



Behavior of Reinforced Concrete Beams with 700 MPa High-Strength Reinforcement – Flexure and Serviceability

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Abstract

Using high-strength reinforcement could provide various benefits to construction industry; material and cost savings, reduction of rebar congestion, and efficient use of high-strength concrete. However, the value of reinforcing steel's yield strength allowed in Korean design codes was limited to being no greater than 600 MPa. Thus it needs to increase the maximum allowable yield strength value in order to use 700 MPa high-strength rebars in Korean construction field. The objective of this research was the investigation of flexure and serviceability of beams reinforced with the high-strength steels. The performance of RC flexural beams designed according to the current KCI design code with 700 MPa high-strength steels would be evaluated by experiments and structural analysis. By analysing the results of the studies, this research would lead to revision recommendations of the KCI design codes to increase reinforcing steel's maximum design yield strength to 700 MPa.

Keywords: high-strength reinforcements; RC beams; flexure; serviceability

1 Introduction

Using high-strength reinforcements could give a variety of benefits to civil engineering field. For example, by using the reinforcements it could save material and costs, and could reduce rebar congestion problem. In addition, high strength concrete could be used more efficiently with high strength of reinforcements.

However, the material properties of the high strength steels are different with the properties of normal strength steels in some aspects; such as having no distinct yield point and less ductility. Thus before allowing to use the high strength steels in concrete design codes, it needs to figure out the performance of the RC beams reinforced with the steels thoroughly.

This research is about verifying the applicability of using SD700 high-strength rebars for Concrete

Design Code (2012) about flexure and serviceability by performing RC beam experiments and structural analysis.

2 Flexure and Serviceability in Korean Design Code

At first, the articles which are relevant to the reinforcement's yield strength in aspect of flexure and serviceability in KCI 2012 were reviewed. KCI 2012 is one of the main design codes about concrete structures in South Korea and its design concept is ultimate strength design like ACI 318 design code.

2.1 Flexure

Articles about flexure in KCI 2012 are relevant with the rebar's nominal yield strain, except the case of minimum flexure rebar article. The critical values of