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BS ISO 27145-6:2015



BSI Standards Publication

Road vehicles — Implementation of World- Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements

Part 6: External test equipment

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The UK participation in its preparation was entrusted to Technical Committee AUE/16, Data Communication (Road Vehicles).

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Road vehicles — Implementation of World-Wide Harmonized On- Board Diagnostics (WWH-OBD) communication requirements —

Part 6: External test equipment

*Véhicules routiers — Mise en application des exigences de
communication pour le diagnostic embarqué harmonisé à l'échelle
mondiale (WWH-OBD) —*

Partie 6: Équipement d'essai externe



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Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms, definitions, symbols, and abbreviated terms	2
3.1 Terms and definitions	2
3.2 Abbreviated terms	2
4 Conventions	3
5 Document overview	3
6 Requirements overview and principles	5
6.1 Basic principles for the graphical notation	5
6.2 Requirements clustering	5
6.2.1 Overview	5
6.2.2 Main requirements clusters	5
7 External test equipment requirements	7
7.1 General	7
7.2 Applicability of requirements according to local legislation	8
7.3 User instructions and guidelines	8
7.4 Cluster "Mechanical requirements"	8
7.5 Cluster "Electrical requirements"	9
7.6 Cluster "Communication setup" and connections	9
7.6.1 Connections	9
7.6.2 Communication setup	10
7.7 Cluster "Diagnostic messages"	12
7.7.1 Overview	12
7.7.2 Timing	12
7.7.3 Negative response handling	12
7.7.4 Error handling of no response from the vehicle	14
7.7.5 Setup of ECU list	15
7.7.6 Setting up ECU communication list	16
7.7.7 Setting up data information list	16
7.7.8 Reading DTCs	17
7.7.9 Setting up DTC information list	17
7.7.10 Clear diagnostic information	22
7.7.11 Continuously reading ECU data	22
8 Roadside inspection test equipment	23
8.1 Definition	23
8.2 Related use cases	23
8.3 Implementation requirements	24
8.3.1 Overview	24
8.3.2 Application layer	24
9 Inspection and maintenance (I/M) test equipment	25
9.1 Definition	25
9.2 Related use cases	25
9.3 Implementation requirements	25
9.3.1 General	25
9.3.2 Application layer	25
10 Repair shop test equipment	27
10.1 Definition	27
10.2 Related use cases	27

This is a preview of "BS ISO 27145-6:2015". Click [here](#) to purchase the full version from the ANSI store.

10.3	Implementation requirements.....	27
10.3.1	Overview.....	27
10.3.2	Application layer.....	28
11	Multiple test equipment communication	31
11.1	General.....	31
11.2	Behaviour of external test equipment.....	31
Bibliography	32

This is a preview of "BS ISO 27145-6:2015". Click here to purchase the full version from the ANSI store.

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 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 3, *Electrical and electronic equipment*.

ISO 27145 consists of the following parts, under the general title *Road vehicles — Implementation of Word-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements*:

- *Part 1: General information and use case definition*
- *Part 2: Common data dictionary*
- *Part 3: Common message dictionary*
- *Part 4: Connection between vehicle and test equipment*
- *Part 6: External test equipment*

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Introduction

Overview

This International Standard includes the communication between the vehicle's on-board diagnostics (OBD) systems and external test equipment within the scope of the World-Wide Harmonized On-Board Diagnostics Global Technical Regulations (WWH-OBD GTR).

This International Standard has been established in order to apply the unified diagnostic services (specified in ISO 14229-1) to WWH-OBD systems.

This International Standard includes the communication between the vehicle's WWH-OBD systems and external (off-board) "generic" test equipment within the scope of the country-specific regulatory requirements.

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

- diagnostic services (layer 7), specified in ISO 27145-3 with reference to ISO 14229-1,
- presentation layer (layer 6), specified in ISO 27145-2 with reference to SAE J1930-DA, SAE J1939-DA, SAE J1939-73, Appendix A (FMIs), SAE J1979-DA, and SAE J2012-DA,
- session layer services (layer 5), specified in ISO 14229-2,
- transport layer services (layer 4), specified in ISO 27145-4 with reference to ISO 13400-2, ISO 15765-2, and ISO 15765-4,
- network layer services (layer 3), specified in ISO 27145-4 with reference to ISO 13400-2, ISO 15765-2, and ISO 15765-4,
- data link layer (layer 2), specified in ISO 27145-4 with reference to ISO 11898-1, ISO 11898-2, ISO 13400-3, ISO 15765-4, and IEEE 802.3, and
- physical layer (layer 1), specified in ISO 27145-4 with reference to ISO 11898-1, ISO 11898-2, ISO 13400-3, ISO 15765-4, and IEEE 802.3,

in accordance with [Table 1](#).

Table 1 — WWH-OBD specification reference applicable to the OSI layers

Applicability	OSI seven layer	WWH-OBD document reference			
Seven layer according to ISO/IEC 7498-1 and ISO/IEC 10731	Application (layer 7)	ISO 14229-1, 3			ISO 27145 -6
	Presentation (layer 6)	ISO 27145-2, SAE J1930-DA, SAE J1939-DA, SAE J1939-73, Appendix A (FMIs), SAE J1979-DA, SAE J2012-DA			
	Session (layer 5)	ISO 14229-2			—
	Transport (layer 4)	ISO 15765-2 DoCAN, ISO 15765-4 DoCAN	ISO 27145-4	ISO 13400-2 DoIP TCP and IP	
	Network (layer 3)				
	Data link (layer 2)	ISO 11898-1 CAN DLL, ISO 11898-2 CAN HS, ISO 15765-4 DoCAN		ISO 13400-3 DoIP, IEEE 802.3	
	Physical (layer 1)				

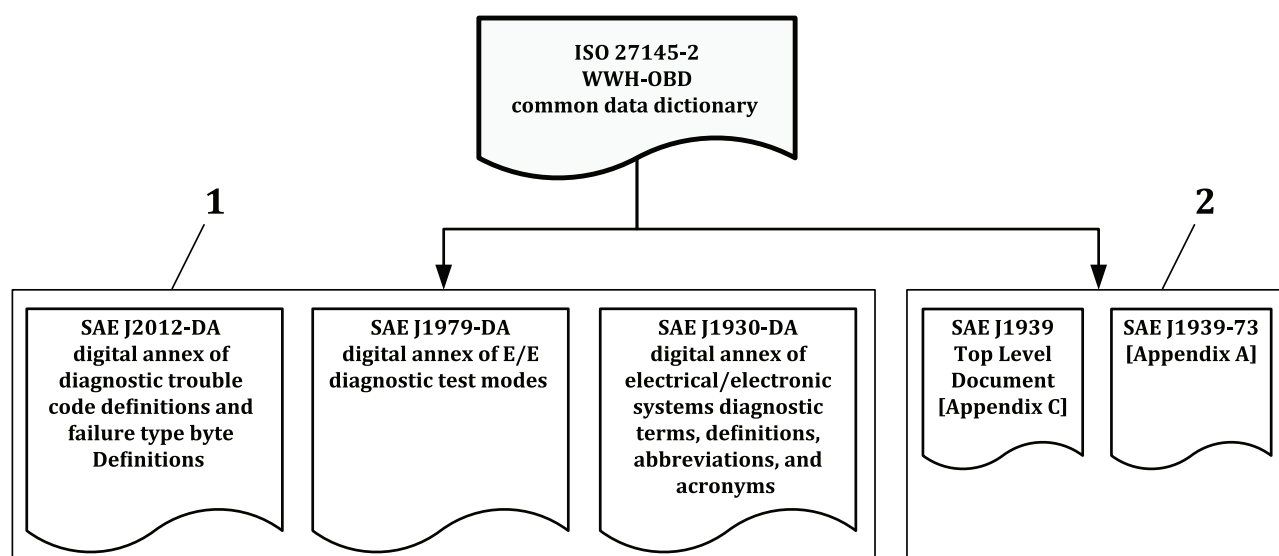
SAE document reference concept

This International Standard references several SAE documents which contain all terms, data and diagnostic trouble code (DTC) definitions.

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ISO 27145-2 defines a common data dictionary for this International Standard, according to the definitions in the following documents ([Figure 1](#)):

- SAE J1930-DA: this digital annex contains all standardized naming objects, terms, and abbreviated terms;
- SAE J1939-DA and SAE J1939-73: The Digital Annex indexes names for suspect parameter numbers (SPNs) that provide an alternative presentation format for SAE J2012-DA DTCs. SPNs are combined with failure mode indicators (FMIs) to form the full alternative presentation. These FMIs are described in SAE J1939-73, Appendix A;
- SAE J1979-DA: this digital annex contains all standardized data items such as data identifiers (DIDs), test identifiers (TIDs), monitor identifiers (MIDs), and infotype identifiers (ITIDs);
- SAE J2012-DA: this digital annex contains all standardized data items such as DTC definitions and FTB (failure type byte) definitions.



Key

- 1 SAE digital annexes: data definitions
- 2 SAE J1939 series of documents: DTC definitions

Figure 1 — SAE digital annex document reference

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Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements —

Part 6: External test equipment

1 Scope

This part of ISO 27145 defines the requirements for the external test equipment as listed:

- a means of establishing communications between a WWH-OBD-equipped vehicle and external test equipment;
- a set of diagnostic services, including addressing methods, to be provided by the external test equipment in order to exercise the services defined in ISO 27145-3.

This part of ISO 27145 describes the minimum capabilities or functions in the external test equipment. Additional functionality, e.g. non WWH-OBD protocols or retrieval of repair and maintenance information, can be integrated into the external test equipment according to the test equipment manufacturer needs. The external test equipment designer ensures that no such capability or function can adversely affect either a WWH-OBD-equipped vehicle connected to the equipment, or the equipment itself.

When the external test equipment implements functionality, which is not covered by ISO 27145-3, this functionality is not linked to the timing requirements defined in this International Standard.

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 7637-2:2011, *Road vehicles — Electrical disturbances from conduction and coupling — Part 2: Electrical transient conduction along supply lines only*

ISO 13400 (all parts), *Road vehicles - Diagnostic communication over Internet Protocol (DoIP)*

ISO 14229-1, *Road vehicles — Unified diagnostic services (UDS) — Part 1: Specification and requirements*

ISO 14229-2, *Road vehicles — Unified diagnostic services (UDS) — Part 2: Session layer services*

ISO 15031-3, *Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics — Part 3: Diagnostic connector and related electrical circuits, specification and use*

ISO 15765-4, *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 4: Requirements for emissions-related systems*

ISO 16750-2:2010, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 2: Electrical loads*

ISO 27145-1:2012, *Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements — Part 1: General information and use case definition*