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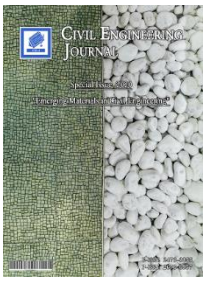

Impact of Fire on Mechanical Properties of Slurry Infiltrated Fiber Concrete (SIFCON)

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Abstract

This research aims to shed light on the fire flame effect on some mechanical properties of SIFCON samples, such as compressive strength, flexural strength and modulus of elasticity and comparing the results with CEN design curve and CEB. Higher temperature resistance is one of the most important parameters affecting the durability and service life of the material. This study comprised of casting and testing SIFCON specimens with 6% fiber volume before and after exposure to elevated temperatures. Two fire exposure duration of 1 and 2 hours were investigate. In addition to room temperature, Silica fume was used as a partial replacement (10%) by weight of cement. It was found from the results achieved that after exposure to high temperatures, compressive strength, flexural strength and elastic modulus decreased. The drastically reduction of compressive strength took place with increasing temperature. The residual compressive strength, flexural strength and elastic modulus at 1010 °C were in the range of (58.4 to 80.1%), (81.6 to 78.7%) and (30.4 to 32.8%) respectively. The compressive strength test results of this study together with results obtained by other investigators were compared with CEB strength-reduction curve and that of CEN. It was noticed that the test results agreed with CEN design curve rather than with that of CEB.

Keywords: Completely Decomposed Granite; Soil Mineralogy; Micro-fabric.

1. Introduction

The production of concrete technology is becoming more advanced as engineers have started using concrete in their designs other than just normal concrete. Given the very high compressive strength values and other high or ultra-high efficiency advantages. In general, such materials remain a brittle composite material. The incorporation of adequate fiber increases the tensile strength with increased ability to deform and therefore offers ductility. In 1979 by Lankard Materials Laboratory, Columbus, Ohio, USA, integrating significant amounts of steel fibers into composite reinforced cement [1]. SIFCON can be considered as a special form of reinforced fiber concrete (FRC) with a high fiber content. Molded with cement-based slurry or flowing mortar, and infiltrated. The SIFCON production involves sprinkling the fibers in the mold to their maximum capacity first. Then, cement-based slurry penetrates the fibre network. To ensure proper fiber bed slurry infiltration Vibration is also required [2, 3]. The amount of fibers will vary from 5 to 20 per cent and is a feature of Various parameters, such as fiber length, diameter and aspect ratio; their orientation; the process used in the packaging; Mold size; and vibration range. SIFCON shows good strength and ductility in comparison with traditional FRC with a Large volume steel fibre fraction [4].

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