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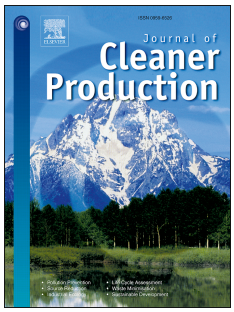

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The combined effects of waste PET particles and pozzolanic materials on the properties of self-compacting concrete

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Abstract

In this study, the combined effects of waste Polyethylene Terephthalate (PET) particles and pozzolanic materials on the rheological, mechanical and durability properties of self-compacting concrete (SCC) are evaluated. The replacement ratios of fine aggregates with the same weight of waste PET aggregates are 5, 10 and 15 weight percent (wt.%). Moreover, the replacement ratio of cement with the same weight of silica fume and fly ash is 10 and 30 wt.%, respectively. The workability of SCC containing waste PET particles was determined using slump flow, V-funnel and L-box tests. Mechanical (compressive, tensile and flexural strengths and modulus of elasticity), rheological (L-Box, slump flow and V-funnel) and durability (water absorption and electrical resistance) properties are assessed. The results show that waste PET particles can be reused as aggregates in SCCs. Use of waste PET in SCC decreases compressive, tensile and flexural strengths. However, pozzolanic materials (fly ash and silica fume) compensate the loss of strength caused by adding PET. The use of waste PET has several advantages. Waste PET has no effect on electrical resistance and decreases the brittleness of concrete. Moreover, waste PET reduces environmental problems, protects natural resources and decreases the dead load of buildings due to its low unit weight.

Keywords: Self-Compacting Concrete (SCC), Polyethylene Terephthalate (PET), Silica fume, Fly ash and Waste management.