



## The Effects of Cold-Drawn Crimped-End Steel Fibers on the Mechanical and Durability of Concrete Overlay

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**ABSTRACT:** A bonded concrete overlay consists of a new concrete overlay placed directly on top of an existing concrete pavement. The properties of such layer have a distinguished factor for reliable service-life extending of concrete pavements repairing systems. In this paper, the engineering properties of cold-drawn crimped-end steel fiber reinforced (CFCSF) concrete mixtures as overlays are evaluated. To this end, CFCSF mixtures were made with fiber contents of 15 and 25 kg/m<sup>3</sup> with diameters of 0.8 and 1 mm and water-cement ratio of 0.5 in comparison with reference concrete. The engineering properties of these types of concrete in the properties of the fresh and the hardened concrete including compressive strength (CS), tensile strength (TS), flexural strength (FS), modulus of elasticity (ME), depth of water penetration (WP), impact (IR) and abrasion resistance (AR) were investigated. The results showed that at an early age, the addition of fibers had no significant effects on the CS but at higher ages, the samples containing steel fibers had higher compressive TS and FS than the control ones. Also, the use of steel fibers increased the ME, IR and AR of CFCSF specimens. Moreover, models developed to correlate the mechanical properties of mixtures with AR and IR. The comparison between the relation of AR and IR to other mechanical properties, made of the linear regression and polynomial relationships in aspects of R<sup>2</sup>, indicated that stronger relations were available between TS with IR and AR with ME.

**Keywords:** Abrasion Resistance, Concrete Overlay, Impact Resistance, Mechanical Properties, Steel Fiber.

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