

Effect of Saturated lightweight Sand Substitution on Shrinkage in 0.35 w/b Concrete

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Abstrak

internal curing is promoted as a way to mitigate autogenous shrinkage in high-performance concrete having a low water binder ratio (w/b). Different methods of internal curing have been proposed. In this study, the effect of substituting 20% of normalweight sand by an equal mass of lightweight sand on the development of shrinkage was investigated on a 0.35 w/b high performance concrete. Shrinkage was monitored using vibrating wire gauges cast at the center of 100x100x400 mm (4x4x16 in.) concrete samples. Two samples were sealed with self-adhesive aluminum foil to present a closed curing system without any exchanged of humidity between the concrete and its environment, After demolding at the age of 23 to 25 hours, two other samples were cured under water for 6 days. Thereafter these two samples were removed from water and maintained at 23 C (73 F) and a 50% relative humidity (RH) Environment. Experimental results clearly demonstrate the efficiency of a 20% substitution of normalweight by a lightweight sand to reduce autogenous and drying shrinkage. The Incorporation of 20% lightweight sand did not significantly affect the 28-day compressive strength. The cementitious matrix presented low chloride ion permeability. Internal curing through the use of partial replacement of normalweight sand by lightweight sand definitely represent an efficient method to diminish autogenous and drying shrinkage in low w/b concretes where external water curing does not allow in-depth curing of concrete