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Effects of Aggregate Type and Concrete Age on Compressive Strength After Subjected to Elevated Temperature

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Abstract : In this study, the influence of elevated temperature and concrete age on the compressive strength of concrete produced by normal quartz aggregate, expanded clay, expanded glass, crushed andesite and crushed clay bricks aggregates were investigated. For this purpose, six different mixtures were prepared by 100% replacement of the coarse aggregate. The specimens were cured in water for seven days, then kept in the laboratory for 120 days and 240 days. The concrete specimens were heated in an electric furnace up to 200, 400, 600, 800, and 1000 °C and kept at these temperatures for two hours heating, then for 24 hours cooling. The residual compressive strength of the specimens was measured. The results showed that, the elevated temperature induces a significant decrease in a compressive strength in both normal weight and lightweight aggregate concrete, by comparing the behavior of different mixes, in all cases, the strength of the specimens containing crushed andesite aggregates showed a better performance for compressive strength after exposure to elevated temperatures over 800 °C, while the specimens containing expanded glass showing the least residual strength after subjected to elevated temperature; moreover the age of the concrete in all mixes has also been an effective factor, the behavior of the concrete strength loss by increasing heating temperature was not changed but the strength results showing the better performance and higher compressive strength in both ambient and elevated temperature.

Keywords : elevated temperature, concrete age, compressive strength, expanded clay, expanded glass, crushed andesite, crushed clay bricks
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