

Effect of high temperature on bond strength of concrete reinforced with 180° hooked bars

Mohammed Qasim Mustafa*, Jamal Al-Esawi and Zaid Al-Azzawi

Abstract

As far as the authors know, this is a novel study. Pull-out prism specimens were used to test the residual bond strength with compressive strength (30 MPa). The variables are the diameter of hooked bar (10 mm and 12 mm), and the temperature levels (200°C, 400°C and 600°C) in addition to room temperature. Ratio of stress of steel to concrete at failure (f_s / f_c') is considered as an indication to the residual bond strength. The results showed that the stress ratio (f_s / f_c') for the concrete with $\Phi 10$ mm bars is greater than $\Phi 12$ mm bars, also the results showed that the decrease in bond strength after exposing to high temperature for concrete with $\Phi 10$ mm bars is more than it for concrete with $\Phi 12$ mm bars. Up to 200°C, the decrease in bond strength is small, but the decrease for higher temperatures is significant. When the temperature was elevated to 400°C, the decrease is 18% and 11% for concrete reinforced by bars of $\Phi 10$ mm and $\Phi 12$ mm, respectively, while decrease is 27% and 15% when the temperature is elevated to 600°C.