BBA CERTIFICATE CS/1004-4 U Value Competency Scheme

Kingspan

Project ID : Online
Structure element : Flat roof
Description : Flat roof - bonded
File reference : 1Z178J40B5.FCF

Calculated 'U' value = 0.18W/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 (MNs/gm)	Vapour Resistance (MNs/g)	Mean T (K)	Delta T (K)
Outside surface resistance	-	-	0.040	-	-	78.26	0.11
BITUMEN ROOFING 3 LAYERS	9.0	0.230	0.039	0.00	850.00	78.37	0.10
KINGSPAN THERMAROOF TR27	120.0	0.024	5.000	300.00	36.00	85.11	3.39
VAPOUR CHECK BITUMINOUS	3.0	0.230	0.013	0.00	300.00	91.82	0.03
SAND CEMENT SCREED	50.0	1.400	0.036	100.00	5.00	91.89	0.10
CONCRETE 1:2:4 2000 kg/m³	150.0	1.400	0.107	100.00	15.00	92.08	0.29
TIMBER BATTEN CAVITY; U/V. 8.8% roof timber - 47mm @ 600mm ctrs + 1% for noggins + loft hatches (25.0mm)	25.0	-	0.163	-	0.05	92.44	0.44
PLASTERBOARD	12.5	0.190	0.066	50.00	0.63	92.75	0.18
PLASTER SKIM	3.0	0.180	0.017	60.00	0.18	92.86	0.04
Inside surface resistance	-	-	0.100	-	-	93.02	0.27

Detailed U-value Calculation Results

Construction includes 1 bridged layer.

Non-bridged layers
Outside surface resistance 0.040 m²K/W
BITUMEN ROOFING 3 LAYERS 0.039 m²K/W
KINGSPAN THERMAROOF TR27 5.000 m²K/W
VAPOUR CHECK BITUMINOUS 0.013 m²K/W
SAND CEMENT SCREED 0.036 m²K/W
CONCRETE 1:2:4 2000 kg/m³ 0.107 m²K/W
PLASTERBOARD 0.066 m²K/W
PLASTER SKIM 0.017 m²K/W
Inside surface resistance 0.100 m²K/W
Resistance of non-bridged layers, R_{NB} = 5.417 m²K/W

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

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Detailed U-value Calculation Results (continued)

Resistance of heat flow paths
$R_{P1} = R_{NB} + R_{L1}$ = 5.417 + 0.163 = 5.581 m²K/W F_{P1} = 91.167%
$R_{P2} = R_{NB} + R_{L2}$ = 5.417 + 0.192 = 5.610 m²K/W F_{P2} = 8.833%

Fraction of face area of materials
TIMBER BATTEN CAVITY; U/V., F_{L1} = 91.2%
roof timber - 47mm @ 600mm ctrs + 1% for noggins + loft hatches, F_{B1} = 8.8%

Upper resistance limit
$R_{upper} = 1 / ((F_{P1}/R_{P1}) + (F_{P2}/R_{P2}))$
R_{upper} = 1 / ((0.912/5.581) + (0.088/5.610)) = 5.583m²K/W
Lower resistance limit
$R_{lower} = R_{NB} + 1 / ((F_{L1}/R_{L1}) + (F_{B1}/R_{B1}))$
R_{lower} = 5.417 + 1 / ((0.9117/0.1633) + (0.0883/0.1923)) = 5.583 m²K/W

Total resistance of roof
$R_T = (R_{upper} + R_{lower}) / 2$ = (5.583 + 5.583) / 2 = 5.583 m²K/W

(Correction for mechanical fasteners, Delta Uf = 0.0000W/m²K | Correction for air gaps, Delta Ug = 0.0000W/m²K)
(Alpha 0.0 m⁻¹ | Fasteners per square metre 0.0000)
(Fasteners cross-sectional area 0.000 mm² | Thermal conductivity of fastener 0.00 W/mK)

(Delta Uf + Delta Ug) is less than 3% of (1 / Rt) so U = (1 / Rt) = 0.18W/m²K

For further information on the specified products, e.g. literature or specification clauses, please follows the links below:-

Thermaroof TR27 LPC / FM

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BBA CERTIFICATE CS/1004-4 U Value Competency Scheme

Kingspan

Project ID : Online
Structure element : Wall
Description : Brick and block cavity wall, partial fill, 2.5 ties per m², cavity greater than 125mm
File reference : 1E13224F68.FCF

Calculated 'U' value = 0.17W/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 (MNs/gm)	Vapour Resistance (MNs/g)	Mean T (K)	Delta T (K)
Outside surface resistance	-	-	0.040	-	-	78.26	0.09
BRICKWORK FACING	102.5	0.770	0.133	42.00	4.31	78.46	0.31
UNV. A/SPACE;	50.0	-	0.665	-	0.05	79.40	1.57
KOOLTHERM K108	80.0	0.018	4.444	-	100.00	85.42	0.47
AERATED BLOCK (k-value = 0.15 W/mK) 6.6% Mortar (100.0mm)	100.0	0.150	0.667	45.00	4.50	91.44	1.57
PLASTER DABS CAVITY. 20.0% Plaster dabs (15.0mm)	15.0	-	0.180	-	0.05	92.44	0.42
PLASTERBOARD	12.5	0.190	0.066	50.00	0.63	92.73	0.15
PLASTER SKIM	3.0	0.180	0.017	60.00	0.18	92.82	0.04
Inside surface resistance	-	-	0.130	-	-	93.00	0.31

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; 0.665 m²K/W
KOOLTHERM K108 4.444 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} = 5.495 m²K/W

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Kingspan

Detailed U-value Calculation Results (continued)

Resistance of heat flow paths
$R_{P1} = R_{NB} + R_{L1}$ = 5.495 + 0.847 = 6.342 m²K/W F_{P1} = 74.746%
$R_{P2} = R_{NB} + R_{L2}$ = 5.495 + 0.294 = 5.789 m²K/W F_{P2} = 5.254%
$R_{P3} = R_{NB} + R_{L3}$ = 5.495 + 0.702 = 6.197 m²K/W F_{P3} = 18.686%
$R_{P4} = R_{NB} + R_{L4}$ = 5.495 + 0.149 = 5.644 m²K/W 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 / ((0.747/6.342) + (0.053/5.789) + (0.187/6.197) + (0.013/5.644)) = 6.273m²K/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} = 5.495 + 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)) = 6.097 m²K/W

Total resistance of wall
$R_T = (R_{upper} + R_{lower}) / 2$ = (6.273 + 6.097) / 2 = 6.185 m²K/W

(Correction for mechanical fasteners, Delta Uf = 0.0049W/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 23.400 mm² | Thermal conductivity of fastener 17.00 W/mK)

(Delta Uf + Delta Ug) is less than 3% of (1 / Rt) so U = (1 / Rt) = 0.17W/m²K

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BBA CERTIFICATE CS/1004-2 U Value Competency Scheme

Kingspan

Project ID : Online
Structure element : Solid Ground floor
Description : Solid ground floor (insulation beneath screed / concrete slab)
File reference : 1Q135Q6209.FCF

Calculated 'U' value = 0.18W/m²K (Calculated in accordance with BS EN ISO 13370:2007)

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)	Mean T (K)	Delta T (K)
Inside surface	-	-	0.170	92.75	0.81
SAND CEMENT SCREED	65.0	1.400	0.046	92.23	0.22
POLYTHENE SEPARATION LAYER	0.5	-	0.001	92.12	0.00
KOOLTHERM K103	50.0	0.018	2.778	85.51	3.20
CONCRETE 1:2:4 2000 kg/m³	150.0	1.400	0.107	78.66	0.51
DAMP PROOF MEMBRANE	0.9	-	0.001	78.40	0.00
Ground	-	-	0.040	78.30	0.19

Ground Floor Details

Calculation method : Perimeter / Area (As defined in BRE IP 3/90)
Perimeter : 0.00m
Area : 0.00m²
P/A : 0.200
Floor type : Solid floor
Earth conductivity : 2.000W/mK
Soil type : Sand or Gravel

Detailed U-value Calculation Results

Total resistance of solid ground floor
$R_T = (R_{upper} + R_{lower}) / 2$ = (3.143 + 3.143) / 2 = 3.143 m²K/W

(Correction for mechanical fasteners, Delta Uf = 0.0000W/m²K | Correction for air gaps, Delta Ug = 0.0000W/m²K)
(Alpha 0.0 m⁻¹ | Fasteners per square metre 0.0000)
(Fasteners cross-sectional area 0.000 mm² | Thermal conductivity of fastener 0.00 W/mK)

(Delta Uf + Delta Ug) is less than 3% of (1 / Rt) so U = (1 / Rt) = 0.18W/m²K

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Rev	Description	Date

CODE SUITABILITY DESCRIPTION

STATUS PURPOSE OF ISSUE

AUTODESK
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PROJECT
Student Accomodation

TITLE
U-value certification

CLIENT
Owner

DRAWN BY Aidan Smith | CHECKED BY Checker | DATE 26/04/21

SCALE (@ A1) | PROJECT NUMBER 1

DRAWING NUMBER A104 | REV

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