



Experimental studies on the behavior of concrete-filled steel tubes incorporating crumb rubber



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ABSTRACT

This study summarizes the results of experimental push-out tests conducted on concrete-filled steel tubes (CFST) incorporating rubberized concrete with the main variables being the recycled rubber replacement ratio, certain sizes of steel tubes having circular and square sections and ages of testing (at 28 days and one year). In addition, 150 mm-cubes were prepared using rubberized concrete mixtures to investigate the impact of shredded rubber contents on the compressive strength of concrete. Four concrete mixtures were designed at a constant water-to-cement ratio of 0.5 and with a cement content of 400 kg/m³. The mixtures were produced by replacing the fine aggregate with crumb-shredded tires at designated replacement levels of zero, 10%, 20% and 30% by total fine aggregate volume. Test results indicated that the use of rubber crumb increased the fresh-state workability and had an adverse influence on the compressive strength of concrete. The details of bond stress and the interface core slip in CFST specimens were estimated and the developed bond mechanisms were explained. The push-out testing of CFST specimens displayed a reduction in the bond strength and the ductility with increasing concrete age.

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