

## عنوان مقاله:

Failure Analysis of Shahid Tondgooyan Petrochemical Company ۲E-۱۷۱۳۱-B Heat Exchanger Tubes Made of DSS ۲۲۰۵ Steel

## محل انتشار:

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## خلاصه مقاله:

In this paper, the failure analysis of ۲E-۱۷۱۳۱-B heat exchanger tubes (second stage condenser of the CTAY unit) of Shahid Tondgooyan Petrochemical Company made of DSS ۲۲۰۵ steel has been studied. To reach the aim, visual inspection, chemical analyses, microstructural studies and cyclic polarization tests were carried out. Visual inspection of failure tubes showed that through-thickness pitting in ۶ o'clock position caused the leakage and shutdown of the production line. Review of the manufacturing history revealed that there were two hold-ups for ۲۴-۴۸ hours. As a result, the hot current fluid lost its velocity and heat during this period, followed by condensing and accumulating the fluid on the bottom of the tube. Optical emission spectroscopy and portable X-ray fluorescence confirmed the chemical composition of the studied DSS ۲۲۰۵ steel based on relevant standards and data sheets. Microstructural investigations of the tube material revealed the typical microstructure of the duplex stainless steels. In addition, no microstructural changes were observed in the tubes after the service so that the pitting resistant was not weakened by a detrimental secondary phase formation. According to energy dispersive spectroscopy results, the corrosion products in the pits were rich in bromine. Therefore aggressive bromide anions ascertained as the main cause of the pitting corrosion. Given the obtained results of cyclic potentiodynamic polarization tests, the pitting resistance of DSS ۲۲۰۵ in the media containing bromide was lower than that of in chloride media, concluding that this steel is not appropriate for using as a ۲E-۱۷۱۳۱-B heat exchanger tube material.

## کلمات کلیدی:

Failure analysis, Heat exchanger tubes, ۲۲۰۵ Duplex stainless steel, Pitting corrosion, Aggressive bromide anions, ,Shahid Tondgooyan Petrochemical Company  
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