

Replacement of Type I Portland Cement by Bagasse Ash in Concrete Flooring Tiles

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ABSTRACT: The chemical compositions and microstructures of concrete produced from type I Portland cement mixed with bagasse ash and bagasse ash and sand were analyzed. Various physical and mechanical properties of those compositions were tested to clarify the optimum ratio to produce a concrete product. The objective was to exploit bagasse ash, an agricultural waste, from sugar industry. The study focused on the use as cement replacement to reduce cement consumption. Moreover, the waste disposal costs should be substantially reduced. The rationale behind this research was that bagasse ash had SiO₂ content up to 62% by weight [1] and it was possible to have pozzolanic reaction with cement and gave better mechanical and physical properties compared with 100% cement. The experimental procedure was divided into three parts, (1) chemical compositions and microstructures analysis (2) physical properties and (3) mechanical properties. The samples were prepared from type I Portland cement, bagasse ash and sand as thin pieces and as concrete flooring tiles. It was found that silica content in cement powder and bagasse ash was 21.89% and 86.79% by weight, respectively. Subsequently, concrete flooring tiles were analyzed water absorption and SEM investigations and showed that the porosity of those with bagasse ash was lower than of those without bagasse ash. The bending strength of the samples with bagasse ash was rather higher than ones without bagasse ash. Chemical composition results by XRD showed that SiO₂ peak intensity increased proportionally with bagasse ash content. The most suitable proportion of cement to bagasse ash to sand was 7 : 2 : 1.

Key words: type I Portland cement, Bagasse ash, Sand, Concrete flooring tiles