

Proposed amendment to ECE Regulation 13

The text reproduced below was prepared by the experts of the informal working group on ACV to be inserted into Regulation No. 13. This is **to enable the type approval of the emerging fully automatic couplings systems that are not using the ISO7638 connector.**

The modifications to the existing text of the Regulation are marked in **bold** characters. As the proposal for text revision under section "I" is fairly extensive it is recommended to start reading section "II. Justification" starting on page 10".

Proposal:

I. Proposal

Main text

Insert new paragraph 2.37., to read:

"2. DEFINITIONS"

2.37. **"Brake electric/electronic interface"** means ~~a connector or part of a connector~~ **pins** dedicated to the braking system for the electrical/electronic connection between towing and towed vehicle, that has to provide contacts for :

1. **Plus voltage supply** for electrovalve (Braking),
referred to as Pin 1
2. **Plus voltage supply** for electronics (Braking),
referred to as Pin 2
3. **Minus voltage return** for electronics (Braking),
referred to as Pin 3
4. **Minus voltage return** for electrovalve (Braking),
referred to as Pin 4
5. Signal for Warning device (Braking),
referred to as Pin 5
(Open
connection on the towed vehicle during normal
operation)
6. Communication line for CAN_High (Braking)
referred to as Pin 6
(to conform
to ISO11992-1 and ISO11992-2)

**7. Communication line for CAN_Low (Braking)
referred to as Pin 7
(to conform
to ISO11992-1 and ISO11992-2)**

2.38 “Automated or Automatic Connector” means a system through which two vehicles are automatically connected electrically ~~pneumatically~~ and/or ~~electrically~~ pneumatically without direct intervention of a human operator.

Amend paragraph 5.1.3.6. to read:

- 5.1.3.6. **a)** The electric control line shall conform to ISO 11992-1 and 11992-2:2003 including its Amd.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, an automatic connector providing as a minimum the same number of pins with the same electrical properties and functionality as the ISO 7638 connector. The automatic connector shall meet all the electrical requirements contained within this regulation applicable to the ISO 7638 connector and 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.

Amend paragraph 5.2.1.23. to read:

5.2.1.23. Power driven vehicles authorized to tow a trailer equipped with an anti-lock system shall also be equipped with a special electrical connector, conforming to ISO 7638:2003¹, for the electric control transmission.

[In the case of power driven vehicles where the connection of the electric control line is automated, an automatic connector providing as a minimum the same number of pins with the same electrical properties and functionality as the ISO 7638 connector shall be used. This automatic connector shall meet all the electrical requirements contained within this regulation applicable to the ISO 7638 connector and the requirements specified in Annex 22 of this Regulation.]

Comment [C1]: suppl.5 to the 11 series of amend./doc. 2010/64

¹ The ISO 7638:2003 connector may be used for 5 pin or 7 pin applications, as appropriate.

Amend paragraph 5.2.2.17. to read:

- 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 a special electrical connector for the braking system and/or anti-lock system, conforming to ISO 7638:2003^{15, 2} **or, where the connection of the electric control line is automated, an automatic connector providing as a minimum the same number of pins with the same electrical properties and functionality as the ISO 7638 connector shall be used. This automatic connector shall meet all the electrical requirements contained within this regulation applicable to the ISO 7638 connector and the requirements specified in Annex 22 of this Regulation.**

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.

Add Annex 22 to read:

Annex 22

TECHNICAL REQUIREMENTS FOR THE BRAKE ELECTRIC/ELECTRONIC INTERFACE

1. Scope

- 1.1. This annex defined requirements applicable to installations where the connection and disconnection of the brake electric/electronic interface [and the pneumatic interface] between towing and towed vehicle is automated.**
- 1.2. For vehicles subject to this Annex 22 it shall be observed that references to ISO 7638 made in the remainder of this regulation shall be interpreted as references to the interface detailed in this Annex 22.**

2. Definitions

- 2.1. For the purposes of this document, the terms and definitions given in ISO 4091 apply.**
- 2.2. ~~[A manual brake electric/electronic interface comprises connectors having a geometrically excluding interface such that unintended connection is not possible.]~~**
- 2.3. ~~[An automatic brake electric/electronic interface comprises separate connectors or part of an integrated connector having a geometrically excluding interface such that unintended connection is not possible and that is operated through an automatic process.]~~**
- 2.4. Automated Coupling Vehicle (ACV), is a vehicle where the coupling/uncoupling between towing and towed vehicle is operated through an automated process.**

² The conductor cross sections specified in ISO 7638:2003 for the trailer may be reduced if the trailer is installed with its own independent fuse. The rating of the fuse shall be such that the

2.5. *Mixed mode operation* is operation where an ACV equipped truck tows a non-ACV equipped trailer or a non-ACV truck tows an ACV trailer. {See Appendix 1 of this Annex }

3. General requirements for the brake electric/electronic interface

3.1. [The contacts for the brake electric/electronic interface according to definition 2.37 shall be realized ~~either as one separate connector ISO 7638 or~~ as a part, geometrically kept together, in an integrated connector.]

3.1.1. The contact designation numbers shall be permanently marked on the terminal faces of both plug and socket.

The character size shall not be less than 2 mm.

3.2. The connectors for the brake electric/electronic interface shall fulfill the technical requirements of ISO4091.

3.2.1. Individual test may be waived by the technical service if the as installed conditions exclude the failure mode addressed by that test.

3.2.2. The individual tests shall be performed at conditions emulating conditions as installed in the automated appliance with respect to encapsulation and cable fixation [clamping].

3.2.3. The endurance test shall be extended to 10 000 cycles.

3.3. The contacts for plus and minus voltage for electrovalves (Pin 1 and Pin 4) of the brake electric/electronic interface shall be physically realized such that leads with 4 mm² cross section may be used. The remaining contacts in the brake electric/electronic interface shall handle at least 1.5 mm².

3.4. Automated connectors have to be fully equipped according to definition 2.37 even if some of the pins are not used. The contacts are not to be used for purposes other than defined in 2.37.

4. Operations requirements

4.1. Vehicles with an automated process with respect to coupling /uncoupling pneumatic and electric/electronic connectors that have the capacity to mechanically couple to a vehicle with only manual brake electric/electronic interface shall have a manual option for the pneumatic supply and a manual option complying with paragraph 5.1.3.6. of this Regulation. This is to enable mixed mode operation {See Appendix 1 of this Annex }

4.2. A towing vehicle with capacity to operate in manual as well as in automatic mode shall have two parking sockets for ISO7638 connector. When such a towing vehicle is operating in automatic mode the helix cable shall be completely disengaged from the ABS/EBS system and occupy both parking sockets on the tractor. The helix cable shall be permanently fixed to the truck to safeguard that the cable is always available.

5. Installation requirements

5.1. The electric control line according to ISO 11992-1 and 11992-2 between the brake ECU (electronic control unit) on the towing vehicle and the towed vehicle has to be point-to-point to ensure an explicit and unequivocal correlation.

5.2. Vehicles capable of mixed mode operation

5.2.1. The basic installation on mixed mode capable vehicles shall be equal to a non-ACV vehicle. Leaving the middle section i.e. what corresponds to the helix cable for proration in the ACV-installation. In this proration 3m maximum is allowed on the towing vehicle and 4 m maximum on the towed vehicle.

5.2.2. [In order to realize alternative point-to-point routings inline ISO 7638:1997 connectors may be used. Only one route shall be active.]

~~5.3. [Active connections shall not have any bypasses or dead ends.]~~

5.4. Vehicles only capable of ACV operation

5.4.1. The cable length on the towing vehicle is maximum 18 m while the maximum cable length on the towed vehicle is 22 m.

5.5. ~~For installations having only two cable sections (i.e. that are not capable to run in mixed mode), the length of the middle cable section (according to ISO 11992-1) may shall be prorated to the two remaining cable sections such that the length of the cable section on the towing vehicle is maximum 18 meter and that the length of the cable section on the towed vehicle is maximum 22 meter.~~ The cable sections shall be arranged such that as long as the electrical specifications according to ISO 11992-1 are met.

5.6. [Vehicles shall in general at the most have one singular socket at each end of the vehicle realizing the brake electric/electronic interface.]

5.6.1. [Vehicles having more than one mechanical coupling e.g. one fifth wheel and one drawbar coupling shall by any of the alternative couplings comply with the requirement of ISO 11992-1 and ISO 11992-2 for point-to-point interface.]

5.6.2. [Vehicles having more than one socket realizing the brake electric/electronic interface installed at any one end shall have means to exclude (See fifth wheel example in Appendix 1 of this Annex) that more than one socket realizing the brake electric/electronic from being active at one given moment in time. Such an installation is accepted as being one singular socket. A CAN-router is accepted as an alternative solution.]

5.7. A vehicle shall in all modes of operation comply with the provisions of Annex 6 of this Regulation.

6. The embodiment of the brake electric/electronic interface:

6.1. [A vehicle intended to be part of a vehicle combination where the engaging/disengaging of the mechanical, the electrical and the pneumatic connections are implemented as parts of an automatic process shall have a brake electric/electronic interface that is part of a fully integrated electrical connector.

6.1.1. This connector shall fulfill the requirements of this Annex 22. The contact allocations for the integrated connector shall be documented in the driver's manual of the coupling.

6.1.2. The pneumatic connection between towing and towed vehicle shall be handled through the same automatic process mechanism as the brake electric/electronic interface.

Appendix 1

FIFTH WHEEL EXAMPLE OF ELECTRICAL LAYOUT OF AUTOMATED CONNECTIONS BETWEEN VEHICLES (ACV)

I. FULLY ACV EQUIPPED

Electrical control line point-to-point in manual and ACV mode

ACV mode

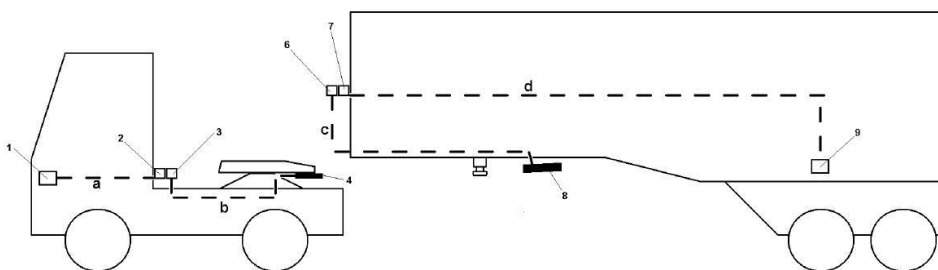


Figure A: Point-to-point connection ECU Tractor (1) and ECU Trailer (9) when Fifth Wheel is closed
ACV mode: No helix cables installed, Connection between 3 and 6 when 4 and 8 are connected (i.e. fifth wheel coupled)

Key

- 1 ISO 11992-2 node on the towing vehicle, i.e. ECU ABS/EBS
- 2 Bottom connector for helix cable, mounted on towing vehicle
- 3 Connector socket to the ACV on towing vehicle acc. to ISO7638
- 4 Towing vehicle-side of the brake electric/electronic and pneumatic interface embodiment
- 5 Helix cable
- 6 Connector socket from the ACV on the towed vehicle acc. to ISO7638
- 7 Towed vehicle-sided connector for helix cable
- 8 Towed vehicle-side of the brake electric/electronic and pneumatic interface embodiment
- 9 ISO 11992-2 node on the towed vehicle, i.e. ECU ABS/EBS
- a Cable harness from 1 to 2
- b Cable harness from 3 to 4
- c Cable harness from 8 to 6
- d Cable harness from 7 to 9

Manual mode

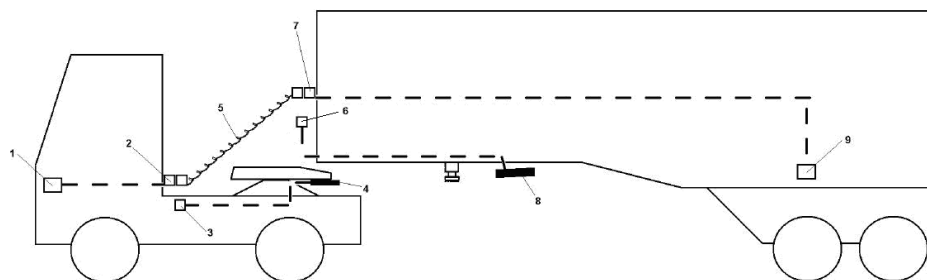


Figure B: Point-to-point connection ECU Tractor (1) and ECU Trailer (9) when Fifth Wheel is closed
Manual mode: Helix cables installed, Connection between 3 and 6 as 4 and 8 are not connected

II. PARTLY ACV EQUIPPED

Manual mode A (only the truck ACV equipped)

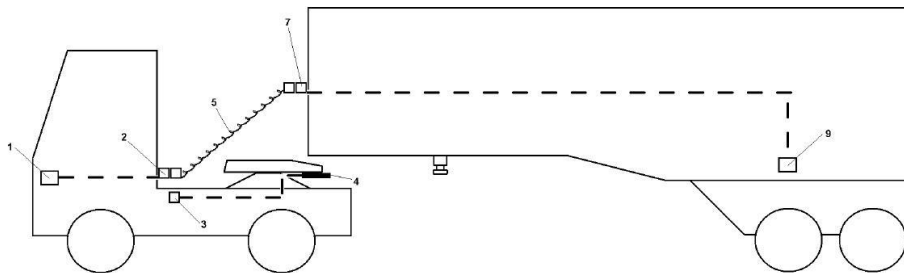


Figure C: Point-to-point connection ECU Tractor (1) and ECU Trailer (9) when Fifth Wheel is closed
Helix cables installed, Line 3 to 4 is not connected

Manual mode B (only the trailer ACV equipped)

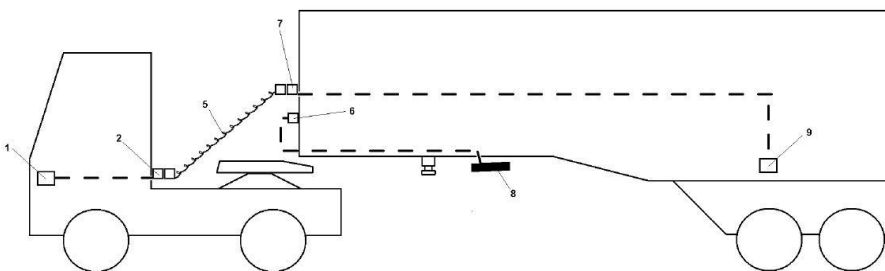


Figure D: Point-to-point connection ECU Tractor (1) and ECU Trailer (9) when Fifth Wheel is closed
Helix cables installed, Line 6 to 8 is not connected