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Determining the Percentage of Optimal Steel Fibers in Terms of Mechanical Properties in Ordinary Concrete and Self-Compaction with Steel Fibers

Reinforced concrete with steel fibers has been widely used in concrete and reinforced concrete structures to improve the properties of concrete. The reason for this widespread use is the myriad technical and economic advantages of using steel fibers in concrete bodies. Reinforced concrete with steel fibers includes a concrete body composed of cement, stone materials, water as well as a percentage of short steel fibers that are mixed in a completely randomly and in different directions in the mixture that the presence of steel fibers characterizes the concrete compared to pure Improves. Determining the optimal percentage of fibers is one of the important factors in terms of economics and efficiency of concrete. In this study, to determine the percentage of optimal fibers in different strength classes, 24 mixing designs were prepared and a mechanical laboratory and fresh concrete were performed. The flexural strength of samples containing 0.9% of steel fibers for categories C40, C50 and C60 was 1.91, 3.86 and 5.14 times higher than the control sample, respectively. Among the self-compacting concrete specimens reinforced with steel fibers, the most optimal mixing design belongs to the specimen in which 0.9% of steel fibers are used; So that the corresponding compressive strength is equal to 71.19 MPa. Among the typical concrete samples reinforced with steel fibers, the most optimal mixing design belongs to the sample in which 0.9% of steel fibers are used; The corresponding compressive strength is 63.7 MPa.

Keywords: Steel Fibers, Mechanical Properties, Self-Compacting Concrete, Compressive Strength, Optimum Percentage.