

**Project Information**

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 Date 9/3/17  
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This 4-page document contains:

- U-value calculation
- Condensation risk analysis
- CAD drawing of wall structure

**Construction Type**

Element : Wall - 184 - PhotonFrame - 0.032 - PhotonFoil - 0.13

Timber framed wall

| Internal surface emissivity  | : High | External surface emissivity | : High                            |   |              |  |  |
|--|--------|-----------------------------|-----------------------------------|---|--------------|--|--|
|  |        | Thickness<br>(mm)           | Thermal<br>Conductivity<br>(W/mK) | Thermal<br>Resistance<br>(m <sup>2</sup> K/W) | Pitch<br>(°) | Bridge details<br>Air gaps<br>(Level, Delta U")  |  |
| Outside surface resistance   | -      | -                           | -                                 | 0.040   |              |  |  |
| Brick - outer leaf (BRE)   |        | 103.0                       | 0.770                             | 0.134   |              | 17.332% Mortar<br>(103.0mm)  |  |
| Cavity<br>(Un-vented cavity - width=600.0mm, hro=5.100, E1=0.050, E2=0.900, horizontal heat flow)                        |        | 50.0                        | -                                 | 0.665   |              |  |  |
| PhotonFrame  |        | 33.0                        | 0.034                             | 0.971   |              | 6.333%<br>Compressed<br>PhotonFrame and<br>Timber (33.0mm)                               |  |
| OSB (BS5250)   |        | 9.0                         | 0.130                             | 0.069   |              | L:0 0.000W/m <sup>2</sup> K  |  |
| Earthwool FrameTherm Roll 32   |        | 180.0                       | 0.032                             | 5.625   |              | 15.000%<br>Prefabricated<br>panels (180.0mm)   |  |
| PhotonFoil   |        | 33.0                        | 0.034                             | 0.971   |              | L:0 0.000W/m <sup>2</sup> K<br>6.333%<br>Compressed<br>PhotonFoil and<br>Timber (33.0mm) |  |
| 50x38mm batten cavity<br>(Bridged un-vented cavity - width=550.0mm, hro=5.100, E1=0.050, E2=0.900, horizontal heat flow) |        | 23.0                        | -                                 | 0.665   |              | 6.333% Softwood<br>(~500kg/m <sup>3</sup> )<br>(23.0mm)                                  |  |
| Plasterboard (BS5250)  |        | 12.5                        | 0.170                             | 0.074   |              |  |  |
| Plaster, lightweight (BS5250)  |        | 3.0                         | 0.220                             | 0.014   |              |  |  |
| Inside surface resistance  | -      | -                           | -                                 | 0.130   |              |  |  |

**U-value = 0.13W/m<sup>2</sup>K**

U-value, Combined Method : 0.128W/m<sup>2</sup>K (upper/lower limit 8.237 / 7.445m<sup>2</sup>K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc1 0.0000, dUrc2 0.0000)

**Correction factors**

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)

|  | Thickness<br>(mm) | Thermal<br>Conductivity<br>(W/mK) | Thermal<br>Resistance<br>(m <sup>2</sup> K/W) | Vapour<br>Resistivity<br>(MNs/gm) | Vapour<br>Resistance<br>(MNs/g) |
|--|-------------------|-----------------------------------|---|-----------------------------------|---------------------------------|
| Outside surface resistance   | -                 | -                                 | 0.040   | -                                 | -                               |
| Brick - outer leaf (BRE)   | 103.0             | 0.770                             | 0.134   | 50.00                             | 5.15                            |
| Cavity<br>(Un-vented cavity - width=600.0mm, hro=5.100, E1=0.050, E2=0.900, horizontal heat flow)                        | 50.0              | -                                 | 0.665   | -                                 | 0.26                            |
| PhotonFrame  | 33.0              | 0.034                             | 0.971   | 0.00                              | 0.22                            |
| OSB (BS5250)   | 9.0               | 0.130                             | 0.069   | 500.00                            | 4.50                            |
| Earthwool FrameTherm Roll 32   | 180.0             | 0.032                             | 5.625   | 5.00                              | 0.90                            |
| PhotonFoil   | 33.0              | 0.034                             | 0.971   | -                                 | 192.00                          |
| 50x38mm batten cavity<br>(Bridged un-vented cavity - width=550.0mm, hro=5.100, E1=0.050, E2=0.900, horizontal heat flow) | 23.0              | -                                 | 0.665   | -                                 | 0.13                            |
| Plasterboard (BS5250)  | 12.5              | 0.170                             | 0.074   | 60.00                             | 0.75                            |
| Plaster, lightweight (BS5250)  | 3.0               | 0.220                             | 0.014   | 30.00                             | 0.09                            |
| Inside surface resistance  | -                 | -                                 | 0.130   | -                                 | -                               |

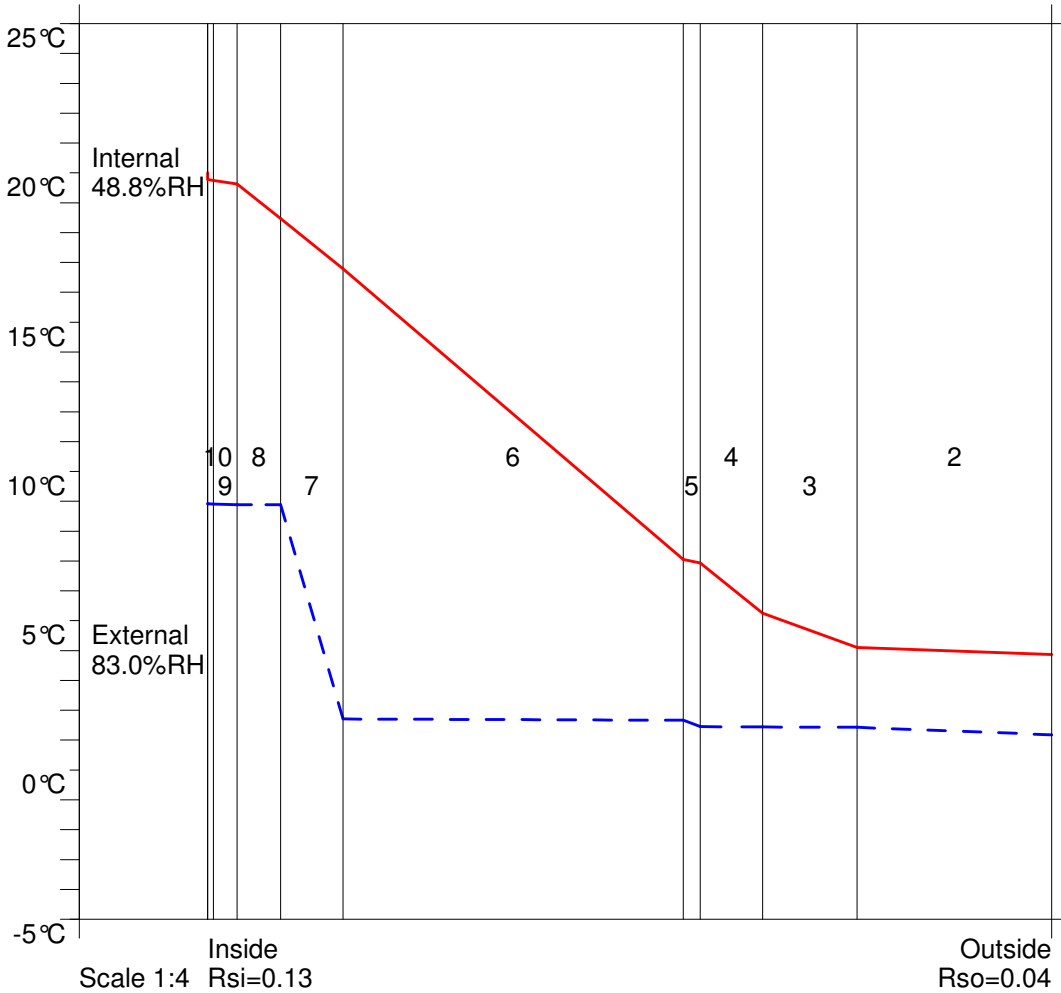
**Condensation Risk Analysis (no account taken of thermal bridges)**

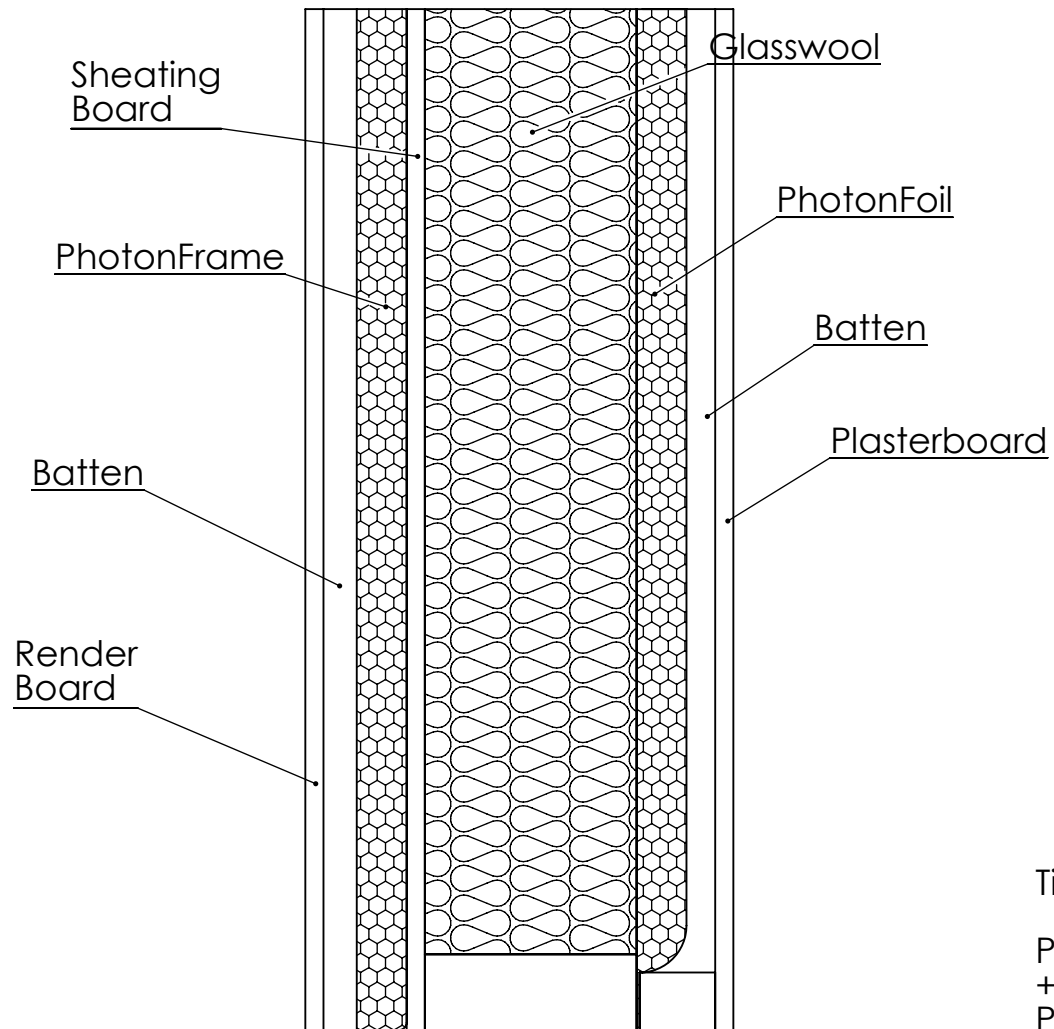
**3 - Dwellings with low occupancy**

| Jan (worst) | Feb         | Mar         | Apr         | May         | Jun         | Jul         | Aug         | Sep         | Oct         | Nov         | Dec         |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 20.0C 48.8% | 20.0C 48.9% | 20.0C 50.7% | 20.0C 52.9% | 20.6C 56.3% | 22.1C 59.2% | 22.9C 60.8% | 22.9C 60.7% | 21.8C 58.5% | 20.3C 55.6% | 20.0C 51.3% | 20.0C 49.5% |
| 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 Brick - outer leaf (BRE)       | 3.9                | 1.2               | 0.67                  | 0.81                 |                                 |                                  | No           |
| 3 Cavity                         | 4.1                | 1.4               | 0.68                  | 0.82                 |                                 |                                  | No           |
| 4 PhotonFrame                    | 5.3                | 1.4               | 0.68                  | 0.89                 |                                 |                                  | No           |
| 5 OSB (BS5250)                   | 6.9                | 1.5               | 0.68                  | 1.00                 |                                 |                                  | No           |
| 6 Earthwool FrameTherm Roll 32   | 7.1                | 1.7               | 0.69                  | 1.00                 |                                 |                                  | No           |
| 7 PhotonFoil                     | 16.8               | 1.7               | 0.69                  | 1.91                 |                                 |                                  | No           |
| 8 50x38mm batten cavity          | 18.5               | 8.9               | 1.14                  | 2.12                 |                                 |                                  | No           |
| 9 Plasterboard (BS5250)          | 19.6               | 8.9               | 1.14                  | 2.28                 |                                 |                                  | No           |
| 10 Plaster, lightweight (BS5250) | 19.8               | 8.9               | 1.14                  | 2.30                 |                                 |                                  | No           |
| 11 Inside surface resistance     | 19.8               | 8.9               | 1.14                  | 2.30                 |                                 |                                  | No           |

Worst case internal / external conditions for graph : 20.0°C @ 48.8%RH / 3.8°C @ 83.0%RH





Timber Frame

PhotonFoil  
 +  
 PhotonFrame  
 +  
 RenderBoard

2D CAD

October 2107