

Microstructure and Mechanical Behavior in Dissimilar SAF2205/API X52 Welded Pipes

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Abstract: The welding of a duplex stainless steel SAF 2205 DSS (UNS 31803) and high strength low alloy steel API X52 by shielded metal arc welding process was conducted using two different filler metals, the duplex E2209 and austenitic E309 grade. The microstructures of the dissimilar metal joints have been investigated by optical microscopy, scanning electron microscopy, energy-dispersive spectroscopy (EDS) and X-ray diffraction. EDS analysis at the interface X52 weld metal showed an evident gradient variation of Cr and Ni between boundaries of fusion and type II, where the highest hardness value was recorded. Tensile strength and toughness values of the weld metal produced by E309 electrode are slightly higher than those of the weld metal produced by E2209 electrode. Potentiodynamic polarization tests of different regions of the welded joints evaluated in 3.5% NaCl solution exhibit a high corrosion resistance of both weld metals.

Keywords : Dissimilar metals welding, 2205 Duplex stainless steel, API X52 HSLA steel, Heat affected zone, mechanical properties