

APPLICATION OF THE S690QL CLASS STEELS IN RESPONSIBLE WELDED STRUCTURES

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Resume

In this paper are considered the most important properties of a special class of high strength steels S690QL, which can be classified into the group of special low alloyed steels. The high strength steels belong into a group of high quality steels. They possess exceptional mechanical properties, especially tensile strength and toughness. Those favorable properties are being achieved by application of special procedures of thermo-mechanical processing and simultaneous alloying with adequate elements. The advantages that the S690QL steels have with respect to other steels are being presented here. However, possibilities for application of those steels in responsible welded structures are limited due to their only relatively good weldability. The special procedures for improving it are discussed here, primarily preheating, controlled heat input during welding and additional heat treatment of the welded joint. The aim of this paper is to point to the possibility of application of these steels for manufacturing of the responsible welded structures, and simultaneously to point to the fact that the properties of steels as declared by manufacturer (chemical composition, mechanical properties etc.) are not always reliable and that they can vary depending on the batch.

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1. Introduction

High strength steels of the S690QL class are being produced in Sweden and are known under the commercial mark WELDOX 700. The production procedure consists of the precisely defined phases and their chemical composition is strictly controlled. Such a procedure ensures acquiring of exceptionally high mechanical properties. The structure of those steels is interphase, what makes them easily weldable, but only for sheets of relatively small thickness. For production of the more massive welded structures exact instructions and recommendations must be followed, related to selection of the optimal welding technology.

Those steels are prone to appearance of phenomenon known as cold cracks. They appear due to a thermo-mechanical processing of the semi-finished pieces at elevated temperatures. The process consists of material heating up to the austenite region, when the recrystallization is complete, then follows rolling at that temperature and quenching (Q). After that, they are tempered (T) in order to obtain the interphase structures and to retain the high mechanical properties. Those steels are used in manufacturing of hoists and cranes, steel platforms, construction machines, transportation tanks, for parts and assemblies exposed to high dynamic loads, responsible welded structures and others.

