

Communication

Influence of waste glass powder addition in the microstructure and durability of mortars in the very long term

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Abstract: At present, the cement industry still constitutes an important pollutant industrial sector. Then, the strategies to reduce its environmental impact are a popular topic of research. One of these strategies consists of replacing partially clinker with other materials, such as waste glass powder. Here, it has been analyzed the effects at 1500 hardening days of the addition of glass powder on the microstructure and durability properties of mortars that incorporate 10% and 20% of this addition as clinker replacement. Reference mortars prepared with ordinary Portland cement without additions were also studied. The mortars were kept in an optimum condition (20°C and 100% relative humidity) until the testing age. Their microstructure has been characterized using mercury intrusion porosimetry and impedance spectroscopy. As durability parameters, the steady-state chloride diffusion coefficient and the absorption after immersion have been determined. According to the results obtained, mortars with glass powder showed similar porosities and more refined microstructure compared to reference mortars. Furthermore, the durability properties at 1500 hardening days of mortars which incorporate glass powder were similar or even better than those noted for reference ones without additions, especially regarding the resistance against chloride ingress, with the added value of contributing to sustainability.

Keywords: sustainability; glass powder; very long term effects; microstructure; durability.
