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Foamed glass – a sustainable load-bearing insulation material

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Foamed glass is a lightweight material used for thermal and acoustic insulation applications in the construction and other industries. It exhibits several advantages in comparison to insulation materials such as organic foams and mineral wool, e.g., water and steam resistance, freeze-thaw cycle tolerance, excellent chemical and thermal stability, and superior mechanical properties. In the last decade, the possibility of recycling different glass cullets and glassy waste materials into this high value added product has been presented. In this contribution, we present the results of our work focused on improvement of the foamed glass preparation process, improvement of the thermal conductivity and development of closed and open porous foamed glass. Foamed glass can be prepared from a pristine glass or from a cullet. Preparation directly from cullet is more sustainable, however, the properties of thus prepared foamed glass are inferior. In order to ensure superior insulation properties and decreased dependence of the foaming process on the cullet composition, we used a foaming agent–oxidizing agent couple to foam cullets of cathode-ray-tube (CRT) panel, flat and container glass. The density and thermal conductivity of the prepared samples are as low as 100 kg/m³ and 37 mW/(m K), respectively. Analysis of the thermal conductivity of open- and closed-porous foamed glasses will be presented.

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