

Back to Earth SW Ltd

7 Tuns Lane
Silverton
Exeter
EX5 4HY

Project Information

Reference

Date 22 November 2023

Construction Type

Element : Suspended ground floor - Floor-suspended-175mm

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")
Inside surface	-	-	0.170		
Floor deck Oriented strandboard (OSB) Ampatex Sinco	22.0	-	0.169		
SteicoFlex	140.0	0.036	3.850		11.000% Softwood (140.0mm) L:0 0.000W/m ² K
Airspace, heat flow downwards, 100 mm thick (Slightly vented cavity - width=5000.0mm, hro=5.100, E1=0.900, E2=0.900, downward heat flow, opening area 500 mm ² /m)	100.0	-	0.220/0.000		
Ampatop Protecta	-	-	-		
Deck underside surface resistance			0.170		
Total thickness	262.0mm				

Ground Floor Details

Floor type : Suspended floor

Calculation method : EN ISO 13370:2007

P/A : 0.900 Characteristic dimension, B' : 2.222

Thermal conductivity of ground: : 1.500 W/mK Width of walls, w: : 0.300 m

Height of floor above ground, h: : 0.225 m U-value of sub-floor walls, Uw: : 1.700 W/m²K

Average wind speed, V: : 5.000 m/s Wind shielding factor, fw: : 0.050

Ventilation opening area, E: : 0.0015 m²/m Subfloor ground resistance, Rs : 0.170 m²K/W

Resistance of insulation on ground, Rg : 0.000 m²K/W External surface resistance, Rse : 0.040 m²K/W

Deck resistance : 0.169m²K/W

Description : Oriented strandboard (OSB)

Edge insulation position : None

U-value = 0.22W/m²K

U-value, Combined Method : 0.224W/m²K (upper/lower limit 3.917 / 3.729m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

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

Calculation of U-value for floor deck (U_f)

Construction includes 1 bridged layer

Non-bridged layers

Inside surface	0.170 m ² K/W
Floor deck Oriented strandboard (OSB)	0.169 m ² K/W
Airspace, heat flow downwards, 100 mm thick	0.220 m ² K/W
Deck underside surface resistance	0.170 m ² K/W
Resistance of non-bridged layers, R _{NB} =	<u>0.729 m²K/W</u>

Bridged layer

SteicoFlex (L1) bridged by Softwood (B1)

Path 1 - SteicoFlex

Path 2 - Softwood

Resistance and fraction of heat flow paths

$$R_{P1} = R_{NB} + R_{L1} = 0.729 + 3.850 = 4.579 \text{ m}^2\text{K/W} \quad F_{P1} = 89.000\%$$

$$R_{P2} = R_{NB} + R_{L2} = 0.729 + 1.077 = 1.806 \text{ m}^2\text{K/W} \quad F_{P2} = 11.000\%$$

Upper resistance limit

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

$$R_{\text{upper}} = 1 / \left(\frac{0.890}{4.579} + \frac{0.110}{1.806} \right) = 3.917 \text{ m}^2\text{K/W}$$

Lower resistance limit

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

$$R_{\text{lower}} = 0.729 + 1 / \left(\frac{0.890}{3.850} + \frac{0.110}{1.077} \right) = 3.729 \text{ m}^2\text{K/W}$$

Total resistance of suspended ground floor

$$R_F = \left(R_{\text{upper}} + R_{\text{lower}} \right) / 2 = (3.917 + 3.729) / 2 = 3.82 \text{ m}^2\text{K/W}$$

$$U_f = 0.262 \text{ m}^2\text{K/W}$$

Calculation of U-value for ground (U_g)

$$\text{Equivalent thickness of ground, } d_g = 0.300 + 1.500(0.170 + 0.000 + 0.040) = 0.615 \text{ m}$$

$$U_g = \left((2 \times 1.500) / \left((\pi \times 2.222) + 0.615 \right) \right) \times \ln \left(\frac{\pi \times 2.222}{0.615} + 1 \right) = 0.993$$

Calculation of U-value for sub-floor void (U_x)

$$U_x = \left(2 \times \frac{0.225 \times 1.700}{2.222} \right) + \left(1450 \times \frac{0.002 \times 5.000 \times 0.050}{2.222} \right) = 0.589$$

Floor U-value, U:

$$1 / U = \left(1 / 0.262 \right) + \left(1 / (0.993 + 0.589) \right) = 4.455$$

$$U = 0.224 \text{ W/m}^2\text{K}$$

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

(Delta U_f + Delta U_g + Delta U_p + Delta U_r) is less than 3% of (1 / R_t) so U = (1 / R_t) + (Delta U_r) + (Delta U_{rc}) = 0.22 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)
Floor deck Oriented strandboard (OSB)	22.0 (22.0)	0.0	0.0	0.0
Ampatex Sinco	0.0 (-)	280.0	850.0	0.0
SteicoFlex	0.0 (140.0)	60.0	2100.0	0.0
Airspace, heat flow downwards, 100 mm thick	0.0 (100.0)	1.2	1008.0	0.0
Ampatop Protecta	0.0 (-)	300.0	850.0	0.0
Total				0.0
kappa value				0.0000
Limiting condition:	insulation			

Admittance : 0.48 W/m²K Decrement : 0.00 factor Decrement delay : 0.00 hours