

Project Information

Reference

Date 14 September 2018

Construction Type

Element : Suspended ground floor - 0 Spec generator copies

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 Particleboard (600 mg/m ³) | 22.0 | - | 0.157 | | |
| Beltermo Ultra | 100.0 | 0.042 | 2.350 | | L:0 0.000W/m ² K |
| Ampatex Sinco | - | - | - | | |
| SteicoFlex | 150.0 | 0.036 | 4.150 | | 9.000% Softwood (150.0mm) L:0 0.000W/m ² K |
| Ampatex Aero | - | - | - | | |
| Airspace, heat flow downwards, 300 mm thick | 300.0 | - | 0.230 | | |
| Deck underside surface resistance | | | 0.170 | | |
| Total thickness | 572.0mm | | | | |

Ground Floor Details

Floor type : Suspended floor

Calculation method : EN ISO 13370:2007

Perimeter : 42.00 m Area : 104.00 m²

P/A : 0.404 Characteristic dimension, B' : 4.952

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 : 0.157m²K/W

Description : Particleboard (600 mg/m³)

Edge insulation position : None

U-value = 0.13W/m²K

U-value, Combined Method : 0.129W/m²K (upper/lower limit 6.794 / 6.441m²K/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 Particleboard (600 mg/m ³) | 0.157 m ² K/W |
| Beltermo Ultra | 2.350 m ² K/W |
| Airspace, heat flow downwards, 300 mm thick | 0.230 m ² K/W |
| Deck underside surface resistance | 0.170 m ² K/W |
| Resistance of non-bridged layers, R _{NB} = | <u>3.077 m²K/W</u> |

Bridged layer

SteicoFlex (L1) bridged by Softwood (B1)

Path 1 - SteicoFlex

Path 2 - Softwood

Resistance and fraction of heat flow paths

$$R_{P1} = R_{NB} + R_{L1} = 3.077 + 4.150 = 7.227 \text{ m}^2\text{K/W} \quad F_{P1} = 91.000\%$$

$$R_{P2} = R_{NB} + R_{L2} = 3.077 + 1.154 = 4.231 \text{ m}^2\text{K/W} \quad F_{P2} = 9.000\%$$

Upper resistance limit

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

$$R_{upper} = 1 / \left(\frac{0.910}{7.227} + \frac{0.090}{4.231} \right) = 6.794 \text{ m}^2\text{K/W}$$

Lower resistance limit

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

$$R_{lower} = 3.077 + 1 / \left(\frac{0.910}{4.150} + \frac{0.090}{1.154} \right) = 6.441 \text{ m}^2\text{K/W}$$

Total resistance of suspended ground floor

$$R_F = \left(R_{upper} + R_{lower} \right) / 2 = (6.794 + 6.441) / 2 = 6.62 \text{ m}^2\text{K/W}$$

$$U_f = 0.151 \text{ m}^2\text{K/W}$$

Calculation of U-value for ground (U_g)

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

$$U_g = \left((2 \times 1.500) / \left((\pi \times 4.952) + 0.615 \right) \right) \times \ln \left(\frac{(\pi \times 4.952)}{0.615} + 1 \right) = 0.606$$

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

$$U_x = \left(2 \times \left(\frac{0.225 \times 1.700}{4.952} \right) + \left(\frac{1450 \times (0.002 \times 5.000 \times 0.050)}{4.952} \right) \right) = 0.264$$

Floor U-value, U:

$$1 / U = \left(\frac{1}{0.151} \right) + \left(\frac{1}{0.606 + 0.264} \right) = 7.766$$

$$U = 0.129 \text{ W/m}^2\text{K}$$

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}) = 0.13 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 Particleboard (600 mg/m ³) | 22.0 (22.0) | 0.0 | 0.0 | 0.0 |
| Beltermo Ultra | 0.0 (100.0) | 180.0 | 2100.0 | 0.0 |
| Ampatex Sinco | 0.0 (-) | 280.0 | 850.0 | 0.0 |
| SteicoFlex | 0.0 (150.0) | 0.0 | 0.0 | 0.0 |
| Ampatex Aero | 0.0 (-) | 300.0 | 850.0 | 0.0 |
| Airspace, heat flow downwards, 300 mm thick | 0.0 (300.0) | 1.2 | 1008.0 | 0.0 |
| Total kappa value | | | | 0.0 0.0000 |
| Limiting condition: | insulation | | | |

Admittance : 0.86 W/m²K Decrement : 0.00 factor Decrement delay : 0.00 hours