Assessment of the use of Arcelor Mittal Electric Arc Furnace Slag as Coarse Aggregates in Concrete Production

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Abstract

Arcelor Mittal electric arc furnace slag is a by product from the steel making process. Locally, it is generated in great amounts and when produced, it is left in stockpiles at the production site. The use of this industrial by product in the construction industry could be beneficial in minimizing natural resource depletion and the high environmental impacts caused by concrete production. As such, this study focuses on the effectiveness of using Arcelor Mittal electric arc furnace slag as coarse aggregates in the making of concrete. However, since the electric arc furnace slag is an industrial by product, a comprehensive knowledge of its characteristics is required. Therefore, this paper examines the physical, mineralogical and chemical properties of electric arc furnace slag. The feasibility of using electric arc furnace slag in the concrete was examined by conducting compressive and tensile strengths of concrete mixtures using replacement ratios of 0%, 15%, 30%, 45%, 60%, 75% and 100% of the slag as coarse aggregates. The findings indicate that the compressive and tensile strengths of the concrete achieved using the different ratios of the slag is comparable to that using purely natural aggregates. Therefore, the utilization of Arcelor Mittal electric arc furnace slag in concrete production is an efficient means of reducing the costs and environmental impacts.