U-Value Calculation and Condensation Risk Assessment

Project Information	3 Fernside Avenue, HD5 8NR
	Construction: EXISTING WALL BUILD UP
	Construction Type: Wall
	File reference: 1-HE-231011-092225-599
	Calculated U-value = $2.66 W/m^2K$

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				
SANDSTONE	450.0	2.300	0.220	6.6% Mortar, 450.0 centres	135.000	60.750	
Outside Surface			0.040				

Key Bridged and fastened Bridged Fastened

Supporting Information

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

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

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

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

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

$$= (0.378 + 0.374)/2$$

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

$$= 0.376$$

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

ΔU_g correction for air voids - 0.0000

ΔU_f correction for fasteners by approximate procedure - 0.0000

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: 2 England E & NE

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 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 (%)	51.6	51.1	51.3	52.9	56.5	61.9	66.1	66.9	63.1	58.8	53.5	52.3
External Temperature (°C)	1.2	1.3	3.4	5.5	8.8	11.9	13.8	13.7	11.6	8.3	4.0	1.9
External Relative Humidity (%)	90.0	88.0	83.5	82.5	81.0	81.0	81.0	82.5	84.0	87.5	88.5	90.5

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 all interfaces (Ma) = 0.000 Kg/m²

Annual moisture accumulation (Ma) = 0.000 Kg/m²

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