Evaluation of Water Absorption Characteristics of Internal Curing Concrete Aggregate with Respect to the Processing Temperature of Expanded Clay Types

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Abstract

The increase of the new technological development of any country may lead to introduce fast and sustainable construction techniques and materials. Internal curing is one of a revolutionary curing process which has more advantages than the conventional curing process. Internal Curing can supply extra water throughout the concrete mixture in order to complete the cement hydration process. This can be done by using lightweight aggregate which replaces some of the normal and conventional aggregate in the concrete mixture. Water that absorbed inside expanded lightweight aggregate can provide additional water throughout the concrete mixture for curing process. This method can be effectively used for concrete road and related infrastructure construction since the traditional curing methods have some inherent limitations in using road infrastructure construction.

Expanded clays can be used to produce suitable aggregates for internal curing. So, heating temperature is a critical parameter in the production of suitable ICC aggregate using expanded clay. Water absorption and desorption are the main requirements of internal curing. This research is mainly focused on selecting suitable heating temperature which gives and optimum water absorption. It includes the selection of suitable expanded clay type to produce ICA. Different clay samples were studied to build a relationship between heating temperature and water absorption. Clay samples were prepared using a mold and that clay samples were heated at various temperatures (in the range of 800 °C to 1300 °C). Heated clay samples were analyzed through the laboratory tests. The bloating coefficient of the clay samples were varied from 1.0 to 2.2. Higher temperature has the higher bloating coefficient but at 1300oC the clay samples were begun to melt due to the phase change of the structure of clay molecules. Higher water absorption values are experienced before the phase change of the clay molecules.

Keywords: (ICC) internally curing concrete, (ICA) internally curing aggregate.

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