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Item 4.7.1 of the provisional agenda

**1958 Agreement – Consideration of draft amendments
to existing Regulations submitted by GRRF****Proposal for Supplement 11 to the 11 series of amendments
to Regulation No. 13 (Heavy vehicle braking)****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 seventy-fifth session (ECE/TRANS/WP.29/GRRF/75, paras. 8 and 9). It is based on ECE/TRANS/WP.29/GRRF/2013/12 as amended by Annex II to the report, and ECE/TRANS/WP.29/GRRF/2013/13 not amended. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee AC.1 for consideration.

* In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, 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.

GE.13-26742



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Table of content, insert a reference to Annex 22., to read:

"22. Requirements for the brake electric/electronic interface of an automated connector"

Text of the Regulation, insert new paragraphs 2.39. and 2.40., to read:

"2.39. "Brake electric/electronic interface" means the part of a separable electrical/electronic connection between the towing vehicle and the towed vehicle which is dedicated to the braking system.

2.40. "Automated Connector" means a system through which the electric and pneumatic connection, between the towing vehicle and towed vehicle is made automatically without direct intervention of a human operator."

Paragraph 5.1.1.4., amend to read:

"5.1.1.4. The effectiveness of the braking systems, including the electric control line, shall not be adversely affected by magnetic or electrical 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 Energy Storage System (traction batteries).
- (b) The 04 series of amendments for vehicles with a coupling system for charging the Rechargeable Energy Storage System (traction batteries)."

Paragraph 5.1.3.6., amend to read:

"5.1.3.6. (a) The electric control line shall conform to ISO 11992-1 and 11992-2:2003 including its amendment 1:2007 and be a point-to-point type using:

- (i) The seven pin connector according to ISO 7638-1 or 7638-2:2003 or,
- (ii) In the case of systems where the connection of the electric control line is automated, the automated connector shall ,as a minimum, provide the same number of pins as the above-mentioned ISO 7638 connector and meet the requirements specified in Annex 22 of this Regulation.

(b) The data contacts of the ISO 7638 connector shall be used to transfer information exclusively for braking (including ABS) and running gear (steering, tyres and suspension) functions as specified in ISO 11992-2:2003 including its Amd.1:2007. The braking functions have priority and shall be maintained in the normal and failed modes. The transmission of running gear information shall not delay braking functions.

(c) The power supply, provided by the ISO 7638 connector, shall be used exclusively for braking and running gear functions and that required for the transfer of trailer related information not transmitted via the electric control line. However, in all cases the provisions of Paragraph 5.2.2.18. of this Regulation shall apply. The power supply for all other functions shall use other measures."

Paragraph 5.1.3.8., amend to read:

"5.1.3.8. Shut-off devices which are not automatically actuated shall not be permitted."

Add new paragraph 5.1.3.9., to read:

"5.1.3.9. In the case of tractor and semi-trailer combinations, the flexible hoses and cables shall be a part of the power-driven vehicle. In all other cases, the flexible hoses and cables shall be a part of the trailer.

In the case of an automated connector, this requirement regarding the allocation of flexible hoses and cables is not applicable."

Paragraph 5.2.1.23., amend to read (Footnote 7 remain unchanged):

"5.2.1.23. Power driven vehicles authorized to tow a trailer equipped with an anti-lock system shall also be equipped with either one or both of the following, for the electric control transmission:

- (a) A special electrical connector conforming to ISO 7638:2003⁷;
- (b) An automated connector meeting the requirements specified in Annex 22."

Paragraph 5.2.2.17., amend to read (Footnotes 15 and 16 remain unchanged, a new footnote is added):*

"5.2.2.17. Trailers equipped with an electric control line and O₃ and O₄ category trailers equipped with an anti-lock system, shall be fitted with either one or both of the following, for the electric control transmission:

- (a) A special electrical connector for the braking system and/or anti-lock system, conforming to ISO 7638:2003^{15, 16};
- (b) An automated connector meeting the requirements specified in Annex 22.

Failure warning signals required from the trailer by this Regulation shall be activated via the above connectors. The requirement to be applied to trailers with respect to the transmission of failure warning signals shall be those, as appropriate, which are prescribed for motor vehicles in paragraphs 5.2.1.29.4., 5.2.1.29.5. and 5.2.1.29.6.

Trailers equipped with an ISO 7638:2003 connector as defined above shall be marked in indelible form to indicate the functionality of the braking system when the ISO 7638:2003 connector is connected and disconnected*.

The marking is to be positioned so that it is visible when connecting the pneumatic and electrical interface connections.

* In the case of a trailer equipped with both an ISO 7638 connector and automated connector, the marking shall show that the ISO 7638 connector should not be connected when an automated connector is in use"

Annex 2,

Insert new paragraphs 14.5., 14.15.1 and 14.15.2., to read:

"14.15. The vehicle is equipped with an automated connector: yes/no²

14.15.1. If yes, does the automated connector fulfil the requirements of Annex 22: yes/no²

14.15.2. The automated connector is of category A/B/C/D²

² Strike out what does not apply."

Annex 6, paragraph 2.5., amend to read:

"2.5. In the case of power-driven vehicles having a pneumatic control line for trailers, in addition to the requirements of paragraph 1.1. of this Annex, the response time shall be measured at the extremity of a pipe 2.5 m long with an internal diameter of 13 mm which shall be joined to the coupling head of the control line of the service braking system. During this test, a volume of $385 \pm 5 \text{ cm}^3$ (which is deemed to be equivalent to the volume of a pipe 2.5 m long with an internal diameter of 13 mm and under a pressure of 650 kPa) shall be connected to the coupling head of the supply line.

Tractors for semi-trailers shall be equipped with flexible pipes for making the connection to semi-trailers. The coupling heads will, therefore, be at the extremity of those flexible pipes. The length and internal diameter of the pipes shall be entered at item 14.7.3. of the form conforming to the model in Annex 2 to this Regulation.

In the case of an automated connector the measurement including the use of a 2.5m pipe and $385 \pm 5 \text{ cm}^3$ of volume as described above shall be made, considering the connector interface as the coupling heads."

Annex 6, paragraph 3.3.3., amend to read:

"3.3.3. The simulator shall be set, e.g. through the choice of orifice in accordance with paragraph 3.3.1. of this annex in such a way that, if a reservoir of $385 \pm 5 \text{ cm}^3$ is joined to it, the time taken for the pressure to increase from 65 to 490 kPa (10 and 75 per cent respectively of the nominal pressure of 650 kPa) shall be 0.2 ± 0.01 seconds. If a reservoir of $1155 \pm 15 \text{ cm}^3$ is substituted for the above-mentioned reservoir, the time taken for the pressure to increase from 65 to 490 kPa without further adjustment shall be 0.38 ± 0.02 seconds. Between these two pressure values, the pressure shall increase in an approximately linear way.

These reservoirs shall be connected to the coupling head without using flexible pipes. The connection between the reservoirs and the coupling head shall have an internal diameter of not less than 10 mm.

The setting shall be carried out using a coupling head arrangement that is representative of the type fitted to the trailer for which type approval is sought."

Annex 13, paragraph 4.4., amend to read:

"4.4. The operation of the anti-lock system shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by compliance with Regulation No. 10 as required by paragraph 5.1.1.4. of the Regulation."

Annex 19, Appendix 7, paragraph 3.7.1., amend to read:

"3.7.1. Documentation demonstrating compliance with Regulation No. 10 as required by paragraph 5.1.1.4. of the Regulation."

Add a new Annex 22, to read:

"Annex 22

Requirements for the brake electric/electronic interface of an automated connector

1. General

This Annex defines the requirements applicable to installations where the connection and disconnection of the brake electric/electronic interface between the towing vehicle and the towed vehicle is achieved by an automated connector.

This Annex also considers the case where a vehicle is equipped with both ISO 7638 connector and an automated connector.

2. Categories of automated connectors

Automated connectors are classified in different categories¹:

Category A automated connector for tractor/semi-trailer combinations shall meet the requirements of Appendix 2 of this annex. All automated connectors within this category are compatible together.

Category B automated connectors for tractor/semi-trailer combinations that do not meet all the requirements of Appendix 2. They are not compatible with category A. Interfaces of category B are not necessarily compatible to all type of interfaces within this category.

Category C automated connectors for combination other than tractor/semi-trailer shall meet the requirements of Appendix 3 of this annex². All automated connectors within this category are compatible together.

Category D automated connectors for combinations other than tractor/semi-trailer that do not meet all the requirements of Appendix 3. They are not compatible with category C. Interfaces of category D are not necessarily compatible to all type of interfaces within this category.

¹ New categories of couplings may be added later on for new/innovative technical solutions, when standard interfaces will be defined and agreed upon.

² Until a standard is defined and agreed upon, no automated connector shall be defined as being of category C.

3. Requirements

The brake electric/electronic interface of the automated connector shall achieve the same functional requirements as specified for the ISO 7638 connector throughout this regulation and its Annexes.

3.1. The contacts (pins and sockets) for the brake electric/electronic interface shall have the same electrical characteristics and functionality as the ISO 7638 contacts.

- 3.1.1. The data contacts of the brake electric/electronic interface shall be used to transfer information exclusively for braking (including ABS) and running gear (steering, tyres and suspension) functions as specified in ISO 11992-2:2003 including its Amendment 1:2007. The braking functions have priority and shall be maintained in the normal and failed modes. The transmission of running gear information shall not delay braking functions.
- 3.1.2. The power supply, provided by the brake electric/electronic interface, shall be used exclusively for braking and running gear functions and that required for the transfer of trailer related information not transmitted via the electric control line. However, in all cases the provisions of paragraph 5.2.2.18. of this Regulation shall apply. The power supply for all other functions shall use other measures.
- 3.2. In the case of semi-trailer combinations equipped with an automated connector the maximum length of the cable for braking data communication shall be;
- (a) Tractor: 21 m;
 - (b) Semi-trailer: 19 m;
- in the running mode.
- In all other cases the conditions of paragraphs 5.1.3.6. and 5.1.3.8. of this Regulation apply with respect to maximum cable lengths.
- 3.3. Vehicles being equipped with both a connector conforming to ISO 7638 and an automated connector shall be built in such a way that only a single path is possible for the functioning of the electric control transmission or in the transmission of information in accordance with ISO 11992-2:2003 including Amendment 1:2007. See Appendix 1 to this annex for examples.
- In the case of automatic path selection the priority shall be given to the automated connector.
- 3.4. Any trailer equipped with an automated connector shall be equipped with a spring braking system according to Annex 8 of this regulation.
- 3.5. The manufacturer applying for type approval shall submit an information document describing the functionality and any limitations in the use of the automated connector and any associated equipment, including information about the category according to paragraph 2 of this Annex.
- In the case of automated connectors of categories B and D, the means to identify the type of automated connector shall also be described to ensure identification of compatibility.
- 3.6. The vehicle user's handbook provided by the manufacturer shall warn the driver of the consequences of not checking the compatibility of the automated connector between the towing vehicle and the trailer. Information about mixed mode operation shall also be provided if applicable.
- To enable the driver to check the compatibility, vehicles fitted with an automated connector shall have a marking specifying the category according to paragraph 2. of this Annex. For category B and D also the type of the installed automated connector shall be shown. This marking shall be indelible and visible to the driver when standing on the ground beside the vehicle.

Annex 22 - Appendix 1

Examples of the layout of an automated connection between vehicles

Automated connection and manual connection equipped vehicles: data bus requirements.

Diagrams for electrical connections show routing of signals of pin 6 and 7 according to ISO 7638.

Legend

Electrical

E1	ISO 11992-2 node in tractor, e.g. ECU ABS/EBS
E2	Tractor ISO 7638 socket
E3	Tractor ISO 7638 plug for automated connector
E4	Tractor part of automated connector
E5	Trailer ISO 7638 plug for automated connector
E6	Trailer ISO 7638 socket
E7	Trailer part of automated connector
E8	ISO 7638 coiled cable
E9	ISO 7638 park socket
E10	ISO 11992-2 node in trailer, e.g. ECU ABS/EBS
I	Cable from E1 to E2
II	Cable from E10 to E6
III	Cable from E5 to E7
IV	Cable from E3 to E4

Pneumatic

P1	Trailer control valve mounted on tractor
P2	T-piece
P3	Pneumatic coupling head on tractor (control and supply)
P4	Tractor part of automated connector
P5	Pneumatic coupling head on trailer (control and supply)
P6	Pneumatic valve to seal the unused terminal (double check valve) (control and supply)
P7	Trailer part of automated connector
P8	Pneumatic coiled tube (control and supply)
P9	Pneumatic park socket (control and supply)

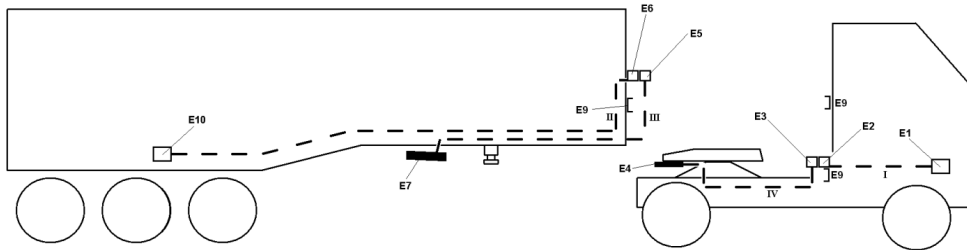
Tractor and semi-trailer examples

I. Automated connection and Manual Connection equipped Vehicles

Automated connection mode

Figure A

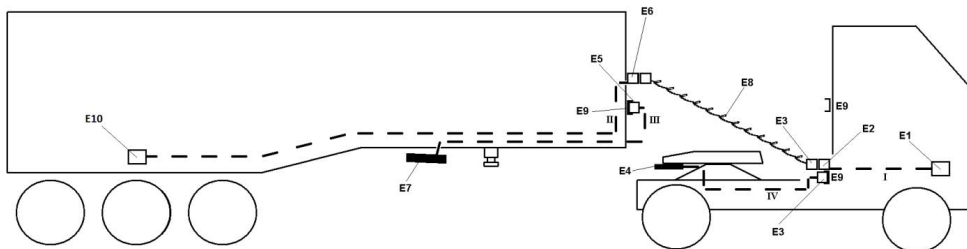
Point-to-point connection ECU Tractor (E1) and ECU Trailer (E10) via ACV. Automated connection mode: No coiled cables connected, Connection between E1 and E10 when E4 and E7 are connected (i.e. when the fifth wheel is coupled)



Manual connection mode

Figure B

Point-to-point connection ECU Tractor (E1) and ECU Trailer (E10) via coiled cable. Manual mode: Coiled cables connected, Connections between E3 and E4 as E5 and E7 are not in use



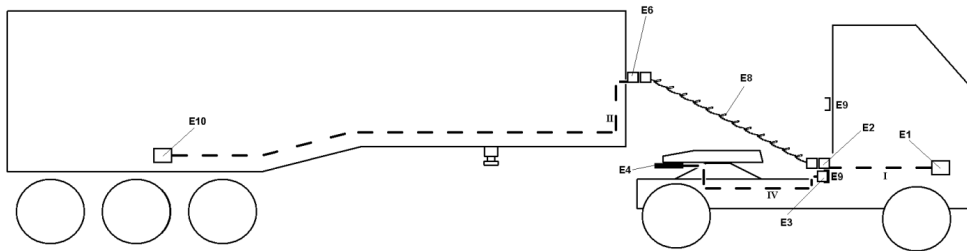
Note by the secretariat: After consultations with the Chairs of GRRF and of the Informal Working Group on Automated Coupling Vehicles: the correct Figure B is the one in the original document ECE/TRANS/WP.29/GRRF/2013/12 and not the one in ECE/TRANS/WP.29/GRRF/75, Annex II.

II. Only one part of the vehicle combination is equipped with an automated connection

Manual mode A (only the tractor equipped with automated connection)

Figure C

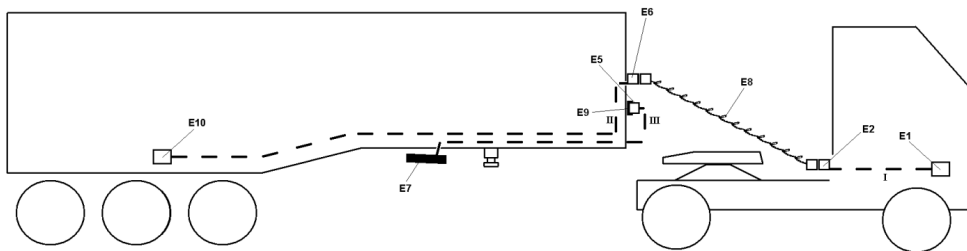
Point-to-point connection ECU Tractor (E1) and ECU Trailer (E10) when the fifth wheel is closed. Coiled cables connected, Line E3 to E4 is not in use



Manual mode B (only the semi-trailer equipped with automated connection)

Figure D

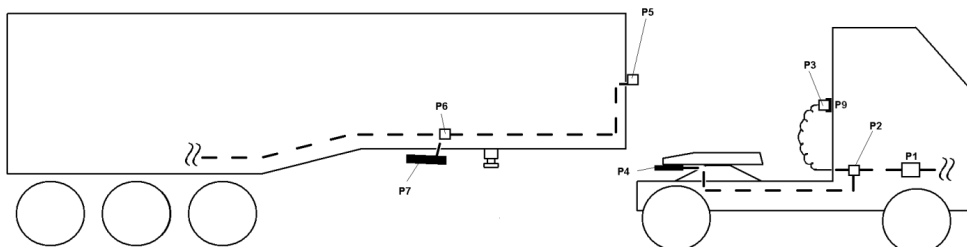
Point-to-point connection ECU Tractor (E1) and ECU Trailer (E10). Coiled cables connected, Line E5 to E7 is not in use



Automated connection mode

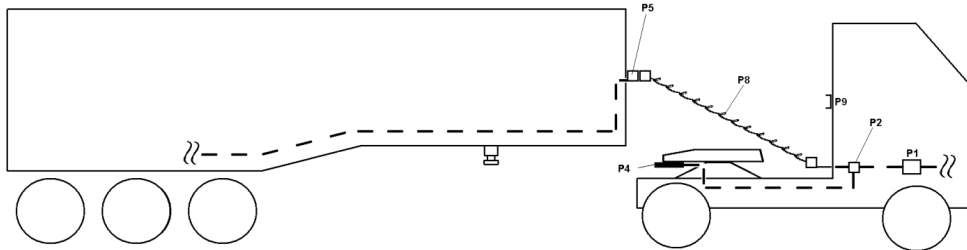
Figure E

Pneumatic connection Tractor and Trailer via ACV. Automated connection mode: No coiled cables connected, Connection between tractor and trailer when P4 and P7 are connected (i.e. when the fifth wheel coupled)



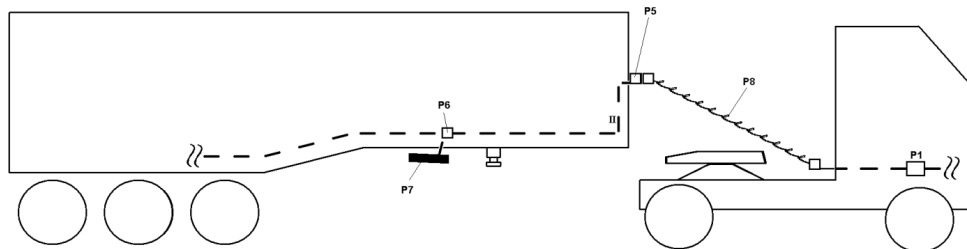
Manual mode A (only the tractor equipped with automated connection)

Figure F
Pneumatic connection Tractor and Trailer via coiled tube. Coiled tubes connected, Line P2 to P5*



Manual mode B (only the semi-trailer equipped with automated connection)

Figure G
Pneumatic connection Tractor and Trailer via coiled tube. Coiled tubes connected, Line P1 to P5*



* **Note by the secretariat:** After consultations with the Chairs of GRRF and of the Informal Working Group on Automated Coupling Vehicles, the wording has been corrected.

Annex 22 - Appendix 2

Couplings of category A shall conform with the relevant provisions of ISO 13044-2:2013 to ensure compatibility of braking systems of tractor and semi-trailer

Annex 22 - Appendix 3

(Reserved)

To be defined at a later date."
