

## Harmfulness of Galvanic Corrosion in Salt Producing Plant -On-site Inspection and Laboratory Test Simulating the Process Condition-

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### Summary

Galvanic corrosion is important problem in salt producing plant made of clad-steel with such various alloys as Hastelloy-C, Monel, austenitic and dual-phase stainless steels. The author first studied the galvanic corrosions in salt producing plants. Two types of galvanic corrosion were revealed, i.e., 1) most typical galvanic corrosion between the tube sheet and tube made of different alloys, and 2) accelerated preferential attack of weld-metal ( or bead) diluted with substrate iron at being coupled with clad Hastelloy and further the catastrophic dissolution of substrate steel coupled with clad Hastelloy. Any types of galvanic corrosion occur in evacuated highly concentrated chloride solution whose dissolved oxygen concentration, particularly important factor controlling the corrosion behavior, is unknown. This year's laboratory research aimed to study the latter one by developing an electrochemical apparatus which simulates the process fluid chemistry in evaporator. The author obtained the fundamental electrochemical data such as corrosion potential, galvanic current density as a function of pressure (760-200mmHg) by using a 20 wt.% Cl<sup>-</sup> solution sampled from actual evaporating vessel. The steady state corrosion potential of Hs-C22, DP3, Monel, Type 304 (WEL308) and carbon steel were measured at 85 C. Galvanic current density of Hs-C/carbon steel, SUS304/carbon steel and Hs-C diluted with iron/Hs-C22 were also measured. The weld metal diluted with iron, induced during welding of Hs-C clad steel, showed extremely high anodic dissolution of lamella shaped iron-rich phase produced by rapid solidification, and lead to catastrophic failure of welded clad-steel evaporator. Welding specification to minimize the dilution of weld metal by iron should be taken for clad steel.