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**Road vehicles — Implementation of  
WWH-OBD communication  
requirements —**

**Part 1:  
General information and use case  
definition**

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*Véhicules routiers — Mise en application des exigences de  
communication WWH-OBD —*

*Partie 1: Informations générales et définition de cas d'usage*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/PAS 27145-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO/PAS 27145 consists of the following parts, under the general title *Road vehicles — Implementation of WWH-OBD communication requirements*:

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

NOTE ISO/PAS 27145-4 will be extended as necessary due to introduction of additional communication media.

## Introduction

This document set includes the communication between the vehicle's OBD systems and test equipment implemented across vehicles within the scope of the WWH-OBD GTR (World Wide Harmonized On-Board Diagnostics Global Technical Regulations).

It has been established in order to apply the unified diagnostic services (specified in ISO 14229-1).

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/PAS 27145 are broken into:

- Diagnostic services (layer 7), specified in ISO/PAS 27145-3;
  - Presentation layer (layer 6), specified in ISO/PAS 27145-2;
  - Session layer services (layer 5), specified in ISO/PAS 27145-4;
  - Transport layer services (layer 4), specified in ISO/PAS 27145-4;
  - Network layer services (layer 3), specified in ISO/PAS 27145-4;
  - Data link layer (layer 2), specified in ISO/PAS 27145-4;
  - Physical layer (layer 1), specified in ISO/PAS 27145-4;
- in accordance with Table 1.

**Table 1 — Enhanced and legislated OBD diagnostic specifications applicable to the OSI layers**

Applicability	OSI 7 layers	Implementation of WWH-OBD communication requirements, e.g. emissions-related UDS
Seven layers according to ISO/IEC 7498-1 and ISO/IEC 10731	Application (layer 7)	ISO/PAS 27145-3 / ISO 14229-1
	Presentation (layer 6)	ISO/PAS 27145-2
	Session (layer 5)	ISO/PAS 27145-4
	Transport (layer 4)	
	Network (layer 3)	
	Data link (layer 2)	
	Physical (layer 1)	

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# Road vehicles — Implementation of WWH-OBD communication requirements —

## Part 1: General information and use case definition

### 1 Scope

ISO/PAS 27145 is intended to become the single communication standard for access to OBD-related information. To allow for a smooth migration from the existing communication standards to this future worldwide standardized communication standard, the initial communication concept will be based on CAN. In a second step, ISO/PAS 27145 will be extended to define the world-wide harmonized OBD communication standard based on existing industry communications standards (e.g. Internet Protocol) over Ethernet. Due to the usage of standard network layer protocols, future extensions to optional physical layers (e.g. wireless) are possible.

This part of ISO/PAS 27145 gives an overview of the structure and the partitioning of the different parts of this standard, and shows the relation between the parts. In addition, it outlines the use case scenarios where the ISO/PAS 27145 document set will be used. All terminology that is common throughout the ISO/PAS 27145 document set is also outlined here.

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### 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.

ISO 7498-1, *Information technology — Open Systems Interconnection — Basic Reference Model — Part 1: The Basic Model*

ISO/IEC 10731, *Information technology — Open Systems Interconnection — Basic Reference Model — Conventions for the definition of OSI services*

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

ISO/PAS 27145-2, *Road vehicles — Implementation of WWH-OBD communication requirements — Part 2: Common emissions-related data dictionary*

ISO/PAS 27145-3, *Road vehicles — Implementation of WWH-OBD communication requirements — Part 3: Common message dictionary*

ISO/PAS 27145-4, *Road vehicles — Implementation of WWH-OBD communication requirements — Part 4: Connection between vehicle and test equipment*

### 3 Terms and definitions

For the purposes of this document the terms and definitions in ISO 14229-1 and the following terms apply.

#### 3.1

##### Calibration Identification

###### CALID

identification code for a specific software/calibration contained in a server/ECU

NOTE If regulations require calibration identifications for emissions-related software, those are reported in a standardized format as specified in ISO/PAS 27145-2. Additional details are included in the WWH-OBD GTR.

#### 3.2

##### Class A, B1, B2, C malfunctions

definitions that apply to emissions-related OBD systems

NOTE Class A, B1, B2 or C are attributes of a DTC. These attributes characterize the impact of a malfunction on emissions or on the OBD system's monitoring capability according to the requirements of the WWH-OBD GTR. Additional details are included in ISO/PAS 27145-3.

#### 3.3

##### Continuous-Malfunction Indicator

malfunction indicator showing a steady indication at all times while the key is in the on (run) position with the engine running (ignition ON – engine ON)

#### 3.4

##### Continuous-Malfunction Indicator Counter

counter which conveys the amount of time during which the OBD system has been operated while a Continuous-MI is activated

NOTE Additional details are included in the WWH-OBD GTR.

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#### 3.5

##### Calibration Verification Number

###### CVN

server/ECU calculated verification number of a calibration identification number to verify the integrity of the software/calibration contained in a server/ECU

NOTE If regulations require calibration identifications for emissions-related software, those are reported in a standardized format as specified in ISO/PAS 27145-2. Additional details are included in the WWH-OBD GTR.

#### 3.6

##### discriminatory display

applying to emissions-related OBD systems, requires the MI to be activated according to the class in which a malfunction has been classified

NOTE Additional details are included in the WWH-OBD GTR.

#### 3.7

##### Global Technical Regulation

###### GTR

(See 3.15.)

#### 3.8

##### malfunction

failure or deterioration of a vehicle or engine system or component, including the OBD system

NOTE The WWH-OBD GTR will specifically identify what conditions are considered to be malfunctions.



**3.9****Malfunction Indicator****MI**

indicator which clearly informs the driver of the vehicle in the event of a malfunction

NOTE Additional details are included in the WWH-OBD GTR.

**3.10****Malfunction Indicator Counter**

counter which conveys the amount of time during which the OBD system has operated while a malfunction is active

NOTE Additional details are included in the WWH-OBD GTR.

**3.11****non-discriminatory display**

applying to emissions-related OBD systems, requires only a single type of MI activation

NOTE Additional details are included in the WWH-OBD GTR.

**3.12****On-Board Diagnostics****OBD**

system that monitors some or all computer input and control signals

NOTE Signal(s) outside of the predetermined limits imply a fault in the system or in a related system.

**3.13****Vehicle Identification Number****VIN**

identification number specific and unique to each vehicle following the applicable legal provisions of each national/regional authority

**3.14****Vehicle On-Board Diagnostics****VOBD**

provides a single access point for external test equipment to retrieve all data of the OBD system

**3.15****World Wide Harmonized – On-Board Diagnostics Global Technical Regulation****WWH – OBDGTR**

defines the use-cases and requirements for OBD systems

NOTE See Reference [1] in the Bibliography for further details regarding the WWH-OBD GTR.

**4 Symbols and abbreviated terms**

CALID	Calibration Identification
CVN	Calibration Verification Number
DTC	Diagnostic Trouble Code
ECM	Engine Control Module
ECU	Electronic Control Unit
GTR	Global Technical Regulations

## ISO/PAS 27145-1:2006(E)

MI	Malfunction Indicator
OBD	On-Board Diagnostics
UDM	Urea Dosing Module
VIN	Vehicle Identification Number
VOBD	Vehicle On-Board Diagnostics
WLAN	Wireless Local Area Network
WWH-OBD	Word Wide Harmonized On-Board Diagnostics
WWH-OBD GTR	World Wide Harmonized On-Board Diagnostics Global Technical Regulation

### 5 Conventions

ISO/PAS 27145 is based on the conventions discussed in the O.S.I. Service Conventions (ISO/IEC 10731:1994) as they apply for diagnostic services.

### 6 Document overview

The ISO/PAS 27145 document set provides an implementer with all documents and references required to support the implementation of legislated on board diagnostics in accordance with the requirements set forth in WWH-OBD GTR (Global Technical Regulation).

- ISO/PAS 27145-1: General information and use case definitions (this part), provides an overview of the document set along with the use case definitions and a common set of resources (definitions, references) for use by all subsequent parts.
- ISO/PAS 27145-2: Common emissions-related data dictionary, provides data definitions for emissions-related legislated diagnostics (see also Note below).
- ISO/PAS 27145-3: Common message dictionary, provides the message implementation details from ISO 14229 – UDS to support the required legislated OBD.
- ISO/PAS 27145-4: Connection between vehicle and test equipment, defines the details necessary to implement the communication between the vehicle's OBD systems and test equipment including the definition/reference of physical layers, data link layers, network layer, transport layer and session layer. This part of the standard will be extended as necessary due to introduction of additional communication media.

NOTE Additional parts of this standard will be introduced as necessary to consider further OBD systems not yet covered by this standard.

## 7 Use case description

### 7.1 Overview

The OBD system is required to make available vehicle diagnostic information under several different use cases as specified by the WWH-OBD GTR (Global Technical Regulation). These use cases provide the implementer with guidance in the implementation of the VOBD (described later in this document), and methodology used on the vehicle to make the required data available. This part of the standard will be extended as necessary due to introduction of additional WWH-OBD GTR use cases (i.e. non emissions-related).

### 7.2 Emissions-related use cases

#### 7.2.1 Use case summary

The following is a summary of the use cases applicable to emissions-related OBD systems:

- **Use case 1: Information about the emissions-related OBD system state** – The purpose of this information package is to provide the minimum data set specified as necessary by the WWH-OBD GTR to obtain the vehicle, or engine state with respect to its emission performance as specified in the WWH-OBD GTR. A typical use of this information package may be a 'Roadside Check' performed by an enforcement authority.
- **Use case 2: Information about active emissions-related malfunctions** – The purpose of this information package is to provide access to the expanded data set specified as necessary by the WWH-OBD GTR to determine vehicle readiness and characterise the malfunctions detected by the OBD system. A typical use of this information package may be a periodic inspection by enforcement authorities.
- **Use case 3: Information related to diagnosis for the purpose of repair** – The purpose of this information package is to provide access to all OBD data required by the WWH-OBD GTR and available from the OBD system. A typical use of this information package may be the Diagnostic Servicing of the vehicle or system in a workshop environment.

Detailed definition of each data item listed in the use cases can be found in the emissions-related module of the WWH-OBD GTR.

#### 7.2.2 Use case 1 – Information about the emissions-related OBD system state

This use case provides an enforcement agency with the Malfunction Indication status and associated vehicle system data (e.g. MI counter, readiness status etc.).

The OBD system shall provide the data items as required by the emissions-related module of the WWH-OBD GTR and in the format as specified in ISO/PAS 27145-2 for the external roadside check test equipment to assimilate and provide the enforcement agency with the following information.

- a) The WWH-OBD GTR (and revision) number.
- b) Discriminatory / Non-Discriminatory display strategy.
- c) The VIN (Vehicle Identification Number).
- d) Presence of a Continuous-MI.
- e) The readiness status of the OBD system.
- f) The number of engine operating hours since the Malfunction Indicator has been activated (Continuous-MI counter).

This information shall be read-only access (i.e. no clearing) within the context of use case 1.