

## **Feasibility study on localized corrosion monitoring using potential noise analysis in salt manufacturing plants**

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Recently, the potential noise analysis has been received significant attention as a promising method for monitoring the initiation of localized corrosions in chemical plants. The objective of this study is to investigate the applicability of potential noise analysis to monitoring the initiation of stress corrosion cracking (SCC) in high-concentrated sodium chloride (NaCl) solution, which could be regarded as a simulated process-fluid in salt manufacturing plants. It is considered SCC is one of the most serious localized corrosion for a chemical plant using stainless-steel as its structural material.

A critical temperature above which propagative corrosion cracks appear can be specified in each combination of the kind of material, the level of applied stress, and the concentration of NaCl in the solution. In order to evaluate the applicability of potential noise analysis, it was investigated the analytical results could tell whether the current temperature over or under the critical one.

The potential noises of direct tension and U-bend specimens were analyzed. The direct tension specimens applied the constant stress of 247, 341, or 440MPa were immersed in 10mass% of NaCl solution and its temperature was stepwise increased from 40 to 80°C every 10°C. The U-bend specimens were immersed in NaCl solution in different concentrations and its temperature was also changed stepwise in the same way. The quantity of electricity on the corresponding localized corrosion currents to the measured potential noise was calculated, and then the generation frequency of the potential noises was plotted against the log of the quantity of the electricity. The peak value of the frequency at a critical temperature was clearly higher than that under the critical temperatures. It is considered this result shows the potential noise analysis is a potential method for monitoring the initiation of SCC in high-concentrated chloride solution environments, or process-fluid in salt manufacturing plants.