

Effect of Filler Metal Diameter on Weld Joint of Carbon Steel SA516 Gr 70 and Filler Metal SFA 5.17 in Submerged Arc Welding SAW

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Abstract : This work describes an investigation on the effect of filler metals diameter to weld joint, and low alloy carbon steel A516 Grade 70 is the base metal. Commercially SA516 Grade70 is frequently used for the manufacturing of pressure vessels, boilers and storage tank, etc. In fabrication industry, the hardness of the weld joint is between the important parameters to check, after heat treatment of the weld. Submerged arc welding (SAW) is used with two filler metal diameters, and this solid wire electrode is used for SAW non-alloy and for fine grain steels (SFA 5.17). The different diameters were selected ($\phi = 2.4$ mm and $\phi = 4$ mm) to weld two specimens. Both specimens were subjected to the same preparation conditions, heat treatment, macrograph, metallurgy micrograph, and micro-hardness test. Samples show almost similar structure with highest hardness. It is important to indicate that the thickness used in the base metal is 22 mm, and all specifications, preparation and controls were according to the ASME section IX. It was observed that two different filler metal diameters performed on two similar specimens demonstrated that the mechanical property (hardness) increases with decreasing diameter. It means that even the heat treatment has the same effect with the same conditions, the filler metal diameter insures a depth weld penetration and better homogenization. Hence, the SAW welding technique mentioned in the present study is favorable to implicate for the industry using the small filler metal diameter.

Keywords : ASME, base metal, micro-hardness test, submerged arc welding

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