



MECHANICAL BEHAVIOR OF MACRO-SYNTHETIC FIBER REINFORCED CONCRETES EXPOSED TO HIGH TEMPERATURE ENVIRONMENTS

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Abstract: An experimental investigation was performed in order to understand the effect of high temperatures (up to 600°C) on the mechanical properties of a Macro-Synthetic Fiber Reinforced Concrete (MSFRC). Barcelona tests and compressive strength tests were used to evaluate the post-heating residual strength of the composite. Besides that, monotonic tension tests were performed in single macro-synthetic fibers in order to evaluate their mechanical properties at room temperature, as well as, to assess the effect of temperature on the fibers residual tensile properties. BCN tests demonstrated that the MSFRC gradually loses tensile strength an energy consumption density with increasing temperature. Temperatures of 400°C and 570°C shown to be critical to the MSFRC mechanical performance. The residual mechanical behavior of the macro-synthetic fibers was not affected by the temperature up to 100°C. For higher temperatures, the reinforcement showed that may lose part of its crystallinity compromising the MSFRC post-cracking performance. The constitutive model used to determine the stress-strain curves of the MSFRC was capable to reproduce the composite behavior after the event of a fire.

Keywords: Elevated temperatures, Macro-synthetic fiber reinforced concretes, Mechanical behavior