

Fly Ash from Serbian Power Plants Used as a Raw Material for Ceramic Tiles Production

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ABSTRACT

Every year, about 6 to 7 million tons of fly ash are produced in thermal power plants in Serbia. Only a small part is utilized, mostly by concrete industry. The remainder is placed in dumps with negative consequences for the safety of the environment. Use of fly ash as a raw material for ceramic tiles production can increase the ash utilization, and also reduce the cost of production by substitution of expensive and rare traditional raw materials.

This investigation included characterization of the materials, optimization of compacting pressure, sintering temperature and the raw mixture composition, synthesis of dense ceramic elements in laboratory, as well as trials under industrial conditions.

Fly ashes used are from four different coal power plants in Serbia. The raw mixture was prepared by substitution of basic ceramic raw materials with fly ash. The contents of fly ashes in the composites were 5, 10, 15, 25, 50 and 75% (mass).

An important criterion for ceramic products quality evaluation is water absorption. Two of four fly ashes investigated in laboratory had acceptable water absorption (less than 2%) even when the fly ash content in the composite was 75%.

Tiles with up to 15% of fly ash produced with large-scale industrial equipment had characteristics comparable to those required for floor and outdoor applications – very low water absorption (less than 0.5%) and flexural strength between 35 and 50 MPa. These tiles also proved to be resistant to biological and chemical corrosion.

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