

RESEARCH CORROSION RESISTANCE OF ALLOYED ALITATED COATINGS IN SULFATE SOLUTIONS

I. Kruhliak, Doctor of Technical Sciences, professor, Head of the Department
D. Sereda, Candidat of Technical Sciences, assistant professor,
M. Vrublevskiy, student

*Dniprovsky State Technical University,
59002, Kamianske., Str. Dniprobudivska, 2
e-mail: seredabp@ukr.net*

Corrosion resistance studies of austenitic, austenitic-ferritic steels and carbon steels with alloyed alloy coatings in the sulfate department of PJSC «Zaporizhkoks» were performed equal amounts (not less than 30 % each). Both of these phases are corrosion resistant due to their high chromium content. Advantages of DCS over austenitic corrosion-resistant steels (ACS) – higher strength and high corrosion resistance, as well as reduced steel cost due to the relatively low nickel content.

The corrosive aggressiveness of the medium in the collections of weak and strong circulation increases with increasing temperature as a result of the release of heat of dissolution, as well as due to the abrasive action of salt when feeding the supernatant after centrifugation. When concentrated sulfuric acid is introduced into the mother liquor without a distributor, a large local warming is observed and zones with very dangerous concentrations (75–40 %) of sulfuric acid are formed.

One of the most effective methods of creating coatings with high mechanical and physicochemical properties are diffusion surface alloying of metal under conditions of self-propagating high-temperature synthesis. The technology of obtaining coatings in the conditions of self-propagating high-temperature synthesis, combined with chemical transport reactions. The dissolution rate of steels (corrosion rate, A/cm²) in the mother liquor of the sulfate department Al-Cr (steel 45) – $2 \cdot 10^{-6}$, Al-Ti (steel 45) – $3 \cdot 10^{-7}$.

Cathodic polarization curves were removed from the potential of 1.0 V to the potential of free corrosion E_q . The value of free corrosion potential for steel Avesta 254SMO at 30 °C, is -0.25 V, at 60 °C -0.50 V. For steel DKS SAF 2507 at 30 °C is -0.28 V, at 60 °C -0.38 V. Anode polarization curves were removed from the free corrosion potential to the 1 V potential. Anode polarization curves are typical for passive steels. They have a maximum potential (Flade potential) followed by a passive region and an active region of dissolution from the passive state. Inverse anode polarization curves were removed from the 1 V potential to the free corrosion potential. Their characteristic feature is the region of their transition to the passive state (potentials 0.4÷0.0 V), which indicates the presence of a passive protective film on the steel surface. The magnitude of the corrosion current density for these steels was determined by extrapolation.

References

1. Surface strengthening of working materials in the conditions of complex influence of aggressive substances: monograph / B.P. Sereda, L.P. Bannikov, S.V. Nesterenko, O.S. Gaidaenko and others. DDTU, 2019. 173 p.