

# Elastogran UK Limited

Alfreton Trading Estate  
Wimsey Way  
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## Project Information

Reference

Date 11 Aug 2008

Client EEA refurb roof

## Construction Type

Element : Pitched roof - Uvalue Element 1

Roof pitch : 35.0°

Warm pitched roof

Internal surface emissivity : High External surface emissivity : High

## Construction

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m <sup>2</sup> K/W)	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)
Outside surface resistance	-	-	0.040	-	-
Concrete tiles (BS5250)	10.0	1.499	0.007	-	2.50
Elastopor H between battens	25.0	0.026	0.950	300.00	7.50
Elastopor H between rafters	85.0	0.026	3.250	300.00	25.50
Loft space	-	-	0.180	-	-
Mineral wool (BS5250)	100.0	0.040	2.500	5.00	0.50
Plasterboard (BS5250)	12.5	0.170	0.074	60.00	0.75
Plaster, lightweight (BS5250)	2.0	0.220	0.009	60.00	0.12
Emulsion paint (BS6229)	-	-	-	-	0.20
Inside surface resistance	-	-	0.100	-	-

## U-value - 0.16W/m<sup>2</sup>K

U-value, Combined Method : 0.16 W/m<sup>2</sup>K (upper/lower limit 6.651 / 5.819 m<sup>2</sup>K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.000W/m<sup>2</sup>K)

(Correction for air gaps, Delta Ug = 0.000W/m<sup>2</sup>K)

(Based on the combined method for determining U-values of structures containing repeating thermal bridges.)

## Detailed U-value Calculation Results

Construction includes 1 bridged layer.

### Non-bridged layers

Outside surface resistance	0.040 m <sup>2</sup> K/W
Concrete tiles (BS5250)	0.007 m <sup>2</sup> K/W
Elastopor H between battens	0.950 m <sup>2</sup> K/W
Loft space	0.180 m <sup>2</sup> K/W
Mineral wool (BS5250)	2.500 m <sup>2</sup> K/W
Plasterboard (BS5250)	0.074 m <sup>2</sup> K/W
Plaster, lightweight (BS5250)	0.009 m <sup>2</sup> K/W
<u>Inside surface resistance</u>	<u>0.100 m<sup>2</sup>K/W</u>
Resistance of non-bridged layers, R <sub>NB</sub> =	<u>3.859 m<sup>2</sup>K/W</u>

### Bridged layer

Elastopor H between rafters (L1) bridged by Timber (B1)

Path 1 - Elastopor H between rafters

Path 2 - Timber

### Resistance and fraction of heat flow paths

$$R_{P1} = R_{NB} + R_{L1} = 3.859 + 3.250 = 7.109 \text{ m}^2\text{K/W} \quad F_{P1} = 92.308\%$$

$$R_{P2} = R_{NB} + R_{L2} = 3.859 + 0.769 = 4.628 \text{ m}^2\text{K/W} \quad F_{P2} = 7.692\%$$

### Upper resistance limit

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

$$R_{\text{upper}} = 1 / ( (0.923/7.109) + (0.077/4.628) ) = 6.651 \text{ m}^2\text{K/W}$$

### Lower resistance limit

$$R_{\text{lower}} = R_{NB} + 1 / ( (F_{L1}/R_{L1}) + (F_{B1}/R_{B1}) )$$

$$R_{\text{lower}} = 3.859 + 1 / ( (0.923/2.662) + (0.077/0.630) ) = 5.819 \text{ m}^2\text{K/W}$$

### Total resistance of roof

$$R_T = ( R_{\text{upper}} + R_{\text{lower}} ) / 2 = ( 6.651 + 5.819 ) / 2 = 6.24 \text{ m}^2\text{K/W}$$

Correction for mechanical fasteners, Delta Uf = 0.000W/m<sup>2</sup>K. Correction for air gaps, Delta Ug = 0.000W/m<sup>2</sup>K

(Delta Uf + Delta Ug + Delta Up) is less than 3% of (1 / Rt) so U = (1 / Rt) + (Delta Ur) + (Delta Urc) = 0.16 W/m<sup>2</sup>K

## Condensation Risk Analysis (no account taken of thermal bridges)

### 3 - Dwellings with low occupancy

Jan (worst)	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20.0C 59.3%	20.0C 58.7%	20.0C 57.2%	20.0C 56.8%	20.0C 57.5%	20.0C 62.0%	20.0C 66.0%	20.0C 66.6%	20.0C 64.3%	20.0C 62.2%	20.0C 59.8%	20.0C 59.6%
3.8C 83.0%	3.9C 81.0%	5.7C 76.5%	7.9C 74.0%	11.3C 71.5%	14.2C 73.5%	15.8C 75.5%	15.7C 76.5%	13.5C 78.5%	10.6C 81.0%	6.3C 82.5%	4.5C 83.5%

	Interface Temp. °C	Dewpoint Temp. °C	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m <sup>2</sup> )	Peak Buildup (g/m <sup>2</sup> )	Condensation
1 Outside surface resistance							
2 Concrete tiles (BS5250)	3.9	1.2	0.67	0.81			No
3 Elastopor H between battens	3.9	2.2	0.71	0.81			No
4 Elastopor H between rafters	5.9	4.8	0.86	0.93			No
5 Loft space	12.8	11.5	1.36	1.47			No
6 Mineral wool (BS5250)	13.2	11.5	1.36	1.52			No
7 Plasterboard (BS5250)	19.6	11.6	1.37	2.28			No
8 Plaster, lightweight (BS5250)	19.8	11.8	1.38	2.31			No
9 Emulsion paint (BS6229)	19.8	11.8	1.38	2.31			No
10 Inside surface resistance	19.8	11.8	1.39	2.31			No

Worst case internal / external conditions for graph : 20.0°C @ 59.3%RH / 3.8°C @ 83.0%RH

