

Effect of Variation of Temperature Distribution on Mechanical Properties of Shield Metal Arc Welded Duplex Stainless Steel

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Abstract : Influence of heat input on the micro structure and mechanical properties of shield metal arc welded of duplex stainless steel UNSNO.S-31803 has been investigated. Three heat input combinations designated as low heat (0.675 KJ/mm), medium heat (0.860 KJ/mm) and high heat (1.094 KJ/mm) and weld joints made using these combinations were subjected to micro structural evaluations and tensile and impact testing so as to analyze the effect of thermal arc energy on the micro structure and mechanical properties of these joints. The result of this investigation shows that the joints made using low heat input exhibited higher tensile strength than those welded with medium and high heat input. Heat affected zone of welded joint made with medium heat input has austenitic ferritic grain structure with some patchy austenite provide high toughness. Significant grain coarsening was observed in the heat affected zone (HAZ) of medium and high heat input welded joints, whereas low heat input welded joint shows the fine grain structure in the heat affected zone with small amount of dendritic formation and equiaxed grain structure where inner zone indicates slowly cooled grains in the direction of heat dissipation. This is the main reason for the observable changes of tensile properties of weld joints welded with different arc energy inputs.

Keywords : microstructure, mechanical properties, shield metal arc welded, duplex stainless steel

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