

3-D U-value Calculation by Finite Element Analysis

Calculation Method: BS EN ISO 10211

Project Summary

Project Name	The Boatmans
Project Address	42 City Rd East, Manchester, M15 4QF
Wall Type	Wall Type 2 (Timber)
Wall Area (m ²)	400m ²
Target U-Value (W/m ² K)	0.30
Company Name	Façade Design Services
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Figure 1 – Material Layers

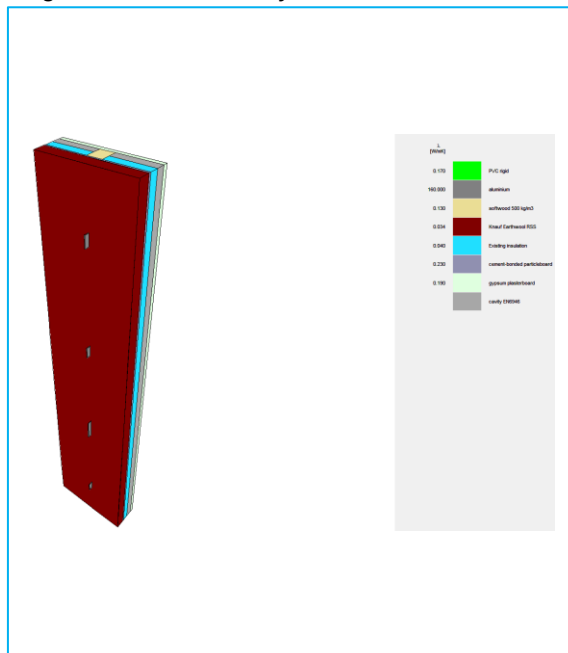
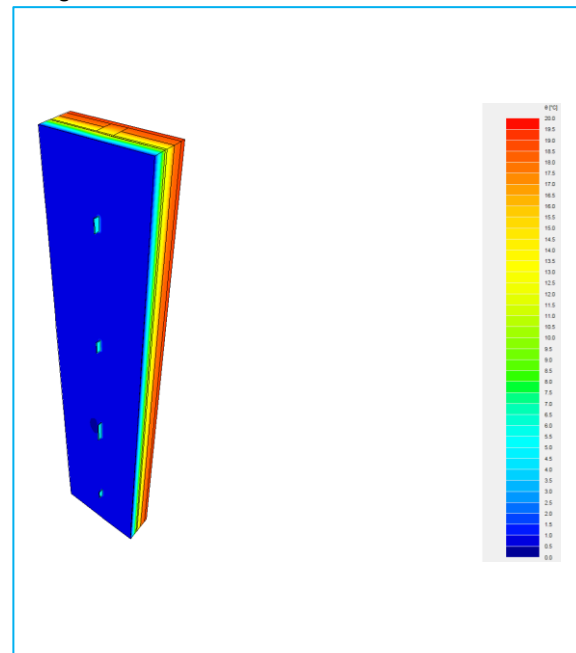


Figure 2 – Heat Flows

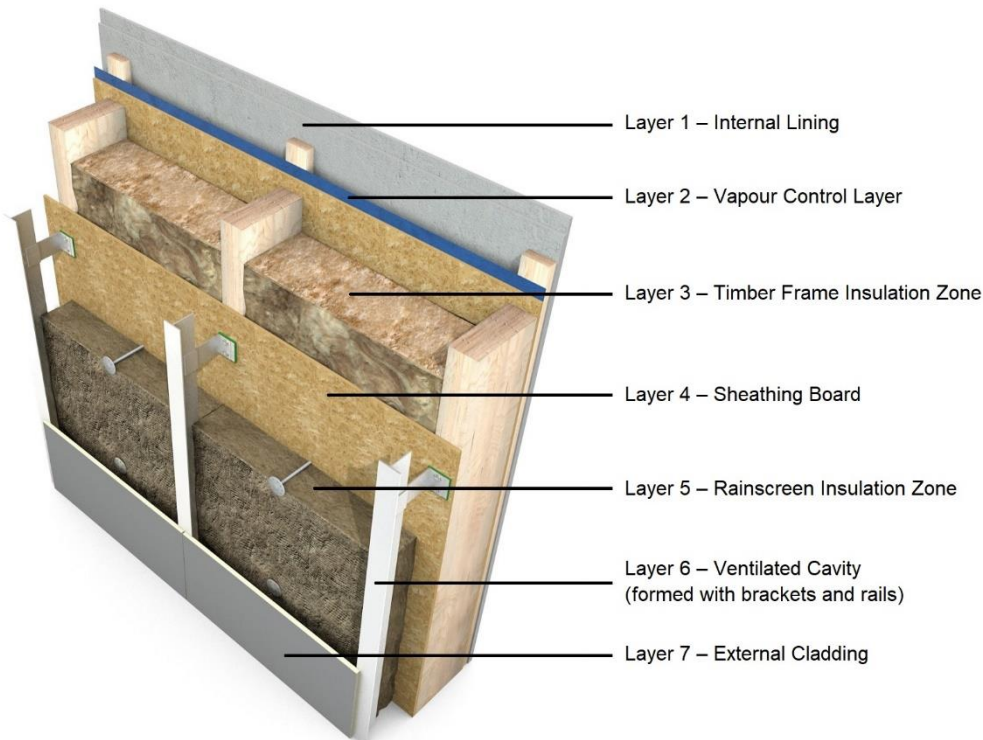


Width of model	0.600m	Height of model	2.940m
Internal surface resistance	0.13m ² K/W	External surface resistance	0.13m ² K/W
Heat Flow (Q)	10.0500W	Area (A)	1.764m ²
Internal temperature (Ti)	20°C	External temperature (Te)	0°C
U-value = Q/A x (Ti - Te)	10.0500/35.28		
U-value (rounded)	0.28W/m ² K		

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Through-Wall Construction



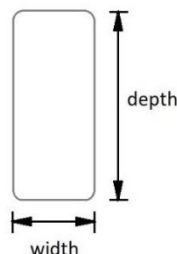
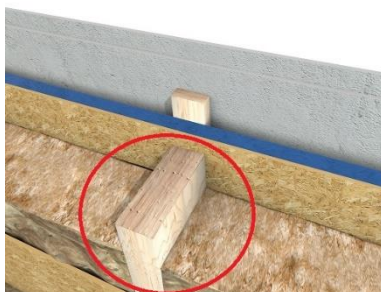
*The model above is a representation of a typical build-up. The table below shows the actual materials and thicknesses in the calculation.

Layer	Description	Thickness (mm)	Thermal Conductivity (W/mK)
1	2x12.5mm Standard Wallboard	25.0	0.190
2	Vapour Control Layer	-	-
3a	Un-ventilated cavity (remainder of studs)	50.0	R-value
3b	Existing Insulation (assumed $K=0.040$) tightly fitted between timber studs (15% bridged with timber)	50.0	0.040
4a	Cement Board	12.0	0.230
4b	Breather Membrane	-	-
5	Knauf Insulation Rocksilk® RainScreen Slab tightly fitted around 'helping hand' brackets	70.0	0.034
6	Ventilated Cavity	38.0	R-value
7	Rainscreen Cladding Panel	-	-

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Timber studs in Layer 3a & 3b

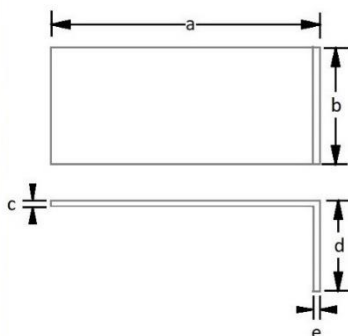


Material: Timber
Thermal Conductivity; $\lambda=0.13\text{W/mK}$
Dimensions; (depth x width)

Depth; 100mm x 38mm*

(*Calculated at 100mm x 90mm to approximate 15% timber bridging as per BR443)

Bracket in Layers 5 & 6



Manufacturer; Nvelope
Material; Aluminium
Conductivity; $\lambda=160\text{W/mK}$

a = Insulation thickness + 30mm

b (single) = 75mm

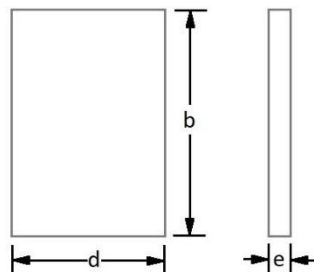
b (double) = 150mm

c = 5mm

d = 62mm

e = 4mm

Isolation Pad in layer 5



Manufacturer; Nvelope
Material; PVC
Conductivity; $\lambda=0.17\text{W/mK}$

b (single) = 75mm

b (double) = 150mm

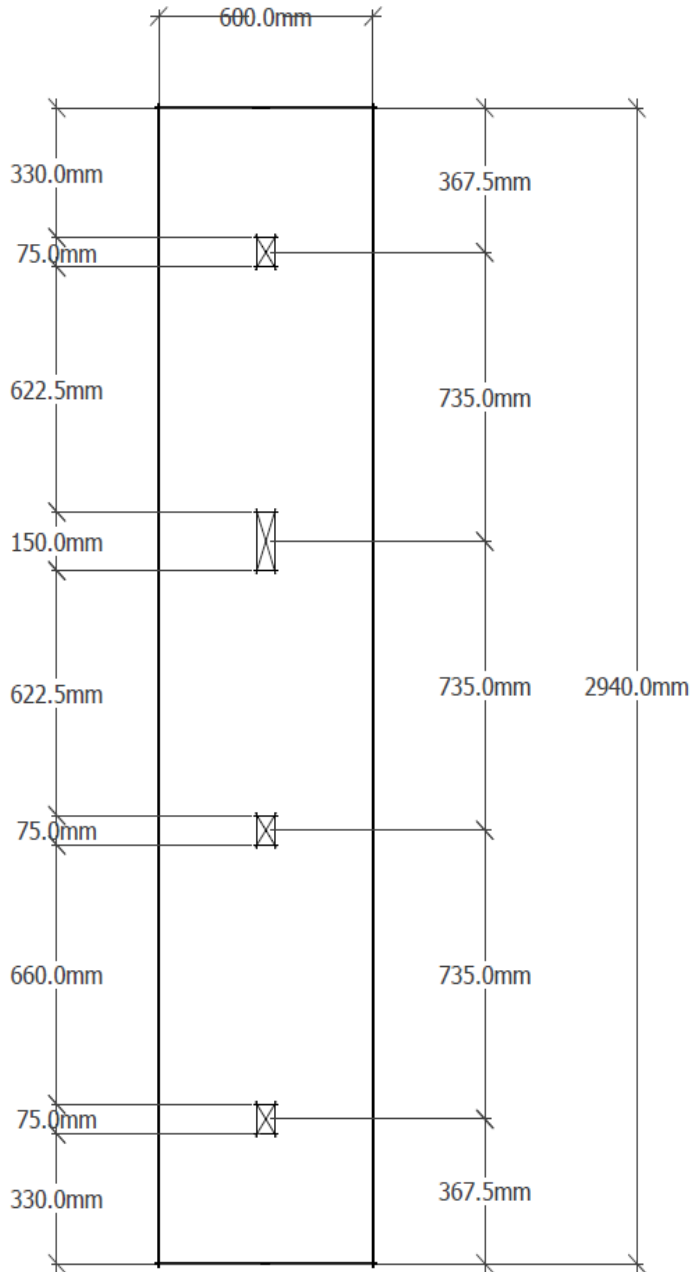
d = 62mm

e = 5mm

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Bracket Layout in layers 5 & 6

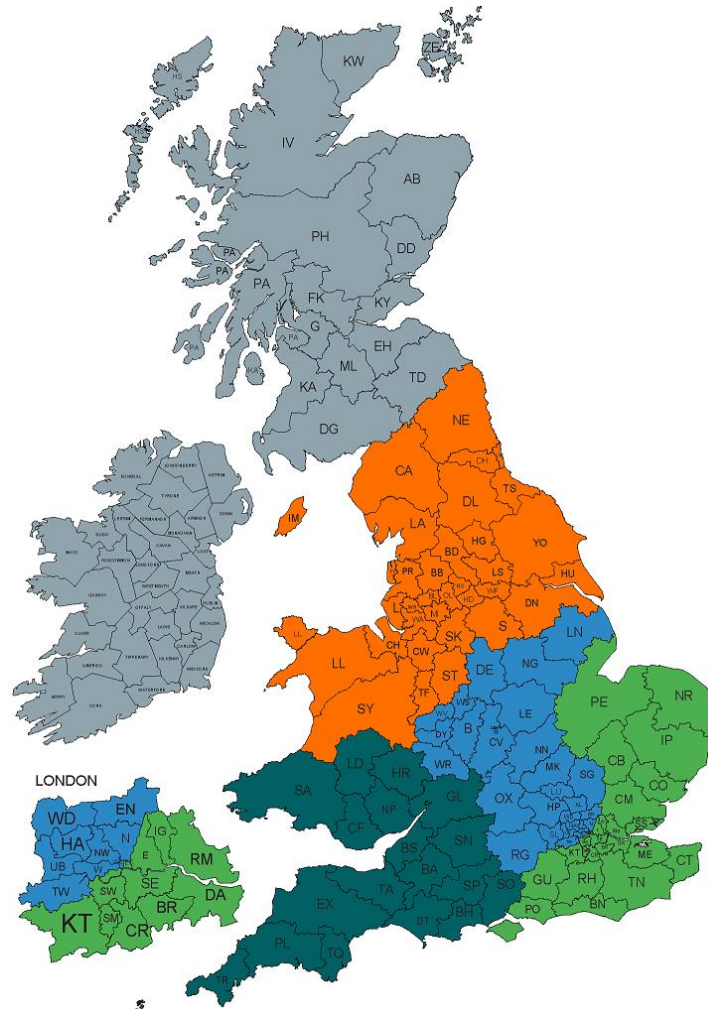


Model width (h) = see diagram
Model height (v) = see diagram

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Contact Us

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