



RESEARCH OF MEANS OF FASTENING GOODS TO WAGONS IN RAIL TRANSPORT

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Annotation: *the article shows the selection of optimal options for quality service methods when placing and fixing goods on wagons during the delivery process. The means of fastening goods to wagons were researched and measures and proposals for their selection were developed. In addition, the process of fastening the goods was analyzed and proposals were made for fixing the goods to the wagons in order to eliminate the shortcomings of the existing system.*

Introduction.

Local technical conditions (in the next place – MTU) or cargo placement and strengthening schemes (in the next place – NTU) are used for the methods of placing and strengthening cargo intended for transportation as part of open movement, but not provided for in this Tu. This MTU or NTU will be developed under the requirements of Chapter 1 of this TUning.

If multiple reinforcement tools are used in cargo transportation, then the positioning and reinforcement scheme for the return of such tools in an empty state is developed as part of the MTU or NTU. Multiple reinforcement tools shipped in idle condition are shipped on the basis of the appropriate MTU or NTU without further arrangements, or other MTU or NTU is developed in accordance with the provisions of this chapter. Figure 1 shows the means of fixing loads placed on the platforms.

The technical conditions for the placement and strengthening of cargo (next – TU) determine the methods of placement and strengthening of cargo in 1520 mm tracked wagons and establish the procedure for the development of placement and strengthening methods not provided for in TU.

**Main part.**

If the method of its placement and strengthening when submitting a cargo for transportation is provided for in this TU, a sketch can be developed that shows the parameters of the cargo in cases required by national legislation. This sketch confirms that the method of placement and reinforcement of the load is consistent with this TU.

This rule does not apply to the methods of placing and strengthening loads in accordance with Chapter 5 of this TU.

The placement and strengthening of cargo is carried out under the guidance of a person who has passed the verification of knowledge on this TU in the manner prescribed by national legislation. This TU is applied to the transportation of goods as part of freight trains at operating speeds of up to 100 km/h [1].

The requirements for materials used as reinforcement tools are established on the basis of the standards of the Russian Federation (GOST), which are referenced in this TU Text [2]. For reinforcement tools, it is allowed to use materials produced according to other regulatory and technical documents, if their characteristics meet the requirements of the specified standards. These TUda physical magnitudes are listed in the MKGSS system of units. In the SI system, the following ratios must be used to represent values of magnitudes:

1 kgs – 9,8 N;

1 ts – $9,8 \times 10^3$ N;

1 ts/t – $9,8 \times 10^3$ N/t;

1 kgs/m² – 9,8 Pa;

1 kgs/sm² – $9,8 \times 10^4$ Pa;

1 ts/m² – $9,8 \times 10^3$ Pa.

The following tools are used for fastening goods on wagons: base drawers (Rastyajka) – used to attach the load from one end to the load fixing device, and from the other end to a special device on the wagon body [3]. Spindle drawers (Obvyazka) – used to wrap the load completely and attach it to the special fastening devices of the wagon. Fastening ties (Styrofoam) – are used to join and tighten other fastening tools (caps, ties, support posts, etc. Connecting ties (Uvyazka) – are used to connect multiple

load units and fasten them as a single load. Wooden supports and posts – used to keep the load stable [4]. Coating panels and blocks – applied to prevent load shifting. "Spurs" and carcasses – designed to hold the load more firmly. Cassettes, pyramids, bearings and turnstiles – are used as special structures for stable fixation of loads of various shapes. Fastening tools can be disposable or multiple (reusable). When installing fasteners in wagons, the following standard fastening elements are used: Bolts (bolts), spindles, nails, construction staples and other fastening details.

A puller is a fastener (fastened) that connects with one end to a tying device in a load, and with the other end to a tie device specially designed for this in a wagon body. A binder is a (fastened) fastener that connects the load to the binder in the wagon body with the coverage and both ends. A drawer is a fastening tool designed to cross-attach and pull other fasteners (usually a drawer, binder, columns). A link is a fastening tool designed to combine individual load units into a single load position.

The following materials are used to make drawers, ties, drawers, ties:

- from thermally processed steel wires in the case of round-cut (GOST 2590), square-cut (GOST 2591);
- from steel rolling or tape (GOST 103);
- from steel chains or ropes.

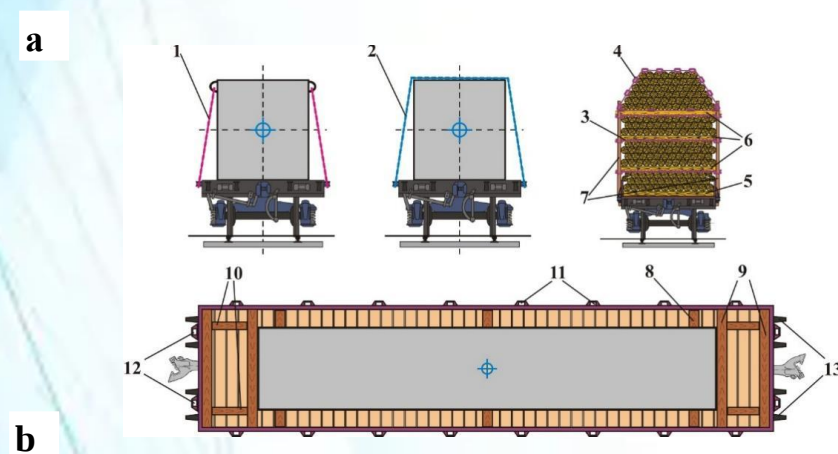


Figure 1. Tools for fastening cargo to wagons:

a-transverse cross section of various loads placed on the platform; b-cross section of load placed on the platform; 1-Pull; 2-tie; 3-Pull; 4-tie; 5-overhang; 6 – gasket; 7 – columns; 8 – and 9 – sidebar and hem hem hem beams; 10 – side hem



beams; 11 – and 12-sidebar and hem hem skobes; 13-base kronshtein on the hem hem hem hem beam.

Round cross-section steel rolling wires should be no less than 5 mm in diameter, non-round steel rolling wires should be no less than 20 mm² in cross-section surface [5].

They have special devices for fixing drawers and fasteners to wagons.

- on the platformers: side and hem column skobes, base kronshtein on the hem barrier; side skobes on platforms for large tonnage containers and wheeled equipment;
- in semi-open wagons: oysters tie device (cosines); intermediate tie device located on the sidewall fence, at an altitude of 1100 – 1200 mm from the floor; skoba-shaped upper tie device.

Oysters and gaskets are made of non-inferior tilting (wood) materials of the third variety. From Birch, Mountain Birch (ansox), hemp and argan (Linden), it is allowed to make tightening-working ostriches and gaskets, but they are not fastened with trellis and kashak trellis fences and other fastening elements. It is not allowed to use these tree breeds, as well as all dry hardwood zorts, in the preparation of Rake and kashak rake fences. If the load is not damaged, it is allowed to make a lining and gasket from metals of different shapes, reinforced concrete and other materials [6].

Oysters and gaskets are used to increase the load-bearing area on the wagon floor, to prevent the load barrel from deviating, to ensure the possibility of mechanizing the increase and unloading of cargo, to protect the cargo and wagon from damage to the base surface, and to fasten the rake and kashak rake barriers. If the intended requirements are provided without the use of a sealant and gasket, it is not necessary to install them [7,8].

The height of the lining and gasket should not be less than 25 mm, and the width should be less than 80 mm, and in this the ratio to the height of the width should not be less than 1.5. The length of the rack, which is placed by the width of the wagon, is obliged to make the wagon body wide, and the gasket – the width of the load [9].

Wooden poles, the trunk of which is not cleaned and the trunk is cleaned, are used to block the stocked loads by the side and skirt, making them from round wood



materials or straight fiber-polished (wood) materials according to GOST 8486 and GOST 2695. Columns made of round wood materials should be 120 – 140 mm at the bottom trim and 90 – 120 mm at the top trim. The trim of the columns made of polished (wood) materials should not be less than 90 x 120 mm. The width of the columns installed on semi-open wagons should not be less than 100 mm, at the level of its upper sarrovi.

Conclusion. For fastening loads to wagons, pull-ups (rastyajka), ties (obvyazka), pull-ups (styajka), ties (uvyazka), ties (upornie) and cash-straws (raspornie) barriers (Bruski), posts (stoyki), ostlik (podkladki), gaskets (prokladki), Shields (tshiti), tourniquet and the like are used many times, as well as standard fasteners. When installing fastening elements and tools, standard fastening items are used, for example, bolts, spills, nails, building dust (skoba). It is not allowed to fasten the pulleys and fasteners to other details of the wagon body, as well as to the skobs designed for column fastening inside the wagon body, to the fastening ring on the semi-open wagon top sarrova, and to the rings on the outer surface of the platform section boards.

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