



Economic and Social Council

Distr.: General
11 July 2019

Original: English

Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

Working Party on Automated/Autonomous and Connected Vehicles*

Fourth session

Geneva, 24-27 September 2019

Item 6 (a) of the provisional agenda

UN Regulation No. 79:

Automatically Commanded Steering Function

Proposal for Amendments to the 03 series of Amendments to UN Regulation No. 79 (Steering equipment)

**Submitted by the expert from the European Association for
Electromobility ****

The text reproduced below was prepared by the expert from the European Association for Electromobility (AVERE) introducing an amendment to UN Regulation No. 79. It is aimed at clarifying the text of the Regulation. The modifications to the existing text of the Regulation are marked in bold for new and strikethrough for deleted characters.

* Formerly: **Working Party on Brakes and Running Gear (GRRF)**.

** In accordance with the programme of work of the Inland Transport Committee for 2018–2019 (ECE/TRANS/274, para. 123 and ECE/TRANS/2018/21/Add.1, Cluster 3), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.



I. Proposal

Paragraph 5.6.2.1.3., amend to read (insert a new provision):

"5.6.2.1.3. The system shall be designed so that excessive intervention of steering control is suppressed to ensure the steering operability by the driver and to avoid unexpected vehicle behaviour, during its operation. To ensure this, the following requirements shall be fulfilled:

(a) The steering control effort necessary to override the directional control provided by the system shall not exceed 50 N;

(b) The specified maximum lateral acceleration $a_{y_{\max}}$ shall be within the limits as defined in the following table:

Table

1

For vehicles of Category M₁, N₁

Speed range	10 - 60 km/h	> 60 - 100 km/h	> 100 - 130 km/h	> 130 km/h
Maximum value for the specified maximum lateral acceleration	3 m/s ²	3 m/s ²	3 m/s ²	3 m/s ²
Minimum value for the specified maximum lateral acceleration	0 m/s ²	0.5 m/s ²	0.8 m/s ²	0.3 m/s ²

For vehicles of Category M₂, M₃, N₂, N₃

Speed range	10 - 30 km/h	> 30 - 60 km/h	> 60 km/h
Maximum value for the specified maximum lateral acceleration	2.5 m/s ²	2.5 m/s ²	2.5 m/s ²
Minimum value for the specified maximum lateral acceleration	0 m/s ²	0.3 m/s ²	0.5 m/s ²

(c) **Notwithstanding subpart (b), the maximum allowed lateral acceleration for vehicles of category M₁ and N₁ may be increased to the following values only if the system is able to maintain a centered position in the lane and is able to detect weather conditions (snow, rain, ice) that would adversely affect vehicle performance:**

4 m/s² at all speed categories (10-130 km/h) prior to entering the curve.

In case weather conditions would affect the vehicle's stability at the abovementioned lateral acceleration values, the maximum values in (b) apply.

Annex 8, paragraph 3.2.1.1., amend to read:

"3.2.1.1. The vehicle speed shall remain in the range from V_{\min} up to V_{\max} .

The test shall be carried out for each speed range (**the speed range determines the starting speed**) specified in paragraph 5.6.2.1.3. of this Regulation separately or within contiguous speed ranges where the $a_{y_{\max}}$ is identical.

The vehicle shall be driven without any force applied by the driver on the steering control (e.g. by removing the hands from the steering control) **with a constant speed** on a curved track with lane markings at each side. **The vehicle is allowed to change speed at any point before or during the curve to meet the maximum lateral acceleration limits specified in paragraph 5.6.2.1.3.**

The necessary lateral acceleration to follow the curve shall be between 80 and 90 per cent of the maximum lateral acceleration specified by the vehicle manufacturer $a_{y_{\text{max}}}$.

The lateral acceleration and the lateral jerk shall be recorded during the test.

Annex 8, Paragraph 3.2.2.1., amend to read:

3.2.2.1. The vehicle speed shall remain in the range from V_{min} up to V_{max} .

The test shall be carried out for each speed range (**the speed range determines the starting speed**) specified in paragraph 5.6.2.1.3. of this Regulation separately or within contiguous speed ranges where the $a_{y_{\text{max}}}$ is identical.

The vehicle shall be driven without any force applied by the driver on the steering control (e.g. by removing the hands from the steering control) **with a constant speed** on a curved track with lane markings at each side. **The vehicle is allowed to change speed at any point before or during the curve to meet the maximum lateral acceleration limits specified in paragraph 5.6.2.1.3.**

The Technical Service defines a test speed and a radius which would provoke a higher acceleration than $a_{y_{\text{max}}} + 0.3 \text{ m/s}^2$ (e.g. by travelling with a higher speed through a curve with a given radius).

The lateral acceleration and the lateral jerk shall be recorded during the test.

II. Justification

A. Paragraph 5.6.2.1.3.

1. Modern Automatically Commanded Steering Function (ACSF) of Category B1 have the capability to use sensory data to predict roads with high curvature and are able to decrease the ego speed in order to keep the vehicle in the lane. This allows for increased controllability in environments that were previously considered difficult. Modern systems such as Tesla's are comfortably able to handle curved roads at a lateral acceleration of up to 5.7 m/s^2 .
2. It is demonstrably safer to lower speeds and keep the vehicle within the lane if the system is capable to do so rather than depart the lane at higher speeds resulting in a severe risk of collision with other vehicles or road infrastructure in the adjacent lane or along the edge of the road. A vehicle type approved under the current requirements would be forced to abruptly brake, depart the lane or deactivate the system in case lateral acceleration values above 3 m/s^2 are reached.
3. Some vehicle systems that have been type-approved under previous R79 versions may be capable of traversing tighter turns. A sudden regressive change in vehicle system behaviour may have negative implications for the owner's safety and general road safety.

B. Annex 8, Paragraph 3.2.1.1.

4. In line with the change proposed for 5.6.2.1.3., we propose to amend this test in order to not artificially lock a vehicle's speed to a constant speed and to allow the vehicle to change speeds at any point in order to meet maximum lateral acceleration values.
5. We believe the GRVA 2019-09 proposal by France is equally acceptable.

C. Annex 8, Paragraph 3.2.2.1.

6. In line with the change proposed for 5.6.2.1.3., we propose to amend this test in order to not artificially lock a vehicle's speed to a constant speed and to allow the vehicle to change speeds at any point in order to meet maximum lateral acceleration values.
7. We believe the proposal ECE/TRANS/WP.29/GRVA/2019/09 (France) is equally acceptable and applicable for this paragraph.