

Hot corrosion behavior of ni-20cr and ni-5al thermal sprayed coatings on boiler steels

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Abstract

In the current study, Ni-20Cr and Ni-5Al wires were deposited on boiler steels for protection in high temperature environment. The microstructure, mechanical properties and high temperature oxidation behavior of the deposited coatings were studied. The weight change study was conducted to ascertain the high temperature oxidation behavior of the coatings at 900°C under laboratory conditions. The kinetics of oxidation was established using weight change values for the uncoated and the coated steels. The oxidation products of the coated and uncoated samples were analyzed using X-ray diffraction (XRD), scanning electron microscopy/energy dispersive spectroscopy (SEM/EDS) and X-ray mapping analysis. The results showed that Ni-20Cr coating reduced the more weight gain than Ni-5Al coating. This higher oxidation resistance is due to the presence of protective phases in the oxide scale (Cr₂O₃, NiCr₂O₄, NiO, and Al₂O₃), lower porosity (2%), and higher micro hardness of the coating.

Keywords: High Temperature Oxidation, Wire Arc Spray, Mechanical Properties, Ni-20Cr, Ni-5Al Coating.

Received: February 9, 2022; **Accepted:** February 17, 2022; **Published:** February 28, 2022

Biography

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