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Fracture resistance of flash welded and laser welded butt joints in a micro-alloyed HSLA steel

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Abstract: High-strength, low-alloy (HSLA) steels are widely used in the automotive and oil industries due to their good mechanical properties and weldability. The selection of the welding process for components manufacturing depends on several factors, including the quality of the weld bead and the production capacity. The weld bead properties are affected by the welding process and by its parameters. The knowledge of the mechanical performance of the welded joint is essential to ensure structural reliability. In the present work, butt joints were produced from 6 mm thick plates of a microalloyed HSLA steel by flash welding and by laser welding processes, the latter using two different heat input conditions. The appearance, microstructure and hardness profile of the weld beads were evaluated. The mechanical behavior of the welded joints was assessed by means of fracture toughness CTOD tests. The results, together with the fracture analyses of the tested specimens, allowed comparing the standards and predicates of these processes in the production of welded joints of microalloyed HSLA steel plates.