

## 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 (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m <sup>2</sup> K/W)	Pitch (°)	Bridge details Air gaps (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	60.0	0.036	1.650		11.800% Softwood (60.0mm) L:0 0.000W/m <sup>2</sup> K
Gyproc Wallboard	12.5	0.190	0.066		
Inside surface resistance	-	-	0.130		

**Total thickness 352.5mm**

### U-value = 0.30W/m<sup>2</sup>K

U-value, Combined Method : 0.296W/m<sup>2</sup>K (upper/lower limit 3.578 / 3.388m<sup>2</sup>K/W, dUf 0.0090, 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 : 0.0090

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

$$R_{P1} = R_{NB} + R_{L1} = 2.122 + 1.650 = 3.772 \text{ m}^2\text{K/W} \quad F_{P1} = 88.200\%$$

$$R_{P2} = R_{NB} + R_{L2} = 2.122 + 0.462 = 2.584 \text{ m}^2\text{K/W} \quad F_{P2} = 11.800\%$$

### Upper resistance limit

$$R_{upper} = 1 / \left( \frac{F_{P1}}{R_{P1}} + \frac{F_{P2}}{R_{P2}} \right)$$
$$R_{upper} = 1 / \left( \frac{0.882}{3.772} + \frac{0.118}{2.584} \right) = 3.578 \text{ m}^2\text{K/W}$$

### Lower resistance limit

$$R_{lower} = R_{NB} + 1 / \left( \frac{F_{L1}}{R_{L1}} + \frac{F_{B1}}{R_{B1}} \right)$$
$$R_{lower} = 2.122 + 1 / \left( \frac{0.882}{1.650} + \frac{0.118}{0.462} \right) = 3.388 \text{ m}^2\text{K/W}$$

### Total resistance of wall

$$R_T = (R_{upper} + R_{lower}) / 2 = (3.578 + 3.388) / 2 = 3.48 \text{ m}^2\text{K/W}$$

### 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 : 0.0090

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

$$U = (1 / R_T) + (\Delta U_f + \Delta U_g + \Delta U_p + \Delta U_{rc2} + \Delta U_{rc2}) = (1/3.4831) + 0.0090 + 0.0000 + 0.0000 + 0.0000 + 0.0000 = 0.30 \text{ W/m}^2\text{K}$$

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**Thermal Mass Details**

	Thickness assessed (actual) (mm)	Density (kg/m <sup>3</sup> )	Specific heat capacity (J/kgK)	Heat capacity (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 (60.0)	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 : 0.54 W/m<sup>2</sup>K    Decrement : 0.19 factor    Decrement delay : -12.31 hours