U-Value Calculation and Condensation Risk Assessment

Project Information

3 Fernside Ave, Huddersfield HD5 8NR

Construction: Internal Dry Lining Wall - mechanically fastened

Construction Type: Wall

File reference: 1-RC-230907-100134-592

Calculated U-value = $0.31 W/m^2K$

Selected Build-Up

Description	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Thermal Bridging	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)	
Inside Surface			0.130				
KOOLTHERM K118 62.5mm (12.5mm plasterboard internal finish)	62.5		2.697			102.100	
TIMBER BATTEN CAVITY; U/V.	25.0		0.486	11.4% wall timber - 47mm batten @ 600mm ctrs + 47mm noggins @ 1200mm ctrs, 600.0 centres		0.050	
PLASTER SKIM	2.0	0.180	0.011		60.000	0.120	
PLASTERBOARD	13.0	0.190	0.068		50.000	0.650	
SANDSTONE	300.0	2.300	0.146	6.6% Mortar, 450.0 centres	135.000	40.500	
Outside Surface			0.040				

Key Bridged and fastened Bridged Fastened

Supporting Information

Product Details

For further information on the specified products e.g. literature or specification clauses, please follow the links below or scan the QR code to the right:

Kingspan Kooltherm K118 Insulated Plasterboard
www.kingspaninsulation.co.uk/k118

Detailed U-value

The calculation method is in accordance with BS EN ISO 6946:2017 / I.S. EN ISO 6946:2017. A simplified summary of the steps involved are shown below

$$Rtotal(R_{tot}) = R_{si} + R_1 + R_2 + \ldots + R_n + R_{se}$$

For a construction containing inhomogeneous layers the upper and lower resistances of the construction must be used

$$R_{tot;upper} = 1/((f_a/R_{tot;a}) + (f_b/R_{tot;b}) + \ldots + (f_q/R_{tot;q}))$$

$$R_j = 1/((f_a/R_{aj}) + (f_b/R_{bj}) + \ldots + (f_q/R_{qj}))$$

$$R_{tot;lower} = R_{si} + R_1 + R_2 + R_j + \ldots + R_n + R_{se}$$

$$R_{tot} = (R_{tot;upper} + R_{tot;lower})/2$$

$$= (3.574 + 3.520)/2$$

$$U = 1/R_{tot}$$

$$= 3.547$$

$$\Delta U = \Delta U_g + \Delta U_f + \Delta U_r$$

ΔU_g correction for air voids - 0.0000

ΔU_f correction for fasteners by approximate procedure - 0.0240

(Fastener 1 : alpha 0.80 | fasteners per m² 16.700 | fasteners cross sectional area 4.000 mm² | thermal conductivity of fasteners 50.00 W/mK)

ΔU_f correction for fasteners by detailed calculation method (rainscreen cladding) – 0.0000
(point thermal transmittance 0.000 W/K | fasteners per m² 0.000)

ΔU_r correction for inverted roofs – 0.0000
(precipitation 0.000 mm/day | f• x 0.0000)

Total U-value $(U_c) = U + \Delta U$
If ΔU is less than 3% of U then the corrections need not be applied.

Calculations including a steel frame construction are calculated in accordance with BRE Digest 465.

Condensation

Condensation calculations have been performed in accordance with BS EN ISO 13788:2012 and BS 5250:2021 and the risk assessed within environmental conditions with the following characteristics

Humidity class 2 - Offices, shops and dwellings with low occupancy

Location: 6 S Wales & England SW

Condensation risk has been assessed up to and including Level 2 Humidity Class (2 - Offices, shops and dwellings with low occupancy) within worst case environment conditions. The risk level is 1 in 20 years

Condensation has been calculated to accumulate at the followings interfaces:

Interface1: PLASTERBOARD / SANDSTONE

Condensation Analysis

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Internal Temperature (°C)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Internal Relative Humidity (%)	53.8	52.9	53.6	54.8	58.6	64.3	69.2	69.7	66.4	62.4	56.5	55.0
External Temperature (°C)	3.9	3.7	4.9	6.8	9.5	12.3	14.1	14.0	12.3	9.9	6.5	5.0
External Relative Humidity (%)	89.5	87.5	86.0	83.5	83.0	83.5	84.5	85.5	87.0	89.0	88.5	89.5
Interface1 (Gc (kg/m²))	0.002	0.001	-0.002	-0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Interface1 (Ma (kg/m²))	0.003	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001

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 interface1 (Ma) = 0.003m Kg/m²

Annual moisture accumulation (Ma) = 0.000 Kg/m²

Peak moisture build-up month: January

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