(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :21/01/2023

(21) Application No.202341004290 A
(43) Publication Date : 17/02/2023

(54) Title of the invention : DURABLE CONCRETE WITH 60% RECYCLED AGGREGATE AND PPC CEMENT

(51) International classification	:C04B0040000000, E04B0001800000, C04B0028020000, H01M0010052000, B32B0015040000
(86) International Application No Filing Date	:PCT// :01/01/1900
(87) International Publication No	: NA
(61) Patent of Addition to Application Number Filing Date	:NA :NA
(62) Divisional to Application Number Filing Date	:NA :NA

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(57) Abstract :
6. ABSTRACT This investigation is discloses the method to improve the durability of structures when recycled materials and industrial waste are used to produce concrete. The goal of the invention is to better understand the mechanical and long-term durability of the concrete that is primarily used in industrial building slabs, columns, and footings and has been in use for many years. Building materials like recycled aggregate from previously demolished structures, M-sand as a fine aggregate, and PPC cement were used to achieve good performance in durability as a solution. The M30 and M35 mixes, which are typically used for structural components in industries, were selected as the four mixes. M-sand is used as a 100% replacement for fine aggregate, and recycled aggregate is used as a 60% replacement, along with PPC cement. To improve the properties of recycled aggregate and increase the durability of structures, 1.5% Nano-silica was added to cement. Two different w/c ratios and coarse aggregate replacement ratios, such as 0.35 and 0.45, were selected. With complete replacement of M-sand and 1.5% of Nano-silica to cement, M30 with typical crushed aggregate and M30 with 60% recycled aggregate, and M35 with typical crushed aggregate and M35 with 60% recycled aggregate The mechanical properties necessary for achieving the desired concrete strength at ages 3, 7, and 28 days were investigated. Permeability, absorption, void ratio, sorptivity, rapid chloride penetration, modulus of elasticity, and chloride attack (0.1% and 0.3% of sulphuric acid) were among the durability properties examined. M-sand and Nano-silica were included, and their properties were analysed in detail. In the current experimental work, concrete containing 60% recycled aggregate performed well in terms of mechanical and durability properties when compared to concrete containing 0% replacement of recycled aggregate.

No. of Pages : 23 No. of Claims : 9