

Abstract

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 in the industrial sector. As such, strategies to reduce its environmental impact are a popular research topic. One of these strategies consists of partially replacing clinker with other materials, such as waste glass powder. Here, the effects of the addition of glass powder on the microstructure and durability properties of mortars that incorporate 10% and 20% of this addition as a clinker replacement after 1500 hardening days were analyzed. Reference mortars prepared with ordinary Portland cement without additions were also studied. The mortars were kept in optimum conditions (20 °C and 100% relative humidity) until the testing age. Their microstructure was characterized using mercury intrusion porosimetry and impedance spectroscopy. The steady-state chloride diffusion coefficient and the absorption after immersion were determined as durability parameters. According to the results obtained in the present study, the mortars with the added glass powder showed similar porosities and more refined microstructure compared to the reference mortars. Furthermore, the durability properties of the mortars that incorporate glass powder were similar or even better than those noted for the reference mortars without any additions after 1500 hardening days, 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



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