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CONSTRUCTION OF UNDER-RAIL LAYING ON THE RAILWAY AT HIGH-SPEED TRAIN TRAFFIC

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ABSTRACT:

The article considers the work of the under-rail laying made of fluoropolymer, which will increase the service life and reduce the vibration load from the rolling stock on high-speed traffic sections.

KEYWORD: ballast prism, roadbed, upper structure of the track, sleeper, embankment, recess, high-speed train traffic.

INTRODUCTION:

One of the main tasks of railway operation is to create a strong and reliable track structure. On different Railways of the world, studies have been conducted on the impact of structural and conditions for the emergence and development of emissions, shifts, theft path and to determine the impact of various structural and operational factors on the maximum allowable temperature of lashes which, if exceeded, relative to the curing temperature leads to theft, shifts and emission paths. Laboratory seamless way all-Union scientific research Institute of railway transport Railways (VNIIZHT MEAs) under the leadership of candidate of technical Sciences, associate docent E. M. Bromberg was conducted multilateral set of experiments. The results of these experiments are published in the proceedings of VNIIZHT [1], [2], [3], [4], [5].

A significant role in ensuring the stable operation of the railway track and the safety of train traffic is played by rail fasteners, which should guarantee a reliable connection of the rails with the sleepers. The stability of the rail track depends largely on the quality and reliability of the rail fasteners and their elements, especially when moving trains with high speeds and axial loads [6].

RESULTS AND DISCUSSION:

The sub-rail gasket made of an elastic material of composite thermoelastoplast contains grooves of different heights uniformly arranged alternately on the upper support surface of the sub-rail gasket. In cross-section, the grooves are trapezoidal in shape with a large base up. The grooves are located along the length of the strip and the axis of the rail. Due to the implementation of trapezoidal grooves, the volume of the groove increases at the same depth, which leads to an increase in the value of the margin factor due to the presence of two corners at the junction of the faces, since the load on each joint is halved, and each corner is greater than the right angle. This reduces the internal shear stress at the junction of the faces.

The technical task to be solved by the claimed solution is to create a strong compressive and tensile sleeper with a high coefficient of friction on concrete, a low

coefficient of friction on metal, resistance to longitudinal and transverse displacements during operation, a long service life in all weather conditions, and high transmission rates of vibration load and vibrations from rolling stock on high-speed traffic sections.

The solution to this problem is to ensure reliable operation of the rail fastener, increase the service life of the sub-rail laying in conditions of increased cyclic loads in the upper structure of the track and prevent rail theft under the action of temperature and longitudinal forces.

The proposed under-rail gasket made of F-4 fluoroplast with a thickness of δ=5 mm, which has a high compressive strength (12.9 MPa) and tensile strength (14.0-25.0 MPa), practically does not absorb water, which ensures the normal operation of the structure. The coefficient of friction on concrete sleepers and high fluoroplast (f=066) that gives the reliability of both shear and friction coefficient of fluoroplast metal (rail) very low (f=0,05÷0,1), which will allow you to change the temperature to prevent the elongation of the rail. The melting point of the fluoroplast is t=327^{0}C, and the glass transition temperature is t= - 120^{0}C, which makes it possible to reliably use the gasket in all weather conditions. The service life without replacement of the gasket is more than 20 times longer than the polymer composite gaskets. The F-4 reduces vibration vibrations better than from a polymer composite: low-frequency vibrations by 5 times, high-frequency vibrations by 10 times. All these positive aspects of the F-4 gasket will be more in demand in high-speed traffic areas and in conditions of high radiation, since the F-4 is not affected by temperature changes and solar radiation, to which the polymer composite gasket is highly susceptible.

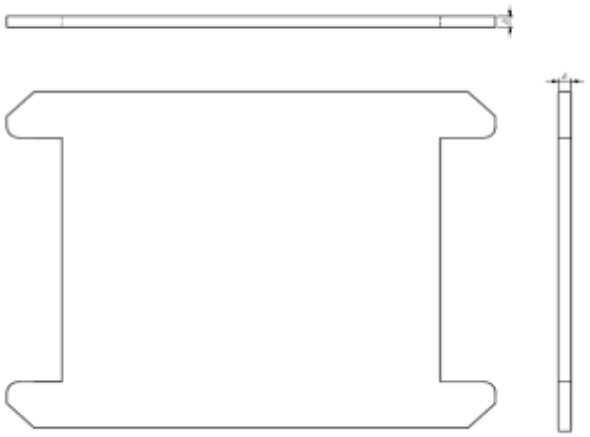

Fig. 1. Under-rail gasket

Reducing the friction between the rail and the F-4 gasket, which occurs when elongation from temperature and the reverse process from temperature reduction, reduces the stress that occurs in the rail-sleeper grid by an average of 10-15%, which will be aimed at improving its operation.

A sub-rail gasket containing a base with a flat support surface in contact with the base of the rail, a flat internal support surface in contact with the sleeper, characterized in that the gasket is made of F-4 fluoroplast in the form of a rectangular plate with protrusions, provides resistance to longitudinal and transverse movements of the rail during operation, a long service life in all weather conditions, and also has high transmission rates of vibration load and vibrations from rolling stock in high-speed traffic areas.

Increase the compressive and tensile strength, the coefficient of friction on the concrete sleeper, the resistance to longitudinal and transverse displacements during operation and the ability to dampen the amplitude-frequency characteristics of the rolling stock.

The proposed under-rail laying will increase the service life and reduce the vibration load from the rolling stock on high-speed traffic sections.

CONCLUSION:

A sub-rail gasket containing a base with a flat support surface in contact with the base of the rail, a flat internal support surface in contact with the sleeper, characterized in that the gasket is made of F-4 fluoroplast in the form of a rectangular plate with protrusions, provides resistance to longitudinal and transverse movements of the rail during operation, a long service life in all weather conditions and reduces vibration loads and vibrations from rolling stock in high-speed traffic areas.

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