s Fraction of s Fraction of t Efficiency of | ing: space hea space hea otal heati main spa | at from se at from m ng from l ace heati | econdar nain syst main sys ing syste ementar | y/supple em(s) stem 1 em 1 y heating | mentary | system | (202) = 1 · (204) = (2 | - (201) = 02) × [1 - | (203)] = | Nov | Dec | 1 1 100 0 | (202) (204) (206) (208) |
| Fraction of s Fraction of s Fraction of t Efficiency of Efficiency of Jan | ing: space hea space hea otal heati main spa seconda | at from so at from m ng from d ace heati ary/supplo Mar | econdar nain syst main sys ing syste ementar Apr | y/supple em(s) stem 1 em 1 y heatino | mentary g systen Jun | v system | (202) = 1 | - (201) = | • | Nov | Dec | 1 1 100 | (202) (204) (206) (208) |
| Fraction of s Fraction of s Fraction of t Efficiency of | ing: space hea space hea otal heati main spa seconda Feb ng require | at from so at from m ng from d ace heati ary/supplo Mar | econdar nain syst main sys ing syste ementar Apr | y/supple em(s) stem 1 em 1 y heatino | mentary g systen Jun | v system | (202) = 1 · (204) = (2 | - (201) = 02) × [1 - | • | Nov 179.87 | Dec 273.7 | 1 1 100 0 | (202) (204) (206) (208) |
| Fraction of s Fraction of s Fraction of s Fraction of t Efficiency of Efficiency of Jan Space heati | ing: space hea space hea otal heati main spa seconda Feb ng require 198.42 | at from set from many from the control of the contr | econdar nain systemain systementar Apr alculater | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | mentary g systen Jun | v system | (202) = 1 · (204) = (2 | - (201) = 02) × [1 - | Oct | | | 1 1 100 0 | (202) (204) (206) (208) ear |
| Fraction of s Fraction of s Fraction of s Fraction of t Efficiency of Efficiency of Jan Space heati 260.64 (211)m = {[(9 | ing: space hea space hea otal heati main spa seconda Feb ng require 198.42 8)m x (20 | at from set from many from the ace heating ry/supplement (colors as 158.35 | econdar nain systemain systematic ing systementar Apr Apr alculate 86.21 00 ÷ (20 | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | g systen Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug | - (201) = 02) × [1 - Sep | Oct 86.11 | 179.87 | 273.7 | 1 1 100 0 | (202) (204) (206) (208) |
| Fraction of s Fraction of s Fraction of s Fraction of t Efficiency of Efficiency of Jan Space heati | ing: space hea space hea otal heati main spa seconda Feb ng require 198.42 8)m x (20 | at from set from many from the control of the contr | econdar nain systemain systementar Apr alculater | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | mentary g systen Jun | v system | (202) = 1 · (204) = (2 Aug | - (201) = 02) × [1 - Sep 0 | Oct 86.11 | 179.87 | 273.7 | 1 1 100 0 kWh/ye | (202) (204) (206) (208) (208) (211) |
| Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s | ing: space hea space hea otal heati main spa seconda Feb ng require 1 198.42 8)m x (20 | at from set from many from the ace heating many supplement (constant) and the ace heating many supplement (constant) an | econdary nain systemain systematar Apr alculate 86.21 00 ÷ (20 86.21 | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | g systen Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug | - (201) = 02) × [1 - Sep | Oct 86.11 | 179.87 | 273.7 | 1 1 100 0 | (202) (204) (206) (208) ear |
| Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Efficiency of Jan Space heati 260.64 (211)m = {[(9) 260.64 | ing: space hea space hea otal heati main spa seconda Feb ng require 198.42 8)m x (20 198.42 ng fuel (s | at from set from ming from mace heating mar lement (compared to 158.35 lecondary | econdary nain systemain systementar Apr alculate 86.21 00 ÷ (20 86.21 | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | g systen Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug | - (201) = 02) × [1 - Sep 0 | Oct 86.11 | 179.87 | 273.7 | 1 1 100 0 kWh/ye | (202) (204) (206) (208) (208) (211) |
| Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of | ing: space heating the part of | at from set from ming from mace heating mar lement (continued from 158.35) 14)] } x 1 158.35 econdary 00 ÷ (20) | econdary nain systemain systematar Apr alculate 86.21 00 ÷ (20 86.21 y), kWh/ 8) | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | g systen Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug 0 | - (201) = 02) × [1 - Sep 0 | Oct 86.11 86.11 ar) =Sum(2 | 179.87 179.87 211) _{15,1012} | 273.7 | 1 1 100 0 kWh/ye | (202) (204) (206) (208) (208) (211) |
| Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Efficiency of Jan Space heati 260.64 (211)m = {[(9) 260.64 | ing: space hea space hea otal heati main spa seconda Feb ng require 198.42 8)m x (20 198.42 ng fuel (s | at from set from ming from mace heating mar lement (compared to 158.35 lecondary | econdary nain systemain systementar Apr alculate 86.21 00 ÷ (20 86.21 | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | g systen Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug 0 Tota | - (201) = 02) × [1 - Sep 0 I (kWh/yea | 86.11 86.11 ar) =Sum(2 | 179.87 179.87 211) _{15,1012} | 273.7 273.7 = | 1 100 0 kWh/ye | (202) (204) (206) (208) (208) (211) |
| Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of | ing: space heater the s | at from set from ming from mace heating mar lement (continued from 158.35) 14)] } x 1 158.35 econdary 00 ÷ (20) | econdary nain systemain systematar Apr alculate 86.21 00 ÷ (20 86.21 y), kWh/ 8) | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | g systen Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug 0 Tota | - (201) = 02) × [1 - Sep 0 | 86.11 86.11 ar) =Sum(2 | 179.87 179.87 211) _{15,1012} | 273.7 273.7 = | 1 1 100 0 kWh/ye | (202) (204) (206) (208) (208) (211) |
| Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of | ing: space heat space heat otal heati main spa seconda Feb ng require 1 198.42 8)m x (20 1 198.42 ng fuel (second)] } x 1 | at from set from ming from mace heating mar lement (continued from 158.35) 14)] } x 1 158.35 econdary 00 ÷ (20) | econdary nain systemain systematar Apr alculate 86.21 00 ÷ (20 86.21 y), kWh/ 8) | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 | g systen Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug 0 Tota | - (201) = 02) × [1 - Sep 0 I (kWh/yea | 86.11 86.11 ar) =Sum(2 | 179.87 179.87 211) _{15,1012} | 273.7 273.7 = | 1 100 0 kWh/ye | (202) (204) (206) (208) (208) (211) |
| Fraction of s Fr | ing: space heater space heater | at from set from ming from mace heating mar lement (c 158.35 lecondar 00 ÷ (20 lecondar condar econdary nain systemain systematra Apr Alculate 86.21 00 ÷ (20 86.21 y), kWh/ 8) 0 | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 month 0 | g system Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug 0 Tota Tota | - (201) = 02) × [1 - Sep 0 I (kWh/yea | Oct 86.11 86.11 out 0 ar) =Sum(2 | 179.87 179.87 211) _{15,1012} 0 | 273.7 273.7 = 0 | 1 100 0 kWh/ye | (202) (204) (206) (208) (208) (211) |
| Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Fraction of s Jan Space heati 260.62 (211)m = {[(9) 260.62 Space heati = {[(98)m x (2) (215)m= 0 Water heatin Output from s 139.62 | ing: space heat space heat otal heati main spa seconda Feb ng require 1 198.42 8)m x (20 1 198.42 ng fuel (second)] } x 1 0 ng water heat 2 122.49 | at from so at from m ng from m ace heati ry/supplo Mar ement (c 158.35 04)] } x 1 158.35 econdar; 00 ÷ (20 0 | econdary nain systemain systematra Apr alculater 86.21 00 ÷ (20 86.21 y), kWh/8) 0 | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 06) 36.57 | g systen Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug 0 Tota | - (201) = 02) × [1 - Sep 0 I (kWh/yea | 86.11 86.11 ar) =Sum(2 | 179.87 179.87 211) _{15,1012} | 273.7 273.7 = | 1 100 0 kWh/ye | (202) (204) (206) (208) (211) (211) |
| Fraction of s Fr | ing: space heat space heat otal heati main spa seconda Feb ng require 1 198.42 8)m x (20 1 198.42 ng fuel (second)] } x 1 0 ng water heat 2 122.49 | at from so at from m ng from m ace heati ry/supplo Mar ement (c 158.35 04)] } x 1 158.35 econdar; 00 ÷ (20 0 | econdary nain systemain systematra Apr Alculate 86.21 00 ÷ (20 86.21 y), kWh/ 8) 0 | y/supple em(s) stem 1 em 1 y heating May d above) 36.57 month 0 | g system Jun 0 | y system n, % Jul 0 | (202) = 1 · (204) = (2 Aug 0 Tota Tota | - (201) = 02) × [1 - Sep 0 I (kWh/yea | Oct 86.11 86.11 out 0 ar) =Sum(2 | 179.87 179.87 211) _{15,1012} 0 | 273.7 273.7 = 0 | 1 100 0 kWh/ye | (202) (204) (206) (208) ear (211) |

| | | | | | | | | | | | - | |
|---|--------------|-----------|------------|-------------------|----------------------|------------|-----------|------------------|------------------|-------------------|-------------------------|---------------|
| (217)m= 100 100 | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | | (217) |
| Fuel for water heati $(219)m = (64)m \times 10^{-10}$ | | | | | | | | | | | | |
| (219)m= 139.62 122. | | 112.28 | 108.69 | 95.19 | 89.59 | 100.83 | 101.45 | 116.52 | 125.53 | 135.63 |] | _ |
| | | | | | | Tota | I = Sum(2 | | | | 1375.13 | (219) |
| Annual totals Space heating fuel | ucod main | cyctom | 1 | | | | | k' | Wh/yea | r | kWh/year 1279.88 | 7 |
| | | System | 1 | | | | | | | | | <u></u> |
| Water heating fuel under the Electricity for pumps | | electric | keep-ho | t | | | | | | | 1375.13 | |
| mechanical ventila | | | • | | nnut fror | n outside | 2 | | | 39.63 | 1 | (230a) |
| central heating pur | | ioou, oxi | raot or p | | iipat iioi | ii odioidi | | | | 30 |] | (230c) |
| Total electricity for t | · | k\\/b/voo | r | | | SIIM | of (230a) | (230g) = | | 30 | [60.63 | (231) |
| · | • | KVVII/yea | l i | | | Juli | 01 (2004) | (200g) – | | | 69.63 | |
| Electricity for lightin | _ | | | | | | | | | | 260.35 | (232) |
| Electricity generate | | | | | | | | | | | -1006.53 | (233) |
| 10a. Fuel costs - ir | idividual he | eating sy | stems: | | | | | | | | | |
| | | | | Fu kW | el /h/year | | | Fuel P (Table | | | Fuel Cost £/year | |
| Space heating - ma | in system 1 | 1 | | | 1) x | | | 13. | 19 | x 0.01 = | 168.82 | (240) |
| Space heating - ma | in system 2 | 2 | | (21 | 3) x | | | 0 | | x 0.01 = | 0 |] (241) |
| Space heating - sec | condary | | | (21 | 5) x | | | 13. | 19 | x 0.01 = | 0 | (242) |
| Water heating cost | (other fuel) | | | (219 | 9) | | | 13. | 19 | x 0.01 = | 181.38 | (247) |
| Pumps, fans and el | ectric keep | -hot | | (23 | 1) | | | 13. | 19 | x 0.01 = | 9.18 | (249) |
| (if off-peak tariff, list Energy for lighting | each of (2 | 30a) to (| 230g) se | eparately (23) | • • | licable a | nd apply | | | rding to x 0.01 = | |] (250) |
| Additional standing | charges (T | ahla 12\ | | (20. | -, | | | 13. | 19 | | 34.34 | |
| Additional standing | charges (1 | able 12) | | | | | | | | | 0 | (251) |
| | | | | one | of (233) to | o (235) x) | | 13. | 19 | x 0.01 = | 0 | (252) |
| Appendix Q items: | • | s (253) a | , , | | | | | | | | | 7, |
| Total energy co | | aating a | | (247) + (25 | 50)(254) | = | | | | | 393.72 | (255) |
| 11a. SAP rating - i | Hulvidual H | ealing sy | /stems | | | | | | | | | |
| Energy cost deflato | |) | | | | | | | | | 0.42 | (256) |
| Energy cost factor (| • | | [(255) x | (256)] ÷ [(| (4) + 45.0] | = | | | | | 1.66 | (257) |
| SAP rating (Section | | | | | | | | | | | 76.78 | (258) |
| 12a. CO2 emission | ns — Individ | lual heat | ing syste | ems inclu | uding mi | cro-CHF |) | | | | | |
| | | | | | ergy /h/year | | | Emiss kg CO | ion fac 2/kWh | tor | Emissions kg CO2/yea | |
| Space heating (mai | n system 1 |) | | (21 | 1) x | | | 0.5 | 19 | = | 664.26 | (261) |
| Space heating (sec | ondary) | | | (21 | 5) x | | | 0.5 | 19 | = | 0 | (263) |
| , 3 (3.3.3 | , | | | | | | | | | | | 」 ` ⁻′ |

| Water heating | (219) x | 0.519 | = | 713.69 | (264) |
|---|---------------------------------|-------------------|---|---------|-------|
| Space and water heating | (261) + (262) + (263) + (264) = | | | 1377.95 | (265) |
| Electricity for pumps, fans and electric keep-hot | (231) x | 0.519 | = | 36.14 | (267) |
| Electricity for lighting | (232) x | 0.519 | = | 135.12 | (268) |
| Energy saving/generation technologies Item 1 | | 0.519 | = | -522.39 | (269) |
| Total CO2, kg/year | sum | n of (265)(271) = | | 1026.82 | (272) |
| CO2 emissions per m² | (272 | 2) ÷ (4) = | | 18.9 | (273) |
| El rating (section 14) | | | | 86 | (274) |

13a. Primary Energy

| | Energy kWh/year | Primary factor | | P. Energy kWh/year | |
|---|---------------------------------|-----------------|---|------------------------------|-------|
| Space heating (main system 1) | (211) x | 3.07 | = | 3929.24 | (261) |
| Space heating (secondary) | (215) x | 3.07 | = | 0 | (263) |
| Energy for water heating | (219) x | 3.07 | = | 4221.64 | (264) |
| Space and water heating | (261) + (262) + (263) + (264) = | | | 8150.89 | (265) |
| Electricity for pumps, fans and electric keep-hot | (231) x | 3.07 | = | 213.76 | (267) |
| Electricity for lighting | (232) x | 0 | = | 799.26 | (268) |
| Energy saving/generation technologies | | | | | |
| Item 1 | | 3.07 | = | -3090.06 | (269) |
| 'Total Primary Energy | sum | of (265)(271) = | | 6073.84 | (272) |
| Primary energy kWh/m²/year | (272 | 2) ÷ (4) = | | 111.77 | (273) |

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.4.16 Printed on 10 October 2018 at 11:31:28

Project Information:

Assessed By: Carlos Melgar (STRO031596) **Building Type:** Semi-detached Flat

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 76.95m² **Plot Reference:** Site Reference : Kings Mews Be Green **Plot 005**

5, 10-11 Kings Mews, WC1N 2ES Address:

Client Details:

Name: James Taylor

Address:

This report covers items included within the SAP calculations.

It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity

Fuel factor: 1.55 (electricity)

Target Carbon Dioxide Emission Rate (TER) 28.95 kg/m²

Dwelling Carbon Dioxide Emission Rate (DER) 22.46 kg/m² OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE) 61.5 kWh/m²

Dwelling Fabric Energy Efficiency (DFEE) 46.0 kWh/m²

OK 2 Fabric U-values

Element Average

Highest External wall 0.15 (max. 0.30) 0.16 (max. 0.70) OK Party wall 0.00 (max. 0.20) **OK** Floor 0.14 (max. 0.25) 0.14 (max. 0.70) OK Roof 0.16 (max. 0.20) 0.16 (max. 0.35) OK **Openings** 1.37 (max. 2.00) 1.40 (max. 3.30) OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

Air permeability at 50 pascals 2.50 (design value)

Maximum **OK** 10.0

4 Heating efficiency

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

Direct acting electric boiler

Secondary heating system: None

5 Cylinder insulation

Measured cylinder loss: 0.80 kWh/day Hot water Storage:

> Permitted by DBSCG: 1.03 kWh/day OK

Primary pipework insulated: Yes **OK**

Regulations Compliance Report

|) and the land | | | |
|---------------------------------|------------------------|-----------------------------|----|
| controls | | | |
| Space heating controls | TTZC by plumbing and e | lectrical services | ОК |
| Hot water controls: | Cylinderstat | ectifical services | OK |
| ow energy lights | - Cymraorolac | | |
| Percentage of fixed lights with | low-energy fittings | 100.0% | |
| Minimum | | 75.0% | ОК |
| lechanical ventilation | | | |
| Continuous extract system (de | ecentralised) | | |
| Specific fan power: | , | 0.19 0.18 | |
| Maximum | | 0.7 | ок |
| ummertime temperature | | | |
| Overheating risk (Thames val | ley): | Medium | ок |
| ed on: | | | |
| Overshading: | | Average or unknown | |
| Windows facing: South West | | 7.64m² | |
| Windows facing: North East | | 0.9m² | |
| Windows facing: North East | | 12.39m² | |
| Ventilation rate: | | 6.00 | |
| | | Closed 0% of daylight hours | |
| Key features | | | |
| Air permeablility | | 2.5 m³/m²h | |
| Doors U-value | | 1.09 W/m²K | |
| Party Walls U-value | | 0 W/m²K | |
| Photovoltaic array | | | |

Predicted Energy Assessment



5 10-11 Kings Mews WC1N 2ES

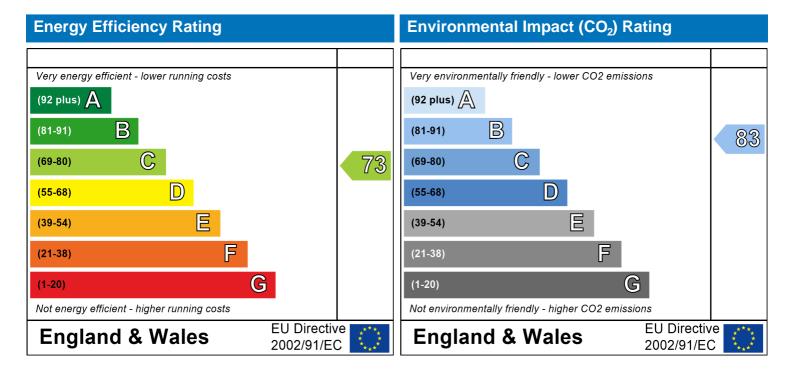
Dwelling type:
Date of assessment:
Produced by:
Total floor area:

Semi-detached Top floor Flat 19 July 2018 Carlos Melgar

76.95 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 carbonn dioxide (CO2) emissions. The higher the rating the less impact it has on the environment.

| | | | l loor D |) otoilo: | | | | | | |
|--|---------------------------------|--------------------|--------------|-------------------------|-------------|--------------|----------|-----------|-------------------------|------|
| Assessor Name: Software Name: | Carlos Melgar Stroma FSAP 20 | 12 | User D | Strom Softwa | | | | | 0031596 on: 1.0.4.16 | |
| A dalage - | 5, 10-11 Kings Mev | | | Address | Plot 00 | 5 | | | | |
| Address: 1. Overall dwelling dim | | vs, vvc ii | N 2E3 | | | | | | | |
| 1. Overall awelling aim | C11310113. | | Δτο | a(m²) | | Δν Ηρ | ight(m) | | Volume(m ³ | 3) |
| Ground floor | | | | | (1a) x | | 26 | (2a) = | 173.91 | (3a) |
| Total floor area TFA = (| 1a)+(1b)+(1c)+(1d)+(1 | e)+(1r | n) 7 | 76.95 | (4) | | | | | |
| Dwelling volume | | | | | (3a)+(3b) |)+(3c)+(3c | d)+(3e)+ | .(3n) = | 173.91 | (5) |
| 2. Ventilation rate: | | | | | | | | | | |
| No contract of this contract | heating | econdar heating | · | other | , | total | | 10 – | m³ per hou | _ |
| Number of chimneys | 0 + | 0 | _ | 0 | <u> </u> | 0 | | 40 = | 0 | (6a) |
| Number of open flues | 0 + | 0 | _] + | 0 |] = [| 0 | x 2 | 20 = | 0 | (6b) |
| Number of intermittent fa | ans | | | | | 0 | X · | 10 = | 0 | (7a) |
| Number of passive vents | S | | | | Γ | 0 | χ. | 10 = | 0 | (7b) |
| Number of flueless gas | fires | | | | | 0 | x 4 | 40 = | 0 | (7c) |
| | | | | | _ | | | | | |
| | | | | | | | | Air ch | nanges per ho | our |
| Infiltration due to chimne | eys, flues and fans = (| 6a)+(6b)+(7 | 'a)+(7b)+(| 7c) = | | 0 | | ÷ (5) = | 0 | (8) |
| | been carried out or is intend | led, procee | d to (17), (| otherwise (| ontinue fr | om (9) to | (16) | | | _ |
| Number of storeys in the Additional infiltration | the dwelling (ns) | | | | | | [(0) | 41.04 | 0 | (9) |
| | 0.25 for steel or timber | frame or | 0.35 fo | r macanı | v constr | uction | [(9) | -1]x0.1 = | 0 | (10) |
| if both types of wall are p | present, use the value corre | | | | • | uction | | | 0 | (11) |
| deducting areas of open | • / . | مامط/ مد 0 | 1 (200) | مما مامم | antar A | | | | _ | 7,40 |
| If no draught lobby, er | floor, enter 0.2 (unsea | ilea) or 0. | . i (seale | ea), eise | enter 0 | | | | 0 | (12) |
| • | vs and doors draught s | tripped | | | | | | | 0 | (13) |
| Window infiltration | vo ana adoro araagini e | шррса | | 0.25 - [0.2 | x (14) ÷ 1 | 00] = | | | 0 | (15) |
| Infiltration rate | | | | (8) + (10) | + (11) + (1 | 2) + (13) | + (15) = | | 0 | (16) |
| Air permeability value | , q50, expressed in cu | bic metre | s per ho | our per s | quare m | etre of e | envelope | area | 2.5 | (17) |
| If based on air permeab | ility value, then (18) = [(| 17) ÷ 20]+(8 | B), otherw | ise (18) = (| 16) | | | | 0.12 | (18) |
| | ies if a pressurisation test ha | as been don | ne or a de | gree air pe | rmeability | is being u | sed | | | _ |
| Number of sides shelter Shelter factor | ed | | | (20) = 1 - | 'n 075 v (1 | Q\1 – | | | 2 | (19) |
| Infiltration rate incorpora | ating shelter factor | | | (23) = 1 (21) = (18) | | 0/] = | | | 0.85 | (20) |
| Infiltration rate modified | _ | d | | (21) = (10) | / X (20) = | | | | 0.11 | (21) |
| Jan Feb | Mar Apr May | 1 | Jul | Aug | Sep | Oct | Nov | Dec | 1 | |
| | 1 . 1 | Journ | Jul | Aug | ОСР | 001 | 1404 | Dec | | |
| Monthly average wind s (22)m= 5.1 5 | 4.9 4.4 4.3 | 3.8 | 3.8 | 3.7 | 4 | 4.3 | 4.5 | 4.7 | 1 | |
| (/ | | 1 5.5 | L | L | · · | L | L | L | J | |
| Wind Factor (22a)m = (2 | 22)m ÷ 4 | | | | | | | | | |
| (22a)m= 1.27 1.25 | 1.23 1.1 1.08 | 0.95 | 0.95 | 0.92 | 1 | 1.08 | 1.12 | 1.18 | | |

| Adjusted infiltration | ate (allow | ing for sh | nelter an | nd wind s | speed) = | : (21a) x | (22a)m | | | | | |
|--|-------------------------------|----------------------------|---------------|----------------|--|--------------------------|----------------|--|--|--|---------------|--------------------|
| 0.14 0.13 | 0.13 | 0.12 | 0.11 | 0.1 | 0.1 | 0.1 | 0.11 | 0.11 | 0.12 | 0.12 |] | |
| Calculate effective a | • | rate for t | he appli | icable ca | se | • | | • | • | | | |
| If mechanical ven | | andiu N. (O | ah) (00. | -\ . | t ² (| NIT\\ atla | | .) (00-) | | | 0.5 | (23a) |
| If exhaust air heat pun | | | , , | , | . ` | ,, . | , |)) = (23a) | | | 0.5 | (23b) |
| If balanced with heat r | - | - | _ | | | | | | | | 0 | (23c) |
| a) If balanced me | | 1 | | 1 | - | - ^ ` ` | í ` | , | ` | ```` |) ÷ 100] 1 | (0.4=) |
| (24a)m= 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |] | (24a) |
| b) If balanced me | | | | | | - ^ ` ` | í ` | - | - | | 1 | (0.41-) |
| (24b)m= 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |] | (24b) |
| c) If whole house | | | • | • | | | | E v (22k | ٠١ | | | |
| if $(22b)m < 0.5$ | 0.5 | 0.5 | (231) = (231) | 0.5 | 0.5 | $\frac{100}{0.5}$ | 0.5 | 0.5 | 0.5 | 0.5 | 1 | (24c) |
| ` ′ | ! | ļ | | <u> </u> | ļ | <u>Į</u> | <u> </u> | 0.5 | 0.5 | 0.5 |] | (240) |
| d) If natural ventila if (22b)m = 1, | | | • | • | | | | 0.5] | | | _ | |
| (24d)m = 0 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (24d) |
| Effective air chang | je rate - er | nter (24a |) or (24h | b) or (24 | c) or (24 | ld) in bo | x (25) | | | | | |
| (25)m= 0.5 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |] | (25) |
| 3. Heat losses and | heat loss | paramete | er: | | | | | | | | | |
| ELEMENT G | ross ea (m²) | Openin m | gs | Net Ar A ,r | | U-val W/m2 | | A X U (W/ | | k-value kJ/m²- | | X k J/K |
| Doors | | | | 2.1 | x | 1.09 | = | 2.289 | Ť | | | (26) |
| Windows Type 1 | | | | 7.64 | x1 | /[1/(1.4)+ | 0.04] = | 10.13 | | | | (27) |
| Windows Type 2 | | | | 0.9 | x1 | /[1/(1.4) + | - 0.04] = | 1.19 | | | | (27) |
| Windows Type 3 | | | | 12.39 |) x1 | /[1/(1.4) | - 0.04] = | 16.43 | | | | (27) |
| Floor | | | | 2.37 | X | 0.14 | | 0.3318 | | 75 | 177.7 | ^{'5} (28) |
| Walls Type1 | 6.68 | 20.93 | 3 | 45.75 | x | 0.16 | | 7.32 | = | 49.5 | 2264.6 | 63 (29) |
| \\\-\\\-\\\-\\\-\\\\-\\\\-\\\\-\\\\\-\\\\ | 3.62 | 2.1 | | 31.52 | | 0.14 | | 4.46 | - | 49.5 | 1560.2 | = |
| | 6.95 | 0 | = | | _ | | | 12.31 | | 9 | 692.5 | = ` ′ |
| Total area of elemen | | | | 76.95 | = | 0.16 | | 12.31 | | 9 | 092.3 | '` |
| | 113, 111 | | | 179.6 | | | | | | | | (31) |
| Party floor | | | | 24.54 | = | 0 | = | 0 | | 49.5 | 1214.7 | = ` ` |
| Party floor | | | | 74.58 | = | | | | | 40 | 2983. | = ` |
| Internal wall ** | | · · · · | | 98.92 | | | 4/5/4/11 | \ 0.047 | . l | 9 | 890.2 | (32c) |
| * for windows and roof w. ** include the areas on b | | | | | atea usin | g rormula 1 | 1/[(1/U-vait | ie)+0.04j a | as given in | ı paragrapı | 1 3.2 | |
| Fabric heat loss, W/ | K = S (A x) | U) | | | | (26)(30 |) + (32) = | | | | 54.46 | (33) |
| Heat capacity Cm = | S(A x k) | | | | | | ((28). | (30) + (3 | 2) + (32a) | (32e) = | 9783.38 | (34) |
| | | | - TFΔ) ir | n k.l/m²K | | | = (34) | ÷ (4) = | | | 127.14 | (35) |
| Thermal mass parar | neter (TMI | $P = Cm \div$ | | 1 10/111 1 | | | | | | | | |
| Thermal mass parar For design assessments can be used instead of a | where the de | etails of the | , | | | recisely the | e indicative | e values of | TMP in T | able 1f | | |
| For design assessments | where the de detailed calc | etails of the culation. | construct | tion are no | t known p | recisely the | e indicative | e values of | f TMP in T | able 1f | 10.49 | (36) |

| Total fabric heat loss | | | | (22) | (26) | | 1 | | — (07) |
|--|-------------------|---------------------|-------------|--------------|----------------------------|------------------------|---------|---------|---------------|
| Ventilation heat loss calculated monthl | lv. | | | | $(36) =$ $= 0.33 \times ($ | (25)m v (5) | | 64.94 | (37) |
| | . | lul au | T Aug | | | 1 | Dec | | |
| Jan Feb Mar Apr (38)m= 28.69 28.69 28.69 28.69 | 28.69 28 | un Jul .69 28.69 | 28.69 | Sep 28.69 | Oct 28.69 | Nov 28.69 | 28.69 | | (38) |
| Heat transfer coefficient, W/K | 1 20:00 20 | | | <u> </u> | = (37) + (37) | <u> </u> | 20.00 | | , |
| (39)m= 93.64 93.64 93.64 93.64 | 93.64 93 | .64 93.64 | 93.64 | 93.64 | 93.64 | 93.64 | 93.64 | | |
| | | | 1 | | L Average = | | | 93.64 | (39) |
| Heat loss parameter (HLP), W/m²K | | | _ | (40)m | = (39)m ÷ | (4) | | | |
| (40)m= 1.22 1.22 1.22 1.22 | 1.22 1.3 | 22 1.22 | 1.22 | 1.22 | 1.22 | 1.22 | 1.22 | | _ |
| Number of days in month (Table 1a) | | | | | Average = | Sum(40) ₁ | 12 /12= | 1.22 | (40) |
| Jan Feb Mar Apr | May J | un Jul | Aug | Sep | Oct | Nov | Dec | | |
| (41)m= 31 28 31 30 | 31 3 | 0 31 | 31 | 30 | 31 | 30 | 31 | | (41) |
| | | • | | | | | | ' | |
| 4. Water heating energy requirement: | | | | | | | kWh/ye | ear: | |
| Account of a company of the | | | | | | | | 1 | (10) |
| Assumed occupancy, N if TFA > 13.9, N = 1 + 1.76 x [1 - exp | o(-0.000349 > | (TFA -13. | 9)2)] + 0.0 | 0013 x (| TFA -13. | | .4 | | (42) |
| if TFA £ 13.9, N = 1 | ` | • | , ,- | | | | | | |
| Annual average hot water usage in litro Reduce the annual average hot water usage by | | | ` , | | se target o | | .26 | | (43) |
| not more that 125 litres per person per day (all v | | • | no acmeve | a water at | sc larger o | 1 | | | |
| Jan Feb Mar Apr | May J | un Jul | Aug | Sep | Oct | Nov | Dec | | |
| Hot water usage in litres per day for each month | | | | <u> </u> | | 1,101 | | | |
| (44)m= 100.38 96.73 93.08 89.43 | 85.78 82 | .13 82.13 | 85.78 | 89.43 | 93.08 | 96.73 | 100.38 | | |
| | | | | | Total = Su | m(44) ₁₁₂ = | = | 1095.1 | (44) |
| Energy content of hot water used - calculated m | onthly = 4.190 x | Vd,m x nm x | DTm / 3600 |) kWh/mor | nth (see Ta | ables 1b, 1 | c, 1d) | 1 | |
| (45)m= 148.87 130.2 134.35 117.13 | 112.39 96 | .99 89.87 | 103.13 | 104.36 | 121.62 | 132.76 | 144.17 | | _ |
| If instantaneous water heating at point of use (n | o hot water stora | age), enter 0 i | n boxes (46 | | Total = Su | m(45) ₁₁₂ = | = | 1435.84 | (45) |
| (46)m= 22.33 19.53 20.15 17.57 | | .55 13.48 | 15.47 | 15.65 | 18.24 | 19.91 | 21.63 | | (46) |
| Water storage loss: | 10.00 | 10.40 | 10.47 | 10.00 | 10.24 | 10.01 | 21.00 | | (12) |
| Storage volume (litres) including any s | olar or WWH | RS storage | within sa | ame ves | sel | | 50 | | (47) |
| If community heating and no tank in dv | velling, enter | 110 litres i | n (47) | | | | | | |
| Otherwise if no stored hot water (this in | ncludes insta | ntaneous c | ombi boil | ers) ente | er '0' in (| 47) | | | |
| Water storage loss: | or io known (| Id Mb /day dy | | | | | _ | 1 | (40) |
| a) If manufacturer's declared loss fact | OI IS KIIOWII (| Kvvii/day). | | | | | .8 | | (48) |
| Temperature factor from Table 2b | oor | | (49) v (40 | \ _ | | | 54 | | (49) |
| Energy lost from water storage, kWh/y b) If manufacturer's declared cylinder | | not known | (48) x (49 |) = | | 0. | 43 | | (50) |
| Hot water storage loss factor from Tab | | | - | | | | 0 | | (51) |
| If community heating see section 4.3 | | | | | | | | l | |
| Volume factor from Table 2a | | | | | | | 0 | | (52) |
| Temperature factor from Table 2b | | | | | | | 0 | | (53) |
| Energy lost from water storage, kWh/y | ear | | (47) x (51 |) x (52) x (| 53) = | | 0 | | (54) |
| Enter (50) or (54) in (55) | | | | | | 0. | 43 | | (55) |
| | | | | | | | | | |

| Water storag | e loss cal | culated f | for each | month | | | ((56)m = (| 55) × (41) | m | | | | |
|--|--|--|--|--|---|--|---|---|---|--|---------------------------------|---------------|--------------------------------------|
| (56)m= 13.39 | 12.1 | 13.39 | 12.96 | 13.39 | 12.96 | 13.39 | 13.39 | 12.96 | 13.39 | 12.96 | 13.39 | | (56) |
| If cylinder contai | ns dedicate | d solar sto | rage, (57)ı | m = (56)m | x [(50) – (| H11)] ÷ (5 | 0), else (5 | 7)m = (56) | m where (| H11) is fro | m Append | ix H | |
| (57)m= 13.39 | 12.1 | 13.39 | 12.96 | 13.39 | 12.96 | 13.39 | 13.39 | 12.96 | 13.39 | 12.96 | 13.39 | | (57) |
| Primary circu | it loss (ar | nnual) fro | m Table | e 3 | | | | | | | 0 | | (58) |
| Primary circu | , | , | | | 59)m = (| (58) ÷ 36 | 65 × (41) | m | | | | • | |
| (modified b | y factor f | rom Tab | le H5 if t | here is s | solar wat | ter heatir | ng and a | cylinde | r thermo | stat) | | | |
| (59)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (59) |
| Combi loss c | alculated | for each | month (| (61)m = | (60) ÷ 36 | 65 × (41) |)m | | _ | _ | | | |
| (61)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (61) |
| Total heat red | quired for | water he | eating ca | alculated | for eacl | h month | (62)m = | 0.85 × (| (45)m + | (46)m + | (57)m + | (59)m + (61)m | |
| (62)m= 162.26 | 142.3 | 147.75 | 130.09 | 125.78 | 109.95 | 103.26 | 116.52 | 117.32 | 135.01 | 145.72 | 157.56 | | (62) |
| Solar DHW inpu | calculated | using App | endix G oı | Appendix | H (negati | ve quantity | /) (enter '0 | if no sola | r contribut | ion to wate | er heating) | • | |
| (add addition | al lines if | FGHRS | and/or \ | WWHRS | applies | , see Ap | pendix (| €) | | | | | |
| (63)m= 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | (63) |
| Output from v | vater hea | iter | - | - | - | | - | | - | - | | | |
| (64)m= 162.26 | 142.3 | 147.75 | 130.09 | 125.78 | 109.95 | 103.26 | 116.52 | 117.32 | 135.01 | 145.72 | 157.56 | | |
| | • | • | | • | | | Outp | out from wa | ater heate | r (annual) ₁ | 12 | 1593.52 | (64) |
| Heat gains from | om water | heating, | kWh/m | onth 0.2 | 5 ´ [0.85 | × (45)m | + (61)m | n] + 0.8 x | ((46)m | + (57)m | + (59)m |] | |
| (65)m= 60.21 | 52.97 | 55.39 | 49.31 | 48.08 | 42.62 | 40.0 | Ī | | I | I | 1 | 1 | (05) |
| | 1 | 00.00 | 49.51 | 40.00 | 42.02 | 40.6 | 45 | 45.07 | 51.15 | 54.51 | 58.65 | | (65) |
| include (57 | <u> </u> | | <u> </u> | l . | | | <u> </u> | | <u> </u> | <u> </u> | | l leating | (65) |
| , | m in cal | culation o | of (65)m | only if c | | | <u> </u> | | <u> </u> | <u> </u> | | eating | (65) |
| 5. Internal of | m in cal | culation of Table 5 | of (65)m and 5a | only if c | | | <u> </u> | | <u> </u> | <u> </u> | | neating | (65) |
| , | m in cal | culation of Table 5 | of (65)m and 5a | only if c | | | <u> </u> | | <u> </u> | <u> </u> | | eating | (65) |
| 5. Internal of |)m in calo lains (see ns (Table Feb | culation of Table 5 | of (65)m and 5a | only if c | ylinder i | s in the d | dwelling | or hot w | ater is fr | om com | munity h | neating | (66) |
| 5. Internal g Metabolic gai | m in calcains (see | e Table 5 e 5), Wat Mar | of (65)m 5 and 5a ts Apr 144.15 | only if c): May 144.15 | ylinder is Jun 144.15 | Jul | Aug 144.15 | or hot w Sep 144.15 | ater is fr | om com | munity h | eating | |
| 5. Internal of Metabolic gain Jan (66)m= 144.15 | m in calcains (see | e Table 5 e 5), Wat Mar | of (65)m 5 and 5a ts Apr 144.15 | only if c): May 144.15 | ylinder is Jun 144.15 | Jul | Aug 144.15 | or hot w Sep 144.15 | ater is fr | om com | munity h | eating | |
| 5. Internal of Metabolic gain (66)m= 144.15 Lighting gain: (67)m= 47.46 | m in calcular man in calcular man (Table Feb 144.15 cs (calcular 42.15 | Culation of Table 5 (a) Wat Mar 144.15 (b) tted in Ap 34.28 | of (65)m 6 and 5a ts Apr 144.15 opendix 25.95 | only if construction only if c | Jun 144.15 ion L9 o | Jul 144.15 r L9a), a | Aug 144.15 Iso see | Sep 144.15 Table 5 30.88 | Oct 144.15 | Nov | Dec | neating | (66) |
| 5. Internal of Metabolic gain Jan (66)m= 144.15 | m in calcular (see 144.15) m in calcular (see 144.15) m in calcular (calcular 42.15) m in calcular (calcular 42.15) | Culation of Table 5 (a) Wat Mar 144.15 (b) tted in Ap 34.28 | of (65)m 6 and 5a ts Apr 144.15 opendix 25.95 | only if construction only if c | Jun 144.15 ion L9 o | Jul 144.15 r L9a), a | Aug 144.15 Iso see | Sep 144.15 Table 5 30.88 | Oct 144.15 | Nov | Dec | neating | (66) |
| Metabolic gaing Jan (66)m= 144.15 Lighting gaing (67)m= 47.46 Appliances g (68)m= 317.83 | m in calcular (see 144.15) (calcular 42.15) (calcular 321.13) | culation of Table 5 5), Wat Mar 144.15 ted in Ap 34.28 culated in 312.82 | of (65)m 5 and 5a ts Apr 144.15 opendix 25.95 Appendix 295.13 | only if construction only if c | Jun 144.15 ion L9 of 16.38 uation L 251.8 | Jul 144.15 r L9a), a 17.7 13 or L1: 237.78 | Aug 144.15 Iso see 23 3a), also 234.48 | Sep 144.15 Table 5 30.88 see Ta | Oct 144.15 39.21 ble 5 260.48 | Nov 144.15 45.76 | Dec 144.15 | neating | (66) (67) |
| Metabolic gaing Jan (66)m= 144.15 Lighting gaing (67)m= 47.46 Appliances g | m in calcular (see 144.15) (calcular 42.15) (calcular 321.13) | culation of Table 5 5), Wat Mar 144.15 ted in Ap 34.28 culated in 312.82 | of (65)m 5 and 5a ts Apr 144.15 opendix 25.95 Appendix 295.13 | only if construction only if c | Jun 144.15 ion L9 of 16.38 uation L 251.8 | Jul 144.15 r L9a), a 17.7 13 or L1: 237.78 | Aug 144.15 Iso see 23 3a), also 234.48 | Sep 144.15 Table 5 30.88 see Ta | Oct 144.15 39.21 ble 5 260.48 | Nov 144.15 45.76 | Dec 144.15 | neating | (66) (67) |
| Metabolic gain (66)m= 144.15 Lighting gains (67)m= 47.46 Appliances g (68)m= 317.83 Cooking gain (69)m= 51.82 | m in calculations (See Ins. (Table Feb 144.15) (Calculations (Calculatio | culation of Table 5 2 5), Wat Mar 144.15 4.28 4.28 51.82 | of (65)m 5 and 5a ts Apr 144.15 opendix 25.95 n Append 295.13 oppendix 51.82 | only if constructions only if constructions only if constructions on the construction of the construction of the construction of the construction on the construction of the construction | Jun 144.15 ion L9 of 16.38 uation L 251.8 tion L15 | Jul 144.15 r L9a), a 17.7 13 or L1 237.78 or L15a) | Aug 144.15 Iso see 23 3a), also 234.48 , also se | Sep 144.15 Table 5 30.88 see Ta 242.79 ee Table | Oct 144.15 39.21 ble 5 260.48 5 | Nov 144.15 45.76 | Dec 144.15 48.78 | eating | (66) (67) (68) |
| Metabolic gain (66)m= 144.15 Lighting gain: (67)m= 47.46 Appliances g (68)m= 317.83 Cooking gain | m in calculations (See Ins. (Table Feb 144.15) (Calculations (Calculatio | culation of Table 5 2 5), Wat Mar 144.15 4.28 4.28 51.82 | of (65)m 5 and 5a ts Apr 144.15 opendix 25.95 n Append 295.13 oppendix 51.82 | only if constructions only if constructions only if constructions on the construction of the construction of the construction of the construction on the construction of the construction | Jun 144.15 ion L9 of 16.38 uation L 251.8 tion L15 | Jul 144.15 r L9a), a 17.7 13 or L1 237.78 or L15a) | Aug 144.15 Iso see 23 3a), also 234.48 , also se | Sep 144.15 Table 5 30.88 see Ta 242.79 ee Table | Oct 144.15 39.21 ble 5 260.48 5 | Nov 144.15 45.76 | Dec 144.15 48.78 | neating | (66) (67) (68) |
| Metabolic gain (66)m= 144.15 Lighting gains (67)m= 47.46 Appliances g (68)m= 317.83 Cooking gains (69)m= 51.82 Pumps and fa (70)m= 3 | min calculations (See Ins. (Table Feb 144.15) s (calculations (Calculati | culation of Table 5 2 5), Wat Mar 144.15 1ted in Ap 34.28 culated in 312.82 ated in Ap 51.82 c (Table 5 | of (65)m s and 5a ts Apr 144.15 ppendix 25.95 Appendix 295.13 ppendix 51.82 5a) 3 | only if constructions only its constructions only in constructions | Jun 144.15 ion L9 of 16.38 uation L 251.8 tion L15 51.82 | Jul 144.15 r L9a), a 17.7 13 or L1: 237.78 or L15a) 51.82 | Aug 144.15 Iso see 23 3a), also 234.48), also se 51.82 | Sep 144.15 Table 5 30.88 see Ta 242.79 ee Table 51.82 | Oct 144.15 39.21 ble 5 260.48 5 51.82 | Nov 144.15 45.76 282.82 51.82 | Dec 144.15 48.78 303.81 51.82 | neating | (66) (67) (68) |
| Metabolic gain (66)m= 144.15 Lighting gains (67)m= 47.46 Appliances g (68)m= 317.83 Cooking gain (69)m= 51.82 Pumps and fa | min calculations (See Ins. (Table Feb 144.15) s (calculations (Calculati | culation of Table 5 2 5), Wat Mar 144.15 1ted in Ap 34.28 culated in 312.82 ated in Ap 51.82 c (Table 5 | of (65)m s and 5a ts Apr 144.15 ppendix 25.95 Appendix 295.13 ppendix 51.82 5a) 3 | only if constructions only its constructions only in constructions | Jun 144.15 ion L9 of 16.38 uation L 251.8 tion L15 51.82 | Jul 144.15 r L9a), a 17.7 13 or L1: 237.78 or L15a) 51.82 | Aug 144.15 Iso see 23 3a), also 234.48), also se 51.82 | Sep 144.15 Table 5 30.88 see Ta 242.79 ee Table 51.82 | Oct 144.15 39.21 ble 5 260.48 5 51.82 | Nov 144.15 45.76 282.82 51.82 | Dec 144.15 48.78 303.81 51.82 | neating | (66) (67) (68) |
| Metabolic gains (66)m= 144.15 Lighting gains (67)m= 47.46 Appliances g (68)m= 317.83 Cooking gains (69)m= 51.82 Pumps and fa (70)m= 3 Losses e.g. 6 | min calcular services (Table Feb 144.15 se (Calcular 321.13 se (Calcular 51.82 services gains gains 3 vaporation -96.1 | culation of Table 5 2 5), Wat Mar 144.15 Ited in Ap 34.28 culated in 312.82 ated in Ap 51.82 a (Table 5 3 on (negation of the second | of (65)m s and 5a ts Apr 144.15 ppendix 25.95 Append 295.13 ppendix 51.82 5a) 3 tive valu | only if construction only if c | Jun 144.15 ion L9 o 16.38 uation L 251.8 tion L15 51.82 3 ble 5) | Jul 144.15 r L9a), a 17.7 13 or L1 237.78 or L15a) 51.82 | Aug 144.15 Iso see 23 3a), also 234.48), also se 51.82 | Sep 144.15 Table 5 30.88 see Ta 242.79 ee Table 51.82 | Oct 144.15 39.21 ble 5 260.48 5 51.82 | Nov 144.15 45.76 282.82 51.82 | Dec 144.15 48.78 303.81 51.82 | neating | (66) (67) (68) (69) |
| 5. Internal (Metabolic gains) [66)m= | min calcular services (Table Feb 144.15 se (Calcular 321.13 se (Calcular 51.82 services gains gains 3 vaporation -96.1 | culation of Table 5 2 5), Wat Mar 144.15 Ited in Ap 34.28 culated in 312.82 ated in Ap 51.82 a (Table 5 3 on (negation of the second | of (65)m s and 5a ts Apr 144.15 ppendix 25.95 Append 295.13 ppendix 51.82 5a) 3 tive valu | only if construction only if c | Jun 144.15 ion L9 o 16.38 uation L 251.8 tion L15 51.82 3 ble 5) | Jul 144.15 r L9a), a 17.7 13 or L1 237.78 or L15a) 51.82 | Aug 144.15 Iso see 23 3a), also 234.48), also se 51.82 | Sep 144.15 Table 5 30.88 see Ta 242.79 ee Table 51.82 | Oct 144.15 39.21 ble 5 260.48 5 51.82 | Nov 144.15 45.76 282.82 51.82 | Dec 144.15 48.78 303.81 51.82 | neating | (66) (67) (68) (69) |
| Metabolic gain (66)m= 144.15 Lighting gain: (67)m= 47.46 Appliances g (68)m= 317.83 Cooking gain: (69)m= 51.82 Pumps and fa (70)m= 3 Losses e.g. 6 (71)m= -96.1 Water heating | min calculations (See Ins. (Table Feb. 144.15) (Calculations (Calculatio | culation of the Table 5 e 5), Wat Mar 144.15 ted in Ap 34.28 culated in 312.82 ated in Ap 51.82 f (Table 5 3 3 on (negation of the part) -96.1 Table 5) 74.44 | of (65)m s and 5a ts Apr 144.15 opendix 25.95 Appendix 295.13 opendix 51.82 5a) 3 tive valu -96.1 | only if constructions | Jun 144.15 ion L9 o 16.38 uation L 251.8 tion L15 51.82 3 ble 5) -96.1 | Jul 144.15 r L9a), a 17.7 13 or L1: 237.78 or L15a) 51.82 | Aug 144.15 Iso see 23 3a), also 234.48 3, also se 51.82 3 | Sep 144.15 Table 5 30.88 see Ta 242.79 ee Table 51.82 3 -96.1 | Oct 144.15 39.21 ble 5 260.48 5 51.82 3 -96.1 | Nov 144.15 45.76 282.82 51.82 3 | Dec 144.15 48.78 303.81 51.82 3 | neating | (66) (67) (68) (69) (70) |
| 5. Internal (Metabolic gains) [66)m= | min calculations (See Ins. (Table Feb 144.15) s (calculations (Calculati | culation of the Table 5 e 5), Wat Mar 144.15 ted in Ap 34.28 culated in 312.82 ated in Ap 51.82 f (Table 5 3 3 on (negation of the part) -96.1 Table 5) 74.44 | of (65)m s and 5a ts Apr 144.15 opendix 25.95 Appendix 295.13 opendix 51.82 5a) 3 tive valu -96.1 | only if constructions | Jun 144.15 ion L9 o 16.38 uation L 251.8 tion L15 51.82 3 ble 5) -96.1 | Jul 144.15 r L9a), a 17.7 13 or L1 237.78 or L15a) 51.82 | Aug 144.15 Iso see 23 3a), also 234.48 3, also se 51.82 3 | Sep 144.15 Table 5 30.88 see Ta 242.79 ee Table 51.82 3 -96.1 | Oct 144.15 39.21 ble 5 260.48 5 51.82 3 -96.1 | Nov 144.15 45.76 282.82 51.82 3 | Dec 144.15 48.78 303.81 51.82 3 | neating | (66) (67) (68) (69) (70) |

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

| Orientation: Access Factor Table 6d | r | Area m² | | Flux Table 6a | | g_ Table 6b | - | FF Table 6c | | Gains (W) | |
|--|----|--|----------|------------------|-------------|----------------|--------|----------------|------------|--------------|-------|
| Northeast 0.9x 0.77 | X | 0.9 | x | 11.28 | x | 0.51 | x_[| 1.11 | | 3.99 | (75) |
| Northeast 0.9x 0.77 | x | 12.39 | x | 11.28 | x | 0.51 | x | 1.11 | = [| 54.9 | (75) |
| Northeast 0.9x 0.77 | X | 0.9 | x | 22.97 | x | 0.51 | x | 1.11 | <u> </u> | 8.12 | (75) |
| Northeast 0.9x 0.77 | x | 12.39 | x | 22.97 | x | 0.51 | _ x [| 1.11 | <u> </u> | 111.75 | (75) |
| Northeast 0.9x 0.77 | x | 0.9 | x | 41.38 | X | 0.51 | x [| 1.11 | <u> </u> | 14.62 | (75) |
| Northeast 0.9x 0.77 | X | 12.39 | x | 41.38 | X | 0.51 | x | 1.11 | = [| 201.33 | (75) |
| Northeast 0.9x 0.77 | x | 0.9 | х | 67.96 | X | 0.51 | x | 1.11 | = [| 24.02 | (75) |
| Northeast 0.9x 0.77 | X | 12.39 | x | 67.96 | X | 0.51 | x | 1.11 | = [| 330.64 | (75) |
| Northeast 0.9x 0.77 | X | 0.9 | x | 91.35 | X | 0.51 | x [| 1.11 | = | 32.28 | (75) |
| Northeast 0.9x 0.77 | X | 12.39 | x | 91.35 | X | 0.51 | x | 1.11 | _ = [| 444.45 | (75) |
| Northeast 0.9x 0.77 | X | 0.9 | x | 97.38 | X | 0.51 | x [| 1.11 | = [| 34.42 | (75) |
| Northeast 0.9x 0.77 | X | 12.39 | x | 97.38 | X | 0.51 | x [| 1.11 | = | 473.83 | (75) |
| Northeast 0.9x 0.77 | x | 0.9 | x | 91.1 | X | 0.51 | x [| 1.11 | = [| 32.2 | (75) |
| Northeast 0.9x 0.77 | X | 12.39 | x | 91.1 | X | 0.51 | x [| 1.11 | = [| 443.26 | (75) |
| Northeast 0.9x 0.77 | X | 0.9 | x | 72.63 | X | 0.51 | x [| 1.11 | = [| 25.67 | (75) |
| Northeast 0.9x 0.77 | x | 12.39 | x | 72.63 | X | 0.51 | x [| 1.11 | = [| 353.37 | (75) |
| Northeast 0.9x 0.77 | x | 0.9 | x | 50.42 | X | 0.51 | x [| 1.11 | = [| 17.82 | (75) |
| Northeast 0.9x 0.77 | x | 12.39 | х | 50.42 | X | 0.51 | x | 1.11 | = | 245.32 | (75) |
| Northeast 0.9x 0.77 | X | 0.9 | x | 28.07 | X | 0.51 | x | 1.11 | = [| 9.92 | (75) |
| Northeast 0.9x 0.77 | x | 12.39 | x | 28.07 | X | 0.51 | x [| 1.11 | = | 136.56 | (75) |
| Northeast 0.9x 0.77 | x | 0.9 | x | 14.2 | X | 0.51 | x [| 1.11 | = [| 5.02 | (75) |
| Northeast 0.9x 0.77 | X | 12.39 | x | 14.2 | X | 0.51 | x [| 1.11 | = [| 69.08 | (75) |
| Northeast 0.9x 0.77 | x | 0.9 | x | 9.21 | X | 0.51 | x [| 1.11 | = [| 3.26 | (75) |
| Northeast 0.9x 0.77 | X | 12.39 | x | 9.21 | X | 0.51 | x [| 1.11 | = [| 44.83 | (75) |
| Southwest _{0.9x} 0.77 | x | 7.64 | X | 36.79 |] | 0.51 | x [| 1.11 | = [| 110.39 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | x | 62.67 |] | 0.51 | x [| 1.11 | = [| 188.03 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | X | 85.75 | | 0.51 | x [| 1.11 | = [| 257.28 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | X | 106.25 | | 0.51 | x [| 1.11 | = | 318.78 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | x | 119.01 |] | 0.51 | x [| 1.11 | = | 357.06 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | X | 118.15 | | 0.51 | x [| 1.11 | = [| 354.48 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | X | 113.91 | | 0.51 | x [| 1.11 | = [| 341.75 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | X | 104.39 |] | 0.51 | x [| 1.11 | = [| 313.2 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | X | 92.85 | | 0.51 | x [| 1.11 | = [| 278.58 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | X | 69.27 |] | 0.51 | x [| 1.11 | = [| 207.82 | (79) |
| Southwest _{0.9x} 0.77 | x | 7.64 | x | 44.07 |] | 0.51 | x [| 1.11 | = [| 132.22 | (79) |
| Southwest _{0.9x} 0.77 | X | 7.64 | x | 31.49 |] | 0.51 | x [| 1.11 | = [| 94.47 | (79) |
| | | | | | | | | | | | |
| Solar gains in watts, calcula | _ | | _ | | | n = Sum(74)m. | | | | | |
| (83)m= 169.28 307.9 473. | | 673.44 833.79 | | 62.72 817.21 | 692 | 2.23 541.72 | 354.3 | 206.31 | 142.56 | | (83) |
| Total gains – internal and so | | ` | <u> </u> | | 1 | 0.07 | 005.00 | 740 :- 1 | 070.5 | | (0.4) |
| (84)m= 718.37 852.87 997. | 65 | 1165.88 1293.4 | 8 12 | 292.96 1230.11 | 1111 | 3.07 980.85 | 825.61 | 713.47 | 676.85 | | (84) |

| 7 Me | an inter | nal temr | perature | (heating | season |) | | | | | | | | |
|---------|----------------------|-----------|-----------|----------------|---|------------|----------------|--------------------|-------------------|----------------|-------------|------------------------|---------|------------------------|
| | | | | · · | | • | from Tal | ole 9, Th | 1 (°C) | | | | 21 | (85) |
| | | Ū | ains for | | | J | | JIC 0, 111 | (0) | | | | 21 | |
| Otinot | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| (86)m= | 0.94 | 0.91 | 0.85 | 0.74 | 0.59 | 0.44 | 0.33 | 0.37 | 0.58 | 0.8 | 0.91 | 0.95 | | (86) |
| Mean | internal | temper | ature in | living an | ea T1 (fo | ollow ste | ns 3 to 7 | in Tabl | e 9c) | | Į. | | | |
| (87)m= | 19.26 | 19.57 | 20 | 20.46 | 20.78 | 20.93 | 20.98 | 20.97 | 20.84 | 20.39 | 19.73 | 19.18 | | (87) |
| Temr | erature | during h | L | L Ariods in | rest of | dwelling | from Ta | able 9, T | h2 (°C) | <u> </u> | <u> </u> | | | |
| (88)m= | 19.91 | 19.91 | 19.91 | 19.91 | 19.91 | 19.91 | 19.91 | 19.91 | 19.91 | 19.91 | 19.91 | 19.91 | | (88) |
| | ation fac | tor for a | ains for | rest of d | welling | h2 m (se | ee Table | (Pa) | l | | l | | | |
| (89)m= | 0.93 | 0.89 | 0.82 | 0.7 | 0.53 | 0.37 | 0.25 | 0.29 | 0.51 | 0.77 | 0.9 | 0.94 | | (89) |
| | | tompor | aturo in | the rest | of dwalli | na T2 (f | ollow etc | eps 3 to 1 | I 7 in Tabl | 0.00 | | | | |
| (90)m= | 17.64 | 18.07 | 18.67 | 19.29 | 19.68 | 19.85 | 19.89 | 19.89 | 19.77 | 19.22 | 18.31 | 17.52 | | (90) |
| (00) | | | | | | | | | | <u> </u> | g area ÷ (4 | | 0.43 | (91) |
| Moon | intornal | tompor | oturo (fo | r tho wh | olo dwo | lling) – f | ΙΛ ν Τ1 | ı /1 fl | ۸) ی T2 | | | | | |
| (92)m= | | 18.71 | 19.24 | 19.79 | 20.16 | 20.32 | 20.36 | + (1 – fL 20.35 | 20.23 | 19.73 | 18.92 | 18.23 | | (92) |
| | | | <u> </u> | | <u> </u> | l | | 4e, whe | | <u> </u> | 10.02 | 10.20 | | (-) |
| (93)m= | 18.19 | 18.56 | 19.09 | 19.64 | 20.01 | 20.17 | 20.21 | 20.2 | 20.08 | 19.58 | 18.77 | 18.08 | | (93) |
| | ace hea | ting requ | uirement | | | | | | | | | | | |
| | | | | | re obtain | ed at st | ep 11 of | Table 9l | b, so tha | t Ti,m=(| 76)m an | d re-calc | ulate | |
| the ut | ilisation | factor fo | or gains | using Ta | able 9a | | | | | | <u> </u> | | | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| | | | ains, hm | 1 | | | | | | I | | | | |
| (94)m= | 0.91 | 0.87 | 0.8 | 0.69 | 0.54 | 0.39 | 0.27 | 0.31 | 0.52 | 0.75 | 0.88 | 0.92 | | (94) |
| | | | W = (94) | | r´ | | 1 | | | <u> </u> | | | | (0.7) |
| (95)m= | 656 | 744.38 | 802.48 | 802.71 | 697.2 | 499.06 | 332.64 | 347.5 | 508.03 | 621.26 | 626.33 | 625.11 | | (95) |
| | <u> </u> | | rnal tem | i | i | i | 100 | 104 | 1444 | 40.0 | 7.4 | 4.0 | | (96) |
| (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 | | (90) |
| | | | 1178.87 | | | 521.32 | 338.22 | x [(93)m 356.14 | - (96)m 560.22 | 840.51 | 1092.82 | 1300.17 | | (97) |
| | | | | | | | | 24 x [(97] | | | | 1300.17 | | (01) |
| (98)m= | 479.57 | 359.5 | 280.04 | 146.28 | 59.95 | 0 | 0.02 | 0 | 0 | 163.12 | 335.88 | 502.25 | | |
| ` ' | | | ļ | | ļ | ļ | ļ | ITota | l Il per year | L (kWh/year |) = Sum(9 | 8) _{15,912} = | 2326.59 | (98) |
| Snac | e heatin | a requir | ement in | k\/\/h/m2 | 2/vear | | | | | ` • | , | | 30.24 | <u> </u> (99) |
| • | | · · | | | • | | 1 12 | |) | | | | 30.24 | |
| | ergy rec e heatir | | πs – Ind | ividual h | eating sy | ystems i | nciuding | micro-C | HP) — | | | | | |
| - | | _ | at from s | econdar | y/supple | mentary | system | | | | | | 0 | (201) |
| Fract | ion of sp | ace hea | at from m | nain syst | em(s) | | | (202) = 1 | - (201) = | | | | 1 | (202) |
| Fract | ion of to | tal heati | ng from | main sys | stem 1 | | | (204) = (2 | 02) × [1 – | (203)] = | | | 1 | (204) |
| Efficie | ency of r | nain spa | ace heat | ing syste | em 1 | | | | | | | | 100 | (206) |
| | • | - | ry/suppl | • | | g systen | ո, % | | | | | | 0 | (208) |
| | - | | , ,, | | - ' | - • | | | | | | | | |

| | | | | | | | | - | |
|--|---|--|-----------|-----------------|---|---|--|---|--|
| | May Jun | Jul | Aug | Sep | Oct | Nov | Dec | kWh/yea | ar |
| Space heating requirement (calculated at 479.57 359.5 280.04 146.28 59 | oove) 9.95 0 | T 0 | 0 | I 0 | 163.12 | 335.88 | 502.25 | 1 | |
| | 9.95 0 | | 0 | 0 | 103.12 | 333.00 | 502.25 | | (044) |
| $ (211)m = \{[(98)m \times (204)] \} \times 100 \div (206) $ | 9.95 0 | 0 | 0 | 0 | 163.12 | 335.88 | 502.25 | 1 | (211) |
| | | | | _ | | 211) _{15,1012} | | 2326.59 | (211) |
| Space heating fuel (secondary), kWh/mor | nth | | | | | | | | J |
| = {[(98)m x (201)] } x 100 ÷ (208) | | | | | 1 | 1 | 1 | 1 | |
| (215)m= 0 0 0 0 | 0 0 | 0 | O Tota | 0 | 0 | 0 215) _{15,1012} | 0 | _ | 7(045) |
| Water booting | | | TOLA | ıı (KVVII/yea | ar) =Surri(| 213) _{15,1012} | F | 0 | (215) |
| Water heating Output from water heater (calculated abov | re) | | | | | | | | |
| | 5.78 109.95 | 103.26 | 116.52 | 117.32 | 135.01 | 145.72 | 157.56 | | |
| Efficiency of water heater | | | • | | | | • | 100 | (216) |
| ` ' | 00 100 | 100 | 100 | 100 | 100 | 100 | 100 | | (217) |
| Fuel for water heating, kWh/month (219)m = (64)m x 100 ÷ (217)m | | | | | | | | | |
| ` ' | 5.78 109.95 | 103.26 | 116.52 | 117.32 | 135.01 | 145.72 | 157.56 | | |
| | | | Tota | I = Sum(2 | 19a) ₁₁₂ = | | | 1593.52 | (219) |
| Annual totals Space heating fuel used, main system 1 | | | | | k | Wh/year | • | kWh/year | 7 |
| , | | | | | | | | 2326.59 |] 7 |
| Water heating fuel used | | | | | | | | 1593.52 | |
| | | | | | | | | | |
| Electricity for pumps, fans and electric kee | | | | | | | Γ | 1 | |
| mechanical ventilation - balanced, extract | | nput fron | n outside | Э | | | 51.35 | | (230a) |
| | | nput fron | | | | | 51.35 |] | (230a) (230c) |
| mechanical ventilation - balanced, extract | | nput fron | | e of (230a). | (230g) = | | | 81.35 | , |
| mechanical ventilation - balanced, extract central heating pump: | | nput fron | | | (230g) = | | | 81.35 335.27 | (230c) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year | | nput fron | | | (230g) = | | | | (230c)](231) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting | t or positive i | nput fron | | | (230g) = | | | 335.27 | (230c) (231) (232) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs | t or positive i | | | | (230g) = | | | 335.27 | (230c) (231) (232) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs | t or positive i | | | | | rice | | 335.27 | (230c) (231) (232) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs | ms: Fu | el | | | Fuel P | Price 12) | 30 | 335.27 -1425.34 Fuel Cost | (230c) (231) (232) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating system | ms: Fu | i el Vh/year | | | Fuel P | Price 12) | 30 | 335.27 -1425.34 Fuel Cost £/year | (230c) (231) (232) (233) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating system Space heating - main system 1 | ms: Fu kW (21 | i el Vh/year | | | Fuel P (Table | Price 12) | 30 x 0.01 = | 335.27 -1425.34 Fuel Cost £/year 306.88 | (230c) (231) (232) (233) (240) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating system Space heating - main system 1 Space heating - main system 2 | ms: Fu kW (21 | nel Vh/year 1) x 3) x 5) x | | | Fuel P (Table | Price 12) 19 | 30 × 0.01 = × 0.01 = | 335.27 -1425.34 Fuel Cost £/year 306.88 | (230c) (231) (232) (233) (240) (241) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating system Space heating - main system 1 Space heating - main system 2 Space heating - secondary | ms: Fu kW (21) (21) | n el Vh/year 1) x 3) x 5) x | | | Fuel P (Table 13. | Price 12) 19 19 | x 0.01 = x 0.01 = x 0.01 = | 335.27 -1425.34 Fuel Cost £/year 306.88 0 | (230c) (231) (232) (233) (240) (241) (242) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating system Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) | ms: Fu kW (21: (21: (21: (23: | n el 1/h/year 1) x 3) x 5) x 9) | sum | of (230a). | Fuel P (Table 13. 13. 13. | Price 12) 19 19 19 | x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = | 335.27 -1425.34 Fuel Cost £/year 306.88 0 0 210.19 10.73 | (230c) [(231) [(232) [(233)](240) [(241)](242)](247) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating system Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot | ms: Fu kW (21: (21: (21: (23: | nel Vh/year 1) x 3) x 5) x 9) 1) y as app | sum | of (230a). | Fuel P (Table 13. 13. 13. | Price 12) 19 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10 | x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = | 335.27 -1425.34 Fuel Cost £/year 306.88 0 0 210.19 10.73 | (230c) [(231) [(232) [(233)](240) [(241)](242)](247) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating system Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230a) | ms: Fu kW (21) (21) (21) (23) (23) (29) separately | nel Vh/year 1) x 3) x 5) x 9) 1) y as app | sum | of (230a). | Fuel P (Table 13. 13. 13. 14. 15. 16. 17. 18. 19. 19. 19. 19. 19. 19. 19 | Price 12) 19 19 19 19 19 10 10 10 10 10 10 10 10 10 10 10 10 10 | x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = | 335.27 -1425.34 Fuel Cost £/year 306.88 0 0 210.19 10.73 Table 12a | (230c) (231) (232) (233) (240) (241) (242) (247) (249) |
| mechanical ventilation - balanced, extract central heating pump: Total electricity for the above, kWh/year Electricity for lighting Electricity generated by PVs 10a. Fuel costs - individual heating system Space heating - main system 1 Space heating - main system 2 Space heating - secondary Water heating cost (other fuel) Pumps, fans and electric keep-hot (if off-peak tariff, list each of (230a) to (230a) Energy for lighting | ms: Fu kW (21) (21) (21) (23) (23) | nel Vh/year 1) x 3) x 5) x 9) 1) y as app | sum | of (230a). | Fuel P (Table 13. 13. 13. 14. 15. 16. 17. 18. 19. 19. 19. 19. 19. 19. 19 | Price 12) 19 19 19 19 19 ce accor | x 0.01 = x 0.01 = x 0.01 = x 0.01 = x 0.01 = | 335.27 -1425.34 Fuel Cost £/year 306.88 0 210.19 10.73 Table 12a 44.22 | (230c) [(231) [(232) [(233) [(240) [(241) [(242) [(247) [(249) [(250) |

| Appendix Q items: repeat lines (253) and (254 Total energy cost (245) |) as needed .(247) + (250)(254) = | | 572.02 (255) |
|--|---|--|---|
| 11a. SAP rating - individual heating systems | | | |
| Energy cost deflator (Table 12) | | | 0.42 (256) |
| Energy cost factor (ECF) [(255) | $\times (256)] \div [(4) + 45.0] =$ | | 1.97 (257) |
| SAP rating (Section 12) | | | 72.52 (258) |
| 12a. CO2 emissions – Individual heating syst | ems including micro-CHP | | |
| | Energy kWh/year | Emission factor kg CO2/kWh | Emissions kg CO2/year |
| Space heating (main system 1) | (211) x | 0.519 = | 1207.5 (261) |
| Space heating (secondary) | (215) x | 0.519 = | 0 (263) |
| Water heating | (219) x | 0.519 = | 827.04 (264) |
| Space and water heating | (261) + (262) + (263) + (264) = | | 2034.54 (265) |
| Electricity for pumps, fans and electric keep-he | ot (231) x | 0.519 = | 42.22 (267) |
| Electricity for lighting | (232) x | 0.519 = | 174.01 (268) |
| Energy saving/generation technologies Item 1 | | 0.519 = | -739.75 (269) |
| Total CO2, kg/year | sun | m of (265)(271) = | 1511.02 (272) |
| CO2 emissions per m ² | (27 | 2) ÷ (4) = | 19.64 (273) |
| El rating (section 14) | | | 83 (274) |
| | | | 83 (274) |
| 13a. Primary Energy | | | 83 (274) |
| 13a. Primary Energy | Energy kWh/year | Primary factor | P. Energy kWh/year |
| 13a. Primary Energy Space heating (main system 1) | | _ | P. Energy |
| | kWh/year | factor | P. Energy kWh/year |
| Space heating (main system 1) | kWh/year (211) x | 3.07 = | P. Energy kWh/year 7142.63 (261) |
| Space heating (main system 1) Space heating (secondary) | kWh/year (211) x (215) x | factor = 3.07 = = | P. Energy kWh/year 7142.63 (261) 0 (263) |
| Space heating (main system 1) Space heating (secondary) Energy for water heating | kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = | factor = 3.07 = = | P. Energy kWh/year 7142.63 (261) 0 (263) 4892.12 (264) |
| Space heating (main system 1) Space heating (secondary) Energy for water heating Space and water heating | kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = | factor = 3.07 = 3.07 = 3.07 = | P. Energy kWh/year 7142.63 (261) 0 (263) 4892.12 (264) 12034.75 (265) |
| Space heating (main system 1) Space heating (secondary) Energy for water heating Space and water heating Electricity for pumps, fans and electric keep-he | kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = ot (231) x | factor = 3.07 = 3.07 = 3.07 = | P. Energy kWh/year 7142.63 (261) 0 (263) 4892.12 (264) 12034.75 (265) 249.76 (267) |
| Space heating (main system 1) Space heating (secondary) Energy for water heating Space and water heating Electricity for pumps, fans and electric keep-he Electricity for lighting Energy saving/generation technologies | kWh/year (211) x (215) x (219) x (261) + (262) + (263) + (264) = ot (231) x (232) x | factor 3.07 = 3.07 = 3.07 = 3.07 = 3.07 = | P. Energy kWh/year 7142.63 (261) 0 (263) 4892.12 (264) 12034.75 (265) 249.76 (267) 1029.29 (268) |