

Documents

Djavanroodi, F., Salman, A.

Variability of Mechanical Properties and Weight for Reinforcing Bar Produced in Saudi Arabia

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Abstract

Under the category of material property variations, the variability of the physical and mechanical properties of reinforcing steel affects the performance of reinforced concrete structures. In Saudi Arabia, these properties have minimum requirements, as detailed by ASTM International Standards A 615. In this study, the variability of the weight and mechanical properties of reinforcing steel produced throughout the Saudi Arabia is evaluated experimentally. The results were analyzed to evaluate which manufacturers satisfy the minimum requirements established by ASTM International. 130 ASTM 615 grade 60 samples from different manufacturers were collected and tested to obtain yield strength, tensile strength and elongation. The numbers of samples tested for percent of nominal weight were 96. A statistical analysis of steel rebar's properties is conducted. EasyFit (5.6) software is utilized to determine the distribution type and to perform the statistical analysis. The analysis showed that yield, tensile, and elongation follows different types of continuous distributions. Finally, control charts are generated for the three tests in order to identify values above and below the 3 sigma. The results show that less than 1.5%, 3% and 7.3% of the steel failed to meet minimum ASTM standards for yield strength, tensile strength, and weight respectively. All the samples satisfied the ASTM 615-15 condition for elongation. © Published under licence by IOP Publishing Ltd.

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