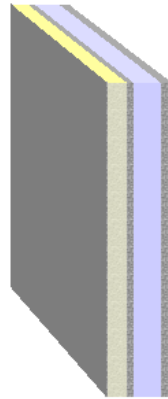


Source: **own catalogue**  
Component: **Typical Wates Property**

OUTSIDE

INSIDE



Assignment: External wall

|                                     | Manufacturer | Name          | Thickness<br>[m], number    | Lambda<br>[W/(mK)] | Q        | R<br>[m²K/W] |
|-------------------------------------|--------------|---------------|-----------------------------|--------------------|----------|--------------|
|                                     |              | Rse           |                             |                    |          | 0.04         |
| <input checked="" type="checkbox"/> | 1            | WBS           | 0.008                       | 0.556              | <b>E</b> | 0.01         |
| <input checked="" type="checkbox"/> | 2            | WBS           | 0.070                       | 0.027              | <b>E</b> | 2.59         |
|                                     |              | Fixings       | 8/m²                        | 0.500              | <b>D</b> | -            |
|                                     |              | Air gaps      | Level 1: dU" = 0.01 W/(m²K) |                    |          |              |
| <input checked="" type="checkbox"/> | 3            | Own catalogue | 0.025                       | 1.650              | <b>E</b> | 0.02         |
| <input checked="" type="checkbox"/> | 4            | Own catalogue | 0.100                       | 0.555              | <b>E</b> | 0.18         |
| <input checked="" type="checkbox"/> | 5            | Own catalogue | 0.025                       | 0.081              | <b>E</b> | 0.31         |
| <input checked="" type="checkbox"/> | 6            | Own catalogue | 0.010                       | 0.382              | <b>E</b> | 0.03         |
|                                     |              | Rsi           |                             |                    |          | 0.13         |
|                                     |              |               |                             |                    |          | <b>0.238</b> |

$$R_T = R_{si} + \sum R_i + R_{se} = 3.31 \text{ m}^2\text{K/W}$$

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

$$U = 1/R_T + \sum \Delta U = 0.30 \text{ W/(m}^2\text{K)}$$

- 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.

$$U_{\max} = \boxed{0.35 \text{ W/(m}^2\text{K)}}$$

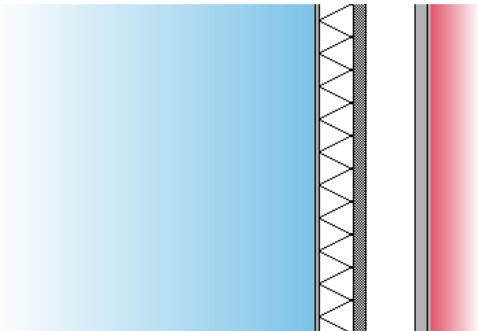
$$U = \boxed{0.30 \text{ W/(m}^2\text{K)}} \quad R_T = \boxed{3.31 \text{ m}^2\text{K/W}}$$

Source of U<sub>max</sub> value: England, Wales: Approved Document L1A (2006), Table 2 - New Build Dwellings

Calculated with BuildDesk 3.4.4

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.<br>[m] | lambda<br>[W/(mK)] | Q | $\mu$<br>[-] | Q | sd<br>[m] | R<br>[m <sup>2</sup> K/W] |
|--------------------------------------|----------------|--------------------|---|--------------|---|-----------|---------------------------|
| WBS Silicone Render                  | 0.008          | 0.556              | E | 6.00         | E | 0.05      | 0.01                      |
| WBS PIR                              | 0.070          | 0.027              | E | 50.00        | E | 3.50      | 2.59                      |
| 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                      |

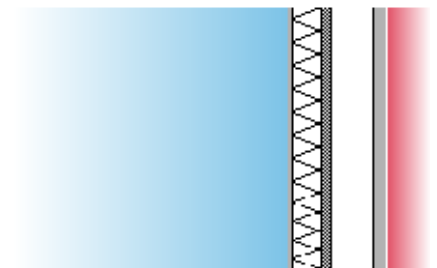
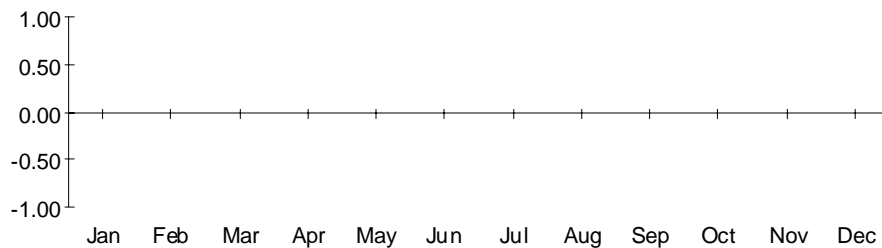
- Q .. The physical values of the building materials has been graded by their level of quality. These 5 levels are the following
- A** .. A: Data is entered and validated by the manufacturer or supplier. Data is continuously tested by 3rd party.
  - B** .. B: Data is entered and validated by the manufacturer 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.

**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<br>[°C] | phi_e<br>--- | Ti<br>[°C] | phi_i<br>--- | pe<br>[Pa] | delta p<br>[Pa] | pi<br>[Pa] | ps(Tsi)<br>[Pa] | Tsi,min<br>[°C] | fRsi<br>--- | Tsi<br>[°C] | Tse<br>[°C] |
| ● January | 3.9        | 0.840        | 20.0       | 0.597        | 678        | 717             | 1395       | 1744            | 15.4            | 0.712       | 18.8        | 4.1         |
| February  | 3.7        | 0.830        | 20.0       | 0.593        | 661        | 726             | 1387       | 1733            | 15.3            | 0.709       | 18.8        | 3.9         |
| March     | 5.8        | 0.780        | 20.0       | 0.578        | 719        | 633             | 1352       | 1689            | 14.9            | 0.638       | 19.0        | 6.0         |
| April     | 7.6        | 0.730        | 20.0       | 0.562        | 762        | 552             | 1314       | 1643            | 14.4            | 0.551       | 19.1        | 7.7         |
| May       | 11.0       | 0.720        | 20.0       | 0.576        | 945        | 401             | 1346       | 1682            | 14.8            | 0.422       | 19.3        | 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      | 19.7        | 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       | 19.5        | 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       | 19.0        | 6.6         |
| December  | 4.9        | 0.850        | 20.0       | 0.603        | 736        | 673             | 1409       | 1761            | 15.5            | 0.702       | 18.9        | 5.1         |

- The critical month is January with  $f_{Rsi,max} = 0.712$   
 $f_{Rsi} = 0.927$

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

### Nr Explanation

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

## Interstitial condensation - main results Calculation according BS EN ISO 13788

**No condensation is predicted at any interface in any month.**

### Climatic 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 |