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

**Part 2:
Application and communication
requirements conformance test plan**

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

*Partie 2: Plan de test de conformité aux exigences des couches
application et communication*

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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).

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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: www.iso.org/01-a3e2-697d7453ecc3/iso-20730-2-2022.

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 20730-3:2021, 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: details the objectives, resources, and processes to test 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.

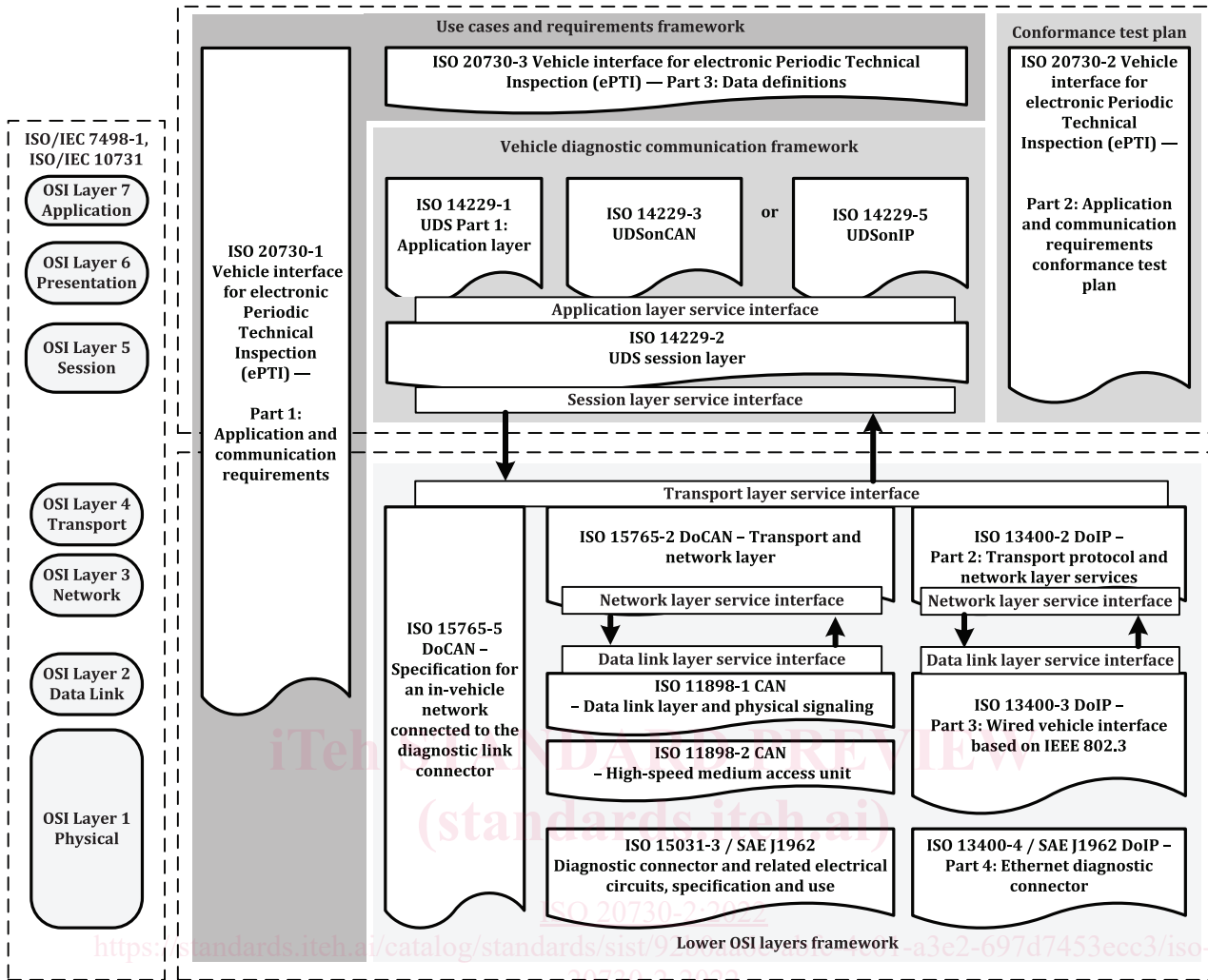


Figure 1 — ePTI document reference according to OSI model

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

Part 2: Application and communication requirements conformance test plan

1 Scope

This document specifies the conformance test plan for the communication requirements stated in ISO 20730-1 of road vehicles' ePTI-relevant systems and associated measurement and control data as specified in ISO 20730-3, which are subject to the usage of the electronic vehicle interface during the periodic technical inspection (ePTI).

The conformance test plan specifies test requirements and expected response behaviour of the system under test (SUT) to verify conformance of a vehicle with respect to ISO 20730-1 and ISO 20730-3 requirements.

This document provides technical information that test results are identical even on different test systems, if the particular test suite and the test system are compliant to the content of this document.

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

ISO 14229-1:2020, *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 20730-1:2021, *Road vehicles — Vehicle interface for electronic Periodic Technical Inspection (ePTI) — Part 1: Application and communication requirements*

ISO 20730-3:2021, *Road vehicles — Vehicle interface for electronic Periodic Technical Inspection (ePTI) — Part 3: Data definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13400-2, ISO 14229-1, ISO 14229-2, ISO 20730-1, ISO 20730-3 and the following apply.

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

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

**3.1
implementation under test**

implementation of one or more OSI protocols in an adjacent user/provider relationship, being the part of a real open system which is to be studied by testing

[SOURCE: ISO/IEC 9646-1:1994, 3.3.43]

**3.2
operational**

in respective diagnostic session, authenticated, authorized state, and pre-conditions to execute the respective diagnostic service, DID(s), and RID(s)

**3.3
REPEAT**

pseudo code command for an iteration

**3.4
REPEAT END**

pseudo code command for ending an iteration

**3.5
system under test**

real open system in which the IUT resides

[SOURCE: ISO/IEC 9646-1:1994, 3.3.103]

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4 Abbreviated terms

AL	application layer
CAN	controller area network ISO 20730-2:2022
CTC	conformance test case https://standards.iteh.ai/catalog/standards/sist/92b0aa6e-abfc-4c01-a3e2-697d7453ecc3/iso-20730-2-2022
CTG	conformance test group
CTP	conformance test plan
DID	data identifier
DLC	data link connector
DoCAN	diagnostic communication over CAN
DoIP	diagnostic communication over Internet Protocol
ECU	electronic control unit
ICS	implementation conformance statements
IOCT_DID	input/output control data identifier
IUT	implementation under test
LT	lower tester
N_AI	network address information
OSI	open system interconnection

PCO	point of control and observation
RID	routine identifier
SA	source address
SUT	system under test
UT	upper tester

5 Conventions

This document is based on OSI service conventions as specified in ISO/IEC 10731 and ISO 9646-1^[3] for conformance test system setup.

6 General test specification considerations

6.1 General

This document covers the conformance test cases (CTC) to verify the requirements specified in ISO 20730-1 and ISO 20730-3.

6.2 Test conditions

The conformance tests shall be performed at a temperature in the range of -20 °C to +40 °C.

An initialisation of the IUT shall be performed before each CTC.

6.3 SUT (vehicle) requirements

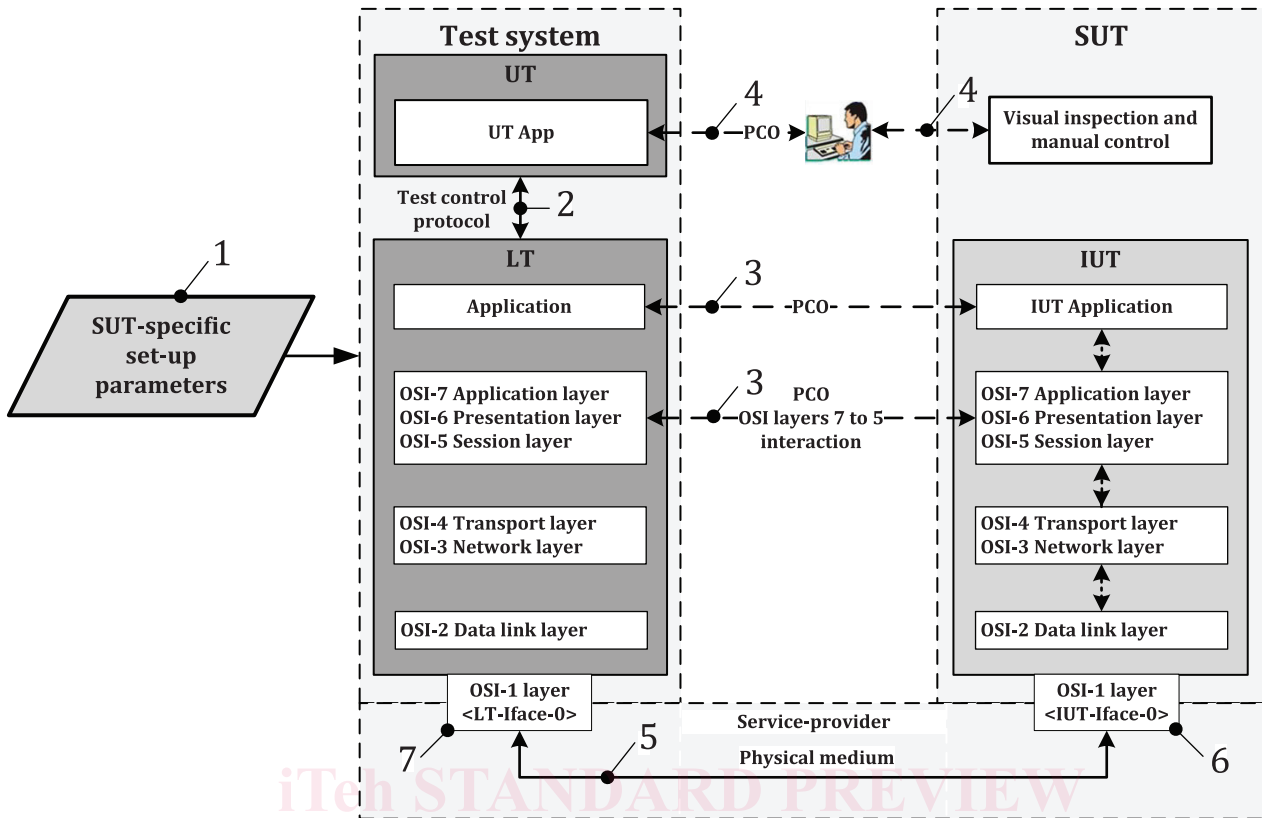
The SUT shall be initialised in the CTC respectively.

6.4 Test system topology

The test system topology follows the ISO 9646-1^[3] and consists of a test setup which consists of a test system and a system under test (SUT) connected via the physical medium via LT communication interface (LT-Iface-0) and the SUT communication interface (IUT-Iface-0). The test system implements an UT and a LT. The UT uses the test control protocol (Figure 2, key 2) to control the LT. The LT supports the functionality required to test the OSI layer (Figure 2, key 3) of the IUT. The test system uses SUT-specific set-up parameters (Figure 2, key 1) for testing the communication with the SUT.

The control and measurement functionality is provided by direct logical access to the service interface (dashed line) (Figure 2, key 3) and the associated parameters of the OSI layer. The UT application instructs the inspector via the point of control and observation (PCO) (Figure 2, key 3) to perform visual inspection and manual control in the SUT (Figure 2, key 4).

The test system uses SUT-specific set-up parameters (Figure 2, key 1), e.g. ISO 20730-1 protocol and ISO 20730-3 data parameters, routine identifiers, and other vehicle manufacturer-specific parameters for testing the communication with the IUT.



- 1 SUT-specific set-up parameters for the test system (SUT electronic data sheet)
- 2 test control protocol (interface between UT and LT)
- 3 points of control and observation (PCO) performed by test operator
- 4 UT human machine interface to provide control instructions and visual inspection feedback by test system operator
- 5 data link connector (DLC) cable
- 6 IUT-Iface-0 physical interface represented by the vehicle's diagnostic link connector referenced in ISO 20730-1
- 7 LT-Iface-0 physical interface represented by the test system's diagnostic link connector

Figure 2 — Test system setup

6.5 Configuration of test system and SUT

The test system uses SUT-specific set-up parameters (Figure 2, key 1) to execute conformance test cases.

The SUT-specific set-up parameters specify at least the following information:

- IUT (ePTI-relevant ECUs installed in the SUT) supported application layer protocol: ISO 20730-1;
- supported protocol(s):
 - DoIP: ISO 13400-2, ISO 13400-3,
 - DLC: ISO 13400-4,
 - CAN: ISO 11898-1, ISO 11898-2,
 - DoCAN: ISO 15765-2, ISO 15765-5,

- DLC: ISO 15031-3,
- DLC: ISO 19689, and
- DLC: SAE J1939-13 (Type 2).
- test system address (ePTI external test equipment) information as specified in ISO 20730-1;
- ePTI-relevant ECU(s) address information as specified in ISO 20730-1;
- application layer protocol timing information as specified in ISO 20730-1;
- data definitions as specified in ISO 20730-3.

6.6 CTC definition

Each CTC is defined in the structure as specified in [Table 1](#). The "Step #" and "Expected response" is the equivalent of an "ICS" (implementation conformance statement).

Table 1 — CTC definition example

Item	Content
OSI#.Name	[OSI layer #].CTC_[number_name] EXAMPLE 8.CTC_1.1 APP - Test DoCAN protocol
Purpose	This CTC verifies that, e.g. the IUT supports the DoCAN protocol on the diagnostic data link connector.
Reference	ISO 20730-1:2021, 14.1: <ul style="list-style-type: none"> — REQ 8.1 APP – Setup vehicle's DoCAN data link framework – DoCAN diagnostic link connector; — REQ 8.2 APP – Setup vehicle's DoCAN data link framework –DoCAN connection on diagnostic link connector; — ... ISO 20730-1:2021, 15.3.1: <ul style="list-style-type: none"> — REQ 7.8 AL – Report ePTI-relevant system(s) – General requirement; — ... ISO 20730-3:2021, B.1, Table B.1: <ul style="list-style-type: none"> — DID_SUPP_SYS (supported ePTI Systems); NOTE This information is the symbolic name for that requirement which is used in ISO 20730-3. In some cases the references to requirements in ISO 20730-1 include text in parenthesis. <ul style="list-style-type: none"> — ...
Prerequisite	The SUT (vehicle) shall: <ul style="list-style-type: none"> — be in ignition RUN (position II); — have all ePTI-relevant ECUs operational.
Setup	The test system setup shall be in accordance with Figure 2 . The test system shall be parameterized in accordance with the SUT-specific set-up parameters as specified in 8.2 . The IUT shall be in DEFAULT_SESSION state. The UT shall initialize the LT with the IUT-specific set-up parameters.
Step	1. The LT shall transmit a request message via the LT-Iface-0 to the IUT-Iface-0. 2. The LT shall report the received information from the IUT to the UT.

Table 1 (continued)

Item	Content
Iteration	Definition of repetitions of test procedure steps. If no repetitions required state: "Not applicable" REPEAT step 1 to step 2, n times ... REPEAT END
Expected response	After step 1 the IUT responds with the — ...
Remark	For example, if no remark "None" or if a remark is included start with "Observation of"

IMPORTANT — All conformance test cases reference the requirements stated in ISO 20730-1:2021, ISO 20730-3:2021, and ISO 9646-1:1994,^[3] 5.6, which states "To evaluate the conformance of a particular system, it is necessary to have a statement of the capabilities and options which have been implemented, for each specification which is supported, so that the system can be tested for conformance test against relevant requirements, and against those requirements only. Such a statement is called implementation conformance statements (ICS)."

7 Basic principles and conformance test groups

7.1 Basic principles

BP1: The CTCs specified in this document are independent of the technical classification specified in each use case defined in ISO 20730-1.

BP2: The CTCs specified in this document only cover standardized diagnostic services specified in ISO 20730-1 and data parameters specified in ISO 20730-3.

BP3: The CTC test sequence is given by the sequence of CTC_X.Y as specified in this document.

BP4: The conformance test plan (CTP) only specifies CTCs which provide a positive "expected response".

BP5: The LT performs IUT application layer to session layer testing, e.g. request/response message behaviour. The LT does not interpret any data following the service identifier of the response message.

BP6: The UT performs IUT application data interpretation to be reported as CTC result(s).

7.2 Conformance test groups

[Table 2](#) provides an overview of the main conformance test groups and associated conformance test cases.

Table 2 — CTGs and associated CTCs

CTG_	CTG name	CTC name
1	CTG_1 – Test data link discovery	8.CTC_1.1 – Test DoCAN protocol and supported ePTI-relevant system(s)
		8.CTC_1.2 – Test DoIP protocol and supported ePTI-relevant system(s)
2	CTG_2 – Test authentication	7.CTC_2.1 – Test ePTI external test equipment authentication
		7.CTC_2.2 – Test ECU(s) authentication
3	CTG_3 – Test supported ePTI-relevant ECU DID(s), RID(s), and IOCT_DID(s)	7.CTC_3.1 – Test supported ECU data identifier(s)
		7.CTC_3.2 – Test supported ECU routine identifier(s)
		7.CTC_3.3 – Test supported ECU input/output control identifier(s)