

Tempering of continuous and pulse current GTA welds of AISI 420 (1.4021) martensitic stainless steel

**Calirea sudurilor din oțel inoxidabil martensitic AISI 420 (1.4021)
obținute prin sudare WIG în current continuu și pulsat.**

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Abstract

The goal of this work is to investigate the tempering conditions for autogenous GTA butt welds of AISI 420 (1.4021) martensitic stainless steel. Constant and pulse current autogeneous welds of full penetration with no backing were prepared on 1,6 mm thick plate. The welds were postweld heat heated within the range 340-720 °C for 15 to 150 min. Hardness test, tensile test and Charpy impact test were carried out. The microstructure was evaluated using optical microscopy, SEM and EPMA.

It was found that the hardness limit of 350 HV10 of the weld metal and HAZ, enabling ductility and machineability, is achieved applying the following PWHT conditions: 600 °C/150 min, 650 °C/60 min and 680 °C/30 min. After PWHT at 700 °C/15 min the impact strength, tensile strength, elongation and transverse contraction of the welds are superior to those of the base metal. The tensile fracture occurred in the base metal. The microstructure of the weld metal and HAZ is represented by a ferrite-carbide mix.

The properties of the full penetration GTA welds and the P-GTA welds seem to be equal. The energy consumption used for the P-GTAW is 12 % less than that used for the conventional GTAW.

Keywords: *martensitic stainless steel, GTA welding, microstructure, tempering*