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THE ROLE OF RELAY VALVE WITH KINKED CHARACTERISTICS IN BRAKING WAGONS WITH DIFFERENT BRAKES IN A FREIGHT TRAIN

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Abstract

This paper explains the problem of more pronounced heating of the wheels and wear of the brake shoes of equally loaded railway vehicles with SS or S2 tread brakes compared to wagons with S0 or S1 brakes when they are in the same train composition. As the mass of the railway vehicle increases and the square of the speed increases, the energy that is converted into heat during braking increases. In the case of tread brakes, this heat is dissipated to a lesser extent through the shoes, and to a greater extent through the wheel. Due to the uneven temperature field, parts of the wheel expand differently, and thermal stresses arise in the wheel. During extreme braking, the thermal stresses in the circumferential part of the wheel can exceed the yield point of the material, and as a result, permanent deformations occur due to circumferential compression. After cooling, residual tensile stresses are created in the direction of the wheel circumference. In extreme cases, this can cause the wheels to crack. For this reason, it is necessary to limit the intensity of braking, especially during long-term partial braking due to speed regulation on railway down slopes. However, the maximum braking force must not be limited. This is achieved by introducing a variable load relay valve with kinked characteristics. The Kink valve is a relay valve of a special design, which, based on the level of loading of the wagon, maps the pressure in the brake cylinder, so that when braking from 80 to 100% of the maximum pressure at all loads, the braking force is proportional to the load, and during partial braking, in the case of a load over 14.5 t/axle, the braking force is reduced, so that the wheels do not overheat during frequent partial braking.

Keywords

Freight wagons, braking, relay valve, kinked characteristics, wheel overheating.

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