Effect of Pulse Current on Mechanical Properties of 2304 Duplex and 304 Stainless Steel Welds

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ABSTRACT

From experimental results shown that duplex stainless steel possesses many other superior mechanical properties than traditional austenitic stainless steel, which is due to exist the advantages on both austenitic and ferritic phases. Furthermore, the capability of corrosion resistance of duplex stainless steel is splendid than austenitic stainless steel, especially under the chloric ion or sulf-oxide compound environments. Therefore, duplex stainless steels were widely utilized in the facility of storage tank, transportation vehicle, heat exchanger, petroleum decomposing and sea-water desalination equipments. The welding methods commonly used in industries were satisfied in duplex stainless steel welding. To avoid affecting the phase equilibrium between austenite and ferrite phases, the heat input still need to be controlled as low as possible during welding. This research will be designed on both 3 mm thickness 304 and 2304 stainless steels plate by using GTA welding process. Under various welding parameter combinations (welding current, frequency of pulsed current, etc.), relationships between content of austenite (γ) and ferrite (α) phase、weld microstructure and their distribution, and the mechanical properties of each welds will be analyzed systematically. From systematic seeking, the best combination of welding parameters on 304 and 2304 duplex stainless steel should be obtained. During this study, to reach the aim of minimizing heat input、increasing cooling rate、and refining the grain size of weld, the pulsed current frequency have also been designed to promote the stirring effect. Hopefully, from the results of this investigation can help the educational circles and traditional metal working industries to advance the knowledge and welding technical capacity.

Keywords : duplex phase stainless steel ; austenitic stainless steel ; pulsed current frequency ; grain refining

Table of Contents

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