GLOBAL THERMAL CYCLE DEVELOPED BY THE SUBMERGED ARC WELDING PROCESS IN API-5L-X70 STEEL

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ABSTRACT

The paper presents an analytical concept concerning the global thermal cycle which could be designed as a modular heat cycle, built by modules assigned to the phases of the welding process. Three welding depositions were performed by classical submerged arc welding process on API-5L-X70 steel plate. The thermal cycles were plotted based on the temperature values achieved by measurement with thermocouples and then comparatively analysed and discussed. Besides, the weldability of API-5L-X70 was evaluated by analysing the metallurgical and technological behaviour estimated through the maximum hardness method. The correlation between the hardness in the heat affected zone and the chemical composition of API-5L-X70 steel experimentally achieved, on the one hand, and the hardness, the chemical composition, the main parameters of the welding process and the cooling rate, t8/5, on the other hand, can provide significant information on the parent material behaviour subjected to welding. A validation of the cooling rate was made by comparing the thermal cycles achieved by measurement with infrared pyrometer and FEA method. This simple method could be a fast instrument useful in the verification of welding technologies for low alloy steel grades.

KEY WORDS: SAW process, thermal cycle, measurements, API-5L-X70 steel.

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