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### Economic Commission for Europe

#### Inland Transport Committee

#### World Forum for Harmonization of Vehicle Regulations

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Item 4.9.9 of the provisional agenda

**1958 Agreement – Consideration of draft amendments  
to existing Regulations submitted by GRRF**

### **Proposal for Supplement 5 to the 01 series of amendments to Regulation No. 79 (Steering equipment)**

#### **Submitted by the Working Party on Brakes and Running Gear\***

The text reproduced below was adopted by the Working Party on Brakes and Running Gear (GRRF) at its eightieth session (ECE/TRANS/WP.29/GRRF/80, para. 51) and at its eighty-first session (ECE/TRANS/WP.29/GRRF/81, para 48). It is based on ECE/TRANS/WP.29/GRSG/2015/12 and ECE/TRANS/WP.29/GRRF/2013/13 as amended by para. 9 of the corresponding report as well as ECE/TRANS/WP.29/GRRF/2016/20 as amended by Annex V of the corresponding session report. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee AC.1 for consideration at their June 2016 sessions.

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\* In accordance with the programme of work of the Inland Transport Committee for 2016–2017 (ECE/TRANS/254, para. 159 and ECE/TRANS/2016/28/Add.1, cluster 3.1), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

## Supplement 5 to the 01 series of amendments to Regulation No. 79 (Steering equipment)

*Table of Contents, add a new Annex 7, to read:*

"7 Special provisions for the powering of trailer steering systems from the towing vehicle....."

*Introduction, amend to read:*

### "Introduction

The intention of the Regulation ..... have been defined as "Autonomous Steering Systems".

This Regulation also prevents the approval of positive steering of trailers by means of electrical control from the towing vehicle as there are currently no standards applicable to this application. It is expected that at some time in the future, ISO 11992 will be amended to include messages associated with the transmission of steering control.

*Paragraph 1.2.3., to be deleted.*

*Paragraph 1.2.4., to be deleted.*

*Paragraph 2.4.6., amend to read:*

"2.4.6. "Turning circle" means the circle within which are located the projections onto the ground plane of all the points of the vehicle, excluding the external devices for indirect vision and the front direction indicators, when the vehicle is driven in a circle;"

*Paragraph 2.5.2.2., amend to read:*

"2.5.2.2. "Articulated steering" means equipment in which the steering forces are produced by a change in direction of the towing vehicle and in which the movement of the steered trailer wheels is linked to the relative angle between the longitudinal axis of the towing vehicle and that of the trailer;"

*Add a new paragraph 2.5.2.5., to read:*

"2.5.2.5. "Full-power steering equipment" means equipment in which the steering forces are provided solely by one or more energy supplies;"

*Paragraph 5.1.3., amend to read:*

"5.1.3. The direction of operation of the steering control shall correspond to the intended change of direction of the vehicle and there shall be a continuous relationship between the steering control deflection and the steering angle. These requirements do not apply to systems that incorporate an automatically commanded or corrective steering function, or to auxiliary steering equipment.

These requirements may also not necessarily apply in the case of full power steering when the vehicle is stationary, during low speed manoeuvres at speeds up to a maximum speed of 15km/h and when the system is not energised."

*Paragraph 5.1.5. amend to read:*

"5.1.5. The effectiveness of the steering equipment, including the electrical control lines, shall not be adversely affected by magnetic or electric fields. This shall

be demonstrated by fulfilling the technical requirements and respecting the transitional provisions of Regulation No. 10 by applying:

- (a) The 03 series of amendments for vehicles without a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries);
- (b) The 04 series of amendments for vehicles with a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries)."

*Add a new paragraph 5.1.7., to read:*

"5.1.7. Towing vehicles equipped with a connection to supply electrical energy to the steering system of the trailer and trailers that utilise electrical energy from the towing vehicle to power the trailer steering system shall fulfil the relevant requirements of Annex 7."

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

*Insert a new paragraph 5.3.1.6., to read:*

- "5.3.1.6. The requirements for the braking performance in paragraphs 5.3.1.4. and 5.3.1.5. above shall not apply if the braking system is such that in the absence of any energy reserve it is possible with the service brake control to achieve the safety requirement for the secondary braking system mentioned in:
- (a) Paragraph 2.2. of Regulation No. 13-H, Annex 3 (for M<sub>1</sub>-, N<sub>1</sub>-vehicles);
  - (b) Paragraph 2.2. of Regulation No. 13, Annex 4 (for M<sub>2</sub>-, M<sub>3</sub>-, N-vehicles)."

*Paragraph 5.3.1.6. (former), renumber as 5.3.1.7.*

*Annex 1,*

*Add a new item 7., to read:*

- "7. Applicable only to towing vehicles
- 7.1. The towing vehicle is / is not<sup>2</sup> equipped with an electrical connector fulfilling the relevant requirements of Annex 7
- 7.2. The maximum current available is.....A<sup>3</sup>"

*Add a new item 8. with a new footnote 3, to read:*

- "8. Applicable only to trailers
- 8.1. The steering system of the trailer fulfils the relevant provisions of Annex 7 to UN Regulation No. 79 ..... Yes/No<sup>2</sup>
- 8.2. The maximum current required for the trailer steering system is A<sup>3</sup>
- 8.3. The trailer steering system is/is not<sup>2</sup> able to supply auxiliary equipment on the trailer with electrical energy.

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<sup>3</sup> As defined by the vehicle manufacturer – see paragraphs 2.3. and 3.1. of Annex 7 as appropriate."

*Items 7. to 16. (former), renumber as items 9. to 18.*

*Annex 5,*

*Paragraph 2.1.1., amend to read:*

"2.1.1. The hydraulic lines of hydraulic transmission shall be capable of a burst pressure at least four times the maximum normal service pressure (T) specified by the vehicle manufacturer. Hose assemblies shall comply with ISO Standards 1402:1994, 6605:1986 and 7751:1991."

*Paragraph 2.3.1., amend to read:*

"2.3.1. The steering transmission shall be protected from excess pressure by a pressure limiting valve which operates at between 1.1 T and 2.2 T. The operating pressure of the pressure limiting valve shall be of a value that is compatible with the operating characteristics of the steering system installed on the vehicle. This shall be confirmed by the vehicle manufacturer at the time of type approval."

*Add a new Annex 7, to read:*

## **"Annex 7**

### **Special provisions for the powering of trailer steering systems from the towing vehicle**

#### 1. General

The requirements of this Annex shall apply to towing vehicles and trailers where electrical energy is supplied from the towing vehicle to facilitate operation of the steering system installed on the trailer.

#### 2. Requirements for towing vehicles

##### 2.1. Energy Supply

2.1.1. The vehicle manufacturer shall define the capacity of the energy source that will enable the current defined in paragraph 2.3. below to be available for the trailer during normal operation of the vehicle.

2.1.2. The driver's manual shall include information to advise the driver on the electrical energy available for the trailer steering system and that the electrical interface shall not be connected when the current requirement marked on the trailer exceeds that which can be supplied by the towing vehicle.

2.1.3. The power supply provided by the connector referenced in paragraph 2.5. below shall be used for the powering of the trailer steering system. However, in all cases the provisions of paragraph 3.3 below shall apply.

2.2. The nominal operating voltage is 24V.

2.3. The maximum current supply available at the connector referenced in paragraph 2.5.2. below shall be defined by the towing vehicle manufacturer.

##### 2.4. Protection of the electrical system

2.4.1. The electrical system of the towing vehicle shall be protected from an overload or short circuit in the supply to the trailer steering system.

##### 2.5. Wiring and Connectors

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- 2.5.1. The cables used to supply the trailer electrical energy shall have a conductor cross-sectional area compatible with the continuous current defined in paragraph 2.3. above.
- 2.5.2. Until a uniform standard has been defined the connector used to connect to the trailer shall fulfil the following:
- (a) The pins shall have a current carrying capacity compatible with the maximum continuous current defined in paragraph 2.3. above;
  - (b) Until uniform standards have been agreed the environmental protection of the connector shall be appropriate to the application and included in the Annex 6 assessment; and
  - (c) The connector shall not be interchangeable with an existing electrical connector currently used on the towing vehicle i.e. ISO 7638, ISO 12098, etc.
- 2.6. Marking
- 2.6.1. The towing vehicle shall be marked to indicate the maximum current available for the trailer as defined in paragraph 2.3. above.
- The marking shall be indelible and positioned so that it is visible when connecting the electrical interface referenced in paragraph 2.5.2. above.
3. Requirements for trailers
- 3.1. The maximum current requirement of the trailer steering system shall be defined by the vehicle manufacturer.
- 3.2. The nominal operating voltage is 24V.
- 3.3. The electrical energy available from the towing vehicle shall only be used as follows:
- (a) Exclusively for use by the trailer steering system;
- or
- (b) For the trailer steering system and to power auxiliary systems on the trailer provided the steering system has priority and is protected from an overload external to the steering system. This protection shall be a function of the trailer steering system.
- 3.4. Wiring and Connectors
- 3.4.1. The cables used to supply the trailer steering system with electrical energy shall have a conductor cross sectional area compatible with the energy requirements of the steering system installed on the trailer.
- 3.4.2. Until a uniform standard has been defined the connector used to connect to the trailer shall fulfil the following:
- (a) The pins shall have a current carrying capacity compatible with the maximum current defined by the vehicle manufacturer in paragraph 3.1. above;
  - (b) Until uniform standards have been agreed the environmental protection of the connector shall be appropriate to the application and included in the Annex 6 assessment;
  - (c) The connector shall not be interchangeable with an existing electrical

connector currently used on the towing vehicle, i.e. ISO 7638, ISO 12098, etc.

- 3.5. Failure warning:  
Failures within the electric control transmission of the steering system shall be directly displayed to the driver.
- 3.6. Demonstration of the operation of the steering system
- 3.6.1. At the time of type approval the trailer manufacturer shall demonstrate to the Technical Service the functionality of the steering system by fulfilling the relevant performance requirements specified within the Regulation.
- 3.6.2. Failure Conditions:
- 3.6.2.1. Under steady state conditions:  
In the event of the trailer being coupled to a towing vehicle that does not have an electrical supply for the trailer steering system, or there is a break in the electrical supply to the trailer steering system or there is a failure in the electric control transmission of the trailer steering control system it shall be demonstrated that the trailer fulfils all relevant requirements of paragraph 6.3. of the Regulation for the intact system.
- 3.6.2.2. Under transient conditions  
The transient behaviour of the vehicle in the case of failure within the electric control transmission of the steering system shall be evaluated to ensure vehicle stability is maintained during the transition following the failure and shall be assessed by fulfilling the following:
- (a) By applying the test procedure and requirements defined within paragraph 6.3.1. of the Regulation. \*
  - (b) By applying the test procedure and requirements defined within paragraph 6.3.3. of the Regulation. \*
- 3.6.3. If the trailer steering system utilises hydraulic transmission to operate the steering, the requirements of Annex 5 shall apply.
- 3.7. Marking
- 3.8.1. Trailers equipped with a connector for the supply of electrical energy to the trailer steering system shall be marked to include the following information:
- (a) The maximum current requirement for the trailer steering system as defined in paragraph 3.1. above.
  - (b) The functionality of the trailer steering system including the impact on manoeuvrability when the connector is connected and disconnected.
- The marking shall be in indelible form and positioned so that it is visible when connecting to the electrical interface referenced in paragraph 3.3.2. above."

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\* The technical service may accepted the test results supplied by the trailer manufacturer to demonstrate compliance with the transient tests.