Thesis Title	Effects of LOI on Heat Evolution, Strength, and Durability of High Volume Bagasse Ash Concrete.
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Abstract

This research aimed to study the effects of loss on ignition (LOI) on heat evolution, strength, and durability of concrete containing high volume ground bagasse ash. Bagasse ash, received directly from the sugar industry, was processed to have three different values of LOI by floating it in the water, i.e., 10±2, 15±2, and 20±2 by weight. Then, all bagasse ashes were ground to have high fineness until the particles retained on a sieve No. 325 were less than 5% by weight. Portland cement type I was replaced by ground bagasse ash at 50, 65, and 80% by weight of binder. All concrete mixtures had a binder content of 400 kg/m^3. Water to binder ratio of 0.45 was used and superplasticizer was employed in order to control slump of fresh concrete between 15-20 cm. Properties of high volume ground bagasse ash concrete such as heat evolution, compressive strength, splitting tensile strength, and elastic modulus were determined. Durability of concrete in terms of chloride resistance, water permeability, and drying shrinkage was also investigated.

The results showed that the peak temperature rise of concrete containing high volume ground bagasse ash could be reduced by 13-24 ^{o}C from the control concrete, depending on the level of cement replacement by ground bagasse ash. The use of 65% replacement of ground bagasse ash having 10-15% of LOI had the compressive strength of concrete at 90 days as high as that of control concrete. Greater proportions of ground bagasse ash and values of LOI decreased the compressive strength of concrete. Use of high volume ground bagasse ash with different values of LOI in concrete had no

significant effect on the splitting tensile strength and modulus of elasticity of concrete, which were properties related to concrete compressive strength.

Concrete containing 50% and 65% of ground bagasse ash by weight of binder and having 10-20% of LOI exhibited higher chloride resistance than the control concrete. At 28 days, total charge passed of high volume ground bagasse ash concrete was lower than 920 Coulombs, which was in the very low level as specified by ASTM C1202. The use of ground bagasse ash in concrete at high cement replacement level could not reduce the water permeability of concrete. Water permeability of high volume ground bagasse ash concrete with different values of LOI tended to decrease when the compressive strength of concrete increased. All concrete incorporating high volume ground bagasse ash with different values of LOI had higher drying shrinkage than that of the control concrete. Drying shrinkage of concrete containing ground bagasse ash increased with the increase of LOI and the level of cement replacement.

Keywords: Bagasse Ash / Compressive strength / Chloride Resistance / Drying Shrinkage / Loss on Ignition / Water Permeability.