PE Insulationn Mesh Ribbon Application in ICCP System of Cross-sea Bridge

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Abstract

In the impressed current cathodic pretection system for reinforced concrete in marine environments, the traditional insulating materials used are cementitous spacers or plastic spacers. Cementitous spacers have shown good application effects in various marine bridges and pile caps of wharfs that I have been involved in completing and operating. However, due to their brittle nature, they are prone to breakage during the concrete pouring process, leading to short circuits that require extensive repairs. This poses safety risks and inconveniences during construction. More seriously, certain areas cannot use cathodic protection technology because workers can not access to repair the damaged cementitous spacer, such as the steel bars at the bottom of pile caps of marine bridge. Therefore, for the design of the cathodic prevention system at Sanjiangkou Cross-Sea Bridge's pile caps, I employed PE insulation mesh ribbon as an alternative insulating layer and conducted verification tests.

PE insulation mesh ribbon possess high strength and excellent toughness while remaining undamaged during construction activities, ensuring effective insulation after installation. Furthermore, their mesh characteristics do not impede concrete inflow or compactness during pouring processes. Field tests confirm that PE insulation mesh ribbon do not hinder uniform distribution of protective currents nor affect normal polarization behavior of steel bars while maintaining proper insulation levels. Polarization and depolarization tests on steel bars demonstrate potential shifts/decays exceeding 50mV within a very short time period close to 100mV of potential shifts/decays standards.

These test results validate successful implementation of PE insulation mesh ribbons which address issues related to inaccessible areas requiring cathodic

protection measures. The testing procedures and data are described and demonstrated comprehensively within this paper.

Keywords: ICCP System of Reinforced Concrete, CP system in Bridge, EPS

Reference

[1] Cathodic protection of steel in concrete (BS EN ISO 12696)

[2] Impressed Current Cathodic Protection of Reinforcement Steel in Atmospherically Exposed Concrete Structures (NACE SP0290)

[3] Cathodic Protection of Reinforcement Steel in Atmosphere (GB/T28721)