

# Calculations

Construction type

Floors

Walls

Pitched  
Roof

Flat Roof

Wall Type

Structural Insulated Panel (SIP)



External Finish

Timber cladding



Cavity Type

Kingspan TEK 142mm



Insulation Thickness



40mm

50mm

60mm



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U-value

0.13

W/m<sup>2</sup>.K

0.10



0.20

[Click here to view construction build-up](#)

Construction build-up includes:

3mm skim coated 12.5mm  
plasterboard  
50x25mm timber battens  
Kingspan Thermawall TW55  
Kingspan TEK Building System Panel  
Kingspan nilvent breathable  
membrane  
Counter battens  
Timber cladding.

[See website for more details](#)



Kingspan TEK Building System

Project ID : Online  
Structure element : Wall  
Description : Structural Insulated Panels (SIPs)  
File reference : 1S13BM5A20.FCF

**Calculated 'U' value = 0.13W/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	-	-	0.141	-	-	78.34	0.26
TIMBER CLADDING	10.0	0.140	0.000	60.00	0.60	78.47	0.00
COUNTER BATTEN CAVITY	38.0	-	0.000	-	0.00	78.47	0.00
<a href="#">KINGSPAN NILVENT.17 BREATHABLE MEMBRANE</a>	0.5	-	0.006	-	0.25	78.47	0.01
<a href="#">TEK 142 WALL PANEL(4% bridge, 15/112/15mm) 4.0% Timber (142.0mm)</a>	142.0	-	4.897	-	49.00	82.94	8.93
<a href="#">KINGSPAN THERMAWALL TW55</a>	50.0	0.022	2.273	-	100.00	89.48	4.14
TIMBER BATTEN CAVITY; U/V. 11.4% wall timber - 47mm batten @ 600mm ctrs + 47mm noggins @ 1200mm ctrs (25.0mm)	25.0	-	0.665	-	0.05	92.16	1.21
PLASTERBOARD	12.5	0.190	0.066	50.00	0.63	92.82	0.12
PLASTER SKIM	3.0	0.180	0.017	60.00	0.18	92.90	0.03
Inside surface resistance	-	-	0.130	-	-	93.03	0.24

### Detailed U-value Calculation Results

Construction includes 2 bridged layers.

#### Non-bridged layers

Outside surface resistance	0.141 m²K/W
KINGSPAN NILVENT.17 BREATHABLE MEMBRANE	0.006 m²K/W
KINGSPAN THERMAWALL TW55	2.273 m²K/W
PLASTERBOARD	0.066 m²K/W
PLASTER SKIM	0.017 m²K/W
Inside surface resistance	0.130 m²K/W
Resistance of non-bridged layers, $R_{NB}$ =	<u>2.632 m²K/W</u>

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

$$R_{P1} = R_{NB} + R_{L1} = 2.632 + 5.562 = 8.194 \text{ m}^2\text{K/W} \quad F_{P1} = 85.015\%$$

$$R_{P2} = R_{NB} + R_{L2} = 2.632 + 1.757 = 4.390 \text{ m}^2\text{K/W} \quad F_{P2} = 3.542\%$$

$$R_{P3} = R_{NB} + R_{L3} = 2.632 + 5.089 = 7.722 \text{ m}^2\text{K/W} \quad F_{P3} = 10.985\%$$

$$R_{P4} = R_{NB} + R_{L4} = 2.632 + 1.285 = 3.917 \text{ m}^2\text{K/W} \quad F_{P4} = 0.458\%$$

Fraction of face area of materials

TEK 142 WALL PANEL(4% bridge, 15/112/15mm),  $F_{L1} = 96.0\%$ Timber,  $F_{B1} = 4.0\%$ TIMBER BATTEN CAVITY; U/V.,  $F_{L2} = 88.6\%$ wall timber - 47mm batten @ 600mm ctrs + 47mm noggins @ 1200mm ctrs,  $F_{B2} = 11.4\%$ 

Fraction of face area of heat flow paths

$$F_{P1} = F_{L1} \times F_{L2} = 0.850$$

$$F_{P2} = F_{L1} \times F_{B2} = 0.110$$

$$F_{P3} = F_{B1} \times F_{L2} = 0.035$$

$$F_{P4} = F_{B1} \times F_{B2} = 0.005$$

Upper resistance limit

$$R_{upper} = 1 / ((F_{P1}/R_{P1}) + (F_{P2}/R_{P2}) + (F_{P3}/R_{P3}) + (F_{P4}/R_{P4}))$$

$$R_{upper} = 1 / ((0.850/8.194) + (0.110/4.390) + (0.035/7.722) + (0.005/3.917)) = 7.861 \text{ m}^2\text{K/W}$$

Lower resistance limit

$$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1})) + 1 / ((F_{L2}/R_{L2}) + (F_{B2}/R_{B2}))$$

$$R_{lower} = 2.632 + 1 / ((0.9600/4.8970) + (0.0400/1.0923)) + 1 / ((0.8856/0.6651) + (0.1144/0.1923)) = 7.449 \text{ m}^2\text{K/W}$$

Total resistance of wall

$$R_T = (R_{upper} + R_{lower}) / 2 = (7.861 + 7.449) / 2 = 7.655 \text{ m}^2\text{K/W}$$

(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  $0.0 \text{ m}^{-1}$  | Fasteners per square metre 0.0000)(Fasteners cross-sectional area  $0.000 \text{ mm}^2$  | Thermal conductivity of fastener  $0.00 \text{ W/mK}$ )(Delta  $U_f + \Delta U_g$ ) is less than 3% of  $(1 / R_t)$  so  $U = (1 / R_t) = 0.13 \text{ W/m}^2\text{K}$ **For further information on the specified products, e.g. literature or specification clauses, please follows the links below:-**[Nilvent.17](#)[TEK](#)[Thermawall TW55](#)

Project ID : Online  
Structure element : Wall  
Description : Structural Insulated Panels (SIPs)  
File reference : **1S13BM5A20.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

Month	Int (°C)	Int (%RH)	Ext (°C)	Ext (%RH)
Jan	20.0	69.5	-0.2	90.5
Feb	20.0	68.7	-0.2	87.5
Mar	20.0	71.9	1.5	85.5
Apr	20.0	69.7	3.7	83.0
May	20.0	68.0	6.7	81.5
Jun	20.0	68.6	9.7	82.5
Jul	20.0	70.4	11.2	84.5
Aug	20.0	71.4	10.9	86.5
Sep	20.0	71.1	8.7	88.0
Oct	20.0	71.2	6.1	89.0
Nov	20.0	72.9	2.1	90.0
Dec	20.0	74.2	0.5	91.0

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) = 0.00 Kg/m²  
Annual moisture accumulation (Ma) = 0.00 Kg/m²

