

# **Effect of High Temperature on Compressive Strength of Structural Lightweight and Normal Weight Concretes**

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This research studies the effect of high temperature which is reached to 600°C on structural lightweight and normal weight concrete. Lightweight concrete mix designed according to ACI committee 211-2-82 with mix proportion 1:1.12:3.35 by volume. The w/c ratio equal to 0.5 by weight and cement content 550 kg/m<sup>3</sup>. Mix proportions of normal weight concrete were 1:2:3 by weight with cement content 400 kg/m<sup>3</sup> and same w/c. The design compressive strength at 28 days of normal weight concrete (NWC) and lightweight concrete (LWC) were 34.7 MPa and 22.62 MPa respectively. Compressive strength tests were performed on 100 mm cubes exposed to high temperature 100,200,400 and 600 °C. The normal weight concrete and light weight concrete test specimens were exposed to high temperature for 10 minute suddenly at the required degree. Moreover, light weight concrete test specimens tested after graduate exposure to high temperature reaching to the required degree with and without drying to examine the effect of moisture content. The results indicated that the structural lightweight concrete exhibits approximately similar compressive strength loss compared to normal weight concrete up to 600 °C at 28 days in graduate exposure. The percentage of reduction on compressive strength was 30% in lightweight concrete compared to 28% in normal weight concrete at 600 °C. In sudden exposure to high temperature, the opposite behavior was noticed. The percentage of reduction on compressive strength was 64.4% in lightweight concrete at 600°C. Drying of lightweight concrete specimens before graduate exposure to high temperatures significantly reduce the loss of compressive strength.

