

PROPOSAL FOR AMENDMENTS TO THE UNECE REGULATION No. 79
(STEERING EQUIPMENT)

Note: The present document was prepared in accordance with the decision of GRRF taken at its 59th session (ECE/TRANS/WP.29/GRRF/59, para. 17).

A. PROPOSAL

Note:

The added text is shown in **bold**. The deleted text is ~~crossed out~~.
To make the following amendments to the text of the Regulation:

A.1. [This proposal concerns the text in Russian language only.]

A.2. In the paragraph 5 - CONSTRUCTION PROVISIONS

5.1.1. The steering system shall ensure easy and safe handling of the vehicle, **which means fulfillment of the provisions of the present Regulation, at a vehicle motion on all speeds** up to its maximum design speed or in case of a trailer up to its technically permitted maximum speed. ~~There must be a tendency to self-centre when tested in accordance with paragraph 6.2. with the intact steering equipment.~~ The vehicle shall meet the requirements of paragraph 6.2. in the case of motor vehicles and of paragraph 6.3. in the case of trailers. If a vehicle is fitted with an auxiliary steering system, it shall also meet the requirements of Annex 4. Trailers equipped with hydraulic steering transmissions shall comply also with Annex 5.

~~5.1.2. It must be possible to travel along a straight section of road without unusual steering correction by the driver and without unusual vibration in the steering system at the maximum design speed of the vehicle.~~

5.1.32. [The text is not changed]

Note: The proposal on change of the paragraph 5.1.32 concerns the text in the Russian language only.

5.1.3. At motion on a circle of constant radius and absence of an effort on the steering wheel, a vehicle with intact steering equipment shall aspire to increase the turning radius or, at least to not reduce it.

5.1.4. The steering equipment shall be designed, constructed and fitted in such a way that it is capable of withstanding the stresses arising during normal operation of the vehicle, or combination of vehicles. **Confirming so, the manufacturer shall**

submit to the technical service the appropriate calculations and the test results.
~~The maximum steering angle shall not be limited by any part of the steering transmission unless specifically designed for this purpose.~~ Unless otherwise specified, it will be assumed that for the purpose of this Regulation, not more than one failure can occur in the steering equipment at any one time and two axles on one bogie shall be considered as one axle.

5.1.5. The maximum steering angle shall not be limited by any part of the steering transmission unless specifically designed for this purpose.

5.1.56. [The text is not changed]

5.1.67. Advanced driver assistance steering systems shall only be approved in accordance with this Regulation where the function does not cause any deterioration in the performance of the basic steering system **and do not interfere with the driver in realization of his control inputs.** In addition they shall be designed such that the driver may, at any time and by deliberate action, override the function.

5.1.67.1. [The text is not changed]

Note: The proposal on change of the paragraph 5.1.67.1 concerns the text in the Russian language only.

Paragraphs 5.1.7. to 5.1.10. (former), renumber as paragraphs 5.1.8. to 5.1.11. respectively.

A.3. In the paragraph 6 - TEST PROVISIONS

6.1.1. The tests shall be conducted on a level surface affording ~~good~~ the adhesion **coefficient not lower than 0.6.**

6.1.2-6.1.4. [The text is not changed]

6.2. Provisions for motor vehicles

6.2.1. Determination of the average angular speed of adjusting turns of a steering wheel at a vehicle motion on a straight line.

6.2.1.1. The vehicle is driven within the corridor of length not less than 400 m, marked by elastic restrictive elements, with constant speed:

Category M₁ and N₁ vehicles - 80 km/h;

Category M₂ and M₃ vehicles - 70 km/h;

Category N₂ and N₃ vehicles, and tractor-trailer combinations with tractors of all categories - 60 km/h or the maximum design speed if this is below the speeds given above.

The width of the corridor depends on the maximum vehicle width measured at a height from 0 up to 150 mm from the road surface and is determined according to the table below:

Maximum vehicle width in m	Up to 1.3	More than 1.3 up to 1.5	More than 1.5 up to 1.7	More than 1.7 up to 1.9	More than 1.9 up to 2.1	More than 2.1 up to 2.3	More than 2.3 up to 2.5	More than 2.5
Corridor width in m	1.7	1.9	2.1	2.3	2.5	2.7	2.9	Maximum vehicle width + 0.5 m

During presence of the vehicle within the marked corridor a test site, the steering wheel angle and the time of passage through the corridor are measured and registered.

Not less than 10 test runs shall be performed.

- 6.2.1.2. The average angular speed of adjusting turns of the steering wheel at motion through the marked corridor of restricted width is determined as the relation of the sum of the steering wheel angles to the total time of the all test runs.

This speed shall not exceed the values specified in the table below:

Vehicle Category	The values of the average angular speed, degrees per second, not more than
M ₁ , N ₁	7
M ₂ , M ₃ , N ₂ , N ₃	14

- 6.2.2. Determination of capability of self-return of steered wheels and a steering wheel to the neutral position corresponding to the straight motion of a vehicle.

- 6.2.2.1. ~~It must be possible to leave~~ The vehicle moves on a circle with a radius of 50 m at a ~~tangent without unusual vibration in the steering equipment~~ at the following speed:

Category M₁ vehicles: 50 km/h

Category M₂, M₃, N₁, N₂ and N₃ vehicles: 40 km/h or the maximum design speed if this is below the speeds given above.

The steering wheel is released from applied effort, and the vehicle leaves from the circular trajectory.

The vehicle speed is kept constant till the termination of rotation of the steering wheel released from the effort, but no more than 6 seconds, then the test run is considered completed.

After expiration of 6 seconds the angle of the steering wheel remained to return it to the neutral position corresponding to the straight motion of a vehicle is measured.

Not less than three test runs to each side of vehicle motion shall be performed.

- 6.2.2.2. When the test runs in accordance with the paragraph 6.2.2.1 are performed: ~~vehicle is driven in a circle with its steered wheels at approximately half lock and a constant speed of at least 10 km/h, the turning circle must remain the same or become larger if the steering control is released.~~

- 6.2.2.2.1. The turning circle shall ~~remain the same or~~ become larger if the steering control is released;

- 6.2.2.2.2. The return of the steering wheel to the neutral position corresponding to the straight motion of a vehicle shall be without oscillations. One transition of the

steering wheel through the neutral position corresponding to the straight motion of a vehicle is allowed.

6.2.2.2.3. The maximum value of the angle of the steering wheel remained to return it to the neutral position corresponding to the straight motion of a vehicle shall not exceed 30% of the value of the steering wheel angle at the time of a vehicle motion on a circle of 50-meter radius according to the paragraph 6.2.2.1.

~~6.2.3.~~ During the measurement of control effort, forces with a duration of less than 0.2 seconds shall not be taken into account.

~~6.2.43.~~ The measurement of steering efforts on motor vehicles ~~with intact steering equipment~~.

~~6.2.43.1.~~ The vehicle **with intact steering equipment** shall be driven from straight ahead into a spiral at a speed of 10 km/h. The steering wheel control effort shall be measured at the nominal radius of the steering control until the position of the steering control corresponds to turning radius given in the table below for the particular category of vehicle with intact steering. One steering movement shall be made to the right and one to the left.

~~6.2.4.2.~~ The maximum permitted steering time and the maximum permitted steering control effort with intact steering equipment are given in the table below for each category of vehicle.

~~6.2.5.~~ The measurement of steering efforts on motor vehicles with a failure in the steering equipment.

~~6.2.5.13.2.~~ The test described in paragraph 6.2.43.1. shall be repeated with a failure in the steering equipment. The steering effort shall be measured until the position of the steering control corresponds to the turning radius given in the table below for the particular category of vehicle with a failure in the steering equipment.

6.2.3.3. [Former paragraph 6.2.3.] **During the measurement of control effort, forces with a duration of less than 0.2 seconds shall not be taken into account.**

~~6.2.5.23.4.~~ The maximum permitted steering time and the maximum permitted steering control effort **with intact steering equipment and** with a failure in the steering equipment are given in the table below for each category of vehicle.

[The table is not changed]

6.3. Provisions for trailers

6.3.1. The trailer **in combination with the towing vehicle** must travel **in accordance with the conditions of the paragraph 6.2.1.1.** ~~without excessive deviation or unusual vibration in its steering equipment when the towing vehicle is travelling in a straight line on a flat and horizontal road at a speed of 80 km/h or the technically permissible maximum speed indicated by the trailer manufacturer if this is less than 80 km/h. In~~

such case the tractor-trailer combination shall satisfy the provisions specified in the table to the paragraph 6.2.1.2.

6.3.2-6.3.5. [The text is not changed]

A.4. **Add new paragraph 12. – TRANSITIONAL PROVISIONS**

- 12.1. **As from the official date of entry into force of the [02] series of amendments, no Contracting Party applying this Regulation shall refuse to grant approval under this Regulation as amended by the [02] series of amendments.**
- 12.2. **As from [18] months after the date of entry into force, Contracting Parties applying this Regulation shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the [02] series of amendments.**
- 12.3. **Starting [36] months after the entry into force of the [02] series of amendments to this Regulation, Contracting Parties applying this Regulation may refuse national or regional type approval and may refuse first national or regional registration (first entry into service) of a vehicle, which does not meet the requirements of the [02] series of amendments to this Regulation.**
- 12.4. **Notwithstanding the transitional provisions above, Contracting Parties whose application of this Regulation comes into force after the date of entry into force of the most recent series of amendments are not obliged to accept approvals, which were granted in accordance with any of the preceding series of amendments to this Regulation.**

A.5. **Annex 4 - ADDITIONAL PROVISIONS FOR VEHICLES EQUIPPED WITH ASE**

- 2.2.1. Malfunction or failure of any part of the ASE (except for parts not considered to be susceptible to breakdown as specified in paragraph 5.3.1.1. of this Regulation) shall not result in a sudden significant change in vehicle behaviour **not meeting driver's expectations; shall not interfere with the driver in realization of control inputs;** and the relevant requirements of paragraph 6. of this Regulation shall still be met. Furthermore, it must be possible to control the vehicle without abnormal steering correction. This shall be verified by the following tests:
- 2.2.1.2.1. Until uniform test procedures have been agreed, the vehicle manufacturer shall provide the technical services with their test procedures and results for transient behaviour of the vehicle in the case of failure. **On the basis of the specified information the technical service should have an opportunity to make sure, that for any possible conditions of vehicle motion and driver's control inputs corresponding to the real conditions of vehicle operation, the provisions of the paragraph 2.2.1. of the present Annex are met. If the technical service will consider the submitted information insufficient, the technical service shall agree with the manufacturer the volume of additional tests, which results would**

allow to make a conclusion about conformity of a vehicle to the provisions of the paragraph 2.2.1 of the present Annex.

2.2.1.2.2. In addition the manufacturer in agreement with the technical service, can submit the results of computer simulation of a vehicle behaviour with the following conditions:

2.2.1.2.2.1. The simulation method takes into account the major factors determining a vehicle behaviour according to the control inputs as of the driver, and auxiliary steering equipment;

2.2.1.2.2.2. The reliability of simulation results is confirmed by test results of a vehicle sample.

A.6. Annex 6 – SPECIAL REQUIREMENTS TO BE APPLIED TO THE SAFETY ASPECTS OF COMPLEX ELECTRONIC VEHICLE CONTROL SYSTEMS

4.1.3. The technical service should have an opportunity to make sure, that for any possible conditions of vehicle motion and driver's control inputs corresponding to the real conditions of vehicle operation, the functionalities of the "system" meet those specified in the documents stipulated in the paragraph 3 of the present Annex. For such purpose the technical service taking into account the tests recently performed by the manufacturer, in agreement with him, shall determine the volume of necessary checks and tests. In addition to the tests the manufacturer in agreement with the technical service, can submit the results of computer simulation of a vehicle behaviour with the following conditions:

4.1.3.1. The simulation method takes into account the major factors determining a vehicle behaviour according to the control inputs as of the driver, and the complex electronic vehicle control systems;

4.1.3.2. The reliability of simulation results is confirmed by test results of a vehicle sample.

B. JUSTIFICATION

B.1. The proposal is made with the purpose of specification of the terms used in the text of the Regulation in Russian language.

B.2-B.3. Being guided by the common position of GRRF (ECE/TRANS/WP.29/GRRF/59, para. 17) about necessity to avoid inclusion in the ECE Regulations the requirements to tests on the basis of subjective estimations, and considering necessity of addition of the results of interpretation of instrumented measurements to the subjective approach to evaluation of the vehicle steering equipment, the Russian Federation proposes to increase objectivity of the results of the tests performed on the straight line and when the steering control is released, which are used in the Regulation No. 79. For this

purpose it is proposed to use the test methods applied by the Russian Federation and included into the national standard GOST R 52302-2004.

Besides that, the proposal of the Russian Federation improves the logic of provisions concerned measurement of steering effort.

B.4. The proposed changes of the technical provisions, in case of their adoption, would entail introduction of a new series of amendments to the Regulation No. 79. The transitional provisions are proposed according to the guidelines adopted by WP.29 (TRANS/WP.29/1044).

B.5-B.6. More and more wide application of auxiliary electronic systems of steering equipment causes urgency of the concern of compatibility of operation of various auxiliary systems and vehicle regular steering system directly controlled by a driver. The vehicle manufacturer should be sure, that he has found a solution for this concern. From the standpoint of the technical service it is necessary to ensure and be assured that in no case the operation of electronic systems may lead to deterioration of vehicle road behavior.

The experts from Russian Federation consider that for the time being there are not enough technical provisions for evaluation of safety of vehicles equipped with such systems. It is necessary to have the evidence that the failure of such systems essentially would not worsen performance of steering, and the characteristics of vehicle handling under all possible driving conditions.

Unfortunately, the available by the present time data are not enough for preparation of the particular proposals on test methods and technical provisions. Until the methods for evaluation of performance of such systems will be agreed, it is proposed to include into the Regulation the provision that the technical service should have an opportunity to make sure that, for any possible conditions of vehicle motion and the driver's control inputs actual for real conditions of vehicle operation, efficiency of steering control and vehicle handling will not worsen essentially. For this purpose the technical service should agree with the manufacturer the number of necessary checks and tests. In addition to tests the manufacturer can agree with the technical service submitting the results of computer simulation of vehicle behavior.
