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CORROSION RESISTANCE of Cr-Mn AUSTENITIC ALLOYS AND ITS WELDED JOINTS

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ABSTRACT. It has been concidered the chromium-manganece steels and its welding joining resistance to corrosion fracture. Investigated the chemical composition of corrosion products after testing in saturated copper chloride solution. Destribution of corrosion products in the cracks propagated zone has been established. Among the corrosion products the leading positions occupied the chloride compositions,

KEYWORDS: austenitic alloys, welded joint, saturated solution, microstructure, corrosion resistance.

INTRODUCTION

The austenitic chromium-nickel and chromium - manganese steels are one of the main structural corrosion-resistant material for making of the welded pipelines and electrotechnical equipment on NPP and FPP. The austenitic Cr-Mn steels with a super equilibrium concentration of nitrogen is used for the manufacture of retaining rings for rotors of the modern turbogenerators [1-9]. The high content of nitrogen is attainted by the electroslag remelting of casting in the medium of a high-nitrogen charge[10-14]. Wide introduction of Ni-free alloys assisted the unique combination of strength and plasticity, which arises by the nigh nitrogen containing. The new steel possesses high strength and fracture toughness, resistance to a local corrosion and stress corrosion resistance of Cr-Mn steels of the 18-18 type is rather limited.

EXPERIMENTAL PROCEDURE

Investigated welded joints (WJ) from the Chromanite steel (0.19%Cr, 10,0%Mn, <1.0%Ni, <Q.5Si, <0.08C, 0.5%N, Fe - the rest), were made by the manual argon-arc tungsten electrode welding using special wire (20%Cr, 16%Ni, 6%Mn, 3%Mo, 0.18%N), in a special shielding atmosphere containing N_2.(76%Ar+20%He+4%N). Such WJ characterized the high homogeneity chemical composition in all zones, excepted the fusion zone, in which Ni containing is low. Introduction to the filler materials a big amount of the Mn and Mo increase the nitrogen solubility in the WJ and its homogeneity .We tested specimens in 3% NaCl, 5% HC1, 22% $CuS0_4$, and 22% $CuCl_2$ solutions, according to ISO 3651/11-1976 (E) for determination of resistance to intergranular corrosion (Monypenny Strauss test).

In a solution of electrolyte, the surface of the welded joint can be regarded as equipotential and each part of the joint is assumed to be polarized to the compromise potential of the corrosion system. Since high-nitrogen steels have narrow ranges of passivity in hot solutions of chlorides, it could be expected that additions with higher potentials would promote their contact corrosion.

Because the structural state and distribution of alloyed elements in WJ zones are important for the understanding of sensitivity to corrosion-mechanical fracture, it was conducting the fracture examination accompanied by EDS (system Link ISIS, Oxford Instruments) and WDS (system IBEX, Noran).