EEC OUN Rules № 29 to be changed.

{ GRSP-INF-CS/6 }

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At present the basic part of specifications to regulate the safety level of road transport relates to the most wide- spread type of passenger vehicles – M_1 cars.

This is quite naturally, considering that passenger cars make up 75 to 95 % of the car fleet in different countries (Table 1).

In Russia the number of passenger vehicles makes up about 60 % of the park (motorcycles included) and about 80 % of the automobile park. Trucks make up 18 % of the automobile park, motorcycles not included. (Fig. 1). The main transport accident factors in Russia are approximately 190 000 road traffic accidents (RTA) per year and 29-30 thousand of those dead as a result of RTA. Of course, the passenger cars constitute the main RTA portion (about 80 %). However during the recent years the relative growth of heavy traffic accidents with trucks involved has been observed. For example, truck portion in the park being 13 % , the RTA death-roll in 1998 with trucks involved in those traffic accident made up more than 20 % of the whole number (Fig. 1). The relative RTA factors for trucks (the RTA number, the number of those dead and injured per 10 thousand vehicles) are more than two times higher than the similar indices for passenger cars.

At the same time the number of trucks in the Russian Federation is constantly increasing: within the last 6 years their number has increased almost by 3 % or more than by 100 000 units.

As before , the road freight transport carries the most cargo volume. Its annual share in the total freight turnover in this country amounts to as much as 50 %. The road freight transport has a great effect on the traffic safety; the truck-involving traffic accidents are characterized by the grave heaviness of consequences. As this takes place, only 46-48% of the truck-involving total number of traffic accidents are commited through the fault of truck drivers.

For instance, more than 60 % of the total number of truck-involving collisions are commited through the fault of drivers of other transport. This testifies that measures have to be taken to increase both inner and outer passive safety.

Thus, inspite of its rather low portion in the automobile fleet of the country, the road freight transport the accident rate and has an essential effect upon the accident rate and the road transport traumatism in Russia.

The said circumstances demonstrate the high urgency of the problem of increasing truck-construction safety, which problem can be solved only on the basis of the thorough analysis of RTA reasons and the weight of consequences for the given type of automobile transport.

The Moscow State Road / Transport Institute (The Technical University) has studied in full details the effect of constructive parameters of trucks of different models upon the accident rate.*)

All the trucks were classified by the their construction features into three main groups:

A- conventional trucks (bonneted)

B- cabover trucks

C- high-sided cargo bed trucks.

The analysis of RTA statistics in Russia shows that typical RTA resulting in truck drivers' and passengers' traumas are the frontal collisions (73%) and rollovers (24%). The rest traffic accidents do not exceed 3%.

The correlation between relative factors of accidents, taking into account operating vehicles of specific marks and models, made it possible to reveal the following traits of the effect of their construction upon the traffic safety.

At a rate of 10 thousand units of each model in the truck fleet the highest number of accidents, those dead and injured have been observed for the heavy-duty trucks of category N_3.

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*)- The analysis has been carried out with the participation of Doctor T. A. Litvinova and of Engineer A. A. Gruzinsky

On comparing various relative indices characterizing the weight of consequences and the risk degree of death and injuries resulting from traffic accidents, there has been determined an obvious impact of the truck-cab arrangement on passive safety (Table 2). For instance, the relative total number of those dead in RTA per 10 000 trucks of group A (conventional trucks) is almost thrice as less as that for group B (cabover) and 1,5 times less than for each specific type in average.
The similar relative number of those injured in the case of trucks of group B is 2.2 times more than for group A and 1.7 times more than for each specific type in average.
Those dead per 100 RTA in the case of group B is significantly more than for group A (38.3 as against 26.8) and those dead per 100 victims (25 to 19).
Much more is the effect of impact-strength characteristics with various cab arrangements of such vehicles, when comparing the RTA relative indices of truck marks and models of similar weight parameters (Table 2-4).
The number of victims per 10 000 vehicles of each model, those dead per 100 traffic accidents and per 100 victims for group B in the case of frontal collisions exceed the similar indices for group A (Table3).
The results obtained for the effect of the cab arrangement on the heaviness of RTA consequences have been supported by the analysis of distributing areas of the worst RTA damages of some truck marks and of the number of those dead in different damages. The maximum number of damages and of those dead in the case of such damages has been fixed in the event of deforming the truck fronts of group B. In the case of conventional trucks the similar indices are much lower.
The average number of rollovers, those dead and injured for each specific type was respectively 16,7%; 17,4%; 16,8% of the similar general indices of the accident rate through the fault of truck drivers.
The comparative analysis of the above relative indices of the accident rate made it possible to reveal the high efficiency of the use of a high-sided truck bed. It has been noted that high-sided truck rollovers are followed by the lowest number of those dead per 10 000 vehicles, those dead per 1000 RTA and those dead per 100 victims, which are respectively 2.5; 2.1 and 2.2 times less than average figures for trucks of all types. (Table 4). These models are also characterized by the less registered number of the roof damage for all kinds of road traffic accidents.
The analysis of distribution of the number and heaviness of RTA consequences testifies to the insufficient protection of truck cabs at the frontal collisions (especially for forward control trucks) and rollovers, which requires the development and special measures to increase the impact-strength properties of such vehicles.
Let us consider the requirements of passive safety placed upon trucks. Today there exist two main specifications to regulate cab impact-strength properties: these are EEC OUN Rules № 29 and the National safety requirements to truck cab strength in Sweden (Swedish Standard SMS 2564).
The EEC OUN specifications and those of Sweden differ in a load quantity and in a cab site of a load to apply. In accordance with these regulations the living space has to be left in a cab for a driver and passengers under the effect of three kinds of loads, simulating conditions of typical and trauma-dangerous kinds trucks – frontal tests and rollovers (Fig.2).
The analysis of requirements to truck cabs made it possible to reveal their peculiarities:

1. EEC OUN Rules № 29 (do not ensure even a minimum protection of truck drivers and passengers in the case of traffic accidents, because of evident low norms and groundless requirements to the impact-strength properties of the cab front and rear parts and particularly to the cab upper part (roof).
2. The Swedish safety requirements ensure rather a high safety level, however:

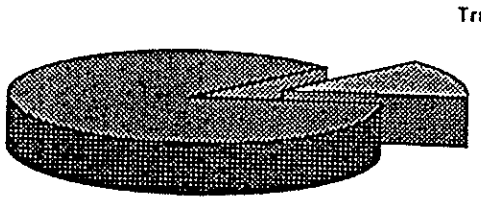
- they set rather a high but not sufficiently justified load degree of the cab front post;
- do not include requirements to the impact-strength properties of the cab front part to protect a driver and passengers at the frontal collisions;
- do not allow to reach the cab roof optimal strength because of using a vertical static load in tests rather than a cross dynamic load acting on the cab under conditions of rollover.

The results of the RTA statistical analysis with trucks involved and the operating specifications of truck cab passive safety show the necessity of the development of more advanced and justified requirements to cabs' impact-strength properties.

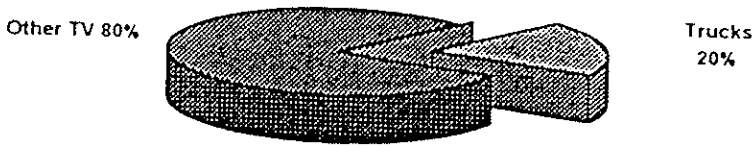
Truck-involving accident

Fig.1

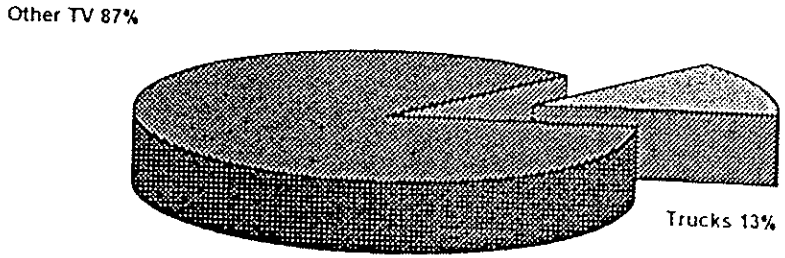
Number of RTA with trucks involved



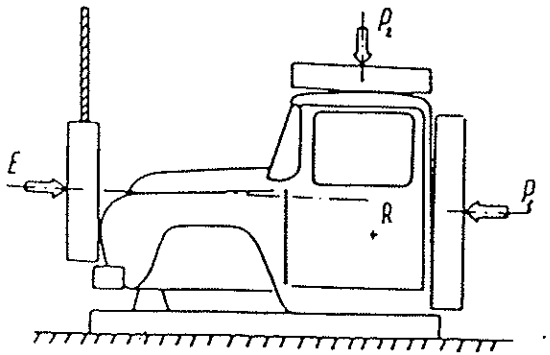
Number of those dead in RTA with trucks involved



Those injured in RTA with trucks involved

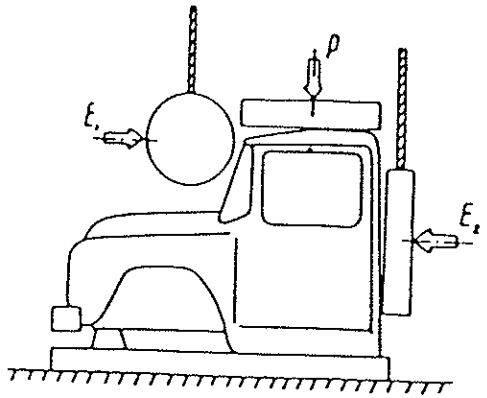


EEC OUN Rules № 29



E-blow with the flat pendulum of 2500×800, mass 1500 ±250 kg
Blow energy E=30 to 45 kJ
P_1-statistic load =200 kg×n
n-admissible load in tons
P_2-statistic load equal to the gross mass of a vehicle accounted for the front axis (but not more than 10 tons)

The Swedish requirements



E_1- blow with the cylindrical pendulum of 600 mm, mass 1000 kg
Blow energy E_1=30 kJ
E_2-blow with the flat pendulum of 1600×500, mass 1000 kg
Blow energy E_2=30 kJ
P- statistic load, $P=2*G_{cm}$ (but not than 15 t)
G_{cm} - vehicle mass. equipped

Fig 2 Requirements to the cab impact-strength properties

Table № 1

Structure of the automobile fleet in Russia and in other countries.

	Relative number of diverse of transport vehicles (TV)				
	Russia	England	Germany	Sweden	USA
Cars	77,6	89,1	94,8	91,8	95,3
Trucks	17,8	10,2	5,0	7,8	4,3
Buses	4,6	0,7	0,2	0,4	0,5

Table № 2

Distribution of accident factors depending on the truck arrangement

Type of the cab arrangement	Number of registered	Number of registered road traffic accidents (RTA)	Those dead in road traffic accidents (RTA)	Dead….per 10 000 TV	Dead….per 100 RTA	Number of victims in RTA (dead + injured)	Victims….per 10 000 TV
Conventional trucks (group A)	29770004	12642	3368	11,3	26,6	17354	58,3
Forward control trucks(group B)	1132036	9455	3620	31,9	38,3	14408	127,3
With high front side(group C)	150981	591	178	11,8	30,1	956	63,3
Average value for all trucks	---	---	---	16,8	31,6	---	76,8

Table №3

Distribution of accident factors at the frontal collisions depending on the truck arrangement.

Type of the cab arrangement	Number of registered vehicles (TV)	Number of registered road transport accidents (RTA)	Those dead in road traffic accidents	Dead .... per 10 000 TV	Dead .... per 100 RTA	Number of victims in RTA (dead + injured)	Victims ....per 10 000 TV
Conventional trucks (group A)	29770004	2666	613	2,06	22,99	4692	15,76
Forward control trucks(group B)	1132036	1962	600	5,30	30,58	2555	22,57
Average value for all trucks	---	---	---	2,74	25,24	---	17,84

Table № 4

Distribution of accident factors at the rollovers depending on the truck arrangement and high side

Type of the cab arrangement	Number of registered transport vehicle (TV)	Number of registered road traffic accidents(RTA)	Those dead in road traffic accident	Dead .... per 10 000 TV	Dead .... per 100 RTA
Conventional trucks (group A)	29770004	1184	355	1,19	29,98
Forward control trucks(group B)	1132036	630	165	1,46	26,19
With high front side(group C)	150981	61	7	0,46	11,48
Average value for all trucks	---	---	---	1,24	28,11