EFFECT OF STRESS RELIEF TEMPERATURE AND COOLING RATE ON PRESSURE VESSEL STEEL WELDS

M. K. Miller, M. A. Sokolov, R. K. Nanstad and S. K. Iskander

Metals and Ceramics Division, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6376, USA.

The high copper weld (test plate 002A with a Linde 80 flux) used in this study has a composition of Fe - 0.29 at. % Cu, 1.69% Mn, 0.54% Ni, 0.69% Si, 0.25% Mo, 0.08% Cr, 0.38% C, 0.022 % P and 0.017% S. The material was characterized in the as-welded state and after the following three heat treatments, A) 24 h at 650°C, B) 24 h at 610°C, and C) 100 h at 580°C. Following each of these isothermal heat treatments, the material was slow cooled at a rate of 15°C/h to room temperature. In order to evaluate the influence of the cooling rate after the stress relief treatment, some material was examined after a heat treatment of 24 h at 650°C and water quenched to room temperature. In order to evaluate the effect of a typical post irradiation treatment, some material was also examined after a heat treatment of 24 h at 650°C, slow cool to room temperature and 168 h at 454°C. The composition of the matrix of each of these heat treatments has been determined in an energy-compensated optical position-sensitive atom probe.

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