Feasibility Study of Using Calicut Tile Waste as an Internal Curing Fine Aggregate in Construction Industry

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Abstract

Over recent decades, internal curing concept has become emerging technology and research in this area has increased tremendously. American Concrete Institute described internal curing as "a process by which the hydration of cement continues because of the availability of internal water that is not part of the mixing water". Internal curing facilitates to minimize autogenous shrinkage as water in the pore structure will work to fill pores which lead to shrinkage. And also, effective cement hydration process will perform inside concrete by maintaining internal relative humidity which leads in to avoid self-desiccation.

Over the years, various methods and materials have tested to use as an internal curing aggregate. Calicut tile waste is generated as a wastage (damage tiles) in manufacturing factories and as construction and demolition waste in the construction industry. Waste Calicut tiles cannot be re-used to cast tiles as it is no longer shows clay properties with the phase changed of the material. The development of an internal curing fine aggregates using Calicut tile waste is described in the study.

The internal curing fine aggregates are prepared by crushing Calicut tile waste to the size less than 4.75mm. Then crushed calicut tile chips are soaked in water for 48hours to absorb and retain water inside the microstructure. Water absorption, Water desorption, the relative density of pre-wetted Calicut tile chips and microstructure were studied. According to ASTM C1761M, internal curing aggregate shall have a 72-h absorption not less than 5%., the release of at least 85% of its absorbed water at 94% relative humidity. Water absorption of 23%, water desorption of 91% and a relative density of 1.8 showed in the investigations. Scanning electron micrographs images of the aggregate show that tiny pores (> 100nm) are presented in the microstructure which can store water and release for hydration.

Initial investigations revealed that Calicut tile waste can be used as an internal curing fine aggregate since it has the required water absorption and desorption capacity.

Keywords: *Internal curing, Calicut tile waste, Self-desiccation, Calicut tile chips*

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