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# Investigation of chemical processes that ensure the strength of adhesion of glass-enamel coating to steel pipelines

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**Abstract**

Pipes with a protective coating are widely used in the construction of pipelines for various purposes. Internal glass-enamel coatings protect pipelines from the corrosive effects of the transported medium, reduce roughness and increase throughput, which ensures their durability. The authors of the article have developed a composition of a single-layer glass-enamel coating based on the diatomite of the Chernoyarsky deposit of the Far East. The article examines the influence of various methods of preparing the steel base on the adhesion strength in the metal-enamel system and the physicochemical processes that occur during the formation of a glass-enamel coating during firing. It was established that pretreatment by chemical boring provides a higher adhesion strength of single-layer enamel with the steel surface of the product compared with the traditional method of metal surface treatment (degreasing, etching, neutralization) and shot blasting. It was revealed that in the process of boronation a layer of iron borides FeB and $Fe_2B$ is formed on the surface of steel, which was confirmed by the NGR spectroscopy method. The mechanism of adhesion in enamel-steel systems during pre-boring of steel is the result of not only electrochemical interactions between the glass-melt coating melt and the steel surface, but also mechanical anchoring due to the micro roughness formed by borides crystals.

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