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

Part 2:

**50 mm fifth wheel couplings —  
Electrical and pneumatic interface**

*Véhicules routiers — Dispositifs d'attelage entièrement automatiques  
24 V (FACS) pour ensembles routiers lourds —*

*Partie 2: Sellettes d'attelage pour pivot de 50 mm — Interface  
électrique et pneumatique*



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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](http://www.iso.org/directives)

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committee responsible for this document is ISO/TC 22, *Road Vehicles*, Subcommittee SC 15, *Interchangeability of components of commercial vehicles and buses*.

ISO 13044 consists of the following parts, under the general title *Road vehicles — Fully automatic coupling systems 24 V (FACS) for heavy commercial vehicle combinations*:

- Part 1: *General requirements and definitions* <https://standards.iteh.ai/catalog/standards/sist/8759547b-b6c6-42db-ae4c-699227527430/iso-13044-2-2013>
- Part 2: *50 mm fifth wheel couplings — Electrical and pneumatic interface*

## 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 automatic coupling systems 24 V (FACS) for heavy commercial vehicle combinations —

## Part 2: 50 mm fifth wheel couplings — Electrical and pneumatic interface

### 1 Scope

This part of ISO 13044 specifies the mechanical, electrical/electronic and pneumatic characteristics of a fully automated fifth wheel coupling system to ensure interchangeability between a tractor vehicle and a coupled semi-trailer(s) with 24 V nominal supply voltage. The two vehicles together constitute an articulated vehicle.

This part of ISO 13044 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 tractor vehicle with a conventional semi-trailer, and vice versa, the combination of a conventional tractor vehicle with a FACS-equipped semi-trailer.

### 2 Normative references (standards.iteh.ai)

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 13044-2:2013(E)

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 part of ISO 13044, the terms and definitions given in ISO 13044-1 and the following terms and definitions apply.

#### 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

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#### 3.2.1 EPI plug module

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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 axle, and to impose a substantial vertical load either on the towing vehicle or on the dolly axle

#### 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 in combination with adjustable air-suspension on the rear axle equipped trucks only.

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 **iTeh STANDARD PREVIEW**

**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 be connected automatically during the coupling process as illustrated in [Annex A](#), Figure A.1.

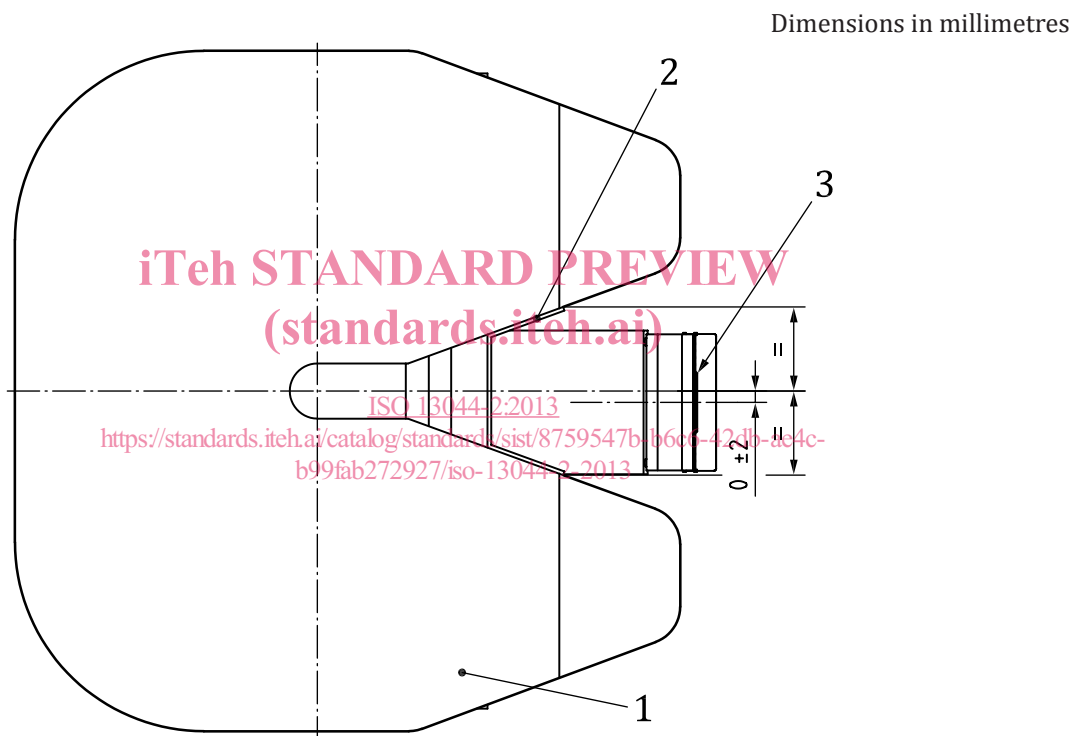
4.6 Guiding and alignment

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. Each of the outer alignment pins shall have sufficient elasticity to permit a maximum of 2 mm deflection in any direction relative to the longitudinal axis of the central alignment pin. The deflection force shall be in the range from 50 N to 200 N.

The central alignment pin shall have the ability to align both EPI parts within a range  $\pm 5$  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  $\pm 2$  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)

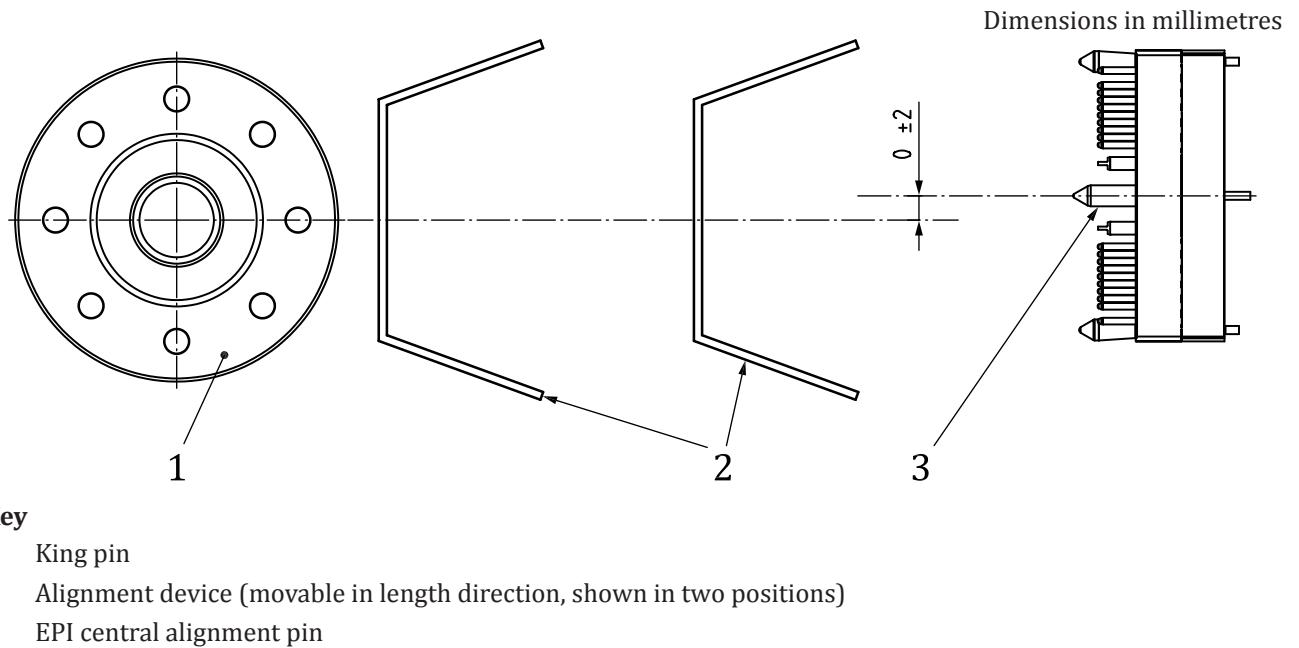


Figure 2 — EPI male module positioning tolerance (displaced shown)

#### 4.6.2 Installation requirements of tractor-mounted EPI module

##### 4.6.2.1 Linear degree of freedom in the longitudinal direction of alignment pin:

**4.6.2.1.1 No actuator:** Displaceable from 0 to a minimum of 30 mm [s2, as shown in Figure A.2 C)], preloaded with a force between 250 N to 500 N (as both pneumatic lines are under pressure) when uncoupled, achieved by means of either elastic elements or other stored energy. With the FACS coupled the EPI socket module will be pushed forward by  $s_1 = 15$  mm [see Figure A.2 B)] which is the nominal position. In the coupled position, a movement as described above shall be possible, without the EPI modules being disconnected or damaged.

**4.6.2.1.2 With actuator:** The actuator shall move the EPI socket by at least the range described in [4.6.2.1.1](#).

**4.6.2.2** Linear degree of freedom in the lateral direction: essentially fixed.

**4.6.2.3** Linear degree of freedom in the vertical direction: essentially fixed.

**4.6.2.4** Rotational degree of freedom around the longitudinal axis of EPI tractor alignment socket: essentially fixed.

**4.6.2.5** Rotational degree of freedom around the lateral articulation axis: from horizontal to a minimum of  $12^\circ$  [EPI module upwards, see Figure A.2 b)].

**4.6.2.6** Rotational degree of freedom around the vertical axis: essentially fixed.

#### 4.6.3 Installation requirements of semi-trailer-mounted EPI module

**4.6.3.1** Linear degree of freedom in the longitudinal direction of the alignment pin: fixed.

**4.6.3.2** Linear degree of freedom in the lateral direction: essentially fixed.

**4.6.3.3** Linear degree of freedom in the vertical direction: essentially fixed.

**4.6.3.4** Rotational degree of freedom around the longitudinal axis of the truck alignment pin:  $\pm 2^\circ$ .

**4.6.3.5** Rotational degree of freedom around the lateral axis:  $\pm 2^\circ$ .

**4.6.3.6** Rotational degree of freedom around the vertical axis:  $\pm 100^\circ$  around king pin axis,  $\pm 2^\circ$  around vertical axis through EPI-Module.

#### **4.6.4 Perpendicular degree of freedom of contacts**

Each electric male contact shall be floating and shall align to the datum position when EPI plug and socket are engaged according to ISO 12098:2004, 4.1 and ISO 7638-1:2003, 4.1.

Each pneumatic male contact shall be floating to allow a degree of freedom of a minimum of 0,5 mm perpendicular to the main alignment pin axis and with a minimum of  $\pm 0,5^\circ$  axis deviation.

#### **4.6.5 Pneumatic valves in EPI socket module**

Both pneumatic sockets have to be airtight when disconnected. These sockets shall be opened by the pneumatic plugs [see A.5 a)]. The sockets shall be fully open a minimum of 3 mm before EPI modules are mated. To compensate tolerances, the sockets shall stay fully open a minimum of 3 mm after the EPI modules are mated.

The minimum flow diameter of the pneumatic socket when fully open shall not be less than the internal diameter of the EPI pneumatic plug, which is strongly recommended to have a minimum inner diameter equivalent to 6 mm (see NOTE below).

NOTE Reductions in the internal diameter may increase the response time when tested in accordance with the procedure defined in regulations like e.g. Annex 6 to ECE Regulation 13.

### **4.7 Encapsulation and protection**

#### **4.7.1 General**

In order to guarantee interchangeability, protection covers of the EPI modules shall be located in defined positions having devices and activation points which are determined as follows.

##### **4.7.1.1 Protection cover on the EPI socket module**

See [Annex A](#), Figures A.6 – A.8.

##### **4.7.1.2 Protection cover on the EPI plug module**

See [Annex A](#), Figures A.9.

#### **4.7.2 EPI plug module protection cover actuation**

The protection cover on the EPI plug module:

- Shall open early enough to lift the EPI socket module during the coupling process;
- Shall try to close before the kingpin reaches the coupled position;
- Shall not cause damage to any part while trying to close;
- Shall close completely in case there is no EPI socket module.

#### **4.7.3 Gasket between plug and socket**

In order to ensure a correct seal when connected, a gasket shall be installed between plug and socket on the contact surface of the EPI socket module.

See [Annex A](#), Figure A.1.