ABSTRACT

Henkhaus, Rachel Elizabeth Ph.D., Purdue University, December 2009. Effect of Epoxy Thickness on Bond between Concrete and Coated Reinforcement. Major Professor: Julio A. Ramirez.

The objective of this dissertation was to determine design recommendations for bond of epoxy-coated bars with thicker coatings up to 18 mils through the evaluation of the performance in bond to normal-weight concrete of epoxy-coated bars with coating thickness up to 21 mils. Single splices as well as splices in bundled bars were evaluated for 20 specimens using No. 5 and No. 9 bars for the experimental program.

A Database for epoxy-coated reinforcement was compiled of 50 splice specimens, which included some specimens from this study and other relevant research studies. Based on the ACI Committee 408 Descriptive Equation, two Descriptive Equations with $\sqrt{f_c'}$ and $f_c'^{1/4}$ were developed for epoxy-coated reinforcement. These descriptive equations were implemented into Code Equations with $\sqrt{f_c'}$ and $f_c'^{1/4}$, and evaluated with the current code equations, AASHTO LRFD (2007) and ACI 318-08, and the proposed code equation, ACI Committee 408. The use of the current provisions was supported by the test findings, and the proposed code equation was not. The author encourages the use of the ACI 318 (2008) provisions that incorporated cover and transverse reinforcement (not considered in AASHTO LRFD (2007)) in the design of development and splice length for bars with coating thickness up to 18 mils.