

## Comparative study of pitting behaviors of two 321 stainless steel welded joints

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**Abstract** Pitting behavior of 321 stainless steel welded joints was studied by potentiostatic pulse technique triggering pits. The pitting resistance of different areas in two welded joints was compared. Micron-sized complex inclusions are the main cause of pitting in the base metal. The pitting resistance of the fusion zone is superior to that of the base metal due to the reduced inclusion density. The difference in pitting resistance between the Tungsten Inert Gas (TIG) welded joint and the electron beam (EB) welded joint is primarily due to the different content and morphology of  $\delta$ -ferrite in the fusion zone. Cr-depleted regions are found at the ferrite boundaries in the fusion zone of the TIG welded joint, and pitting starts precisely at these sites. In contrast, the  $\delta$ -ferrite in the fusion zone of the EB welded joint is fine and evenly distributed, resulting in excellent pitting resistance.

**Keywords** TIG welding, EB welding, Pitting mechanism, Element segregation,  $\delta$ -ferrite

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