University of Twente
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Thermal conductivity Of Gypsum Plasterboards

Subject
Thermal properties of gypsum plasterboards under fire

Goal

One of the goal of this PhD-research is to predict the thermal properties of gypsum plasterboards with different composition in order to improve their fire behaviour. One of the more complicated thermal properties to calculate is the thermal conductivity. This parameter influences the fire behaviour of gypsum plasterboards.

Chemical composition

The thermal conductivity of the solid phases can be best determined by geometric average of thermal conductivity of the separate solid phases

(micro-)structure

The microstructure of the porous medium influences the conductivity. The structure can be described by particle shape, arrangement of the particles and the presence of solid-phase bridges. This parameters are taken in account by shape-factor in some of two-phase equations

Thermal Conductivity

The rate of heat transfer through the thickness of a material per unit area per unit temperature difference

Void fraction

The porosity of the boards is related to the density. The normal density of the boards is between 55-75%

Moisture content

The moisture content influences the thermal conductivity of boards. A moisture content of 2.78% is found in our research.

Two-phase equation

Different equations can be used for the calculation of the saturated two phase system. We found that the best results can be obtained by Zehner and Schlunder Equation with shape-factor of 5.

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