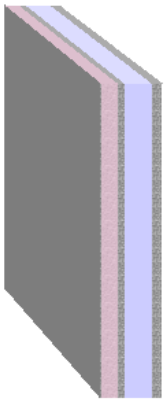
Documentation of the component — 28. September 2011
Thermal transmittance (U-value) according to BS EN ISO 6946 —
Source: **own catalogue**
Component: **Typical Wates Property**

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 Phenolic Insulation Board (45+)	0.060	0.020	E	3.00
		Fixings	Plastic insulation anchors No./m²:	8/m²	0.500	D	-
		Air gaps	Level 1: dU" = 0.01 W/(m²K)				
☑	3	Own catalogue	Concrete, Medium density 2200	0.025	1.650	E	0.02
☑	4	Own catalogue	Normal cavity - 100 mm, unventilated	0.100	0.555	E	0.18
☑	5		Stramit Board	0.025	0.081	E	0.31
☑	6	Own catalogue	Gypsum plastering	0.010	0.382	E	0.03
		Rsi					0.13
				0.228			

$R_T = R_{si} + \Sigma R_i + R_{se} = 3.71$ 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	~~0.007~~
Air gaps and fixings corrections need not be applied, as their total effect is less than 3% (Annex D BS 6946:1996).		
		0.000

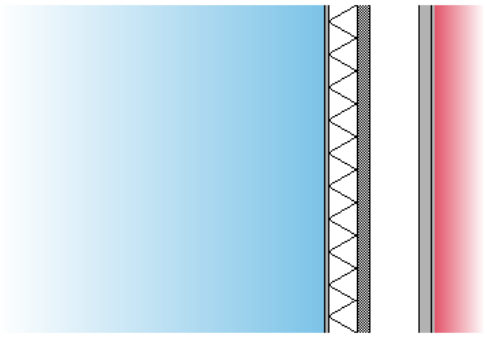
$U = 1/R_T + \Sigma\Delta U = 0.27$ W/(m²K)

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 = **0.27** W/(m²K) R_T= **3.71** 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 Phenolic Insulation Board (45+)	0.060	0.020	E	60.00	E	3.60	3.00
Concrete, Medium density 2200	0.025	1.650	E	70.00	E	1.75	0.02
Normal cavity - 100 mm, unventilated	0.100	0.555	E	1.00	E	0.10	0.18
Stramit Board	0.025	0.081	E	30.00	E	0.75	0.31
Gypsum plastering	0.010	0.382	E	6.00	E	0.06	0.03

Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
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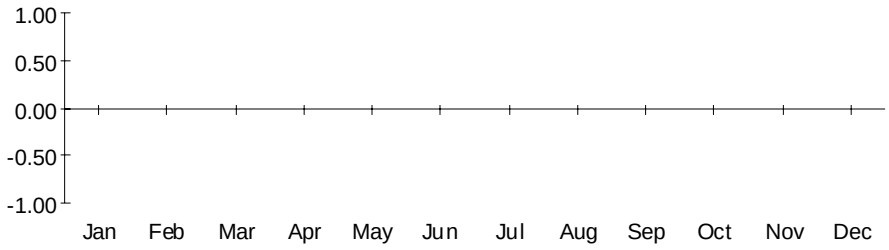
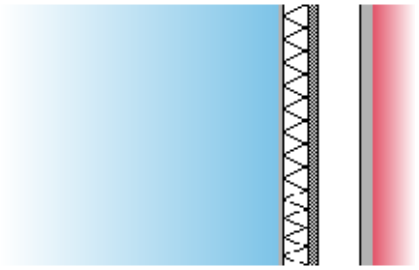
Condensation risk analysis - summary of main results
Calculation according BS EN ISO 13788

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: Birmingham; 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	3.9	0.840	20.0	0.597	678	717	1395	1744	15.4	0.712	19.0	4.1
	February	3.7	0.830	20.0	0.593	661	726	1387	1733	15.3	0.709	18.9	3.9
	March	5.8	0.780	20.0	0.578	719	633	1352	1689	14.9	0.638	19.1	5.9
	April	7.6	0.730	20.0	0.562	762	552	1314	1643	14.4	0.551	19.2	7.7
	May	11.0	0.720	20.0	0.576	945	401	1346	1682	14.8	0.422	19.4	11.1
	June	14.1	0.720	20.0	0.608	1158	263	1421	1776	15.6	0.261	19.6	14.2
	July	16.3	0.710	20.0	0.633	1315	165	1480	1850	16.3	-0.005	19.8	16.3
	August	15.9	0.720	20.0	0.634	1300	183	1483	1853	16.3	0.100	19.7	15.9
	September	13.3	0.770	20.0	0.631	1175	298	1474	1842	16.2	0.435	19.6	13.4
	October	9.8	0.820	20.0	0.619	993	454	1447	1809	15.9	0.601	19.3	9.9
	November	6.4	0.840	20.0	0.605	807	606	1413	1766	15.6	0.673	19.1	6.5
	December	4.9	0.850	20.0	0.603	736	673	1409	1761	15.5	0.702	19.0	5.1

- The critical month is January with $f_{Rsi,max}$ = 0.712
  f_{Rsi} = 0.935

$f_{Rsi} > f_{Rsi,max}$, 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: Birmingham; 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	59.7	59.3	57.8	56.2	57.6	60.8	63.3	63.4	63.1	61.9	60.5	60.3
External temperature [°C]	Te	3.9	3.7	5.8	7.6	11.0	14.1	16.3	15.9	13.3	9.8	6.4	4.9
External rel. humidity [%]	phi_e	84.0	83.0	78.0	73.0	72.0	72.0	71.0	72.0	77.0	82.0	84.0	85.0