

THE EFFECTS OF ADDING ACRYLIC POLYMER ON SOME MECHANICAL PROPERTIES AND THE RESISTANCE TO ELEVATED TEMPERATURES OF FIBER REINFORCED CONCRETE

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Abstract

This research includes the study of the mechanical properties and resistance to high temperatures of concrete using steel fibers with different ratios of volume (0.5%, 1%, 1.5%) and polymer with different weight ratios of polymer to cement (3%, 7%, 10%). The specimens were made as follows: (100 × 100 × 100mm) cubes for compressive strength tests, (100 × 200mm) cylinders for splitting tensile strength tests and (100 × 100 × 500mm) prisms for flexural strength tests. The results show an improvement in all properties of steel fiber concrete with and without polymer as compared with reference concrete. In compressive strength, the increase was (14.2% - 29.2%) for steel fiber concrete, while the increase was (44.8% - 86.64%) for steel fiber concrete containing polymer. In splitting tensile strength, the increase was (50% - 91%) for steel fiber concrete, while the increase was (102.4% - 124.7%) for steel fiber concrete containing polymer. For flexural strength, the increase was (24.2% - 48.3%) for steel fiber concrete, while the increase was (62% - 78%) for steel fiber concrete containing polymer. Investigating the effect of temperature on concrete with (1%) steel fiber containing (7%) Acrylic polymer, gained compressive, tensile, and flexural strength greater than reference concrete specimens for all temperatures (100, 300, 500, 700C°). The increase in compressive strength was (82%, 54%, 69.8%, 171.4%), respectively; while the increase in tensile strength was (119.2%, 132.6%, 99%, 52.3%), respectively; and the increase in flexural strength was (87.3%, 194.4%, 115.8%, 164%), respectively