TITLE OF ARTICLE: EVALUATION OF POST-FIRE RESIDUAL STRENGTHS OF IN-SITU CONCRETE AND STEEL REINFORCEMENTS SAMPLESUSING NON-DESTRUCTIVE AND DESTRUCTIVETEST METHODS.

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ABSTRACT: The post-fire residual strengths of in-situ concrete and steel reinforcement samples were evaluated using non-destructive and destructive testing methods. Sixty samples of 320 mm x 150 mm x 100 mm reinforced concrete beams were cast in the laboratory in four batches of fifteen samples each with concrete cover for reinforcement varied at 10 mm, 15 mm, 20 mm and 25 mm respectively for each batch. At 28 days maturity, the beam samples were subjected to laboratory furnace temperature ranging from 50^0C to 700^0C in steps of 50^0C. Thereafter, the samples were subjected to rebound hammer and ultrasonic pulse tests after cooling. It was observed that the rebound number initially increased from 27 at room temperature to a maximum of 35 at 250^0C, representing a 29.6 % increase over the pre-fire value. As temperature increased beyond 250^0C the rebound number decreased continuously up till a value of 12 representing a reduction of 65.7% at 700^0C. On the other hand, the pulse velocity decreased from 4.302 Km/sec at room temperature to 1.080 Km/sec at 700^0C reducing by 74. 9%. Results of tensile tests on reinforcements extracted from the fire-exposed beams showed decrease of ultimate tensile strength of steel with increasing temperatures, especially for bars with 10 mm concrete covers which at 700^0C lost 62% of its pre-fire strength.