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# Assessment of the Resistance of Stainless Steel Clad Bars to Chloride-Induced Corrosion in Concrete

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## Abstract

Recently, the highway agencies in many states in the United States have raised the design life for concrete bridges from 50 years to 75 and 100 years for minor and major bridges, respectively, without major repairs. To meet this ambitious goal, corrosion resistant and yet economical reinforcing bars will be needed. Fortuitously, the preliminary results of a recent investigation funded by U.S. Federal Highway Administration funded, aimed at identifying reinforcing bars that can perform better than the current epoxy-coated bars, had suggested that bars made of carbon steel that is clad with a stainless steel could be such a material.

With the objective of verifying those preliminary results, the resistance of a new clad bar to corrosion attack by chloride ions in concrete was investigated and compared against a solid carbon steel bars and two different austenitic stainless steel bars (304 and 316LN). In this part of the investigation, all these bars were separately embedded in test concrete blocks, which were then subjected to weekly cycles of 3-day ponding with a saturated salt solution followed by 4-day drying in outdoor environment.

Weekly measurements of electrochemical parameters such as macrocell current and open-circuit potential, during 1,300 days of the salt-exposure regime, have indicated that the clad bars exhibited practically the same excellent corrosion resistance as the two solid stainless steel bars did. While the carbon steel bars had started to corrode even after just 90 to 95 days of exposure, the other bars have yet to show any discernible corrosion activity even after 1,300 days. Comparison of the estimated chloride concentrations at these two time benchmarks indicated that the clad bars and the stainless steel bars were able to tolerate at least 11 to 14 times more of the corrosive chloride ions than the carbon steel bars did.