

The Effects of Stearates on Mechanical and Durability Properties of Concrete

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Abstract

Moisture and aggressive ions transfer into concrete can be considered as a significant threat to the durability of concrete. Calcium stearate and zink stearate as damp-proofing admixtures can provide a water repellent layer along capillary pores and this layer restricts moisture transfer through the capillary pores of the concrete. Accordingly, this research studies the impacts of calcium stearate and zink stearate on characteristics of ordinary concrete and fresh cement paste. Results of fresh concrete and paste evaluation shows that these admixtures reduces workability of fresh concrete, but their impacts on air content of fresh concrete, normal consistency, and setting time of the fresh paste are fairly negligible. Additionally, investigating the mechanical characteristics demonstrates that they mainly cause compressive strength loss in the concrete. Furthermore, these admixtures do not improve the durability properties under hydro-static pressure. By contrast, the durability properties under non-hydrostatic condition have been drastically improved due to their inclusion. In this regard, utilizing 2kg/m^3 of calcium stearate and zink stearate averagely reduced short term water absorption and final capillary penetration depth by respectively 54% and 25%.

Keywords: Calcium stearate, Zink stearate, durability, damp-proofing admixtures, permeability.

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