

## Thermal Transmittance of EVG-3D walls

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We usually calculate thermal transmittance of EVG-3D panels according to EN-ISO 6946, appendix D.3. Section 6.2 of this standard cannot be applied since this method is limited to heat bridges which do not consist of metal. However, the results according to D.3 are roughly the same as for a calculation according to section 6.2.3 (*lower limit of thermal resistance R of structures with inhomogeneous layers*). Appendix D.3 is applicable when the heat insulation is penetrated by a mechanical fixing device.

Calculations according to EN-ISO 6946, Appendix D.3 use a correction value  $\Delta U_f$ , which describes additional heat loss due to the diagonal truss wires. This value results in

$$\Delta U_f = \alpha \lambda_f n_f A_f$$

- $\alpha$  coefficient acc. to table D.2  
for walls with 2 shells  $\alpha$  is defined as  $6 \text{ m}^{-1}$   
for roofs with 2 shells  $\alpha$  is defined as  $5 \text{ m}^{-1}$
- $\lambda_f$  thermal conductivity of diagonal truss wires
- $n_f$  number of fixing devices per sqm
- $A_f$  cross section of fixing devices

For determination of thermal resistance and thermal transmittance the thermal conductivity of each material is required. These values can be found in the following table. Of course, all numbers are mean values only. In literature sometimes slightly different values can be found.

concrete	$\lambda =$	1.4 W/mK
EPS	$\lambda =$	0.035 W/mK
galvanised steel	$\lambda =$	55 W/mK (used for standard panels)
stainless steel	$\lambda =$	17 W/mK (used for special panels with better thermal resistance)

For a standard wall panel with 100 mm EPS and 100 diagonal truss wires (3.8 mm; galvanised steel) the result is as follows:

$$U_f = 0.326 \text{ W/m}^2\text{K}$$

$$\Delta U_f = 0.374 \text{ W/m}^2\text{K}$$

$$U_{\text{total}} = 0.700 \text{ W/m}^2\text{K}$$

The R-value results in

$$R = 1/U_{\text{total}} = 1.43 \text{ m}^2\text{K/W}$$

This value is in accordance with tests carried out with 3D panels.

In cases where the panel's R-value is not sufficient and panels with stainless steel diagonals are not available we sometimes have attached additional layers of heat insulation material (preferably at the outside).