ABSTRACT

The use of high-strength concrete in building construction is increasing faster than the development of appropriate design recommendations. This results in increased flexibility of members design for service load. Also, high-strength concrete is a far more brittle material than normal-strength concrete, as results, doubts have been expressed as to the deflection in members made of high-strength reinforced concrete.

This research reports experimental results on both short-term and long-term deflection for period of 6-months of high-strength reinforced concrete beams, with related experimental data on concrete mechanical properties such as compressive strength, modulus of elasticity and drying shrinkage.

Eight reinforced concrete beams with dimensions of 120 • 230 * 2650 mm are investigated. The variables studied in this work are tensile steel ratios (0.0099) for beams (1, 2, 3, 4) and (0.0177) for beams (5, 6, 7, 8), the second variable is compression steel ratios (0.0-0.0177).

The effect of the previously mentioned variables on the short-term deflections and long-term deflections for period 6-months of high-strength reinforced concrete beams were investigated. The measured deflections were compared with values obtained using different methods proposed by different design codes such as (ACI 318, ACI 209, BS and CEB).

From the results obtained, it is concluded that the increase in tensile steel ratio has small or negligible effect because the ratio of maximum moment to cracking moment smaller than 1.U, while

an increase in Compression steel ratio

obviously caused a decrease in short-term deflections, and long-term deflections. Using the results, show that long-term deflections always smaller than predicted values from methods (ACI 209 and CEB) methods for all beams, while these deflections are variables for methods (ACI318 and BS).

The results show that the effect of compression steel ratio on the long-term deflection multiplier; an increase in the compression steel ratio caused a decrease the long-term deflection multiplier. However, its effect shown is lower than that in normal strength concrete beams. Also, from this study and based on analysis of results by a computer program theoretical formula to calculate the was made and compared with the long-term deflection multiplier calculated by (ACI 318) and by other references.