

Characterization of heat-treated gas metal arc-welded boron steel sheets

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Abstract The effect of heat treatment on the microstructure and mechanical properties of 1.6-mm-thick boron steel welded by using gas metal arc welding was investigated. The microstructure and mechanical properties of welded boron steel were determined before and after heat treatment. The heat treatment process was conducted according to manufacturer recommendation for optimum outcome. In results, the microstructure of heat treated specimen was completely transformed to martensite. The soften region that was detected and caused fracture of tensile test is located. EDX analysis found that boron element was concentrated at heat-affected zone. Fractography on heat-treated samples shows an intergranular fracture at heat-affected zone because of microvoid existence at grain boundaries. Consequently, this fracture decreased sample strength and promoted fracture propagation.

Keywords Boron steel (22MnB5) · Boron steel welding · Fusion welding · GMAW