Mass and composition of rails

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Annotation: This article provides information about rails, which are the main element of the railway. Here we will talk about the mass and their composition, depending on the type of rails.

Keywords: Mass, steel, carbon, hidden defects, pits and cavities, deformations, sutures.

Entrance part: The overhead structure of the track is designed to receive the load from the moving content wheels and give it a slippery handling, as well as to guide the motion of the moving content wheels along the rail sleeve. These goals are achieved when all elements work as one and the same, as a single construction.The most stringent requirements for the elevated structure of the line are: all its elements should be robust and reliable operation, ensure safe movement of trains at the specified maximum speed; the service life should be long and it should not be expensive to look at and maintain. Rails are the head element of the upper device. they take pressure from the moving content wheels and transmit it to the elements in the well, as well as diverting its wheels as the moving content moves. On autoblogged plots, the rails also act as conductors for the signal current, and on electric traction – for the reverse torque.

On World Railways, long rails as well as welded rail plates tend to be used more widely. Therefore, due to the decrease in the number of eclipses, this situation and the content in motion will improve the conditions of their interaction and have a great economic effect. For example, if similar but 25 m rails are laid instead of R65 type rails with a length of 12.5 m, 3,902 t of metal is saved every 1,000 km due to a decrease in the need for grip attachments. In addition, the reduction in the number of junctions reduces the resistance to train traffic by about 10%, reducing the absorption of the moving content wheels as well as the current maintenance costs of the track.

The standard length of modern rails is between 10 m and 60 m in different countries, equivalent to: 25 m in the CIS countries; 24 and 48 m in the Czech Republic, 30, 45 and 60 m in Germany; 18, 24 and 36 m in France; 18, 29 m in England; 25 m in Japan; 11, 89 and 23, 96 m in the USA. In the countries of the Commonwealth of independent

states, a limited number of rails with a length of 12.5 M are produced for threaded conductors.

In addition to standard length rails, length-shortened rails are also used for laying on the Inner Line of curved sections of the road. Such rails will be shortened by 80 and 160 mm, and for rails 12.5 m long – by 40, 80 and 120 mm.

The rail mass is determined by:

- the greater the load on the axis of the railway crew, the speed of the movement of trains and the scale of the load carried on the line, the greater the mass of the rails, along with the same other conditions;
- the larger the Rail Mass, the greater the cost of use on larger lines (to maintain the track, to overcome the resistance of train traffic) when other conditions are the same.

Today, there are various proposals to determine the rail mass empirically, depending on a limited number of factors.

The data in the available reports and literature, reference materials, scientific research and the results of the feasibility analysis determine the relationship between the Pogon mass of the rail, q and the main parameters of use listed below.

The quality of rail steel is determined by its chemical composition, micro-and macro-corrosion.

Carbon increases the hardness and wear resistance of rail steel. However, the greater the amount of carbon in the composition, the greater the fracture strength of the steel even when other conditions are the same, and the more complex it is to straighten it in a cold State. Therefore, the metal rail is distributed relatively evenly throughout the cut, requiring strict adherence to its chemical composition, especially in the case of phosphorus and sulfur. Manganese increases the hardness and wear resistance of steel, ensuring its sufficient viscosity. Silicon also increases the metal hardness, increasing its resistance to absorption.

Phosphorus and sulfur are harmful mixtures that make steel brittle: when the content of phosphorus increases — the rails become brittle in the cold, and when the sulfur content increases – when heated.

Arsenic increases the hardness and wear resistance of rail steel several times, but its excess reduces the degree of viscosity to the tattoo.

The rails are prepared according to the established technology regulation, in accordance with GOST R 51685-2000.

The rails are made of quiet (Spokane) Steels made in marten, converter or electropechs. The quality of rail steel is characterized by its micro - and macrospection. The steel microtusion is detected by magnifying it 100-200 times under a microscope. Typical

rail steel components are Ferrite and ferrite, composed of carbon-free iron, and perlite, constructed from the addition of cementite.

A study of rail steel microtussion suggests that it will have the potential for severe resistance to absorption as well as the property of tightness when it has a sorbite structure in the result of special thermal processing.

Volumetric polishing of rails is common today. It increases the plasticity and tightness of the rails, increasing the resistance of the rails against the formation of snoring roughness and transverse snoring fractures. The durability of such rails in use will be 1.3-1.5 times higher than that of non-polished rails in use.

For the quality of rail steel, its macro-structure (structure at the fracture site, which is visible when viewed without a tool or using a magnifying glass) plays an extremely important role. Steel should have a uniform structure," hair", plene and slag-free, with no traces of uneven distribution of chemical compounds by cross section. The improvement of steel quality is achieved by strict adherence to technical conditions and continuous improvement of steel preparation and rolling technology of rails. In the CIS countries, the density of rail steel was assumed to be 7.83 tons/m3.

Thus, the requirements and conditions for rails are, at the same time, important, necessary and opposite. Therefore, in this case, rails that satisfy most of the requirements specified under certain conditions are found to be the optimal option.

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