

FABRICATION OF POLYMER CONCRETE OF LIGHT WEIGHT AND HIGH PERFORMANCE

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ABSTRACT: Concrete demonstrating high durability, lightweight, and high strength is demanded by a growing number of building projects. Concrete with these properties was achieved in Jordan by employing widespread local raw materials to make Lightweight High-Performance Polymer Concrete (LHPPC). The present study sought to assess the impact of new concrete mixture weight enhanced with polymers in various concentrations on the compressive and tensile strengths alterations as well as to promote the adoption of LHPPC technology in the construction industry. To that end, preparation of 300 concrete test samples was undertaken to enable measurement of compressive and tensile strength after curing intervals of 3 to 28 days. The samples consisted of two categories sub-classified C-20 and C-40 composition designs of aggregate to standard, with addition of polymers in different concentrations (2.5%, 5%, 7.5%, 10%, and 15%) according to the plain concrete weight. The findings revealed that the addition of polymers caused a strength reduction by 40% and 30% for C-20 and C-40, respectively, but the concrete mixtures were still suitable for use in construction. When polymers were added in a proportion of 15%, plain concrete displayed a weight reduction of up to 10%. Tensile strength diminished by just 15% compared to standard concrete when polymers were added in a proportion of 10%. Based on such findings, LHPPC should be produced in line with the specifications of each construction project, particularly in cases of cost increase exceeding 200%.

Keywords: Polymer, Performance, Strengths, Lightweight, Construction