

Thermal conductivity

Introduction

Thermal conductivity (sometimes referred to as k-value or lambda value (λ)) is a measure of the rate at which temperature differences transmit through a material. The lower the thermal conductivity of a material, the slower the rate at which temperature differences transmit through it, and so the more effective it is as an insulator. Very broadly, the lower the thermal conductivity of a building's fabric, the less energy is required to maintain comfortable conditions inside.

Thermal conductivity is a fundamental material property independent of thickness. It is measured watts per meter kelvin (W/mK).

The thermal resistance of the layers of the a building's fabric (R measured in in $\text{m}^2\text{K/W}$) can be calculated from the thickness of each layer / the thermal conductivity of that layer.

The U value of an element of a building can be calculated from sum of the thermal resistances (R-values) of the layers that make up the element plus its internal and external surface resistances (R_i and R_o).

$$U\text{-value} = 1 / (\sum R + R_i + R_o)$$

U-values (sometimes referred to as heat transfer coefficients or thermal transmittances) are used to measure how effective elements of a buildings fabric are as insulators.

The standards for the measurement of thermal conductivity are BS EN 12664, BS EN 12667 and BS EN 12939. In the absence of values provided by product manufacturers following thermal conductivity tests, the thermal conductivity data obtained from BS EN 12524 Building materials and products. Hygrothermal properties.

Thermal conductivity of typical building materials

Thermal conductivity values of typical building materials shown below.

Material	W/mK
screed (cement/sand)	0.41

Source: https://www.designingbuildings.co.uk/wiki/Thermal_conductivity