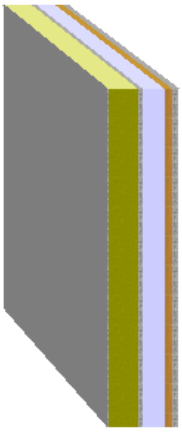
Documentation of the component — 20. September 2011
Thermal transmittance (U-value) according to BS EN ISO 6946 —
Source: **own catalogue**
Component: **New external wall**

OUTSIDE INSIDE



Assignment: External wall

		Manufacturer	Name	Thickness [m], number	Lambda [W/(mK)]	Q	R [m²K/W]
		Rse					0.04
☑	1	WBS	WBS Silicone Render	0.008	0.556	E	0.01
☑	2	WBS	WBS Mineral Fibre	0.100	0.037	E	2.70
		Fixings	Plastic insulation anchors No./m²:	8/m²	0.500	D	-
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
☑	3	Own catalogue	Plywood [700 kg/m³]	0.018	0.170	E	0.11
☑	4	Own catalogue	Normal cavity - 75 mm, unventilated	0.075	0.417	E	0.18
☑	5	Own catalogue	Timber [500 kg/m³]	0.025	0.130	E	0.19
☑	6	Own catalogue	Gypsum Plasterboard	0.013	0.250	E	0.05
☑	7	Own catalogue	Gypsum plastering	0.005	0.382	E	0.01
		Rsi					0.13
				0.244			

$R_T = R_{si} + \Sigma R_i + R_{se} = 3.43$ m²K/W

Correction to U-value for	according to	delta U [W/(m²K)]
Mechanical fasteners	BS EN ISO 6946 Annex D	~~0.000~~
Air gaps	BS EN ISO 6946 Annex D	~~0.006~~
Air gaps and fixings corrections need not be applied, as their total effect is less than 3% (Annex D BS 6946:1996).		
		0.000

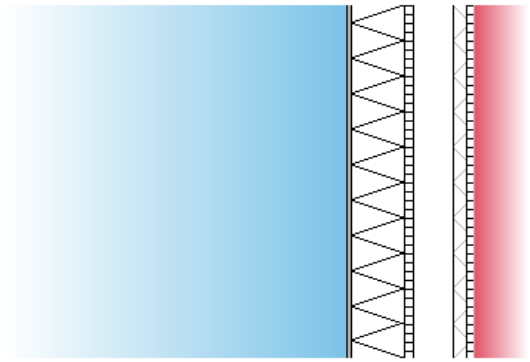
$U = 1/R_T + \Sigma\Delta U = 0.29$ W/(m²K)

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
A .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.
B .. B: Data is entered and validated by the manufacturer or supplier. Data is certified by 3rd party
C .. C: Data is entered and validated by the manufacturer or supplier.
D .. D: Information is entered by BuildDesk without special agreement with the manufacturer, supplier or others.
E .. E: Information is entered by the user of the BuildDesk software without special agreement with the manufacturer, supplier or others.

U_{max} = **0.35** W/(m²K) U = **0.29** W/(m²K) R_T= **3.43** m²K/W

Source of Umax value: England, Wales: Approved Document L1A (2006), Table 2 - New Build Dwellings

OUTSIDE INSIDE



The list of material layers shown below may differ from those in the U-value calculation print out. Only material layers which are used in the Condensation Risk Analysis are listed.

Assignment: External wall

Name	Thickn. [m]	lambda [W/(mK)]	Q	μ [-]	Q	sd [m]	R [m²K/W]
WBS Silicone Render	0.008	0.556	E	6.00	E	0.05	0.01
WBS Mineral Fibre	0.100	0.037	E	1.00	E	0.10	2.70
Plywood [700 kg/m³]	0.018	0.170	E	90.00	E	1.62	0.11
Normal cavity - 75 mm, unventilated	0.075	0.417	E	1.00	E	0.08	0.18
Timber [500 kg/m³]	0.025	0.130	E	20.00	E	0.50	0.19
Gypsum Plasterboard	0.013	0.250	E	4.00	E	0.05	0.05
Gypsum plastering	0.005	0.382	E	6.00	E	0.03	0.01

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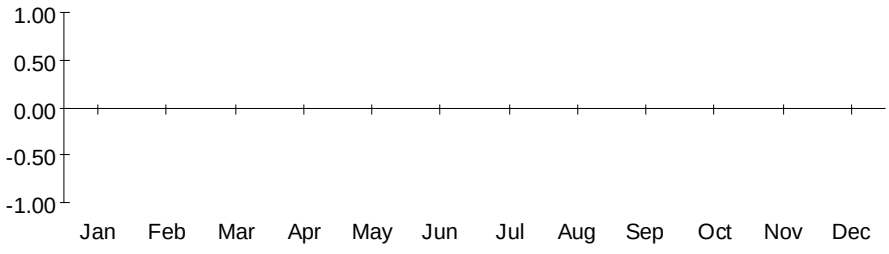
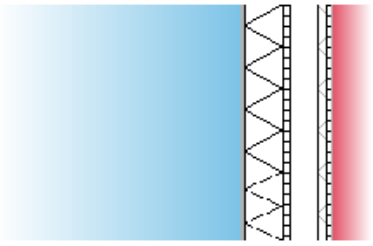
Condensation risk analysis - summary of main results
Calculation according BS EN ISO 13788

Surface temperature to avoid critical surface moisture:
No danger of mould growth is expected.

Interstitial condensation:
No condensation is predicted at any interface in any month.

Interstitial condensation and evaporation per month gc [g/m²]





Component, condensation range

Surface temperature to avoid critical surface humidity
Calculation according BS EN ISO 13788

Location: Manchester Airport; Humidity class according BS EN ISO 13788 annex A: Dwellings with low occupancy

		1	2	3	4	5	6	7	8	9	10	11	12
	Month	Te [°C]	phi_e ---	Ti [°C]	phi_i ---	pe [Pa]	delta p [Pa]	pi [Pa]	ps(Tsi) [Pa]	Tsi,min [°C]	fRsi ---	Tsi [°C]	Tse [°C]
●	January	4.2	0.830	20.0	0.594	684	704	1388	1735	15.3	0.701	18.9	4.4
	February	4.1	0.800	20.0	0.583	655	708	1363	1704	15.0	0.685	18.9	4.3
	March	5.8	0.760	20.0	0.570	701	633	1333	1666	14.7	0.623	19.0	6.0
	April	7.8	0.710	20.0	0.554	751	544	1294	1618	14.2	0.524	19.1	7.9
	May	11.3	0.680	20.0	0.555	910	388	1298	1622	14.2	0.337	19.4	11.4
	June	14.1	0.710	20.0	0.601	1142	263	1405	1756	15.5	0.231	19.6	14.2
	July	16.1	0.720	20.0	0.638	1317	174	1491	1863	16.4	0.075	19.7	16.1
	August	15.8	0.740	20.0	0.648	1328	187	1515	1894	16.6	0.201	19.7	15.8
	September	13.3	0.770	20.0	0.631	1175	298	1474	1842	16.2	0.435	19.5	13.4
	October	10.3	0.810	20.0	0.619	1014	432	1446	1808	15.9	0.579	19.3	10.4
	November	6.7	0.820	20.0	0.598	804	593	1397	1746	15.4	0.652	19.1	6.8
	December	5.2	0.840	20.0	0.600	743	659	1402	1752	15.4	0.691	19.0	5.4

- The critical month is January with $f_{Rsi,max}$ = 0.701
  f_{Rsi} = 0.930

$f_{Rsi} > f_{Rsi,max}$, the component complies.

Nr Explanation

1 External temperature
2 External rel. humidity
3 Internal temperature
4 Internal relative humidity
5 External partial pressure $p_e = \phi_e * p_{sat}(T_e)$; $p_{sat}(T_e)$ according formula E.7 and E.8 of BS EN ISO 13788
6 Partial pressure difference. The security factor of 1.10 according to BS EN ISO 13788, ch.4.2.4 is already included.
7 Internal partial pressure $p_i = \phi_i * p_{sat}(T_i)$; $p_{sat}(T_i)$ according formula E.7 and E.8 of BS EN ISO 13788
8 Minimum saturation pressure on the surface obtained by $p_{sat}(T_{si}) = p_i / \phi_{si}$,
where ϕ_{si} = 0.8 (critical surface humidity)
9 Minimum surface temperature as function of $p_{sat}(T_{si})$, formula E.9 and E.10 of BS EN ISO 13788
10 Design temperature factor according 3.1.2 of BS EN ISO 13788
11 Internal surface temperature, obtained from $T_{si} = T_i - R_{si} * U * (T_i - T_e)$
12 External surface temperature, obtained from $T_{se} = T_e + R_{se} * U * (T_i - T_e)$

Interstitial condensation - main results
Calculation according BS EN ISO 13788

No condensation is predicted at any interface in any month.

Climcatic conditions
Location: Manchester Airport; Humidity class according BS EN ISO 13788 annex A: Dwellings with low occupancy

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Internal temperature [°C]	Ti	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 rel. humidity [%]	phi_i	59.4	58.3	57.0	55.4	55.5	60.1	63.8	64.8	63.1	61.9	59.8	60.0
External temperature [°C]	Te	4.2	4.1	5.8	7.8	11.3	14.1	16.1	15.8	13.3	10.3	6.7	5.2
External rel. humidity [%]	phi_e	83.0	80.0	76.0	71.0	68.0	71.0	72.0	74.0	77.0	81.0	82.0	84.0