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Road vehicles — Fully automatic coupling systems 24 V (FACS) for heavy commercial vehicle combinations —

Part 2:

Electrical and pneumatic interface for 50 mm fifth wheel couplings

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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The committee responsible for this document is ISO/TC 22, *Road Vehicles*, Subcommittee SC 40, *Specific aspects for light and heavy commercial vehicles, busses and trailers*.

A list of all the parts in the ISO 13044 series can be found on the ISO website.

Introduction

This International Standard specifies the integrated electrical and pneumatic connections of an automated fifth wheel coupling system for articulated vehicles and related components.

Fully Automated Coupling Systems improve safety and comfort of vehicle combinations.

a) Higher safety standards

reduction of operational accidents,

less injured drivers because no need for driver to stay in the dangerous zone between the towing and the towed vehicle while uncoupling.

b) Higher comfort level

Fully Automated Coupling Systems eliminate necessity to access the coupling,

higher comfort makes “Driver-Job” easier and safer,

new components create space for future extensions and potentials.

c) Cost reduction for end user

less inactive periods for the vehicle combination due to less damage and repair,

less repair and maintenance of cables and pipes.

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Road vehicles — Fully automated coupling systems 24 V (FACS) for heavy commercial vehicle combinations — Part 2: Electrical and pneumatic interface for 50 mm fifth wheel couplings

1 Scope

This document specifies the mechanical, electrical/electronic and pneumatic characteristics of a fully automated fifth wheel coupling system to ensure interchangeability between a towing vehicle and a coupled semi-trailer(s) with 24 V nominal supply voltage. The two vehicles together constitute an articulated vehicle or are part of a vehicle combination.

This document also supports the smooth introduction of fully automated fifth wheel coupling systems in the market. It specifies features necessary for mixed mode operation; i.e. the combination of a fully automated coupling system (FACS) equipped towing vehicle with a conventional semi-trailer, and vice versa, the combination of a conventional towing vehicle with a FACS-equipped semi-trailer.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 337, *Road vehicles — 50 semi-trailer fifth wheel coupling pin — Basic and mounting/interchangeability dimensions*

ISO 1726-1, *Road vehicles — Mechanical coupling between tractors and semi-trailers — Part 1: Interchangeability between tractors and semi-trailers for general cargo*

ISO 1726-2, *Road vehicles — Mechanical couplings between tractors and semi-trailers — Part 2: Interchangeability between low-coupling tractors and high-volume semi-trailers*

ISO 3833, *Road vehicles — Types — Terms and definitions*

ISO 3842, *Road vehicles — Fifth wheels — Interchangeability*

ISO 4009, *Commercial vehicles — Location of electrical and pneumatic connections between towing vehicles and trailers*

ISO 4091:2003, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — Definitions, tests and requirements*

ISO 7638-1:2003, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — Part 1: Connectors for braking systems and running gear of vehicles with 24 V nominal supply voltage*

ISO 11992 (all parts), *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles*

ISO 12098:2004, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — 15-pole connector for vehicles with 24 V nominal supply voltage*

ISO 16750-3:2012, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 3: Mechanical loads*

ISO 16750-5:2003, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 5: Chemical loads*

ISO 6150:1988, *Pneumatic fluid power — Cylindrical quick-action couplings for maximum working pressures of 10 bar, 16 bar and 25 bar (1 MPa, 1,6 Mpa, and 2,5 MPa) — Plug connecting dimensions, specifications, application guidelines and testing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13044-1 and the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- — IEC Electropedia: available at <http://www.electropedia.org/>
- — ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

fully automated coupling system

FACS

coupling and uncoupling system where all operations, i.e. mechanical, electrical, pneumatic and applicable auxiliary functions, are performed automatically, enabling the coupling and uncoupling process to be completed without direct manual intervention

Note 1 to entry: As defined in ISO 13044-1:2012.

3.2

electrical/electronic-pneumatic interface module

EPI module

component, combining all electrical/electronic and pneumatic connections in one mating unit, consisting of two complementary parts, the EPI plug module and the EPI socket module

3.2.1

EPI plug module

part of the EPI module containing the electric male contacts, pneumatic male connections and the alignment pins. It is permanently attached to the kingpin side mounted on the semi-trailer

3.2.2

EPI socket module

part of the EPI module containing the electric female contacts, pneumatic female connections and the alignment sockets. It is permanently attached to the fifth wheel which is mounted to the tractor vehicle

3.2.3

semi-trailer

towed vehicle which is designed to be coupled to either a towing vehicle or to a dolly, and to impose a substantial vertical load either on the towing vehicle or on the dolly

3.2.4

alignment device

device placed on the trailer-side, which makes contact to the 5th wheel throat during the coupling process and centres the EPI plug relative to the EPI socket

4 Requirements

4.1 General

In order to guarantee best functionality, comfort and safety, the use of FACS is recommended in combination with spring-brake equipped semi-trailers only. FACS does not exonerate the driver from ensuring the semi-trailer is correctly parked before coupling or uncoupling.

In order to guarantee best functionality, comfort and safety, the use of FACS is recommended for towing vehicles with height adjustable air-suspension at least on the rear axle.

In the case of coupling systems that are not fully automatic, but utilize an automatic electro-pneumatic interface, this interface shall comply with the requirements specified within this International Standard.

4.2 Tractor and semi-trailer

In order to ensure interchangeability between tractor vehicles and semi-trailers, the requirements of ISO 3842 and ISO 1726-1 or ISO 1726-2 shall be met for vehicles to be equipped with FACS.

4.3 Mechanical interface, Manual operation

Fifth wheels installed on FACS-equipped tractor vehicles shall comply with the requirements of ISO 3842. Fifth wheel coupling pins (King Pins) installed on FACS-equipped semi-trailers shall comply with the requirements of ISO 337. In the event of a failure of the remote control it shall be possible, in an emergency, to open the coupling in at least one other way. If this requires the use of a tool then this shall be included in the vehicle's tool kit. Any manual operation shall not lead to any damages or malfunction of the system components.

NOTE For fifth wheel versions with a throat angle other than 40° (e.g. 52°) optional versions would be allowed under the condition that the alignment device (Figure 2, key 2 or Figure 1, key 2) would use a corresponding angle. In this case the interchangeability will only be ensured within the individual version.

4.4 EPI module

4.4.1 EPI plug modules and EPI socket modules in accordance with this Standard shall provide the following electrical connections with 24 V nominal supply voltage:

- 7 poles for the electrical connection of the braking systems and running gear (incl. 2 poles for the CAN based communication compliant to ISO 11992-1 and -2);
- 23 poles for the electrical connection of equipment other than braking systems and running gear (incl. 2 poles for the CAN-based communication compliant to ISO 11992-1 and -3);

The dimensional characteristics and location of the EPI module shall be in accordance with the specifications of Annex A. Number, location and functionality shall be in accordance with the specifications of Annex B. Electrical contacts shall only be used as specified.

CAUTION — Using the electrical contacts for non-specified purposes (including ground) may cause damage to equipment. Any deviation from the contact allocation specified in Table 1 is not allowed. However, depending on legislation and customer demand, only some of the 30 electrical contacts may be required.

4.4.2 EPI plug modules and EPI socket modules in accordance with this International Standard shall provide connections for the following two pneumatic braking lines:

- one control line;
- one supply line;

The dimensional characteristics of the pneumatic connections shall be in accordance with the specifications of Annex A.

4.5 Mating of the two EPI parts

The mating of the EPI plug module and the EPI socket module shall take place automatically during the coupling process as illustrated in Annex A, Figure A.1.

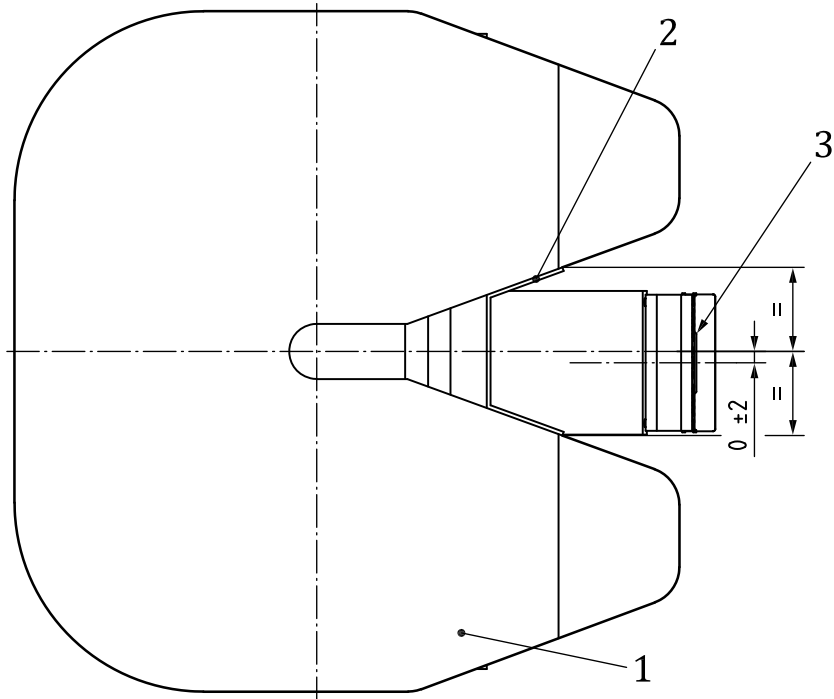
4.6 Guiding and alignment

4.6.1 General

The guiding and alignment of the EPI module shall be made by a rigid alignment pin in the middle plus two outer pins, which are preferably “self-aligning” designed to provide low forces during EPI mating; see Annex A, Figure A.5.

The central alignment pin shall have the ability to align both EPI parts within a range ± 5 mm in both horizontal and vertical directions. The two outer pins shall ensure the parallel orientation of both EPI parts for connection alignment.

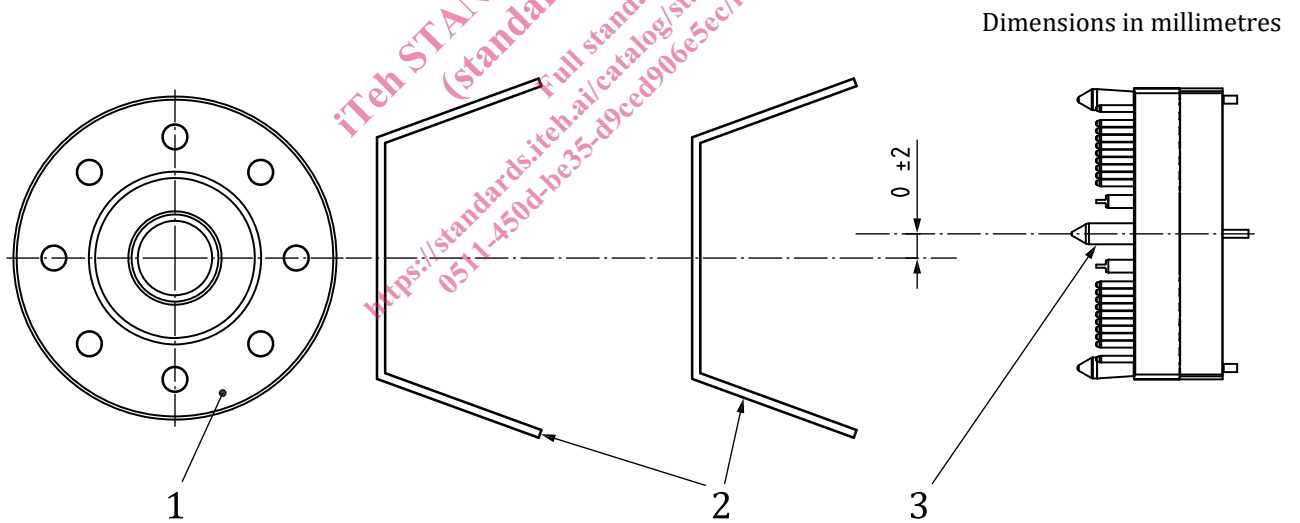
The positional tolerance between the contact surface of the alignment device and the fifth wheel shall be a maximum of ± 2 mm, according to Figure 1.



Key

- 1 Fifth wheel
- 2 Alignment device (movable in length direction, shown in contact position, see Figure 2)
- 3 EPI central alignment socket

Figure 1 — EPI female module positioning tolerance (displaced shown)



Dimensions in millimetres

Key

- 1 King pin
- 2 Alignment device (movable in length direction, shown in two positions)
- 3 EPI central alignment pin

Figure 2 — EPI male module positioning tolerance (displaced shown)

4.6.2 Installation requirements of EPI socket module

4.6.2.1 Translational degree of freedom in the longitudinal direction of alignment pin: