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MEETING OF THE GRRF WORKING GROUP ON ELECTRONIC STABILITY CONTROL

Development of the draft global technical regulation on Electronic Stability Control

Proposed amendments to draft global technical regulation on Electronic Stability Control

Submitted by the expert from Hungary

The text reproduced below was prepared by the expert from Hungary in order to amend paragraph 6.3. of the draft global technical regulation (gtr) on Electronic Stability Control (ESC) systems regarding "vehicle conditions".

The modifications to document ECE/TRANS/WP.29/GRRF/2007/14 are marked in **bold** characters or as strikethrough.

A. PROPOSAL

Paragraph 6.3., amend to read:

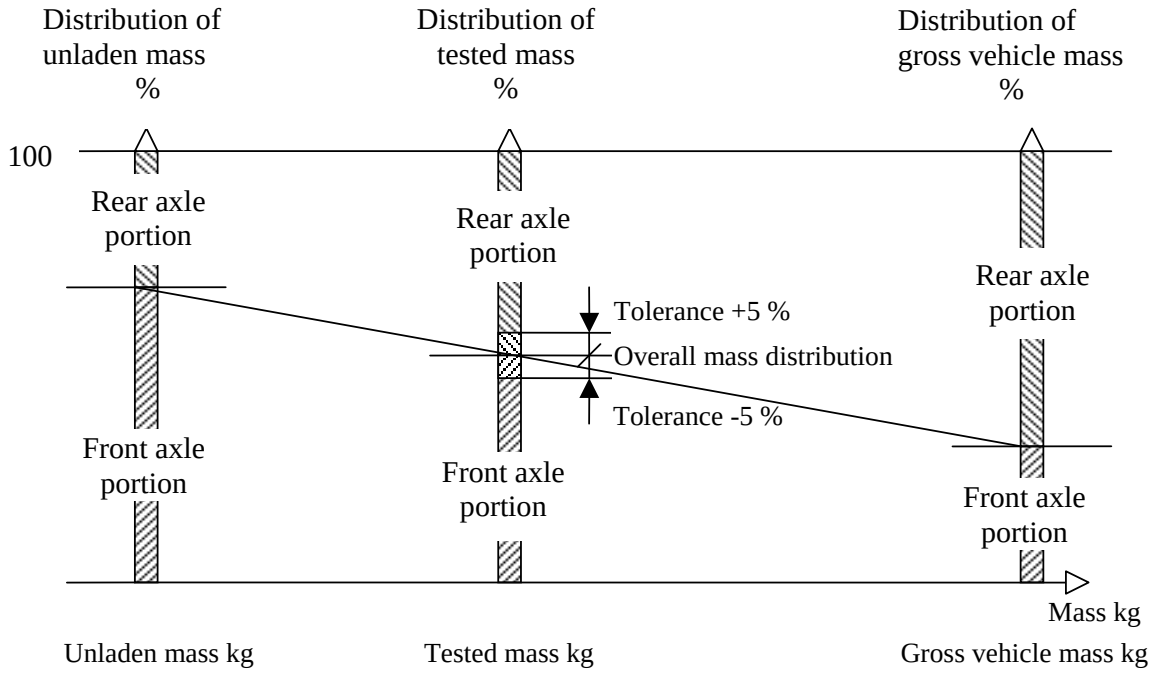
"6.3. Vehicle conditions

6.3.1. The ESC system is enabled for all testing.

6.3.2. Vehicle mass. The vehicle is loaded with the fuel tank filled to at least 75 percent of capacity, and total interior load of 168 kg comprised of the test driver, approximately 59 kg of test equipment (automated steering machine, data acquisition system and the power supply for the steering machine), and ballast as required by differences in the mass of test drivers and test equipment. Where required, ballast shall be placed on the floor behind the passenger front seat or if necessary in the front passenger foot well area. All ballast shall be secured in a way that prevents it from becoming dislodged during test conduct.

6.3.3. Outriggers. Outriggers **shall** be used for testing trucks, multipurpose passenger vehicles and buses **and may be used for testing any other vehicles**. Vehicles with a baseline mass under 2,722 kg **shall** be equipped with "standard" outriggers and vehicles with a baseline mass equal to or greater than 2,722 kg **shall** be equipped with "heavy" outriggers. A vehicle's baseline mass is the mass of the vehicle delivered from the dealer, fully fuelled, with a 73 kg driver. Standard outriggers shall be designed with a maximum mass of 32 kg and a maximum roll moment of inertia of 35.9 kg·m². Heavy outriggers shall be designed with a maximum mass of 39 kg and a maximum roll moment of inertia of 40.7 kg·m². **Application of an additional subframe close to the body of the vehicle for attaching the outrigger onto it and to distribute dynamic forces on load carrying elements of the body is allowed under the condition that the maximum mass [of the subframe is not more than the maximum mass of the outrigger] / [and maximum roll moment of inertia of the subframe is not more than [80 per cent] of those data of the outrigger].**

6.3.4. Overall mass distribution. The overall mass distribution, subject to ±[5 per cent] tolerance, of the tested mass resulting from the unladen mass, from the total interior load as in paragraph 6.3.2., from the mass of the outriggers (if any) and from the mass of the subframe (if any) as in paragraph 6.3.3. shall be set upon the following chart.



6.3.5. Tires. The vehicle is tested with the tires installed on the vehicle at time of initial vehicle sale. The tires are inflated to the vehicle manufacturer's recommended cold tire inflation pressure(s) specified on the vehicle's placard or the tire inflation pressure label. ~~Tubes may be installed to prevent tire de-beading.~~

6.3.6. Automated steering machine. A steering machine programmed to execute the required steering pattern must be used in paragraphs 7.5.2, 7.5.3, 7.6 and 7.9. The steering machine shall be capable of supplying steering torques between 40 to 60 Nm. The steering machine **shall** be able to apply these torques when operating with steering wheel velocities up to 1200 degrees per second."

B. JUSTIFICATION

In case of small passenger cars and light trucks, the actual tested mass represents a relatively high portion of the payload and may be relatively closer to the gross vehicle mass, than to those vehicles, which were subject of study when developing the Federal Motor Vehicle Safety Standard FMVSS 126.

The total interior load + maximum outrigger mass + maximum subframe mass in the lighter class may reach 232 kg, while passenger car types well around or below 400 kg load capacity exist. These vehicles have usually a shorter wheelbase as well, i.e. less than 2.4 m. Both factors contribute to a higher degree of sensitivity of the dynamic behaviour of the vehicle, when load and/or centre of gravity position are changing. Results of sensitivity analysis, proving that the

influence of mass distribution within the entire practical geometric and mass range is negligible, are not known. This fact justifies establishing uniform rules for setting the overall load distribution, when the vehicle is fitted with all the above add-ons, which are necessary to do the test.

Furthermore, for sake of safety, it is advisable to encourage test crew to use outriggers even for smaller (and often relatively high) passenger cars. The outriggers outlined in the draft text are concrete constructions of the National Highway Traffic Safety Administration (NHTSA) of the United States of America. In case of a worldwide test practice, a certain flexibility is needed to allow different constructions.

Even if the mass and roll moment inertia of the outriggers may remain as suggested, at least the attachment of the outriggers to the body should be eased in such a way, that less rigid bodies, where the main load carrying elements might not be in the vicinity of the attachment points, could also safely accommodate the outriggers without danger of mechanical damage. That is why an additional subframe, or auxiliary frame, not significantly extending from the contours of the vehicle (thus with a negligible roll moment of inertia) may be used.

Alternatively, the mass and the roll moment of inertia of the additional subframe could also be determined as a percentage of the respective data of the outriggers. This alternative version is written after a slash. The corresponding parts of the proposed additional text variants are put therefore in brackets.

The proposal does not specify how to determine the distribution of the gross vehicle mass in fully laden state. Usually, the maximum axle loads are not reached when fully laden. Rather, the maximum legal payload is distributed in a practical way (68 kg people on the seats, the rest evenly distributed in the luggage compartment), and the ratio of the resulting axle loads to the fully laden mass represents the load distribution percentage. A precise description of the realisation of this principle is found e.g. in the appendix of European Union Directive 92/21/EC. Similarly to the draft text, the variability of the height of the centre of gravity is not addressed.

Allowing the installation of tubes in tubeless tyres may have the side effect that the vehicle passes the test, although without tubes it would fail because of de-beading. Thus the assessment of the ESC may come out wrong. That is why the last sentence in paragraph 6.3.5. (new) was deleted. This is again an argument in favour of the usage of outriggers.

Throughout the whole draft text, the word "weight" should be substituted by "mass". This proposal contains this changes, but other parts of the text were not investigated in this respect.

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