

RESEARCH ON NEW HSLA STEEL – WDL STEEL WITH LOW SUSCEPTIBILITY TO WELD CRACK

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ABSTRACT This paper introduces the comprehensive properties and applications of new HSLA steel – 07MnCrMoV(WDL) with low susceptibility to weld crack developed by Wuhan Iron & Steel Co. This steel has been verified excellent in weldability and low temperature toughness, and no crack is formed in $t \leq 50$ mm plates after welding even without preheating or with slight preheating before welding. The plates have been applied to the manufacture of large spherical vessels, pressure pipes for large hydraulic power station and heavy load engineering machinery.

KEY WORDS low susceptibility to weld crack, low temperature toughness, weldability, large spherical vessels.

With steel structures developing towards a tendency of large dimension and high parameterization, the safety reliability of large size structure steels (especially large sized spherical vessels) have attached great attention and high importance. In order to meet as quickly as possible the need of metal applications by national industrial sectors such as petrol-chemistry, chemistry, metallurgy, municipal infrastructure construction, petroleum, hydropower and mechanical manufacture etc., in recent years Wuhan Iron & Steel Co., in cooperation with Iron & Steel Research Institute of Metallurgical Ministry, China's General Petrol-chemistry Mechanical Engineering Co., General Machinery Research Institute of Mechanical Ministry, Beijing Technology University, Metal Research Department of Scientific Institute of China, Lanzhou Petrol-chemistry Machinery Plant etc., jointly researched and developed a new generation of WDL series steels with low susceptibility to welding crack.

WDL series steels were tested and appraised at provincial level and ministerial level respectively in early 1995. The comprehensive mechanism properties of the actual steel plates reached top international level, and the technical requirements to their impact tests were even more strict than foreign corresponding regulations on steel plates (corresponding foreign regulation require):

5--15°C, longitudinal sample $A_{kv} \geq 47J$, for domestic WDL steels they are: -20--40°C, transverse sample $A_{kv} \geq 47J$. The low temperature toughness of WDL series steel plates in physical level has been in the leading position in comparison with the similar ones abroad. The steel plates with thickness not more than 50mm, without preheating or with slight preheating before welding, will not produce cold weld crack. The steel plates with thickness of not more than 38mm may not be subject to heat treatment after welding, thus showing a broad prospect in application.