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Abstract

In this research project it is investigated, how type and size of mortar joints, moisture content, grip holes, brick dimensions and orientation of the cavities and air voids affect the equivalent thermal conductivity of the masonry. Therefore a wide range of measurements and calculations were performed and their results compared. Based on the findings for each type of influence factor, threshold values for the increase in thermal transmittance were defined, where the respective influences exceed the 3 % limit in ISO 6946.

Furthermore, the methods of determination of thermal design values for masonry in DIN 4108-4 and EN 1745 are compared. Some in European context vague aspects in DIN 4108-4 are presented and recommendations for adaption are elaborated.

The thickness and material of the mortar joints have a significant influence on the thermal conductivity of the masonry. Only a 2 mm thin mortar joint with a thermal conductivity of 0.4 W/(m·K) leads to a 3 % increase of the U-value of the wall. Since the influencing factors on the U-value have to be accumulated, the 3 % criterion is reached quickly.

Thermal conductivity and U-value of masonry is also strongly influenced by absorbed humidity. During numerical simulations, the application of the humidity correction factors on all material has to be ensured.

Further investigations show that the previously neglected influence of anisotropy of the brick should be taken into account in numerical simulations. Due to non-consideration of the anisotropy, the simulation results are found to be 6 – 8 % too low and thus significantly too favorable.