

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 ² 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	40.0	0.038	1.050		L:0 0.000W/m ² K
Ampatex Variano	-	-	-		
SteicoFlex	38.0	0.036	1.050		11.800% Softwood (38.0mm) L:0 0.000W/m ² K
Gyproc Wallboard	12.5	0.190	0.066		
Inside surface resistance	-	-	0.130		

Total thickness 310.5mm

U-value = 0.41W/m²K

U-value, Combined Method : 0.414W/m²K (upper/lower limit 2.553 / 2.426m²K/W, dUf 0.0123, 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 m² Af : 20.000mm² Recess : 0.0mm

Delta Uf for UdiTHERM : 0.0123

nf = fasteners per m² Af = fasteners cross-sectional area

Air gaps, Delta Ug = 0.000W/m²K

(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 ² K/W
Brick outer leaf	0.136 m ² K/W
Brick inner leaf	0.188 m ² K/W
Clay Plaster	0.013 m ² K/W
UdiTHERM	1.050 m ² K/W
Gyproc Wallboard	0.066 m ² K/W
Inside surface resistance	0.130 m ² K/W
Resistance of non-bridged layers, R_{NB} =	<u>1.622 m²K/W</u>

Bridged layer

SteicoFlex (L1) bridged by Softwood (B1)

Path 1 - SteicoFlex

Path 2 - Softwood

Resistance and fraction of heat flow paths

$$R_{P1} = R_{NB} + R_{L1} = 1.622 + 1.050 = 2.672 \text{ m}^2\text{K/W} \quad F_{P1} = 88.200\%$$

$$R_{P2} = R_{NB} + R_{L2} = 1.622 + 0.292 = 1.915 \text{ m}^2\text{K/W} \quad F_{P2} = 11.800\%$$

Upper resistance limit

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

$$R_{\text{upper}} = 1 / \left(\frac{0.882}{2.672} + \frac{0.118}{1.915} \right) = 2.553 \text{ m}^2\text{K/W}$$

Lower resistance limit

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

$$R_{\text{lower}} = 1.622 + 1 / \left(\frac{0.882}{1.050} + \frac{0.118}{0.292} \right) = 2.426 \text{ m}^2\text{K/W}$$

Total resistance of wall

$$R_T = (R_{\text{upper}} + R_{\text{lower}}) / 2 = (2.553 + 2.426) / 2 = 2.49 \text{ m}^2\text{K/W}$$

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 m² Af : 20.000mm² Recess : 0.0mm

Delta Uf for UdiTHERM : 0.0123

Correction for air gaps, Delta Ug = 0.0000W/m²K

(Delta Uf + Delta Ug + Delta Up + Delta Ur) is less than 3% of (1 / Rt) so U = (1 / Rt) + (Delta Ur) + (Delta Urc) = 0.41 W/m²K

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Thermal Mass Details

	Thickness assessed (actual) (mm)	Density (kg/m ³)	Specific heat capacity (J/kgK)	Heat capacity (kJ/m ² 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 (40.0)	160.0	2100.0	0.0
Ampatex Variano	0.0 (-)	280.0	850.0	0.0
SteicoFlex	0.0 (38.0)	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 : 0.56 W/m²K Decrement : 0.24 factor Decrement delay : -10.19 hours