Keywords: duplex stainless steel, tungsten inert gas welding, activation flux

Abstract

The purpose of this research is to clarify the improvements in productivity when A-TIG welding is applied on DSS X2CrNiMoN22-5-3 7 mm in thickness. According to standard ISO 9692-1:2013 for TIG welding of steels in thicknesses 3 < t ≤ 10 the edge preparation should be single V groove with root gap b ≤ 4 mm and a V groove angle 40° ≤ α ≤ 60°. It is notably that edge preparation requires material loss prior the welding and additional filler material during the welding. With A-TIG technology the edge preparation is simplified, loss of the material and additional filler material is avoided. The dependance of the weld penetration on the heat input and shielding gas type has been measured from the produced runs in the first part of the experiment. In the second part parameters for welding 2 butt joints have been determined.

2. EXPERIMENT

2.1. PENETRATION OF THE ELECTRIC ARC

Mechanical properties of the used X2CrNiMoN22-5-3 material according to the standard EN 10088-2:2015 are presented in Table 1. The results of welding parameters in bead on plate welding are presented in Table 3. Welding parameters for welded joints are presented in Table 4.

A-TIG welding utilizes an activation flux coating on the upper surface of the plates that should be joined. Activating flux is a mixture of inorganic material suspended in evaporative medium [7]. A-TIG makes it possible to intensify the conventional TIG for joining the thickness of 8-10 mm by single pass full penetration welds, without edge preparation, instead of multipass procedure [7].

General objective of this research was to clarify the improvements in productivity when A-TIG welding is applied on DSS X2CrNiMoN22-5-3 7 mm in thickness. According to standard ISO 9692-1:2013 for TIG welding of steels in thicknesses 3 < t ≤ 10 the edge preparation should be single V groove with root gap b ≤ 4 mm and a V groove angle 40° ≤ α ≤ 60°. It is notably that edge preparation requires material loss prior the welding and additional filler material during the welding. With A-TIG technology the edge preparation is simplified, loss of the material and additional filler material is avoided. The dependance of the weld penetration on the heat input and shielding gas type has been measured from the produced runs in the first part of the experiment. In the second part parameters for welding 2 butt joints have been determined.

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