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Effect of solution heat treatment of AISI 2205 duplex stainless steel joints in microstructure, mechanical properties and corrosion resistance

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Duplex stainless steels are microstructurally constituted by a matrix of ferrite (δ) and austenite (γ) in a dispersed phase. Welding of these steels is an inevitable manufacturing process in large industrial applications. Although such weldability is good, during fusion welding the base metal is subjected to a series of thermal cycles that give rise to a microstructural transformation in both the thermally affected zone and the molten one. This transformation, by its turn, can alter the ferrite/austenite phases balance and cause formation of secondary phases that might result in lower toughness and corrosion resistance decrease. The present work aims to analyze the microstructure solution heat treatment effect, mechanical properties, and pitting corrosion resistance of AISI 2205 duplex stainless steel welded joint by the Tungsten Inert Gas (TIG) process without metal addition. Thus, TIG welded joints will be subjected to thermal treatments of solubilization at 1050 ºC and 1100 ºC. Then, confocal microscopy, scanning electron microscopy and X-ray diffraction techniques will be used, in addition to microhardness, hardness and tensile mechanical tests to characterize the joint's microstructure and determine its mechanical properties. In this paper, we expect to demonstrate how beneficial the solution heat treatment of welded joints is, and which thermal treatment parameters would be the most appropriate.

Keywords: Phase balance. Tensile Strength. Microhardness.

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