SLOVENSKI STANDARD
oSIST prEN ISO 15118-4:2021

01-november-2021

Cestna vozila - Komunikacijski vmesnik med vozilom in omrežjem - 4. del: Preskus skladnosti omrežja in aplikacijskega protokola (ISO/DIS 15118-4:2021)

Road vehicles - Vehicle to grid communication interface - Part 4: Network and application protocol conformance test (ISO/DIS 15118-4:2021)

Straßenfahrzeuge - Kommunikationsschnittstelle zwischen Fahrzeug und Ladestation - Teil 4: Konformitätsprüfungen für das Netzwerk- und Anwendungsprotokoll (ISO/DIS 15118-4:2021)

Véhicules routiers - Interface de communication entre véhicule et réseau électrique - Partie 4: Test de conformité du protocole d'application et du réseau (ISO/DIS 15118-4:2021)

Ta slovenski standard je istoveten z: **prEN ISO 15118-4**

ICS:

35.100.05	Večslojne uporabniške rešitve	Multilayer applications
43.040.15	Avtomobilska informatika. Vgrajeni računalniški sistemi	Car informatics. On board computer systems

oSIST prEN ISO 15118-4:2021 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 15118-4

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Road vehicles — Vehicle to grid communication interface —

Part 4:
Network and application protocol conformance test

Véhicules routiers — Interface de communication entre véhicule et réseau électrique —

Partie 4: Test de conformité du protocole d'application et du réseau

ICS: 43.120

Member bodies are requested to consult relevant national interests in IEC/TC 69 before casting their ballot to the e-Balloting application.

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

IMPORTANT — Please use this updated version dated 2020-09-23, and discard any previous version of this DIS. Note that the IEC logo has been added.

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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*.

This second edition cancels and replaces the first edition (ISO 15118-4:2018), which has been technically revised.

The main changes compared to the previous edition are as follows:

— Test control section removed to align with more atomic testing approach (7.3.5 in Ed. 1);

— Quality and readability of all Figures improved;

— General error corrections and/or improvements for better consistency in test objective descriptions in Clauses 8, 9 and 10;

— General error corrections and /or improvements for better consistency in TTCN-3 test case specification in the Annexes;

— New Clause on reliability and robustness test cases added (Clause 11 and Annex E).

A list of all parts in the ISO 15118 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

The first three parts of ISO 15118 describe the use cases and the technical specification of the vehicle-to-grid communication Interface which is intended for the optimized use of energy resources so that electric road vehicles can recharge in the most economic or most energy efficient way. It is furthermore required to develop efficient and convenient billing systems in order to cover the resulting micro-payments. The necessary communication channel may serve in the future to contribute to the stabilization of the electrical grid as well as to support additional information services required to operate electric vehicles efficiently and economically.

The complexity resulting from the network and application protocol requirements defined in the second part of the standard requires a considerable amount of testing in order to enable interoperability between independent implementations. This part of the standard therefore defines a conformance test suite for the network and application layer protocols in order to derive a common and agreed basis for conformance tests. The resulting test suite is a necessary prerequisite for downstream interoperability tests. Since interoperability furthermore involves the actual application logic of an implementation those tests are beyond the scope of this standard. Hence this standard focuses on the interface aspects and the corresponding requirements given in part two only.

Road vehicles — Vehicle to grid communication interface — Part 4: Network and application protocol conformance test

1 Scope

This document specifies conformance tests in the form of an abstract test suite (ATS) for a system under test (SUT) implementing an EVCC or SECC according to ISO 15118-2. These conformance tests specify the testing of capabilities and behaviors of an SUT as well as checking what is observed against the conformance requirements specified in ISO 15118-2 and against what the supplier states the SUT implementation's capabilities are.

The capability tests within the ATS check that the observable capabilities of the SUT are in accordance with the static conformance requirements defined in ISO 15118-2. The behavior tests of the ATS examine an implementation as thoroughly as is practical over the full range of dynamic conformance requirements defined in ISO 15118-2 and within the capabilities of the SUT (see NOTE).

A test architecture is described in correspondence to the ATS. The conformance test cases in this part of the standard are described leveraging this test architecture and are specified in TTCN-3 Core Language for ISO/OSI Network Layer (Layer 3) and above. The conformance test cases for the Data Link Layer (Layer 2) and Physical Layer (Layer 1) are described in Part 5 of this standard. Test cases with overlapping scopes are explicitly detailed.

This document does not include specific tests of other standards referenced within ISO 15118-2, e.g. IETF RFCs. Furthermore, the conformance tests specified in this International Standard do not include the assessment of performance nor robustness or reliability of an implementation. They cannot provide judgments on the physical realization of abstract service primitives, how a system is implemented, how it provides any requested service, nor the environment of the protocol implementation. Furthermore, the test cases defined in this standard only consider the communication protocol defined ISO 15118-2. Power flow between the EVSE and the EV is not considered.

NOTE 1 Practical limitations make it impossible to define an exhaustive test suite, and economic considerations may restrict testing even further. Hence, the purpose of this part is to increase the probability that different implementations can interwork. This is achieved by verifying them by means of a protocol test suite, thereby increasing the confidence that each implementation conforms to the protocol specification. However, the specified protocol test suite cannot guarantee conformance to the specification since it detects errors rather than their absence. Thus, conformance to a test suite alone cannot guarantee interworking. What it does do is give confidence that an implementation has the required capabilities and that its behavior conforms consistently in representative instances of communication.

NOTE 2 This standard has some interdependencies to the conformance tests defined in ISO 15118-5 which result from ISO/OSI cross layer dependencies in the underlying protocol specification (e.g. for sleep mode)

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 15118-2:2014, *Road vehicles — Vehicle-to-Grid Communication Interface — Part 2: Network and application protocol requirements*

ISO 15118-3, *Road vehicles — Vehicle-to-Grid Communication Interface — Part 3: Physical and data link layer requirements*

IEC 61851-1:2017, *Electric vehicle conductive charging system — Part 1: General requirements (Ed 3.0, 2017)*

ITU-T X.290, *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications — General concepts (April 1995)*

ETSI ES 201 873-5 V4.6.1, *TTCN-3: TTCN-3 Runtime Interface (June 2014)*

ETSI ES 201 873-6 V4.6.1, *TTCN-3: TTCN-3 Control Interface (June 2014)*

NOTE 1 Even though the technical specification ISO 15118-2:2014, which is the baseline for this conformance test document, explicitly references IEC 61851-1:2011 Edition 2, this document references IEC 61851-1:2017 Edition 3 because of applicability on the market.

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 15118-1, ISO 15118-2, ISO 15118-3 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
abstract test case
complete and independent specification of the actions required to achieve a specific test purpose

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: This specification is defined at the level of abstraction of a particular Abstract Test Method, starting in a stable testing state and ending in a stable testing state and may involve one or more consecutive or concurrent connections.

Note 3 to entry: The specification should be complete in the sense that it is sufficient to enable a test verdict to be assigned unambiguously to each potentially observable test outcome (i.e. sequence of test events).

Note 4 to entry: The specification should be independent in the sense that it should be possible to execute the derived executable test case in isolation from other such test cases (i.e. the specification should always include the possibility of starting and finishing in the “idle” state).

3.2
abstract test suite
ATS
test suite composed of abstract test cases

Note 1 to entry: See ITU-T X.290.

3.3
black box testing
method of testing that examines the behavior of an SUT without considering the internal implementation and structure of the SUT, thus relying on the SUT's open interface for testing

3.4
conformance requirements
conformance of a real system consisting of conformance to each requirement and conformance to the set

Note 1 to entry: Set of interrelated requirements which together define the behavior of the system and its communication. Conformance of a real system will, therefore, be expressed at two levels, conformance to each individual requirement and conformance to the set. Applicable ISO 15118-4 conformance tests include requirements and transfer syntax requirements as far as they can be validated by black box testing.

Note 2 to entry: See also *static conformance requirements* (3.4) and *dynamic conformance requirements* (3.6).

3.5
conforming implementation
IUT which satisfies both static and dynamic conformance requirements, consistent with the capabilities stated in the PICS(s)

Note 1 to entry: See ITU-T X.290.

3.6
dynamic conformance requirements
one of the requirements which specifies what observable behavior is permitted by the relevant specification(s) in instances of communication

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The requirements for this conformance specification are defined in ISO 15118-2.

3.7
executable test case
realization of an abstract test case

Note 1 to entry: See ITU-T X.290.

3.8
expected behavior
exact response of the SUT according to the underlying protocol specification to the stimulus defined in the test behavior

3.9
implementation conformance statement
ICS
statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The given document for this conformance specification is ISO 15118-2.

3.10
implementation extra information for testing
IXIT
statement made by a supplier or implementer of an IUT which contains or references all information (in addition to that given in the ICS) related to the IUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the IUT

Note 1 to entry: See ITU-T X.290.

3.11
implementation under test
IUT
implementation of one or more OSI protocols in an adjacent user/provider relationship, being part of a real open system, which is to be studied by testing

Note 1 to entry: See ITU-T X.290.

3.12
main test component
MTC
single test component in a test component configuration responsible for creating and controlling *parallel test components* and computing and assigning the test verdict

Note 1 to entry: See ITU-T X.292.

3.13
parallel test component
PTC
test component created by the main test component

Note 1 to entry: See ITU-T X.292.

3.14
post-condition
test steps needed to define the path from the end of the *test behavior* up to the finishing stable state for the test case

Note 1 to entry: See also *test behavior* (3.23).

3.15
pre-condition
test steps needed to define the path from the starting stable state of the test case up to the initial state from which the *test bevavior* will start

Note 1 to entry: See also *test behavior* (3.23).

3.16
protocol implementation conformance statements
PICS
ICS for an implementation or system claimed to conform to a given protocol specification

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The given protocol document for this conformance specification is ISO 15118-2.

3.17
protocol implementation extra information for testing
PIXIT
IXIT related to testing for conformance to a given protocol specification

Note 1 to entry: See ITU-T X.290.

Note 2 to entry: The given protocol document for this conformance specification is ISO 15118-2.

3.18
runtime environment
an environment that describes the operating system and corresponding platform requirements of a system

EXAMPLE Test system.

3.19
semantically invalid test behavior
SemITB
test steps where the test system sends stimuli to the SUT that are semantically invalid according to the protocol requirements

Note 1 to entry: This type of test behavior is defined in this conformance standard and explicitly includes requirements which define the appropriate error handling of the SUT.

3.20
static conformance requirements
one of the requirements that specify the limitations on the combinations of implemented capabilities permitted in a real open system which is claimed to conform to the relevant specification(s)

Note 1 to entry: See ITU-T X.290.

3.21
system under test
SUT
real open system in which the IUT resides

Note 1 to entry: See ITU-T X.290.

3.22
syntactically invalid test behavior
SynITB

test steps where the test system sends stimuli to the SUT that are syntactically invalid according to the protocol requirements

Note 1 to entry: This type of test behavior is not defined in this conformance standard, see codec requirements.

3.23
test behavior
set of test steps (test body) which are essential in order to achieve the test purpose and assign verdicts to the possible outcomes

3.24
test execution
interpretation or execution of an abstract test suite

Note 1 to entry: Conceptually, the TE can be decomposed into three interacting entities: an Executable Test Suite (ETS), a Test Framework (TFW) and an optional internal Encoding/Decoding System (EDS) entity.

Note 2 to entry: See also ETSI ES 201 873-5 V4.6.1.

3.25
test framework
TFW
an entity to perform all actions of test cases or functions

Note 1 to entry: The Test Framework interacts with the test management (TM), SUT adaptor (SA) and platform adaptor (PA) entities via test control interface (TCI) and test runtime interface (TRI) and additionally manages the executable test suite (ETS) and encoding/decoding system (EDS) entities. It initializes adaptors as well as ETS and EDS entities. This entity