

Research and application of Rebar corrosion inhibitor with hydrophobic function in marine environment

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Abstract An innovative hydrophobic, efficient steel corrosion inhibitor with responsive release characteristics has been developed to enhance the corrosion resistance of steel rebar. By integrating the hydrophobic effect and corrosion resistance through group connections, this approach effectively addresses the issue of poor dispersion of individual hydrophobic groups and their corresponding weakening of concrete performance. Hydrophobic rust-resistant materials react in situ within the pores of concrete, generating hydrophobic nanoparticles that enhance the water repellency of the concrete and delay the penetration of aggressive ions, such as chloride ions, into the concrete structure. Concurrently, rust-resistant groups released in situ by these hydrophobic rust-resistant materials form a protective layer on the metal surface, isolating harmful substances from the steel rebar. This further effectively prevents steel corrosion within the concrete and enhances the durability of the concrete structure. The technology achieved a corrosion area ratio of less than 5% in severe conditions of high temperature and salt, outperforming comparable domestic and international technology. The corrosion resistance of steel rebar in environments with high chloride concentrations was significantly enhanced, overcoming the technical challenge of the diminished pitting resistance of traditional organic corrosion inhibitors under such conditions. The findings offer valuable insights for the design of concrete structures in harsh environments. This technology have been effectively applied to Nuclear Power Station projects.

Keywords inhibitor; hydrophobic function; marine environment; concrete; durability

Reference

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