Analysis of structural and thermal-physical characteristics of high-porosity basalt thermal insulation for tubing

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The study shows the importance of developing high-porosity, low-density environmentally friendly thermal insulation using accessible and inexpensive basalt fibres and a mineral matrix to create structures operational under temperatures up to 750 °C. We discuss basalt thermal insulation coating for tubing obtained via the technique of depositing short fibres from the pulp upon a perforated attachment by means of filtration. We analysed a quantitative account of heat flow in oil well annuli through high-porosity thermal insulation of tubing due to thermal conductivity of the basalt fibre framework, dry air and via radiant heat transfer. We show that when determining the coefficient of thermal conductivity for a fibrous material characterised by high porosity it is necessary to account for the radiant heat transfer contribution to the heat transfer process, the radiant heat transfer being a critical factor.

Keywords: *thermal insulation of structures, short basalt fibres, thermal insulation material porosity, coefficient of thermal conductivity, tubing, cylindrical jackets*

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