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Road vehicles — Vehicle interface for electronic Periodic Technical Inspection (ePTI) —

Part 1:

Application and communication requirements

Véhicules routiers — Interface de véhicule pour contrôle technique périodique électronique (ePTI) —

Partie 1: Exigences d'application et de communication

ISO 20730-1:2021

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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 (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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

A list of all parts in the ISO 20730 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Roadworthiness testing is a part of a wider regime designed to ensure that road vehicles are kept in a safe and environmentally acceptable condition during their use. This regime covers periodic roadworthiness testing of vehicles and technical roadside inspections of vehicles used for commercial road transport activities and provides a vehicle registration procedure allowing for the suspension of a vehicle's authorisation to be used in road traffic where the vehicle constitutes an immediate risk to road safety. Periodic testing is the main tool to ensure roadworthiness. Technical roadside inspections of commercial vehicles are merely complementary to periodic testing.

An ePTI system list, which is defined in ISO 20730-3, summarises ePTI-relevant systems and specifies a defined name (system), a unique identifier (ePTI system identifier) and a description for each ePTI system. All the definitions in this document refer to this ePTI system list.

The ISO 20730 series 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 application protocol and data link framework requirements specified/referenced in the ISO 20730 series are structured according to Figure 1.

Figure 1 illustrates a standard-based documentation concept, which consists of the following main clusters:

- vehicle diagnostic communication framework: covers all relevant basic vehicle diagnostic communication specifications of OSI layers 7, 6 and 5;
- vehicle diagnostic communication use case framework: covers the master specification, which specifies the use cases and requirements of the subject matter of OSI layer 7;
- presentation layer framework: covers all data relevant specifications of OSI layer 6;
- conformance test plan: covers the conformance test plan requirements of the use cases and communication requirements of OSI layers 7, 6 and 5;
- lower OSI layer framework: covers all vehicle diagnostic protocol standards of OSI layers 4, 3, 2 and
 1, which are relevant and referenced by the use case specific standard.

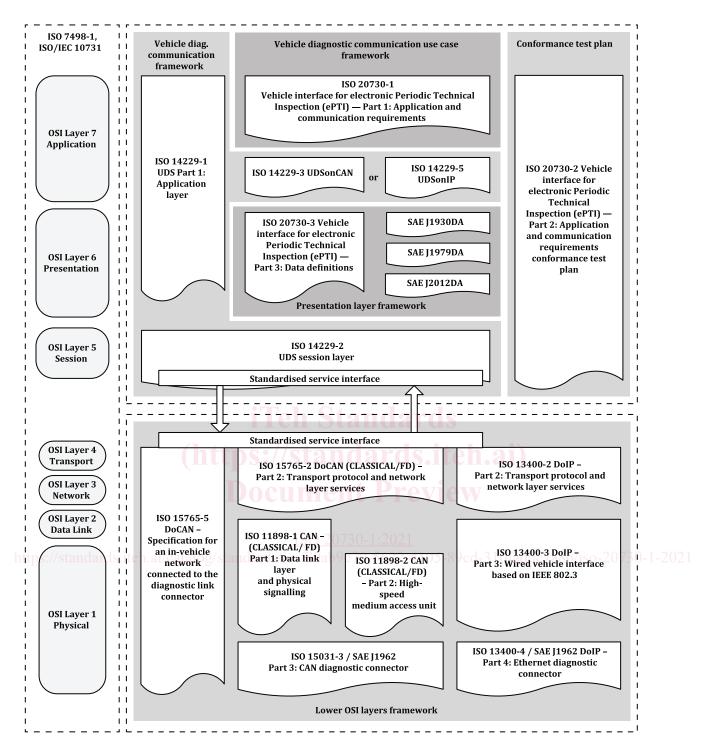


Figure 1 — ePTI document reference according to OSI model

Road vehicles — Vehicle interface for electronic Periodic Technical Inspection (ePTI) —

Part 1:

Application and communication requirements

1 Scope

This document is applicable to road vehicles, where the electronic vehicle interface is used to perform a test method that is part of a periodic technical inspection (ePTI).

This document describes use cases and specifies technical requirements in order to support the ePTI-relevant vehicle safety system(s) checks during the periodic technical inspection via the electronic interface. This document references the ISO 14229 series, the unified diagnostic services implemented on diagnostic communication over controller area network (DoCAN) and the Internet protocol (DoIP) along with the required provision of data definitions.

The technical requirements of diagnostic services and data definitions of emissions-related systems are specified in other International Standards, for example, ISO 15031 and ISO 27145. Other environmental systems' ePTI use cases and technical requirements can be considered in the future.

This document defines: ttps://standards.iteh.ai

- all requirements describing the vehicle-communication functionality via the diagnostic link connector related to ePTI, for example:
 - 1) discovery of the ePTI data link;
- https://sta 2) a discovery of the ePTI-relevant systems; 0-5622-4105-89cd-310faddc7a8b/iso-20730-1-2021
 - 3) query of ePTI-relevant systems' information, including software identification, software integrity, current and/or stored values;
 - 4) query of ePTI-relevant systems' error information;
 - 5) activation of ePTI-relevant systems' actuators or routines;
 - the use cases about the individual vehicle communication functionality, for example, query identification information, command functional test method.

This document does not directly specify any type of test method or pass/fail criteria of the ePTI-relevant system during a PTI, but provides data, which may support PTI test methods.

The document specifies:

- terminology;
- communication establishment between the ePTI external test equipment and the vehicle's ePTIrelevant systems;
- usage of a credentials-based authentication and authorisation mechanism between the ePTI external test equipment and the vehicle;
- protection against tampering of the defined ePTI methods;

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- definition of ePTI-relevant use cases:
 - ePTI external test equipment discovers available data identifier as specified in ISO 20730-3;
 - ePTI external test equipment queries the ePTI-relevant system's information, including software numbers, software integrity information, current and/or stored values, self-test completion status, system status, and error information (e.g. DTC and/or DID information);
 - ePTI external test equipment activates the ePTI-relevant system's actuators or routines;
- definition of ePTI-relevant technical requirements;
- ePTI external test equipment minimum requirements.

This document excludes:

- process definitions for performing the PTI check;
- process and data definitions for off-board data provision;
- standardised data exchange formats;
- validation and verification of vehicle safety systems according to vehicle manufacturer specifications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 11898-1, Road vehicles — Controller area network (CAN) — Part 1: Data link layer and physical signalling

ISO 11898-2, Road vehicles — Controller area network (CAN) — Part 2: High-speed medium access unit

ISO 13400-2, Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 2: Transport protocol and network layer services

ISO 13400-3, Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 3: Wired vehicle interface based on IEEE 802.3

ISO 13400-4, Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 4: Ethernet-based high-speed data link connector

ISO 14229-1, Road vehicles — Unified diagnostic services (UDS) — Part 1: Application layer

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

ISO 14229-3, Road vehicles — Unified diagnostic services (UDS) — Part 3: Unified diagnostic services on CAN implementation (UDSonCAN)

ISO 14229-5, Road vehicles — Unified diagnostic services (UDS) — Part 5: Unified diagnostic services on Internet Protocol implementation (UDSonIP)

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

ISO 15765-2, Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 2: Transport protocol and network layer services

ISO 15765-5¹⁾, Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 5: Specification for an in-vehicle network connected to the diagnostic link connector

ISO 19689, Motorcycles and mopeds — Communication between vehicle and external equipment for diagnostics — Diagnostic connector and related electrical circuits, specification and use

ISO 20730-3²⁾, Road vehicles — Vehicle interface for electronic Periodic Technical Inspection (ePTI) — Part 3: Data definitions

SAE J1939-13, Off-Board Diagnostic Connector

3 Terms and definitions

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

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

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

3.1

credentials

data that are transferred to establish the claimed identity of an entity

[SOURCE: ISO/IEC 2382:2015, 2126254, modified — The notes to entry have been deleted.]

3.2

electronic periodic technical inspection

standardised communication functionality utilising the electronic vehicle communication interface supporting the PTI (3.8)

3.3 ePTI external test equipment

test system external to the vehicle's diagnostic link connector, which uses serial communication to perform *ePTI-relevant system* (3.4) assessments, measurements and control functions

3.4

ePTI-relevant system

system which is able to perform a function required to be tested during the PTI (3.8)

Note 1 to entry: The *ePTI system list* (3.6), which is defined in ISO 20730-3, summarises safety-relevant systems which may be part of a PTI test.

Note 2 to entry: An ePTI-relevant system (3.4) consists of one or multiple ECUs with dedicated sensors and actuators.

3.5

ePTI inspection module

container of one or more use cases related to the same subject

¹⁾ Under preparation. Stage at the time of publication: ISO/FDIS 15765-5:2021.

²⁾ Under preparation. Stage at the time of publication: ISO/DIS 20730-3:2021.

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3.6

ePTI system list

list of ePTI-relevant systems (3.4)

Note 1 to entry: It contains a basis of defined electronic systems to be tested via the electronic vehicle interface as part of the PTI (3.8). The ePTI system list (3.6) specifies a defined name (system), a unique ID (ePTI system ID) and a description for each ePTI-relevant system.

3.7

ePTI system identifier

unique identifier for an ePTI-relevant system (3.4)

3.8

periodic technical inspection

PTI

roadworthiness testing at predefined intervals and authorized test facilities

Note 1 to entry: Roadworthiness testing is part of a wider regime designed to ensure that vehicles are kept in a safe and environmentally acceptable condition during their use.

[SOURCE: DIRECTIVE 2014/45/EC]

3.9

safety-relevant system

vehicle systems and components, that when not operating to their design criteria, affect the safety of the vehicle

3.10

system self-test completion status

finalised status of the on-board diagnosis of the ePTI-relevant system(s) (3.4)

3.11

technical classification

<use case> indication of the relevance of the use case related to the communication between the vehicle's ePTI-relevant system(s) (3.4) and the ePTI external test equipment (3.3) as specified in this document

3.12

use case

description of a system's behaviour as it responds to a request that originates from outside that system

[SOURCE: ISO 15118-1:2019, 3.1.71, modified — The notes to entry have been deleted.]

3.13

conditional

mandatory if a certain criterion is met

3.14

mandatory

keyword indicating an item that is required to be implemented as defined in this document to claim compliance with this document

[SOURCE: ISO/IEC 14776-113:2002, 3.3.3, modified — The word "standard" has been replaced by "document".]

3.15

optional

keyword indicating that the referenced item is not required to claim compliance with this document

Note 1 to entry: Implementation of an optional item should be as defined in this document.

[SOURCE: ISO/IEC 15205:2000, 2.1.23, modified — The wording "keyword indicating that" has been added; the word "standard" has been replaced by "document"; the last sentence in the definition has been moved to Note 1 to entry.]

Symbols and abbreviated terms

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

ВP basic principle

CANID CAN identifier

DID data identifier

ePTI electronic periodic technical inspection

ECU electronic control unit

ETE external test equipment

IM inspection module

MsgParam message parameter

N/A not applicable

NRC negative response code tandards.iteh.ai)

protocol data unit **PDU**

periodic technical inspection PTI

PosRspMsgParam positive response message parameter

requirement ds/iso/80ab9c70-5622-4105-89cd-310faddc7a8b/iso-20730-1-2021 https:/REOidards.iteh.ai/ca

ReqMsgParam request message parameter

RID routine identifier

RMI repair and maintenance information

SEO sequence

SF subFunction

UC use case

VIN vehicle identification number

VM vehicle manufacturer

5 How to read this document

5.1 Layout of the document

This subclause provides an overview about the structuring of the content of this document. Table 1 describes the layout of the main clauses in the document.

Table 1 — Layout of the document

Overview of vehicle system requirements	Clause/Subclause
Definition of ePTI inspection modules (IM) and basic principles (BP)	<u>Clause 6</u>
Definition of use cases (UC)	<u>Clauses 7</u> to <u>12</u>
Technical requirements versus use cases coverage matrix	Clause 13
Technical requirement statements to setup the vehicle data links	Clause 14
ePTI application layer requirements related to diagnostic services with message sequence implementation and examples	Clause 15

5.2 Use case structure explanation

Table 2 provides an overview about the use case structure and the elements accompanied by an example.

Table 2 — Use case structure

Title	Use case number – Use case name	
	EXAMPLE UC 4.1 – Query vehicle identification number.	
Actor	Entity in charge of performing the operation in the use case	
	EXAMPLE ePTI external test equipment.	
Goal	Definition of the purpose and objective of the use case	
	EXAMPLE UC 4.1 – Query vehicle identification number.	
Input	Definition of input information required to start the purpose and objective of the use case	
	EXAMPLE VIN data identifier.	
Output	Definition of output information expected to achieve the purpose and objective of the use	
https://standarc	case Supplied to the control of the	
Description	Detailed description of the sequence of steps to be performed to achieve the purpose and objective of the use case	
	EXAMPLE The ePTI external test equipment requests the VIN. The vehicle responds with the VIN.	
Technical classification	Indication of the relevance of the use case related to communication between the vehicle's ePTI-relevant system(s) and the ePTI external test equipment (mandatory/conditional/optional).	

5.3 Requirements statement structure

A requirement statement is indicated by the following notation:

- REQ: requirement statement indication;
- X = main requirement statement number;
- Y = sub requirement statement number.

NOTE 1 A requirement statement table does not have a table title.