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## Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics —

Part 3:

### Diagnostic connector and related electrical circuits: specification and use

*Véhicules routiers — Communications entre un véhicule et un équipement externe pour le diagnostic relatif aux émissions —*

*Partie 3: Connecteur de diagnostic et circuits électriques associés: spécifications et utilisation*

ICS: 43.180; 13.040.50; 43.040.10

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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.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

This second edition cancels and replaces the first edition (ISO 15031-3:2004), which has been technically revised.

ISO 15031 consists of the following parts, under the general title *Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics*:

- *Part 1: General information*
- *Part 2: Terms, definitions, abbreviations and acronyms*
- *Part 3: Diagnostic connector and related electrical circuits: specification and use*
- *Part 4: External test equipment*
- *Part 5: Emissions-related diagnostic services*
- *Part 6: Diagnostic trouble code definitions*
- *Part 7: Data link security*

## Introduction

ISO 15031 consists of a number of parts which, taken together, provide a coherent self-consistent set of specifications to facilitate emissions-related diagnostics. ISO 15031-1 provides an introduction to the series of International Standards. Parts 2 through 7 are based on SAE recommended practices. This part is based on SAE J1962 (Diagnostic connector).

This document set includes the communication between the vehicle's OBD systems and test equipment implemented across vehicles within the scope of the legislated emissions-related OBD.

To achieve this, it is based on the Open Systems Interconnection (OSI) Basic Reference Model in accordance with ISO/IEC 7498-1 and ISO/IEC 10731, which structures communication systems into seven layers. When mapped on this model, the services specified by ISO 15031 are broken into:

- Diagnostic services (layer 7), specified in:
  - ISO 15031-5 (emissions-related OBD),
  - ISO 27145-3 (WWH-OBD),
- Presentation layer (layer 6), specified in:
  - ISO 15031-2, SAE J1930-DA,
  - ISO 15031-5, SAE J1979-DA,
  - ISO 15031-6, SAE J2012-DA (OBD),
  - ISO 27145-2, SAE J2012-DA (WWH-OBD),
- Session layer services (layer 5), specified in:
  - ISO 14229-2 supports ISO 15765-4 DoCAN and ISO 14230-4 DoK-Line protocols,
  - ISO 14229-2 is not applicable to the SAE J1850 and ISO 9141-2 protocols,
- Transport layer services (layer 4), specified in:
  - DoCAN: ISO 15765-2 Transport protocol and network layer services,
  - SAE J1850: ISO 15031-5 Emissions-related diagnostic services,
  - ISO 9141-2: ISO 15031-5 Emissions-related diagnostic services,
  - DoK-Line: ISO 14230-4, ISO 15031-5 Emissions-related diagnostic services,
- Network layer services (layer 3), specified in:
  - DoCAN: ISO 15765-2 Transport protocol and network layer services,
  - SAE J1850: ISO 15031-5 Emissions-related diagnostic services,
  - ISO 9141-2: ISO 15031-5 Emissions-related diagnostic services,
  - DoK-Line: ISO 14230-4, ISO 15031-5 Emissions-related diagnostic services,
- Data link layer (layer 2), specified in:
  - DoCAN: ISO 15765-4, ISO 11898-1, -2,
  - SAE J1850,
  - ISO 9141-2,

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- DoK-Line: ISO 14230-2,
- Physical layer (layer 1), specified in:
  - DoCAN: ISO 15765-4, ISO 11898-1, -2,
  - SAE J1850,
  - ISO 9141-2,
  - DoK-Line: ISO 14230-1,

in accordance with [Table 1](#).

**Table 1 — Legislated emissions-related OBD/WWH-OBD diagnostic specifications applicable to the OSI layers**

Applicability	OSI 7 layers	Emissions-related OBD communication requirements				Emissions-related WWH-OBD communication requirements		
Seven layer according to ISO/IEC 7498-1 and ISO/IEC 10731	Application (layer 7)	ISO 15031-5				ISO 27145-3		
	Presentation (layer 6)	ISO 15031-2, -5, -6				ISO 27145-2		
		SAE J1930-DA / SAE J1979-DA				SAE J1930-DA / SAE J1979-DA		
		SAE J2012-DA (OBD)				SAE J2012-DA (WWH-OBD)		
	Session (layer 5)	Not Applicable				ISO 14229-2		
	Transport (layer 4)	ISO 15031-5		ISO 14230-4	ISO 15765-2	ISO 15765-2		ISO 13400-2
	Network (layer 3)							
Data link (layer 2)	SAE J1850	ISO 9141-2	ISO 14230-2	ISO 11898-1, -2	ISO 15765-4	ISO 11898-1, -2	ISO 27145-4	ISO 13400-3
Physical (layer 1)			ISO 14230-1					

# Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics —

## Part 3: Diagnostic connector and related electrical circuits: specification and use

### 1 Scope

This part of ISO 15031 references the latest publication of SAE J1962 Diagnostic Connector.

On-Board Diagnostic (OBD) regulations require road vehicles to be equipped with a standardized connector for purposes of access to on-board diagnostic information by ISO 15031-4 compliant external test equipment. This document describes the requirements for the physical connection and associated pin usage to allow for standard access to the OBD data.

ISO 15031-3 was based on SAE J1962 and was intended to meet European OBD requirements for 2000 and later model year vehicles, and added a modified connector type to accommodate vehicles with a 24 V system. This revised ISO 15031-3 is technically equivalent to SAE J1962 with the exception of the specific requirements identified in the document.

This part of ISO 15031 specifies additional requirements related to Right Hand Driven (RHD) vehicles.

The Annexes listed are for information and not required to fulfil emissions-related OBD:

- [Annex A](#) (informative) — Ethernet pin assignment option #1 and #2 according to ISO 13400-4,
- [Annex B](#) (informative) — Additional communication line (ACL) according to ISO 26021 pin assignment.

### 2 Normative references

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

SAE J1962, *Diagnostic connector*

### 3 Terms, definitions, symbols and abbreviated terms

#### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions of SAE J1962 apply.

#### 3.2 Abbreviated terms

ACL	additional communication line with bidirectional communication
CAN	Controller Area Network
ETH	Ethernet

LHD	left-hand-driven
RHD	right-hand-driven

### 4 Conventions

ISO 15031 is based on the conventions discussed in the OSI Service Conventions (ISO/IEC 10731:2004) as they apply for diagnostic services.

### 5 Connector requirements

#### 5.1 Normative reference to SAE J1962

This part of ISO 15031 corresponds to SAE J1962 diagnostic connector.

#### 5.2 Right hand driven (RHD) vehicle connector system performance requirements

For RHD vehicles the performance requirement “It shall also withstand a force of 220 N applied in all other axial directions without mechanical failure.” as specified in SAE J1962 subclause 5.10.4 e) does not apply.

#### 5.3 Right hand driven (RHD) location and position of vehicle connector type A

This definition replaces the chapter 4.1.1 in SAE J1962.

Right Hand Driven (RHD) vehicles with connector type A shall have the connector located in the first row foot well region.

The vehicle connector shall be securely mounted to the vehicle in order to facilitate mating and un-mating.

The connector shall be mounted such that the face of the vehicle connector is pointing downward (90° from horizontal, the -z direction) or toward the rear of the vehicle (0° from horizontal, the -x direction), or any angle in between (see SAE J1962 Figure 2). Tolerance: ± 5°.

The connector may be mounted vertically or horizontally, (see SAE J1962 Figure 2), but may not be oriented in any other angles. Additionally, the orientation of the connector must follow the drawing in SAE J1962 Figure 2. For vertically mounted connectors, the long side must be to the left (+y direction). For horizontally mounted connectors, the long side must be on top (or rearward if the connector is pointing down). Tolerance: ± 5°.

### 6 Ethernet

The reference to the Ethernet connector layout, pin-out information and simplified test equipment circuitry example for Ethernet option #1 and #2 is specified in [Annex A](#).

### 7 ACL for on-board pyrotechnic devices

The reference to the additional communication line (ACL) for on-board pyrotechnic devices connector layout and pin-out information is specified in [Annex B](#).



**Annex A**  
(informative)

**Ethernet pin assignment option #1 and #2 according to ISO 13400-4**

The requirements of Ethernet pin assignment option #1 and #2 are specified in ISO 13400-4.

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