

CLIENT

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CONTRACT

Grenfell Tower regeneration
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This calculation is not covered by the BBA u-value calculation & condensation risk analysis competency scheme as it utilises bracket adjustments calculated separately via numerical analysis which are outside of the scope of this scheme

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Client : Studio E Architects Ltd
 Contract : Grenfell Tower regeneration
 Structure element : Wall
 Description : ETIC rainscreen system (insulation fasteners of lambda value or part of it less than 1 W/mK)
 File reference : 1DF763E21.FCF

Calculated 'U' value = 0.15W/m²K (Calculated in accordance with BS EN ISO 6946:2007)

Discrete cladding brackets assumed at 600mm centres horizontally and vertically

Correction for rain screen cladding, Delta Urc = 0.0554W/m²K
 (x : 0.020 n : 2.770 per m²)

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	-	-	0.316	-	-	280.89	0.36
PANEL	20.0	0.000	0.000	0.00	0.00	281.07	0.00
VENTILATED CLADDING ZONE	50.0	-	0.000	-	0.00	281.07	0.00
KOOLTHERM K15	100.0	0.020	5.000	-	100.00	283.93	5.72
KOOLTHERM K15	100.0	0.020	5.000	-	100.00	289.65	5.72
CONCRETE 1:2:4 2000 kg/m³	250.0	1.400	0.179	100.00	25.00	292.62	0.20
PLASTER DABS CAVITY. 20.0% Plaster dabs (15.0mm)	15.0	-	0.180	-	0.05	292.82	0.21
PLASTERBOARD	12.5	0.190	0.066	50.00	0.63	292.96	0.08
Inside surface resistance	-	-	0.130	-	-	293.08	0.15

Detailed U-value Calculation Results

Construction includes 1 bridged layer.

Non-bridged layers

Outside surface resistance	0.316 m²K/W
KOOLTHERM K15	5.000 m²K/W
KOOLTHERM K15	5.000 m²K/W
CONCRETE 1:2:4 2000 kg/m³	0.179 m²K/W
PLASTERBOARD	0.066 m²K/W
Inside surface resistance	0.130 m²K/W
Resistance of non-bridged layers, R _{NB} =	10.691 m²K/W

Bridged layer

PLASTER DABS CAVITY. (L1) bridged by Plaster dabs (B1)

Path 1 - PLASTER DABS CAVITY.

Path 2 - Plaster dabs

Resistance of heat flow paths

$$R_{P1} = R_{NB} + R_{L1} = 10.691 + 0.180 = 10.871 \text{ m}^2\text{K/W} \quad F_{P1} = 80.000\%$$

$$R_{P2} = R_{NB} + R_{L2} = 10.691 + 0.035 = 10.725 \text{ m}^2\text{K/W} \quad F_{P2} = 20.000\%$$

Fraction of face area of materials

PLASTER DABS CAVITY., F_{L1} = 80.0%

Plaster dabs, F_{B1} = 20.0%

Upper resistance limit

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

$$R_{upper} = 1 / ((0.800/10.871) + (0.200/10.725)) = 10.841 \text{ m}^2\text{K/W}$$

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Detailed U-value Calculation Results (continued)

Total resistance of wall

$$R_T = (R_{\text{upper}} + R_{\text{lower}}) / 2 = (10.841 + 10.789) / 2 = 10.815 \text{ m}^2\text{K/W}$$

(Correction for mechanical fasteners, $\Delta U_f = 0.0000 \text{ W/m}^2\text{K}$ | Correction for air gaps, $\Delta U_g = 0.0000 \text{ W/m}^2\text{K}$)

(Alpha 0.0 m^{-1} | Fasteners per square metre 0.0000)

(Fasteners cross-sectional area 0.000 mm^2 | Thermal conductivity of fastener 0.00 W/mK)

Correction for rain screen cladding, $\Delta U_{rc} = 0.0554 \text{ W/m}^2\text{K}$

(x : 0.020 n : 2.770 per m^2)

($\Delta U_f + \Delta U_g$) is less than 3% of $(1 / R_T)$ so $U = (1 / R_T) = 0.15 \text{ W/m}^2\text{K}$

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 Description : ETIC rainscreen system (insulation fasteners of lambda value or part of it less than 1 W/mK)
 File reference : 1DF763E21.FCF
 Humidity Class: 4 - Dwellings with high occupancy, sport halls, kitchens, canteens; buildings heated with unflued gas heaters
 Location: 5a England SE & Central South

Condensation calculations performed in accordance with BS5250: 2002

Month	Int (°C)	Int (%RH)	Ext (°C)	Ext (%RH)	Prediction of mould growth	Prediction of surface condensation	pe (Pa)	Dp (Pa)	pi (Pa)	psat (Pa)	simin (°C)	si (°C)	fRsi
January	20.00	73.20	1.50	90.00	No	No	612.4	999.0	1711.3	2139.1	18.6	20.0	0.924
February	20.00	72.00	1.80	86.50	No	No	601.4	982.8	1682.5	2103.1	18.3	20.0	0.908
March	20.00	70.00	3.70	84.00	No	No	668.5	880.2	1636.7	2045.9	17.9	20.0	0.870
April	20.00	68.00	6.00	81.00	No	No	757.0	756.0	1588.6	1985.8	17.4	20.0	0.815
May	20.00	67.80	9.30	81.00	No	No	948.4	577.8	1584.0	1980.0	17.4	20.0	0.754
June	20.00	68.60	12.40	80.00	No	No	1151.4	410.4	1602.8	2003.5	17.6	20.0	0.678
July	20.00	70.80	14.50	80.50	No	No	1328.5	297.0	1655.2	2069.0	18.1	20.0	0.649
August	20.00	71.80	14.10	82.50	No	No	1326.7	318.6	1677.2	2096.5	18.3	20.0	0.708
September	20.00	71.50	11.80	85.50	No	No	1182.8	442.8	1669.9	2087.4	18.2	20.0	0.781
October	20.00	71.10	8.70	88.00	No	No	989.5	610.2	1660.7	2075.9	18.1	20.0	0.834
November	20.00	71.70	4.40	89.50	No	No	748.2	842.4	1674.9	2093.6	18.3	20.0	0.888
December	20.00	72.80	2.50	90.50	No	No	661.5	945.0	1701.0	2126.2	18.5	20.0	0.914

fRsi for mould growth = 0.981

fRsi,max for mould growth = 0.924

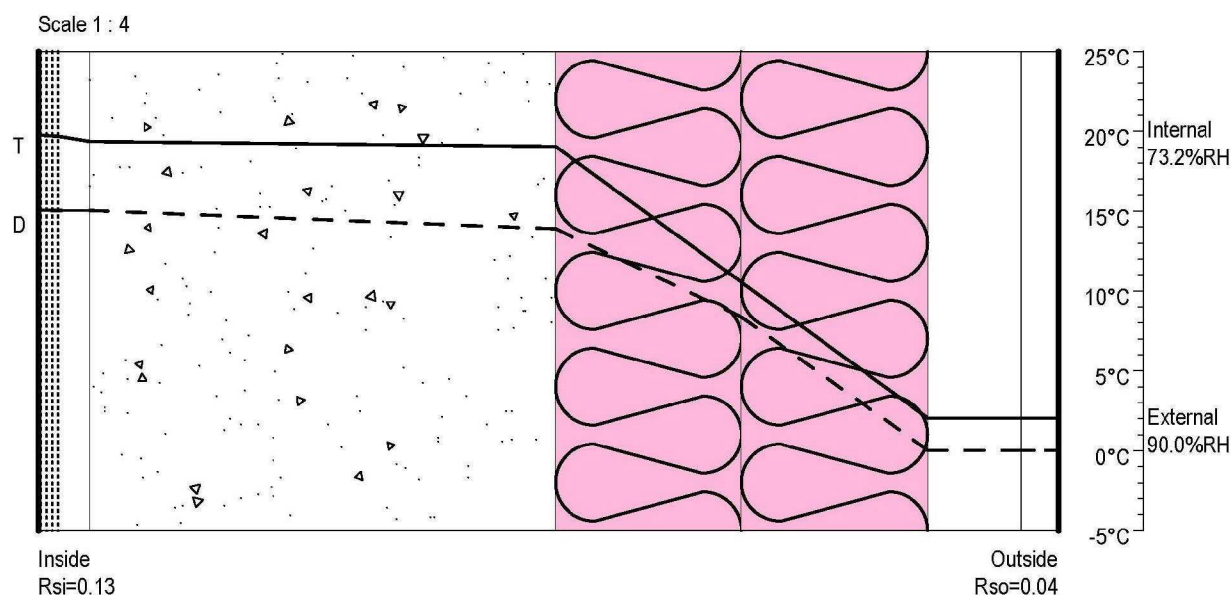
fRsi,max for surface condensation = 0.750

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 interface (Ma) = 0.000 Kg/m²

Annual moisture accumulation (Ma) = 0.000 Kg/m²



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