

Project ID : Online
Structure element : Wall
Description : Brick and block cavity wall, full fill (with 10mm cavity) cavity less than or equal to 125mm
File reference : 1Z16AP46F8.FCF

Calculated 'U' value = 0.13W/m²K (Calculated in accordance with BS EN ISO 6946:2017)

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 (MN/gm)	Vapour Resistance (MNs/g)	Mean T (K)	Delta T (K)
Outside surface resistance	-	-	0.040	-	-	78.25	0.08
BRICKWORK FACING	102.5	0.770	0.133	42.00	4.31	78.41	0.26
UNV. A/SPACE;	10.0	-	0.150	-	0.05	78.69	0.29
KOOLTHERM K106	115.0	0.018	6.389	-	100.00	84.97	2.28
AERATED BLOCK (k-value = 0.15 W/mK) 6.6% Mortar (100.0mm)	100.0	0.150	0.667	45.00	4.50	91.75	1.28
PLASTER DABS CAVITY. 20.0% Plaster dabs (15.0mm)	15.0	-	0.180	-	0.05	92.57	0.35
PLASTERBOARD	12.5	0.190	0.066	50.00	0.63	92.80	0.13
PLASTER SKIM	3.0	0.180	0.017	60.00	0.18	92.88	0.03
Inside surface resistance	-	-	0.130	-	-	93.03	0.25

Detailed U-value Calculation Results

Construction includes 3 bridged layers.

Non-bridged layers

Outside surface resistance	0.040 m²K/W
BRICKWORK FACING	0.133 m²K/W
UNV. A/SPACE;	0.150 m²K/W
KOOLTHERM K106	6.389 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>6.924 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

$$R_{P1} = R_{NB} + R_{L1} = 6.924 + 0.847 = 7.771 \text{ m}^2\text{K/W} \quad F_{P1} = 74.746\%$$

$$R_{P2} = R_{NB} + R_{L2} = 6.924 + 0.294 = 7.218 \text{ m}^2\text{K/W} \quad F_{P2} = 5.254\%$$

$$R_{P3} = R_{NB} + R_{L3} = 6.924 + 0.702 = 7.626 \text{ m}^2\text{K/W} \quad F_{P3} = 18.686\%$$

$$R_{P4} = R_{NB} + R_{L4} = 6.924 + 0.149 = 7.073 \text{ m}^2\text{K/W} \quad F_{P4} = 1.314\%$$

Fraction of face area of materials

BRICKWORK FACING, $F_{L1} = 93.3\%$

Mortar, $F_{B1} = 6.7\%$

AERATED BLOCK (k-value = 0.15 W/mK), $F_{L2} = 80.0\%$

Mortar, $F_{B2} = 20.0\%$

Fraction of face area of heat flow paths

$$F_{P1} = F_{L1} \times F_{L2} = 0.747$$

$$F_{P2} = F_{L1} \times F_{B2} = 0.187$$

$$F_{P3} = F_{B1} \times F_{L2} = 0.053$$

$$F_{P4} = F_{B1} \times F_{B2} = 0.013$$

Upper resistance limit

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

$$R_{upper} = 1 / ((0.747/7.771) + (0.053/7.218) + (0.187/7.626) + (0.013/7.073)) = 7.703 \text{ m}^2\text{K/W}$$

Lower resistance limit

$$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1})) + 1 / ((F_{L2}/R_{L2}) + (F_{B2}/R_{B2})) + 1 / ((F_{L3}/R_{L3}) + (F_{B3}/R_{B3}))$$

$$R_{lower} = 6.924 + 1 / ((0.9333/0.6667) + (0.0667/0.1136)) + 1 / ((0.8000/0.1804) + (0.2000/0.0349)) + 1 / ((0.0000/0.0000) + (1.0000/0.0000)) = 7.526 \text{ m}^2\text{K/W}$$

Total resistance of wall

$$R_T = (R_{upper} + R_{lower}) / 2 = (7.703 + 7.526) / 2 = 7.614 \text{ m}^2\text{K/W}$$

(Correction for mechanical fasteners, Delta Uf = 0.0025W/m²K | Correction for air gaps, Delta Ug = 0.0000W/m²K)

(Alpha 0.8 m⁻¹ | Fasteners per square metre 2.5000)

(Fasteners cross-sectional area 12.500 mm² | Thermal conductivity of fastener 17.00 W/mK)

(Delta Uf + Delta Ug) is less than 3% of (1 / Rt) so U = (1 / Rt) = 0.13W/m²K