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THE EFFECTS OF TEMPERATURE ON THE MECHANICAL PROPERTIES AND MICROSTRUCTURE OF HIGH-STRENGTH CONCRETE CONTAINING POLYPROPYLENE FIBRES

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ABSTRACT

Concrete that possesses an extraordinary level of strength has discovered use in a wide variety of applications, some of which require it to withstand temperatures that are quite high. The building of bridges is an example of one of these applications. The considerable significance that polypropylene fibre plays in the spalling resistance of high strength concrete has been demonstrated by a large number of authors. These authors have demonstrated that this role plays a significant influence in the overall role. As a result of this effort, some vital information regarding the microstructure and mechanical characteristics of high-strength concrete has been acquired. These data will be used to improve the material. The concrete in question is polypropylene fibre-reinforced and can reach temperatures as high as 200 degrees Celsius during the heating process. When polyethylene fibre concrete with a high strength is heated to a maximum temperature of 170 degrees Celsius, the fibres readily melt and volatilize, which results in an increase in the concrete's porosity in addition to the production of microscopic channels. Investigations using differential scanning calorimetry (DSC) and thermogravimetric analysis (TG) shed light on the temperature ranges at which reactions of deterioration occurred in the high strength concrete. In the course of the examination using the SEM, it was discovered that the melting of fibres had resulted in the formation of additional pores and narrower channels inside the concrete. Melting the fibres resulted in the formation of these pores and channels in the material. During the course of the mechanical testing, it was observed that the splitting tensile strength, compressive strength, and modulus of elasticity of the material exhibited some very slight variations from one another. It's probable that the melting of the strands of polypropylene is what's creating these variations in the results.

KEYWORDS: *Fibre-Reinforced, Polypropylene, Mechanical Properties*

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