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## NRC CONTRACT 04-75 202

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Total funds expended during July are estimated to be \$16K, including G&A, IR&D and fee.

## Crevice Effect

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A crevice effect has been observed for surface EPR measurements using the miniature cells with O-ring seals. Samples containing low levels of sensitization reveal more pronounced grain boundary attack in the crevice region between the O-ring seal and the metal surface. Samples with high degrees of sensitization are not significantly affected by the crevice effect, which explains why this effect has gone un-noticed; initial qualification tests were conducted on furnace sensitized samples. The crevice effect can be eliminated by masking off the area to be measured using stop-off lacquer so that the O-ring makes contact with the lacquer. A hole is cut in the lacquer, or the lacquer is applied in a manner creating an open area to the sample surface, such that the measurement area is smaller than the area enclosed by the O-ring seal. Using this method, good agreement has been achieved on samples with relatively low levels of sensitization (as-welded), and on as-received material, with the conventional mounted-sample laboratory technique.

## Type 316/316L Stainless Steel Studies

A study is in progress to assess the EPR measurement for quantitatively measuring degree of sensitization in Types 316 and 316L stainless steels. Preliminary results indicate that the Pa values for these alloys are very low compared to Type 304 stainless steel. The molybdenum present in Types 316/316L apparently influenceschromium diffusion such that the amount of chromium depletion is less, especially for the low levels of heat input associated with welding (in contrast to furnace sensitizing). The Pa values for welded Type 316L generally range between 0 to 0.1 C/cm<sup>2</sup>, while for Type 316 they are 0.1 to 2 C/cm<sup>2</sup>. Comparable values for Types 304L and 304 are 0 to 1, and 2-40 C/cm<sup>2</sup>, respectively. The sensitivity of the EPR test for Types 316/316L can be increased by increasing the amount of KSCN activator, and/or using slower reactivation scan rates. For example, the Pa value for a Type 316 sample furnace sensitized 4 hours at 1250°F increased from 9.5 C/cm<sup>2</sup> using 0.01M KSCN in 0.5M H2SO4, to 19.6 C/cm<sup>2</sup> using 0.05M KSCN. Alternately, a Pa value of 25.3 C/cm2 was obtained using a reactivation scan rate of 3 v/h (instead of regular 6 v/h), when tested in the 0.01M KSCN electrolyte. The reactivation scan rate appears, therefore, to exert a greater influence on revealing sensitization in Mo-bearing stainless steel than the KSCN additions. It may be necessary to use both parameter modifications for EPR testing Types 316/316L stainless steel in the welded condition.

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