

High Temperature Behavior of a 75Cr3C2-25NiCr Coated T91 Boiler Steel in an Actual Industrial Environment of a Coal Fired Boiler

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Abstract : In the present investigation, 75Cr3C2-25NiCr coating was deposited on T91 boiler tube steel substrate by high velocity oxy-fuel (HVOF) process to enhance high-temperature corrosion resistance. High-temperature performance of bare, as well as HVOF-coated steel specimens was evaluated for 1500 h under cyclic conditions in the platen superheater zone coal-fired boiler, where the temperature was around 900 °C. Experiments were carried out for 15 cycles each of 100 h duration followed by 1 h cooling at ambient temperature. The performance of the bare and coated specimens was assessed via metal thickness loss corresponding to the corrosion scale formation and the depth of internal corrosion attack. 75Cr3C2-25NiCr coating deposited on T91 steel imparted better hot corrosion resistance than the uncoated steel. Inferior resistance of bare T91 steel is attributed to the formation of pores and loosely bounded oxide scale rich in Fe₂O₃.

Keywords : 75Cr3C2-25NiCr, HVOF process, boiler steel, coal fired boilers

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