

Quinn Building Products

U-Value Calculator

QUINN BUILDING PRODUCTS

U-Value
0.13
W/m²·K

Email my U-Value

Construction Type:

Floors

Walls

Pitched Roof

Flat Roof

Insulation Solution:

Pitched roof: insulated above rafters (Quinn Therm QR) ↕

Rafter Dimensions:

47

mm

175

mm

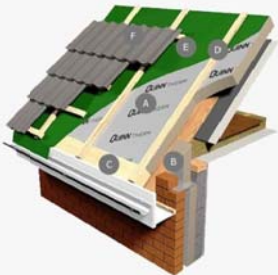
600mm

150mm

Insulation over rafters:

20mm 30mm 50mm 70mm 90mm 110mm 125mm 140mm

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Pitched roof: insulated above rafters (Quinn Therm QR)

1. Quinn Therm QR PIR insulation boards
2. Quinn Therm QR PIR insulation boards
3. Stop batten
4. Counter battens
5. Vapour open underlay
6. Roof covering

QUINN Building Products

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Project Information

Reference

Date 3 April 2020

Construction Type

Element : Pitched roof, ceiling at rafter line - Pitched roof: insulated above rafters (Quinn Therm QR)

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")
Outside surface resistance	-	-	0.100		
Tiling including batten space	-	-	0.120		
Cavity between counter batten	-	-	0.000		
Breather membrane	-	-	-		
Quinn Therm QR over rafter	150.0	0.022	6.818		L:0 0.000W/m ² K
Cavity (low emissivity) rafter space	175.0	-	0.454		11.750% Timber (175.0mm)
Polythene, 1000 gauge, VCL + Air Leakage Barrier	-	-	-		
GTEC Standard Board	12.5	0.250	0.050		
Inside surface resistance	-	-	0.040		

U-value = 0.13W/m²K

U-value, Combined Method : 0.131W/m²K (upper/lower limit 7.677 / 7.621m²K/W, dUf 0.0037, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

Correction factors

Mechanical fasteners :-

Alpha : 0.80 per m lambda f : 17.0000W/mK nf : 6.700 per m² Af : 7.450mm² Recess : 0.0mm

Delta Uf for Quinn Therm QR over rafter : 0.0037

nf = fasteners per m² Af = fasteners cross-sectional area

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

Construction includes 1 bridged layer

Non-bridged layers

Outside surface resistance	0.100 m ² K/W
Tiling including batten space	0.120 m ² K/W
Quinn Therm QR over rafter	6.818 m ² K/W
GTEC Standard Board	0.050 m ² K/W
Inside surface resistance	0.040 m ² K/W
Resistance of non-bridged layers, R_{NB} =	<u>7.128 m²K/W</u>

Bridged layer

Cavity (low emissivity) rafter space (L1) bridged by Timber (B1)

Path 1 - Cavity (lo

Path 2 - Timber

Resistance and fraction of heat flow paths

$$R_{P1} = R_{NB} + R_{L1} = 7.128 + 0.454 = 7.582 \text{ m}^2\text{K/W} \quad F_{P1} = 88.250\%$$

$$R_{P2} = R_{NB} + R_{L2} = 7.128 + 1.346 = 8.474 \text{ m}^2\text{K/W} \quad F_{P2} = 11.750\%$$

Upper resistance limit

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

$$R_{upper} = 1 / ((0.882/7.582) + (0.118/8.474)) = 7.677 \text{ m}^2\text{K/W}$$

Lower resistance limit

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

$$R_{lower} = 7.128 + 1 / ((0.882/0.454) + (0.118/1.346)) = 7.621 \text{ m}^2\text{K/W}$$

Total resistance of roof

$$R_T = (R_{upper} + R_{lower}) / 2 = (7.677 + 7.621) / 2 = 7.65 \text{ m}^2\text{K/W}$$

Mechanical fasteners :-

Calculations to BS EN ISO 6946:2007

Alpha : 0.80 per m lambda f : 17.0000W/mK nf : 6.700 per m² Af : 7.450mm² Recess : 0.0mm

Delta Uf for Quinn Therm QR over rafter : 0.0037

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 $U = (1 / R_T) + (\Delta U_r) + (\Delta U_{rc}) = 0.13 \text{ W/m}^2\text{K}$