

Use of Non-woven Polyethylene Terephthalate Fabrics to Improve Certain Properties of Concrete

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Abstract : Plastic packages have been broadly used for a long time. Such widespread usage of plastic has resulted in an increased amount of plastic wastes and many environmental impacts. Plastic wastes are one of the most significant types of waste materials because of their non-degradation and low biodegradability. It is why many researchers tried to find a safe and environmentally friendly solution for plastic wastes. In this goal, in the civil engineering industry, many types of plastic wastes have been incorporated, as a partial substitution of aggregates or as additive materials (fibers) in concrete mixtures because of their lengthier lifetime and lower weight. This work aims to study the mechanical properties (compressive, split tensile and flexural strengths) of concrete with a water-cement ratio (w/c) of 0.45 and with the incorporation of non-woven PET plastic sheets. Five configurations -without PET (reference), 1-layer sheet, 2-side, 3-side, and full sample wrapping- were applied. The 7, 14 and 28-days samples' compressive strengths, flexural strength and split tensile strength were measured. The outcomes of the study show that the compressive strength was improved for the wrapped samples, particularly for the cylindrical specimens. Also, split tensile and flexural behaviors of the wrapped samples improved significantly compared to the reference ones. Moreover, reference samples were damaged into many parts after mechanical testing, while wrapped specimens were taken by the applied configurations and were not divided into many small fragments. Therefore, non-woven fabrics appeared to improve some properties of the concrete.

Keywords : solid waste plastic, non-woven polyethylene terephthalate sheets, mechanical behaviors, crack pattern

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