

Investigation of Mechanical Properties of Reinforcement Steel Bars: Case Study on Construction Sites in and Around Amhara Region, Ethiopia

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Abstract

This paper investigates the annual report of the mechanical strength of reinforcement bars (re-bars) from construction sites taking projects as the case in and around Amhara, Ethiopia. Both imported and locally imported re-bars are used in the analysis without due consideration of their variety in the quality of the two sources. 224 experiments were conducted with three sets of samples each on re-bars with diameters 6, 8, 10, 12, 14, 16, 20, 24, 30, and 32mm using Universal Testing Machine. Strength properties analyzed including ultimate tensile strength (UTS), yield strength (YS), percentage elongation and mass per length steel reinforcing bars. This paper will focus with reinforcement bars of diameter 10mm, 12mm, 8mm and 16mm as they accounted for 67% of the total tests. The mean values of YS and UTS of all diameters surpassed the standard values recommended limit set by BS449 1997, ASTM A706, and Nst65-Mn 1994. The mean values of the percentage elongation at fracture for all the tested steel products of diameters surpassed the 12% limit recommended by BS 449, 10% by ASTM A706 and for all diameters but only 12mm and 16mm surpassed the 14% limit set by Nst65-Mn for reinforcing steel bars. The mean mass per length values for 10mm, 12mm and 16mm are below standard values set by ASTM A615/A615M.

Keywords: *Reinforced Steel bar, Ultimate Tensile Strength, Yield Strength, Elongation, Mass-per-Length*