

AGA UPDATE

Question of the Month



Q: How does the bond strength of hot-dip galvanized rebar to concrete compare to black and epoxy-coated rebar?

A: Bond strength of reinforcing bars (rebar) to concrete is very important in terms of the overall strength of reinforced concrete systems. Several factors affect bond strength, including whether the bars are straight or deformed (ribbed), the protective coatings on the rebar, and the surface condition of the rebar, which ranges from new to rusted.

Various studies (see the book, *Galvanized Steel Reinforcement in Concrete*) have looked at the bond strength of black rebar (uncoated), hot-dip galvanized, and epoxy-coated rebar. These studies have shown the bond strength of hot-dip galvanized rebar is as good or better than black rebar. The bond strength of hot-dip galvanized rebar is believed to be aided from calcium hydroxyzincate crystals, which develop between the galvanized coating and concrete.

In studies, epoxy-coated rebar has been found to have a lower bond strength than both galvanized rebar and black rebar. One study¹ by the American Society of Civil Engineers (ASCE), found epoxy-coated rebar had a reduction in bond strength of 20% to 50% when compared to black rebar. In another study², epoxy-coated rebar slipped in concrete 200% more than galvanized or black rebar.

The take-home message is the bond strength of hot-dip galvanized rebar to concrete is as good or better than black rebar, and is much better than epoxy-coated rebar. For more information please contact the AGA Technical Department at 720-554-0900 x21 or technical@galvanizeit.org.



¹ Mathey, R.G., & Clifton J.R. (1976). "Bond of Coated Bars in Concrete." Structural Engineering Division. American Society of Civil Engineers, 102, ST 1, 215-229.

² Kayali, O., & Yeomans, S.R. (2000). 'Bond of Galvanized Steel in Concrete.' Cement and Concrete Composites, 22, 6, 459-467.