

Evaluation of Microstructure and Mechanical Properties of Gas Tungsten Arc welded 2.25 Cr-1Mo Steel pipes

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ABSTRACT

The present research work aims to investigate the microstructure and mechanical properties of P₂₂ steel low carbon steel pipes by using gas tungsten arc welding technology. It is popular choice of welding method when a high level of weld quality or considerable precision welding is necessary. In this work, Gas tungsten arc welding has been performed on 4.5 mm thickness 2.25 Cr-1Mo steel pipes with using of ER90SB3 filler material. Wide range of welding current and gas flow rates are used to obtain full penetration three pass welded joints by maintaining 1mm root gap between pipes. Microstructure and mechanical properties of the welded joints were characterized. Micrograph showing the presence of acicular structure in weld zone where as in base metal presence of ferrite and pearlite was observed. Tensile, impact tests were conducted and obtained values are near to the base material. Micro hardness was carried out on welded joint shows that the hardness value is more in weld zone as compared with heat affected zone and base metal. SEM and XRD analysis was carried out and M₂C, M₇C₃ carbides and the development of coarse grain-boundary carbides were noted.

Keywords: 2.25 Cr-1Mo Steels; Microstructure; Heat affected zone; Weld zone; Acicular