

5、Cathodic Protection

Effectiveness Evaluation of Cathodic Protection for Nearshore Submarine Pipelines based on Measurement and Numerical Simulation

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Abstract The offshore submarine pipeline usually adopts the coating combined with sacrificial anode cathodic protection(CP) system to prevent external corrosion from sea water and mud. Compared with the offshore pipelines in clear deep-water environment, the nearshore pipeline usually has a weight concrete layer and is laid in the sea mud, and the surrounding seawater is turbid, which makes the measurement of CP potential difficult and the effectiveness of CP hard to grasp. For this reason, a portable testing tool developed to measure CP potentials at the sacrificial anodes exposed to seawater and at both ends of the insulated joints of a nearshore pipeline. Samples of an in-service sacrificial anode and its electrochemical performance, and cathodic polarization behavior of pipeline material with weighted concrete were also tested. Combined with numerical simulation methods, calculations of CP potential distribution and sacrificial anode output current were carried out. Those results were used together for the effectiveness evaluation of CP of nearshore pipelines. The results show that the CP potential of the nearshore submarine pipeline under investigation is within the effective protection potential range, indicating that the CP is effective. This result has also been verified by the internal inspection data of the nearshore submarine pipeline. However, the test results show that the unevenness of sacrificial anode corrosion and the impact of stray current interference may lead to a shortened lifespan of the sacrificial anodes, which requires attention.

Keywords Nearshore Submarine Pipeline, Cathodic Protection, Effectiveness, Potential Measurement, Numerical Simulation

Reference

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