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## UDC 629.35

### INCREASING THE EFFICIENCY OF FREIGHT TRANSPORTATION BY USING TRUCK TRAINS IN TRANSPORT LOGISTICS

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The transport complex of Ukraine is developing a new type of combined transport – container transport, or transportation by rail using scheduled trains of heavy goods vehicles – trucks (tractors with semi-trailers and trailer trucks). The issue of transport logistics has become very relevant in our country in recent times. This type of transport has the following advantages:

- combining the qualities of two dominant modes of transport – the maneuverability, efficiency, and speed of road transport and the high productivity and safety of rail transport;
- reduction of downtime for road trains in queues at border crossings (from several days to hours);
- reduction in motor fuel consumption;
- significant reduction in environmental pollution;

- ensuring the safety of motorways;
- reduction in the likelihood of traffic accidents involving heavy goods vehicles.

A comparison of freight delivery options shows that for distances greater than 250–300 km and delivery lengths by road of up to 20% of the rail transport distance, containerized transport is the most efficient in terms of the costs and cost of transportation indicated. [2]

A road train can consist of a tractor and a semi-trailer, a car and a trailer. The technical characteristics of road trains and semi-trailers are a height of no more than 4000 mm, a width of no more than 2500 mm, and for refrigerated road trains, no more than 2600 mm.

A road train consisting of a tractor and a semi-trailer is placed on the platform symmetrically to its longitudinal axis. The wheels of the semi-trailer and the rear wheels of the tractor must be on the horizontal platform of the lowered part of the platform floor. The front wheels of the tractor are located on the upper horizontal part of the platform's loading area or on its inclined section within the platform frame. [3]

The transverse plane of symmetry of the semi-trailer of a road train consisting of a tractor and a semi-trailer may have a longitudinal shift from the transverse plane of symmetry of the platform of no more than 0.1. [4,5]

Depending on its length, gross weight, and body height, a road train is placed on one or two platforms. When placed on one platform, the front wheels of the tractor and the rear wheels of the trailer must be on the upper horizontal section of the platform floor. [6,7]

When placing a car with a trailer on one platform, it is permissible to install the road train both in a coupled and uncoupled state. When placing a road train longer than the length of the platform frame, it is permissible to transport it with an overhang beyond the front beam on one side of the platform by an amount not exceeding 400 mm.

If the total weight of the road train exceeds the load capacity of the platform or its height exceeds 3820 mm (when placed on platforms of models M13-9004, 13-4095) and 3920 mm (when placed on a platform of model 13-9009), the car and trailer are placed on separate platforms (Fig. 1). A road train placed on one or two platforms is secured against longitudinal displacement by eight stops installed under the wheels of the single-axle, double-axle, and triple-axle axles of the car, tractor, trailer, or semi-trailer. [8]

Table 1 Technical characteristics of the specialized railway platform model 13-4095

Parameter name	M13-4095
1. Load capacity, t	48
2. Tare weight, t	28
3. Frame length, mm	21350
4. Length between axles, mm	22520
5. Number of platform axles	4

6. Base, mm	1780
7. Height of the center of gravity above the rail head level (RHL), mm	813
- height of the lowered part above the RGR,	970
- height to the top part above the RGR, mm	1,300
- length of the lowered part, mm	12,250
8. Number of inventory fastening stops	8

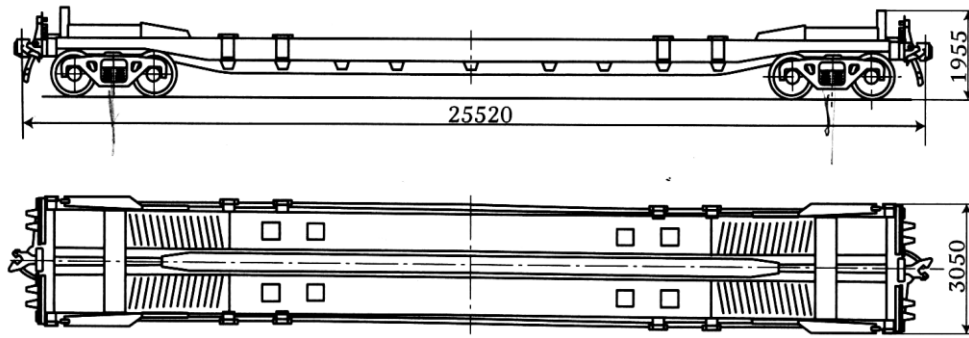


Figure 1 – Diagram of the 13-4095 model platform

The load is placed (Fig. 2) symmetrically with respect to the longitudinal and transverse axes of the platform, and then checked for correct placement and compliance with the load dimensions. [8]

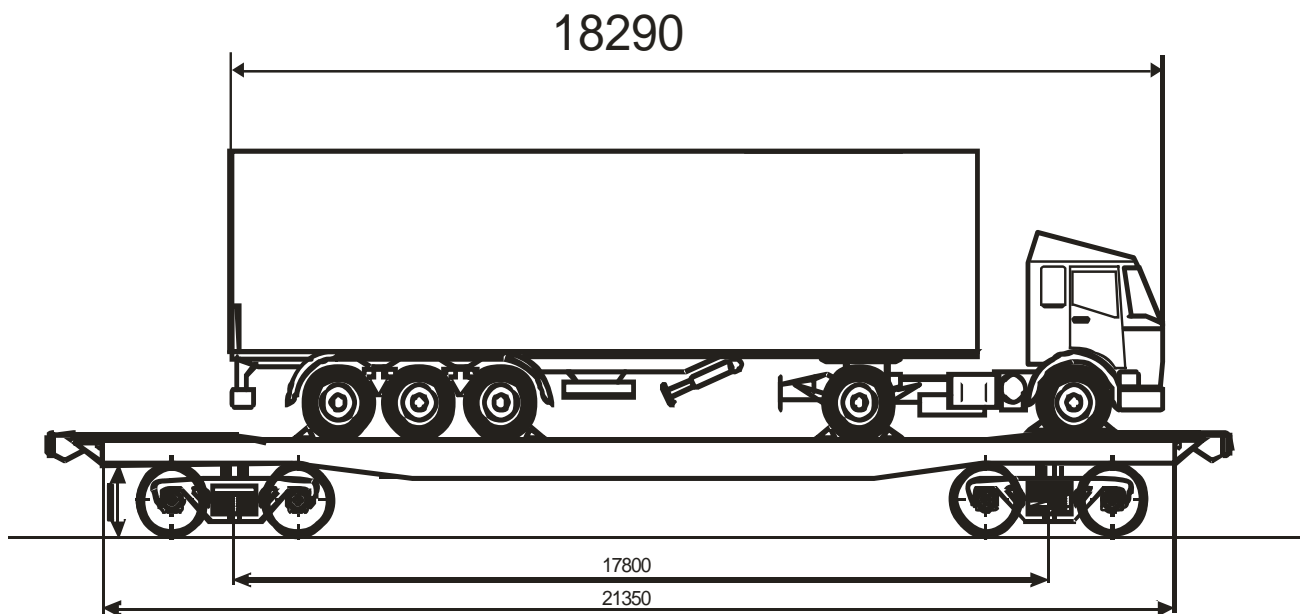


Figure 2 – Cargo placement and fastening diagram

## Conclusions

This work illustrates the possibility of using two types of transport for cargo transportation, namely road and rail. In our opinion, the issue under consideration is quite useful and can be applied in transportation, but at the same time, it is necessary to resolve the issue of the rational use of road trains and rail platforms.

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