surface of a cooling tube (2 electrodes are for spares)

5. The heat exchanger must be equipped with an anti-biofouling device by sea water electrolysis and a strainer on the sea water pipe line to be used continuously for along period without cleaning.

6. The capacity of the oxternal D. C. source is calculated by the current density estimated by the operating conditions.

The heat exchanger is more complex in structure and more expensive in manufacturing cost, but has better effects on corrosion prevention and heat transfer, and it needs less current consumption than the heat exchanger equipped with an anti-corrosive device by iron eiectrolysis and an antibiofouling by sea water electrolysis.

AISI 304 스텐레스鋼의 應力腐蝕龜裂에 관한 연구

朴 弼 相　尹 勝 烈

A Study on the Stress Corrosion Cracking of AISI 304 Stainless Steel

P. S. Park and S. R. Yoon

Abstract

Stress corrosion cracking phenomenon of the commercial type 304 stainless steel wire in the boiling 42% magnesium chloride solution has been investigated. Main experimental techniques were to measure the time to faliure of the wire varying the applied tensile stress, to follow potential of the material versus time, to observe potentiostatic polarization behavior, and to examine the microstructure of the failed specimens. Results showed that every crack propagates in the transgranular fashion. With the more applied stress up to 53, 200 psi, the more crack density appeared per unit length of specimen and the less time was taken to the final fracture. The role of applied stress seemed to be involved both in the crack initiation and in the crack propagation, but more pronounced in the latter process. Potential vs. time curve and potentiostatic polarization behavior of the wire indicated that a passive film would be present on the corroding specimen surface. Breaking of such a film induced by strain due to the applied stress would initiate crack formation when anodic dissoulution of the metal was followed at the resulting bare sites. It was found that crack propagation started at the base of a pit especially when large anodic current was forced to flow into the wire. A cathodic polarization to the potential slightly more active than the steady state corrosion potential retarded remarkably the time to failure of the wire specimen. Data revealed that such a slight cathodic protectection was slowing down crack propagation.