

U-Value Calculator Results

17 November 2021

Corin Yarrow

Kingsway Houses

Dear Corin Yarrow,

Thank you for using the Kingspan Insulation U-Value Calculator.

The full specification for the construction you have selected and the result of your calculation are on the next page.

To purchase the insulation suggested by the calculation please visit kingspaninsulation.co.uk/stockists to find your nearest supplier.

Product information can be found on our website kingspaninsulation.co.uk, and provides more detailed information on construction build ups, sitework and installation guidance.

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Project ID : Online
Structure element : Pitched or mansard roof, ceiling at line of pitch
Description : Pitched roof - Ventilated
File reference : 1E14215233.FCF

Calculated 'U' value = 0.12W/m²K (Calculated in accordance with BS EN ISO 6946:2007)

Condensation risk has been assessed up to and including Level 4 Humidity Class (dwellings with high occupancy) within UK worst case environmental conditions.

Element Description	Element Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)	Mean T (K)	Delta T (K)
Outside surface resistance	-	-	0.172	-	-	78.32	0.22
TILES / SLATES ON BATTENS ; PITCHED ROOF.	30.0	0.000	0.000	0.00	0.00	78.43	0.00
SARKING FELT	2.0	0.230	0.000	0.00	50.00	78.43	0.00
VENTILATED RAFTER CAVITY	50.0	-	0.000	-	0.00	78.43	0.00
KOOLTHERM K107 - BETWEEN TIMBER RAFTERS 12.7% roof timber - 47mm @ 400mm ctrs + 1% for noggins + loft hatches (150.0mm)	150.0	0.018	8.333	-	24.50	83.86	0.86
KOOLTHERM K118 (12.5mm plasterboard internal finish)	62.5	-	2.844	-	100.00	91.14	3.71
PLASTER SKIM	3.0	0.180	0.017	60.00	0.18	93.01	0.02
Inside surface resistance	-	-	0.100	-	-	93.08	0.13

Detailed U-value Calculation Results

Construction includes 1 bridged layer.

Non-bridged layers

Outside surface resistance	0.172 m²K/W
KOOLTHERM K118 (12.5mm plasterboard internal finish)	2.844 m²K/W
PLASTER SKIM	0.017 m²K/W
Inside surface resistance	0.100 m²K/W
Resistance of non-bridged layers, R_{NB}	3.133 m²K/W

Not all insulation thicknesses shown may currently be stocked, so please check with Kingspan Insulation Customer Service Department on 01544 388601.

Whilst the information and/or specification contained herein is to the best of our knowledge true and accurate we specifically exclude any liability for errors, omissions or otherwise arising therefrom. Details, practices, principles, values and calculations should be verified as to accuracy and suitability for the required purpose for use.

Detailed U-value Calculation Results (continued)

Resistance of heat flow paths

$$R_{P1} = R_{NB} + R_{L1} = 3.133 + 8.333 = 11.466 \text{ m}^2\text{K/W} \quad F_{P1} = 87.251\%$$

$$R_{P2} = R_{NB} + R_{L2} = 3.133 + 1.154 = 4.287 \text{ m}^2\text{K/W} \quad F_{P2} = 12.749\%$$

Fraction of face area of materials

KOOLTHERM K107 - BETWEEN TIMBER RAFTERS, $F_{L1} = 87.3\%$ roof timber - 47mm @ 400mm ctrs + 1% for noggins + loft hatches, $F_{B1} = 12.7\%$

Upper resistance limit

$$R_{upper} = 1 / ((F_{P1}/R_{P1}) + (F_{P2}/R_{P2}))$$

$$R_{upper} = 1 / ((0.873/11.466) + (0.127/4.287)) = 9.449 \text{ m}^2\text{K/W}$$

Lower resistance limit

$$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1}))$$

$$R_{lower} = 3.133 + 1 / ((0.8725/8.3333) + (0.1275/1.1538)) = 7.780 \text{ m}^2\text{K/W}$$

Total resistance of roof

$$R_T = (R_{upper} + R_{lower}) / 2 = (9.449 + 7.780) / 2 = 8.614 \text{ m}^2\text{K/W}$$

(Correction for mechanical fasteners, $\Delta U_f = 0.0000 \text{ W/m}^2\text{K}$ | Correction for air gaps, $\Delta U_g = 0.0000 \text{ W/m}^2\text{K}$)(Alpha 0.0 m^{-1} | Fasteners per square metre 0.0000)(Fasteners cross-sectional area 0.000 mm^2 | Thermal conductivity of fastener 0.00 W/mK) $(\Delta U_f + \Delta U_g)$ is less than 3% of $(1 / R_T)$ so $U = (1 / R_T) = 0.12 \text{ W/m}^2\text{K}$ **For further information on the specified products, e.g. literature or specification clauses, please follows the links below:-**[KOOLTHERM K107](#)

Project ID : Online
Structure element : Pitched or mansard roof, ceiling at line of pitch
Description : Pitched roof - Ventilated
File reference : **1E14215233.FCF**
Humidity Class: 4 - Dwellings with high occupancy, sport halls, kitchens, canteens; buildings heated with unflued gas heaters
Location: 1c Scotland West

Condensation calculations performed in accordance with BS5250: 2011

Condensation risk has been assessed up to and including Level 4 Humidity Class (dwellings with high occupancy) within UK worst case environmental conditions.

Not all insulation thicknesses shown may currently be stocked, so please check with Kingspan Insulation Customer Service Department on 01544 388601.

Condensation is occurring at the following layers interfaces:-
Interface 1 : VENTILATED RAFTER CAVITY / KOOLTHERM K107 - BETWEEN TIMBER RAFTERS

Month	Int (°C)	Int (%RH)	Ext (°C)	Ext (%RH)	Interface 1	
					Gc (Kg/m²)	Ma (Kg/m²)
Jan	20.0	69.5	-0.2	90.5	0.02	0.09
Feb	20.0	68.7	-0.2	87.5	0.02	0.11
Mar	20.0	71.9	1.5	85.5	0.02	0.13
Apr	20.0	69.7	3.7	83.0	0.02	0.15
May	20.0	68.0	6.7	81.5	0.01	0.16
Jun	20.0	68.6	9.7	82.5	0.00	0.16
Jul	20.0	70.4	11.2	84.5	-0.01	0.15
Aug	20.0	71.4	10.9	86.5	0.00	0.15
Sep	20.0	71.1	8.7	88.0	0.01	0.01
Oct	20.0	71.2	6.1	89.0	0.02	0.03
Nov	20.0	72.9	2.1	90.0	0.02	0.05
Dec	20.0	74.2	0.5	91.0	0.02	0.07

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 interface (Ma) = 0.16 Kg/m²

Annual moisture accumulation (Ma) = 0.15 Kg/m²

Peak moisture build-up month : December

Internal conditions : 20.0°C @ 69.5%RH

External conditions : -0.2°C @ 90.5%RH

