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DESIGN DATA SHEET 001

5424 – St KATHERINE'S HOUSE

0.15 W/m²K U VALUE – WALL



U-Value Calculation and Condensation Risk Assessment

Project Information	St Catherines House, Shorne, Gravesend
	Construction: Cavity wall - partial fill, 2.5 ties per m ² , cavity greater than 125mm
	Construction Type: Wall
	File reference: 1-JS-241125-152848-807
	Calculated U-value = 0.15W/m ² K

Selected Build-Up

Description	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m ² K/W)	Thermal Bridging	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)	
Inside Surface			0.130				
PLASTERBOARD	12.5	0.190	0.066		50.000	0.625	
PLASTER DABS CAVITY. 	15.0		0.150	20.0% Plaster dabs, 100.0 centres		0.050	
BLOCKWORK 1400 Kg/m ³ (k-value = 0.51 W/mK) 	100.0	0.510	0.196	6.6% Mortar, 450.0 centres	45.000	4.500	
KOOLTHERM K108 	100.0	0.019	5.263			37.700	
UNV. A/SPACE;	50.0		0.664			0.050	
BLOCKWORK 2000 kg/m ³ (k-value = 1.13 W/mK) 	100.0	1.130	0.088	6.6% Mortar, 450.0 centres	45.000	4.500	
BRICKWORK FACING 	102.5	0.770	0.133	6.6% Mortar, 450.0 centres	42.000	4.305	
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

$$R_{total}(R_{tot}) = R_{si} + R_1 + R_2 + \dots + R_n + R_{se}$$

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

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

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

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

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

$$= (6.730 + 6.679) / 2$$

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

$$= 6.705$$

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

ΔU_g correction for air voids - 0.0000

ΔU_f correction for fasteners by approximate procedure - 0.0048

(Fastener 1 : alpha 0.80 | fasteners per m² 2.500 | fasteners cross sectional area 23.400 mm² | thermal conductivity of fasteners 17.00 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 | $f \bullet \times 0.0000$)

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: 5a England SE & Central South

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 (%)	51.9	51.0	51.7	52.8	57.2	62.3	67.5	67.9	64.4	59.7	54.3	52.8
External Temperature (°C)	1.5	1.8	3.7	6.0	9.3	12.4	14.5	14.1	11.8	8.7	4.4	2.5
External Relative Humidity (%)	90.0	86.5	84.0	81.0	81.0	80.0	80.5	82.5	85.5	88.0	89.5	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

