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Item 9(a) of the provisional agenda

Steering equipment – Regulation No. 79**Proposal for an amendment to Regulation No. 79 (Steering equipment)****Submitted by the experts from the International Association of the Body and Trailer Building Industry***

The text reproduced below was prepared by the International Association of the Body and Trailer Building Industry (CLCCR) introducing into UN Regulation No. 79 an amendment removing design restrictions and allowing the vehicle manufacturer to use new technologies that would have previously been prohibited. It supersedes ECE/TRANS/WP.29/GRRF/2013/25, ECE/TRANS/WP.29/GRRF/2014/8, ECE/TRANS/WP.29/GRRF/2015/8 and Informal document GRRF/79/21. The modifications to the existing text of the Regulation are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2014–2018 (ECE/TRANS/240, para. 105 and ECE/TRANS/2014/26, programme activity 02.4), 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.



I. Proposal

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 using energy supply and** electrical control from the towing vehicle as there are **currently not any no** standards applicable to **this application energy supply connectors or to control transmission digital information interchange**. It is expected that at some time in the future the ~~International Standards Organization (ISO) Standard~~, ISO 11992 will be amended to ~~take account of~~ **include messages associated with the** transmission of steering control data."

Paragraph 1.2.3., to be deleted.

Paragraph 1.2.4., to be deleted.

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 ~~firmly~~ 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."

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.

Annex 1,

Add a new item 7., to read:

- "7. **Applicable only to towing vehicles**
- 7.1. **The towing vehicle is/is not² equipped with an electrical connector fulfilling the relevant requirements of Annex 7**
- 7.2. **The maximum current available is.....A³"**
- 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/No²"**
- 8.2. **The maximum current required for the trailer steering system is A³ _**
- 8.3. **The trailer steering system is/is - not² able to supply auxiliary equipment on the trailer with electrical energy.**

³ **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 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.

In the case of steering systems fulfilling the requirements of Annex 7, the hydraulic lines of hydraulic transmission shall be capable of a burst pressure [X] times the maximum normal operating pressure (T) specified by the vehicle manufacturer.

Paragraph 2.3.1., amend to read:

- "2.3.1. The steering transmission ~~must~~ **shall** be protected from excess pressure by a pressure limiting valve which operates at between ~~1.5~~ **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

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 ~~or indirectly~~ displayed to the driver as required ~~by paragraph 5.4.1.1. of the Regulation. The means of providing driver warning shall be defined by the vehicle manufacturer as required by paragraph 3.4.3. of Annex 6.~~

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 and its Annexes.

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 vehicle manufacturer shall provide the technical services with their test procedures and results for~~ 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."

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

II. Justification

1. At the seventy-fourth session of GRRF, CLCCR presented GRRF-74-37, which did not propose any amendments to Regulation No. 79 but sought to bring to the attention of GRRF that, currently, a design restriction is applied which prevents trailers from utilising any form of energy from the towing vehicle. Following discussion, a number of

delegates indicated their support for an amendment to UN Regulation No. 79 by removing this restriction.

2. At the seventy-fifth GRRF session, CLCCR presented ECE/TRANS/WP.29/GRRF/2013/25. Comments were received from the experts from Japan and the Netherlands. Additionally the expert from International Organisation of Vehicles Manufacturers (OICA) tabled GRRF-75-11.

3. This document contains amendments which take account of the comments made by several experts, including those from OICA as follows:

- (a) Remove the reference to "IP54" but require the connector to have an environmental protection appropriate to the application and that the specification of the connector should be included in the Annex 6 assessment.
- (b) It is considered that, at this juncture, when the trailer power steering systems are very much in their infancy it would, by specifying a maximum current, introduce another design restriction which should be avoided. However to ensure safe operation of the trailer improved failure modes have been defined and more information has been made available to ensure that the driver is suitably informed on any limitations placed on the operation of trailer steering system.
- (c) Discussions have been ongoing with the experts from OICA on the majority of their concerns addressed either in ECE/TRANS/WP.29/GRRF/2013/25 or this document.

4. At the seventy-eighth session of GRRF, document ECE/TRANS/WP.29/GRRF/2014/8 was presented. However, it was pointed out that there were a number of issues still needed to be clarified on the requirements in the event of electrical failure or non-connection of the power supply. These issues have now been addressed by requiring that, in the event of such a failure or non-connection, the requirements defined in paragraph 6.3. of the Regulation applying to a trailer when no fault is present. This is considered appropriate for such a trailer operating behind a towing vehicle that is not equipped with the requisite power supply for the trailer steering system until uniform provisions have been defined for a connector and that connector is in general use.

5. Additionally comments were received from both European Association of Automotive Suppliers (CLEPA) and OICA on the use of the electrical energy supplied by the towing vehicle. Their concerns have been addressed in paragraphs 2.1.3. and 3.3. to Annex 7 where the latter defines conditions for the use of electrical energy. This follows the principles used in UN Regulation No. 13 on the electrical energy available from the ISO 7638 connector.

6. At the seventy ninth session of GRRF, document ECE/TRANS/WP.29/GRRF/2015/8 was presented. Delegates from Denmark and Germany commented on the content of a number of paragraphs however their concerns were resolved during discussion. However, the delegate from Japan raised the issue of the trailer mounted warning signal conforming with requirements prescribed in Regulation No. 48. It was agreed that the UN Secretariat would raise the subject at the April session of GRE (see informal document GRE-73-09).

7. As no formal agreement was reached with respect to the application of Regulation No. 48 with respect to a trailer mounted warning signal the above proposal removes reference to the requirement for a trailer mounted warning signal. However the existing provisions with respect to failure warning still apply.