

Drying Shrinkage of Magnesium Silicate Hydrate Gel Cements

Authors : T. Zhang, X. Liang, M. Lorin, C. Cheeseman, L. J. Vandeperre

Abstract : Cracks were observed when the magnesium silicate hydrate gel cement (prepared by 40% MgO/ 60% silica fume) was dried. This drying cracking is believed to be caused when unbound water evaporates from the binder. The shrinkage upon forced drying to 200 °C of mortars made up from a reactive magnesium oxide, silica fume and sand was measured using dilatometry. The magnitude of the drying shrinkage was found to decrease when more sand or less water was added to the mortars and can be as low as 0.16% for a mortar containing 60 wt% sand and a water to cement ratio of 0.5, which is of a similar order of magnitude as observed in Portland cement based mortars and concretes. A simple geometrical interpretation based on packing of the particles in the mortar can explain the observed drying shrinkages and based on this analysis the drying shrinkage of the hydration products at zero added solid is estimated to be 7.3% after 7 days of curing.

Keywords : magnesium silicate hydrate, shrinkage, dilatometry, gel cements

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