BUILDING TRUST

U-Value Calculation and Condensation Risk Assessment

Project Information

P-1066633 Stubbin Wood Nursery, Mansfield

Construction: Tapered Flat Roof - insulation / membrane fixed with telescopic tube fasteners

Construction Type: Flat Roof

File reference: 1-TC-250331-124539-973

Calculated U-value = $0.13 W/m^2K$

Selected Build-Up

Description	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m^2K/W)	Thermal Bridging	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)	
Inside Surface			0.100				
EXPOSED TIMBER JOISTS			0.000				
PLYWOOD DECKING	18.0	0.140	0.129		520.000	9.360	
1000 GAUGE 0.25mm POLYTHENE VAPOUR CONTROL LAYER	0.3		0.001			500.000	
SIKATHERM AL TAPERED	167.0	0.022	7.591			100.000	1
SINGLE PLY MEMBRANE (mechanically fixed)	1.5	0.160	0.009			138.000	
Outside Surface			0.040				

Key Bridged and fastened | Bridged | Fastened

Supporting Information

1. EFFECTIVE THICKNESS

Users should always refer to the most recent issue of the Product Data Sheet for the product concerned, copies of which will be supplied on request.

Detailed U-value

The calculation method is in accordance with BS EN ISO 6946:2017 / I.S. EN ISO 6946:2017. A simplified summary of the steps involved are shown below

$$Rtotal(R_{tot}) = R_{si} + R_1 + R_2 + \ldots + R_n + R_{se}$$

For a construction containing inhomogeneous layers the upper and lower resistances of the construction must be used

$$R_{tot;upper} = 1/((f_a/R_{tot;a}) + (f_b/R_{tot;b}) + \ldots + (f_q/R_{tot;q}))$$

$$R_j = 1/((f_a/R_{aj}) + (f_b/R_{bj}) + \ldots + (f_q/R_{qj}))$$

$$R_{tot;lower} = R_{si} + R_1 + R_2 + R_j + \ldots + R_n + R_{se}$$

$$R_{tot} = (R_{tot;upper} + R_{tot;lower})/2$$

$$= (7.869 + 7.869)/2$$

$$U = 1/R_{tot}$$

$$= 7.869$$

$$\Delta U = \Delta U_g + \Delta U_f + \Delta U_r$$

ΔU_g correction for air voids - 0.0000

ΔU_f correction for fasteners by approximate procedure - 0.0000

(Fastener 1 : alpha 0.00 | fasteners per m² 0.001 | fasteners cross sectional area 0.001 mm² | thermal conductivity of fasteners 0.00 W/mK)

ΔU_f correction for fasteners by detailed calculation method (rainscreen cladding) – 0.0000
(point thermal transmittance 0.000 W/K | fasteners per m² 0.000)

ΔU_r correction for inverted roofs – 0.0000
(precipitation 0.000 mm/day | f• x 0.0000)

Total U-value (U_c) $= U + \Delta U$
If ΔU is less than 3% of U then the corrections need not be applied.

Calculations including a steel frame construction are calculated in accordance with BRE Digest 465.

Condensation

Condensation calculations have been performed in accordance with BS EN ISO 13788:2012 and BS 5250:2021 and the risk assessed within environmental conditions with the following characteristics

Humidity class 4 - Sports halls, kitchens, canteens, school classrooms, hospitals and buildings heated with unflued gas heaters

Location: 4 Midlands

Condensation risk has been assessed up to and including Level 4 Humidity Class (4 - Sports halls, kitchens, canteens, school classrooms, hospitals and buildings heated with unflued gas heaters) within worst case environment conditions. The risk level is 1 in 20 years

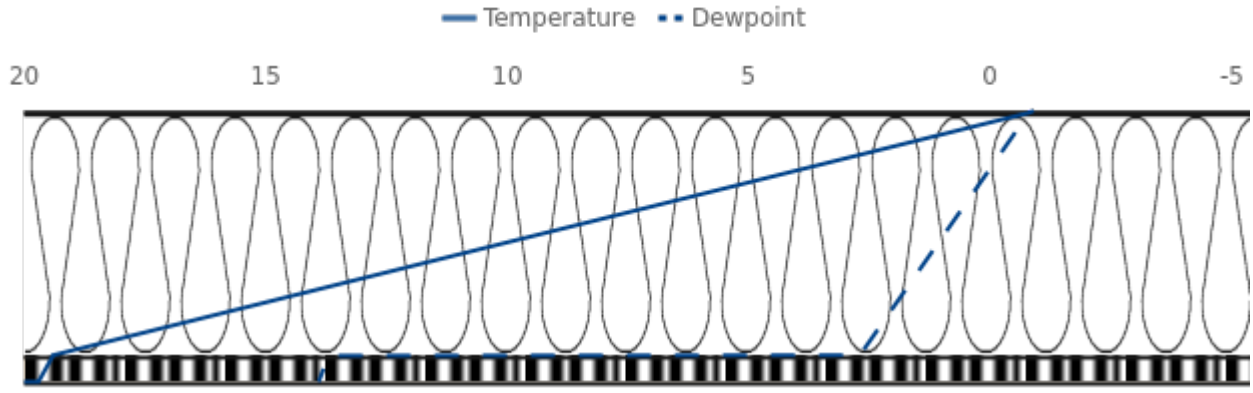
Condensation has been calculated to accumulate at the followings interfaces:

Interface1: SIKATHERM AL TAPERED / SINGLE PLY MEMBRANE (mechanically fixed)

Condensation Analysis

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Internal Temperature (°C)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Internal Relative Humidity (%)	67.8	67.4	67.5	65.5	65.7	66.5	68.2	69.3	68.5	68.4	68.6	69.5
External Temperature (°C)	-0.9	-0.9	1.2	3.6	6.6	10.0	11.8	11.4	9.2	6.0	2.0	0.2
External Relative Humidity (%)	89.0	87.5	83.5	79.5	80.0	78.5	79.0	81.5	83.5	87.0	88.0	89.5
Interface1 (Gc (kg/m²))	0.003	0.003	0.002	0.000	-0.001	-0.004	-0.005	-0.004	0.000	0.000	0.002	0.003
Interface1 (Ma (kg/m²))	0.009	0.011	0.013	0.013	0.012	0.008	0.003	0.000	0.000	0.000	0.003	0.006

Gc = Monthly moisture accumulation per area at an interface
Ma = Accumulated moisture content per area at an interface
Peak accumulated moisture content per area at interface1(Ma) = 0.013m Kg/m²
Annual moisture accumulation (Ma) = 0.000 Kg/m²
Peak moisture build-up month: March



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