



Using of rust converters for deposition of anti-corrosion coatings

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ABSTRACT

This work is devoted to the study of phosphate coatings formed on the surface of iron samples from Tzinkar rust converter solutions manufactured in industry. The optimal conditions for the deposition of anticorrosion coatings from a solution of the Tzinkar rust converter in the presence of accelerators of nitrophenol, sodium m-nitrobenzosulfonate and hydroxylamine are determined. It was shown that the coatings deposited from Tzinkar the presence of an accelerator of sodium m-nitrobenzosulfonate with a concentration of 5 g/l at a deposition temperature of 40 °C and a deposition time of 10 min had the highest corrosion resistance. The corrosion resistance of such coatings is 180 s according to the Akimov method, while the corrosion resistance of coatings deposited from the phosphating solution FR under the same conditions is 25 s. The study of deposited anticorrosion coatings from Tzinkar solution was carried out using the EM method with OLYMPUS LEXTOLS 4100 microscope. The thickness of the coatings was determined using a thickness gauge of galvanic coatings Constant K6C. Coating strength was determined on a PosiTestAT. It was shown that the addition of 0.5 g/l m-nitrobenzosulfonate to the Tzinkar solution promotes the formation of a uniform fine-crystalline coating with the smallest thickness of 5.2 μm and the highest adhesion of 3.7 MPa with the surface of the iron sample in comparison with other accelerators.

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1. Introduction

Among the ways to obtain anti-corrosion coatings, phosphate solutions are most widely used due to their efficiency, economic feasibility and technological simplicity [1,2]. However, the use of phosphate anti-corrosion coatings becomes effective with appropriate preparation of the surface of metal samples, which include machining, degreasing, etching, and surface activation [3–5]. Unlike phosphating solutions used in industry, the use of rust converters, which allow obtaining anti-corrosion coatings with high protective ability and good adhesion, does not imply preliminary preparation of the surface of metal samples. This circumstance greatly simplifies the process of applying anti-corrosion coatings and is of particular interest. To successfully carry out the processes

of phosphate films deposition with a high protective ability, phosphating accelerators of both oxidative and reducing effect are used [5,6]. It should be noted that the effect of accelerators when using rust converters for the preparation of protective anti-corrosive coatings is not well understood. The aim of this work was to study the possibility of using rust converters produced in industry as solutions for the formation of phosphating coatings on the surface of iron samples and to compare them with known phosphating solution. The novelty of the work consists in the fact that the effect of phosphate accelerators on the corrosion resistance, thickness and adhesion of formed anticorrosion coatings in solutions of rust converters was first investigated.

2. Methods and materials

Corrosion-resistant coatings were deposited on samples of cold-rolled steel grade (Art. 08PS) using rust converter Tzinkar and phosphate solutions FR having the following composition:

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