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Development of Test Methods for Vehicles Designated for Carriage of Dangerous Goods

Transmitted by the Russian Federation

Development of currently applied in the automotive industry and new methods of testing and evaluation of handling and stability is among the most complicated goals of improvement of vehicle active safety.

The currently applied ECE Regulations No. 105 related to the design features of vehicles designated for carriage of dangerous goods contain specifications to the electrical equipment, protection against fire, brakes and speed limitation.

A separate requirement to the vehicle stability is established by the European Agreement concerning the international carriage of dangerous goods by road (ADR) - Marginal Number 211 128. This Agreement sets. the minimal relation between vehicle track and height of the center of gravity for the loaded tank vehicle in the value of 90%, which is close to the lateral stability coefficient value of 0.45.

The already developed ECE Regulation No. 111 specify determination of the static stability coefficients by the tilting table test method as well as by calculation of vehicle stability through simulation of the constant-speed circular motion.

However, to the opinion of the Russian Federation, the complete evaluation of handling and stability can be performed at the similar road conditions for all vehicle categories i.e. on the marked line simulating actually constructed roads.

Combination of mandatory bench and road testing allows performing vehicle complex evaluation at static and dynamic loading conditions.

The results of the tests performed in the past several years, included those carried out in conjunction with UTAC and Renault in regards to separate tank vehicles and tractor-trailer combinations are shown on the figures ("Lane Change", S_{lc} = 20 m, and "Tilting on a Table") as functions of tilting angle and sprung mass roll angle versus lateral stability coefficient.

As it is followed from the test results, tank vehicles partly, especially in case of tractor-trailer combinations are considered as with not significant lateral stability criterions.

The above note requires additional attention taking into account that the Draft Regulations establishes minimum tilt angle on the tilting table of 23 degrees.

The Russian Federation applies National Standard concerning lateral stability, but its consent with the ECE cannot be considered without statistical data collected from the majority of vehicles of the European manufacturers. Thus we assume that for such data collection other contracting parties should cooperate. However, it is clear that development of the Regulations for evaluation of handling and stability is quite necessary.

The informal documents transmitted by Japan confirm existence of certain interest in development of activity for collection and analysis of the information on road accident statistics, where rollover of not only tank vehicles but other construction trucks like mixers and all those intended for carriage of fluctuating goods.

The discussion held in GRRF shown that for creation of method for vehicle stability evaluation the test procedure shall be developed, which allows indicating of discrepancy of vehicle design to the safety requirements and determining actions intended for improvement of rollover stability providing necessary road traffic safety.

Taking into account the above-mentioned, we feel important to continue collection and analysis of data on traffic accident statistics involving N and O category vehicles including environment conditions, vehicle designation, design features of suspension, and percentage of loading.

Conclusively, development of the Regulations for stability evaluation shall be continued in regards to evaluation of vehicle dynamic rollover stability.

N- and O-category (Tank vehicles)

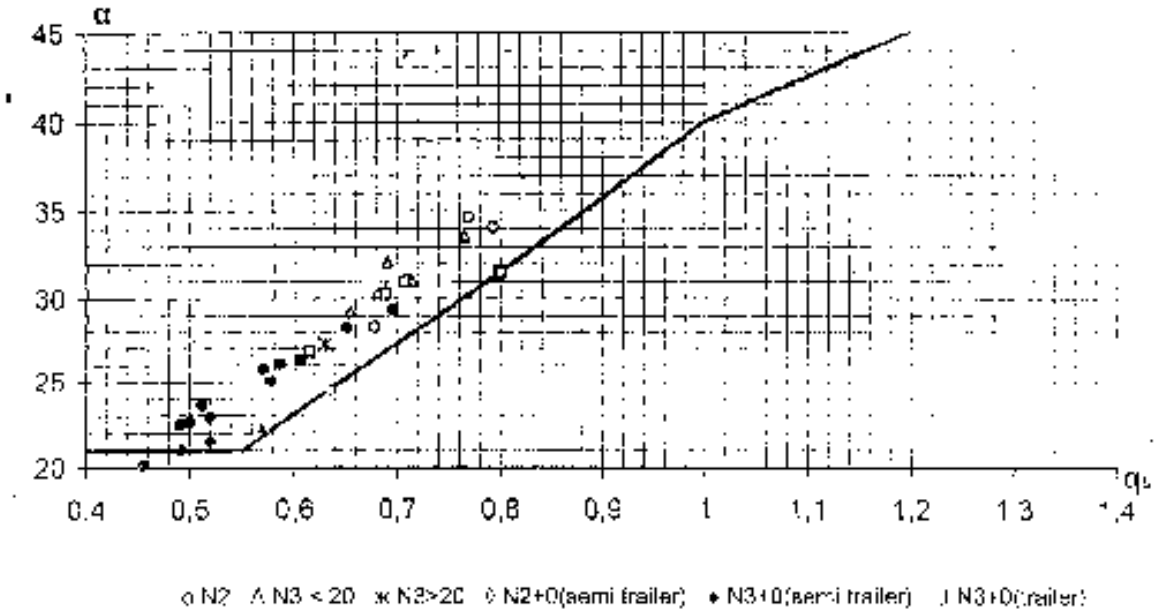

Fig. 1. Tilting table inclination angle, α (degrees) relatively to the lateral stability coefficient q_s

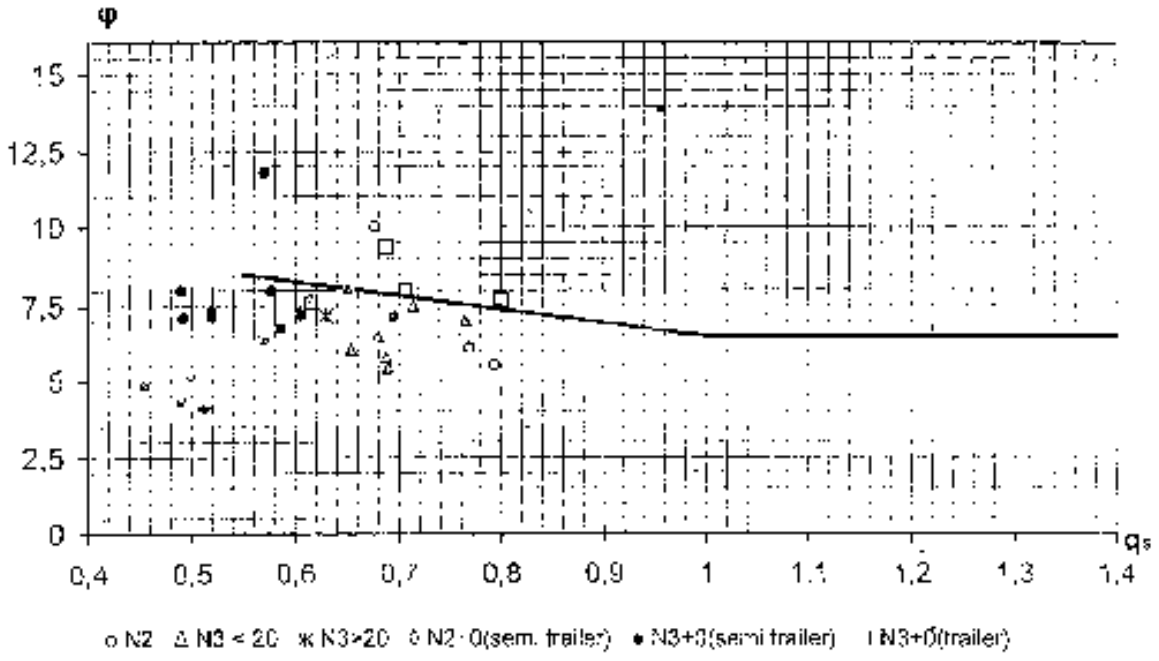

Fig. 2. Sprung mass roll angle, φ relatively to the lateral stability coefficient q_s