

Evaluation of Fresh, Strength and Durability Properties of Self-Compacting Concrete Incorporating Bagasse Ash

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Abstract : Self-compacting concrete is an engineered concrete that flows and de-airs without additional energy input. Such concrete requires a high slump which can be achieved by the addition of superplasticizers to the concrete mix. In the present work, bagasse ash is utilised as a replacement of cement in self-compacting concrete. This serves the purpose of both land disposal and environmental concerns related to the disposal of bagasse ash. Further, an experimental program was carried out to study the fresh, strength, and durability properties of self-compacting concrete made with bagasse ash. The mixes were prepared with four percentages (0, 5, 10 and 15) of bagasse ash as partial replacement of cement. Properties investigated were; Slump-flow, V-funnel and L-box, Compressive strength, Splitting tensile strength, Chloride-ion penetration resistance and Water absorption. Compressive and splitting tensile strength tests were conducted at the age of 7 and 28 days. Rapid chloride-ion permeability test was carried at the age of 28 days and water absorption test was carried out at the age of 7 days after initial curing of 28 days. Test results showed that there is an increase in the compressive strength and splitting tensile strength of the concrete specimens having up to 10% replacement level, however, there is a slight decrease at 15% level of replacement. Resistance to chloride-ion penetration of the specimens increased as the percentage of replacement was increased. The charge passed in all the specimens containing bagasse ash was lower than that of the specimen without bagasse ash. Water absorption of the specimens decreased up to 10% replacement level and increased at 15% level of replacement. Hence, it can be concluded that optimum level of replacement of cement with bagasse ash in self-compacting concrete comes out to be 10%; at which the self-compacting concrete has satisfactory flow characteristics (as per the European guidelines), improved compressive and splitting tensile strength and better durability properties as compared to the control mix.

Keywords : bagasse ash, compressive strength, self-compacting concrete, splitting tensile strength

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