

The Effectiveness of Close Interval Potential Survey on the Large Pre-Stressed Concrete Cylinder Pipe with a Length of More than 2000 km Comparing with Other Techniques

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Abstract : Evaluation of cathodic protection systems using sacrificial zinc and magnesium electrodes is critical to ensuring the longevity and structural integrity of large reinforced concrete pipes spanning more than 2,000 km. This study focuses on evaluating these systems using near-interval potential survey (CIPS) techniques over a 25-year installation period. Comparing these tests with international standards and assessing the extent to which these standards are met is crucial for ensuring the effectiveness and reliability of the cathodic protection system. This comparison allows for the identification of any discrepancies and ensures that the system adheres to globally recognized benchmarks, thereby enhancing the overall protection and longevity of the infrastructure. Cathodic protection is necessary to reduce corrosion, which poses a major threat to the durability of concrete pipes. Sacrificial zinc and magnesium electrodes are used due to their effectiveness in providing a protective layer against corrosive elements. Additionally, it is important to compare cases of pipe failures and their causes, particularly those not related to corrosion. Factors such as external loads, internal pressures, water velocity, clogging, ground movement, and extreme temperatures can all contribute to pipe failures. By understanding these non-corrosion-related causes, we can develop more comprehensive protection strategies and improve the overall resilience of the pipeline system. The CIPS method allows for precise monitoring of the protection levels along the extensive pipeline, identifying areas of potential vulnerability and ensuring uniform protection. The results indicate that the use of sacrificial electrodes significantly reduces the rate of corrosion, thereby extending the service life of the infrastructure. This evaluation underscores the importance of regular monitoring and maintenance of cathodic protection systems to prevent costly repairs and ensure the safe operation of critical infrastructure. The findings contribute to the optimization of cathodic protection strategies, enhancing the reliability and sustainability of large-scale pipeline projects.

Keywords : cathodic protection, sacrificial anodes, reinforced concrete pipes, corrosion prevention, structural integrity, longevity

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