**Back to Earth SW Ltd**
7 Tuns Lane
Silverton, Exeter
Devon. EX5 4HY

***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 (m²K/W) | Pitch (º) | Bridge details Air gaps (Level, Delta U") |
|---|---|---|---|---|---|
| Inside surface | - | - | 0.170 | | |
| Floor deck Particleboard (600 mg/m³) | 22.0 | - | 0.157 | | |
| Beltermo Ultra | 60.0 | 0.042 | 1.400 | | L:0 0.000W/m²K |
| Ampatex Sinco | - | - | - | | |
| SteicoFlex | 200.0 | 0.036 | 5.550 | | 9.000% Softwood (200.0mm) L:0 0.000W/m²K |
| Ampatex Aero | - | - | - | | |
| Airspace, heat flow downwards, 300 mm thick | 300.0 | - | 0.230/0.000 | | |
| (Slightly vented cavity - width=12.0mm, hro=5.100, E1=0.900, E2=0.900, downward heat flow, opening area 1500 mm²/m) | | | | | |
| Deck underside surface resistance | | | 0.170 | | |
| **Total thickness** | **582.0mm** | | | | |

***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 : 0.130W/m²K (upper/lower limit 6.989 / 6.622m²K/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 (Uf)**

Construction includes 1 bridged layer

Non-bridged layers

| | |
|---|---|
| Inside surface | 0.170 m²K/W |
| Floor deck Particleboard (600 mg/m³) | 0.157 m²K/W |
| Beltermo Ultra | 1.400 m²K/W |
| Airspace, heat flow downwards, 300 mm thick | 0.230 m²K/W |
| Deck underside surface resistance | 0.170 m²K/W |
| Resistance of non-bridged layers, $R_{NB}$ = | 2.127 m²K/W |

Bridged layer

SteicoFlex (L1) bridged by Softwood (B1)

Path 1 - SteicoFlex
Path 2 - Softwood

Resistance and fraction of heat flow paths

$R_{P1} = R_{NB} + R_{L1} = 2.127 + 5.550 = 7.677$ m²K/W $F_{P1} = 91.000\%$
$R_{P2} = R_{NB} + R_{L2} = 2.127 + 1.538 = 3.665$ m²K/W $F_{P2} = 9.000\%$

Upper resistance limit

$R_{upper} = 1 / ( (F_{P1}/R_{P1}) + (F_{P2}/R_{P2}) )$
$R_{upper} = 1 / ( (0.910/7.677) + (0.090/3.665) ) = 6.989$m²K/W

Lower resistance limit

$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1}))$
$R_{lower} = 2.127 + 1 / ((0.910/5.550) + (0.090/1.538)) = 6.622$m²K/W

Total resistance of suspended ground floor

$R_F = ( R_{upper} + R_{lower} ) / 2 = (6.989 + 6.622) / 2 = 6.81$ m²K/W
$U_f = 0.147$ m²K/W

**Calculation of U-value for ground (Ug)**

Equivalent thickness of ground, dg = 0.300 + 1.500(0.170 + 0.000 + 0.040) = 0.615m

Ug = ((2 x 1.500) / ((Pi x 4.952) + 0.615)) x ln(((Pi x 4.952) / 0.615) + 1) = 0.606

**Calculation of U-value for sub-floor void (Ux)**

Ux = (2 x (0.225 x 1.700 / 4.952)) + (1450 x (0.002 x 5.000 x 0.050 / 4.952)) = 0.264

**Floor U-value, U:**

1 / U = (1 / 0.147) + (1 / (0.606 + 0.264)) = 7.954
U = 0.126 W/m²K

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) = 0.13 W/m²K

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***Thermal Mass Details***

| | Thickness assessed (actual) (mm) | Density (kg/m³) | Specific heat capacity (J/kgK) | Heat capacity (kJ/m²K) |
|---|---|---|---|---|
| Floor deck Particleboard (600 mg/m³) | 22.0 (22.0) | 0.0 | 0.0 | 0.0 |
| Beltermo Ultra | 0.0 (60.0) | 180.0 | 2100.0 | 0.0 |
| Ampatex Sinco | 0.0 (-) | 280.0 | 850.0 | 0.0 |
| SteicoFlex | 0.0 (200.0) | 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 | | | | 0.0 |
| kappa value | | | | 0.0000 |
| Limiting condition: | insulation | | | |

Admittance : 0.78 W/m²K Decrement : 0.00 factor Decrement delay : 0.00 hours