

## Back to Earth SW Ltd

7 Tuns Lane  
Silverton  
Exeter  
EX5 4HY

### Project Information

Reference

Date 4 December 2023

### Construction Type

Element : Wall - Wall-masonry-solid-internal-plasterboard

Internal surface emissivity : High External surface emissivity : High

|                            | Thickness<br>(mm) | Thermal<br>Conductivity<br>(W/mK) | Thermal<br>Resistance<br>(m <sup>2</sup> K/W) | Pitch<br>(°) | Bridge details<br>Air gaps<br>(Level, Delta U")             |
|----------------------------|-------------------|-----------------------------------|---|--------------|---|
| Outside surface resistance | -                 | -                                 | 0.040   |              |   |
| Brick outer leaf           | 105.0             | 0.770                             | 0.136   |              |   |
| Brick inner leaf           | 105.0             | 0.560                             | 0.188   |              |   |
| Clay Plaster               | 10.0              | 0.800                             | 0.013   |              |   |
| UdiTHERM                   | 60.0              | 0.038                             | 1.550   |              | L:0 0.000W/m <sup>2</sup> K                                 |
| Ampatex Variano            | -                 | -                                 | -   |              |   |
| SteicoFlex                 | 25.0              | 0.036                             | 0.650   |              | 11.800% Softwood<br>(25.0mm)<br>L:0 0.000W/m <sup>2</sup> K |
| Gyproc Wallboard           | 12.5              | 0.190                             | 0.066   |              |   |
| Inside surface resistance  | -                 | -                                 | 0.130   |              |   |

**Total thickness 317.5mm**

### U-value = 0.39W/m<sup>2</sup>K

U-value, Combined Method : 0.391W/m<sup>2</sup>K (upper/lower limit 2.709 / 2.630m<sup>2</sup>K/W, dUf 0.0167, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

### Correction factors

Mechanical fasteners :-

Insulation Fixings

Alpha : 0.80 per m lambda f : 50.0000W/mK nf : 4.000 per m<sup>2</sup> Af : 20.000mm<sup>2</sup> Recess : 0.0mm

Delta Uf for UdiTHERM : 0.0167

nf = fasteners per m<sup>2</sup> Af = fasteners cross-sectional area

Air gaps, Delta Ug = 0.000W/m<sup>2</sup>K

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

## Detailed U-value Calculation Results

Construction includes 1 bridged layer

### Non-bridged layers

|   |                                      |
|---|--------------------------------------|
| Outside surface resistance                                | 0.040 m <sup>2</sup> K/W             |
| Brick outer leaf  | 0.136 m <sup>2</sup> K/W             |
| Brick inner leaf  | 0.188 m <sup>2</sup> K/W             |
| Clay Plaster  | 0.013 m <sup>2</sup> K/W             |
| UdiTHERM  | 1.550 m <sup>2</sup> K/W             |
| Gyproc Wallboard  | 0.066 m <sup>2</sup> K/W             |
| Inside surface resistance                                 | 0.130 m <sup>2</sup> K/W             |
| <b>Resistance of non-bridged layers, R<sub>NB</sub> =</b> | <b><u>2.122 m<sup>2</sup>K/W</u></b> |

### Bridged layer

SteicoFlex (L1) bridged by Softwood (B1)

Path 1 - SteicoFlex

Path 2 - Softwood

### Resistance and fraction of heat flow paths

$$R_{P1} = R_{NB} + R_{L1} = 2.122 + 0.650 = 2.772 \text{ m}^2\text{K/W} \quad F_{P1} = 88.200\%$$

$$R_{P2} = R_{NB} + R_{L2} = 2.122 + 0.192 = 2.315 \text{ m}^2\text{K/W} \quad F_{P2} = 11.800\%$$

### Upper resistance limit

$$R_{upper} = 1 / \left( \frac{F_{P1}}{R_{P1}} + \frac{F_{P2}}{R_{P2}} \right)$$

$$R_{upper} = 1 / \left( \frac{0.882}{2.772} + \frac{0.118}{2.315} \right) = 2.709 \text{ m}^2\text{K/W}$$

### Lower resistance limit

$$R_{lower} = R_{NB} + 1 / \left( \frac{F_{L1}}{R_{L1}} + \frac{F_{B1}}{R_{B1}} \right)$$

$$R_{lower} = 2.122 + 1 / \left( \frac{0.882}{0.650} + \frac{0.118}{0.192} \right) = 2.630 \text{ m}^2\text{K/W}$$

### Total resistance of wall

$$R_T = (R_{upper} + R_{lower}) / 2 = (2.709 + 2.630) / 2 = 2.67 \text{ m}^2\text{K/W}$$

### Mechanical fasteners :-

Calculations to BS EN ISO 6946:2007

Insulation Fixings

Alpha : 0.80 per m lambda f : 50.0000W/mK nf : 4.000 per m<sup>2</sup> Af : 20.000mm<sup>2</sup> Recess : 0.0mm

Delta Uf for UdiTHERM : 0.0167

Correction for air gaps, Delta Ug = 0.0000W/m<sup>2</sup>K

$$U = (1 / R_T) + (\Delta U_f + \Delta U_g + \Delta U_p + \Delta U_{rc2} + \Delta U_{rc2}) = (1/2.6696) + 0.0167 + 0.0000 + 0.0000 + 0.0000 + 0.0000 = 0.39 \text{ W/m}^2\text{K}$$

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**Thermal Mass Details**

|                     | Thickness<br>assessed (actual)<br>(mm) | Density<br>(kg/m <sup>3</sup> ) | Specific heat<br>capacity<br>(J/kgK) | Heat<br>capacity<br>(kJ/m <sup>2</sup> K) |
|---------------------|--|---------------------------------|--------------------------------------|---|
| Brick outer leaf    | 0.0 (105.0)                            | 1700.0                          | 840.0                                | 0.0                                       |
| Brick inner leaf    | 0.0 (105.0)                            | 1700.0                          | 840.0                                | 0.0                                       |
| Clay Plaster        | 0.0 (10.0)                             | 1700.0                          | 1000.0                               | 0.0                                       |
| UdiTHERM            | 0.0 (60.0)                             | 160.0                           | 2100.0                               | 0.0                                       |
| Ampatex Variano     | 0.0 (-)                                | 280.0                           | 850.0                                | 0.0                                       |
| SteicoFlex          | 0.0 (25.0)                             | 60.0                            | 2100.0                               | 0.0                                       |
| Gyproc Wallboard    | 12.5 (12.5)                            | 0.0                             | 0.0                                  | 0.0                                       |
| Total               |  |                                 |                                      | 0.0                                       |
| kappa value         |  |                                 |                                      | 0.0000                                    |
| Limiting condition: | insulation                             |                                 |                                      |   |

Admittance : 0.62 W/m<sup>2</sup>K    Decrement : 0.22 factor    Decrement delay : -11.00 hours