



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 15118-21:2024**  
**01-junij-2024**

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**Cestna vozila - Komunikacijski vmesnik med vozilom in omrežjem - 21. del: Načrt preskusa skladnosti z zahtevami za skupno omrežno in aplikacijsko plast druge generacije (ISO/DIS 15118-21:2024)**

Road vehicles - Vehicle to grid communication interface - Part 21: Common 2nd generation network layer and application layer requirements conformance test plan (ISO/DIS 15118-21:2024)

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Véhicules routiers - Interface de communication entre véhicule et réseau électrique - Partie 21: Plan de test de conformité aux exigences communes de la couche réseau et de la couche application de 2ème génération (ISO/DIS 15118-21:2024)

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**Ta slovenski standard je istoveten z: prEN ISO 15118-21**

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**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 15118-21:2024**

**en,fr,de**





# DRAFT International Standard

## ISO/DIS 15118-21

### Road vehicles — Vehicle to grid communication interface —

#### Part 21: Common 2nd generation network layer and application layer requirements conformance test plan

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

*Partie 21: Plan de test de conformité aux exigences communes de  
la couche réseau et de la couche application de 2ème génération*

ICS: 43.120 [ds.iteh.ai/catalog/standards/sist/b37b8cc0-8920-4064-83cc-264d833e4eff/osist-pren-iso-15118-21-2024](https://standards.iteh.ai/catalog/standards/sist/b37b8cc0-8920-4064-83cc-264d833e4eff/osist-pren-iso-15118-21-2024)

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### Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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 document 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](http://www.iso.org/directives) or [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs)).

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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](http://www.iso.org/iso/foreword.html). In the IEC, see [www.iec.ch/understanding-standards](http://www.iec.ch/understanding-standards).

This document was prepared jointly by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*, and Technical Committee IEC/TC 69, *Electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks*.

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](http://www.iso.org/members.html) and [www.iec.ch/national-committees](http://www.iec.ch/national-committees).

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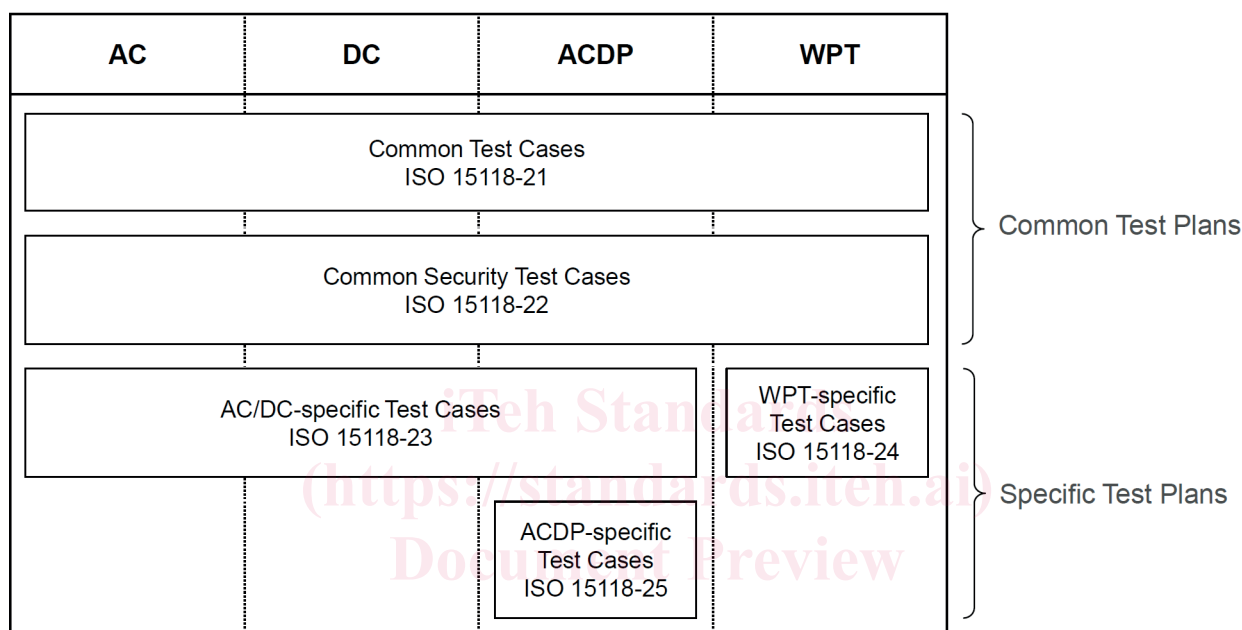
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### Introduction

Resulting from the 2nd generation network layer and application layer requirements for the vehicle to grid communication interface specified in ISO 15118-20, a corresponding set of abstract test cases is necessary to verify the conformance of implementations. Hence, this document specifies a conformance test suite for the 2nd generation network layer and application layer protocols in order to derive a common basis for conformance tests. The resulting test suite is a prerequisite for downstream interoperability tests. Since interoperability furthermore involves the actual application logic of an implementation, those tests are beyond the scope of this document. Hence, this document focuses on the interface aspects and the corresponding requirements given in ISO 15118-20 only.

The layered structure of the conformance test documents with reference to ISO 15118-20 is shown in [Figure 1](#). The complete set of relevant conformance test documents per charging type is composed of all the documents within its column according to [Figure 1](#).



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<https://standards.iso.org/iso/15118-21-2024> **Figure 1 — Overview of mandatory set of conformance test plan documents per charging type**

Example For a SUT supporting DC-charging the following conformance test plan documents apply:

- Common Test Cases specified in ISO 15118-21
- Common Security Test Cases specified in ISO 15118-22
- AC/DC specific Test Cases specified in ISO 15118-23 (only DC-specific subset applies)



# Road vehicles — Vehicle to grid communication interface —

## Part 21:

# Common 2nd generation network layer and application layer requirements conformance test plan

## 1 Scope

This document specifies conformance tests in the form of an abstract test suite (ATS) for a system under test (SUT) implementing an electric-vehicle or supply-equipment communication controller (EVCC or SECC) for all common requirements that are independent of a particular charging type (AC, DC, ACD, WPT charging) according to ISO 15118-20 and against the background of ISO 15118-1. These conformance tests specify the testing of capabilities and behaviours of an SUT, as well as checking what is observed against the conformance requirements specified in ISO 15118-20 and against what the implementer 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 specified in ISO 15118-20. The behaviour tests of the ATS examine an implementation as thoroughly as practical over the full range of dynamic conformance requirements specified in ISO 15118-20 and within the capabilities of the SUT (see NOTE 1).

A test architecture is described in correspondence to the ATS. The abstract test cases in this document are described leveraging this test architecture and are specified in descriptive tabular format covering the ISO/OSI layer 3 to 7 (network to application layers).

In terms of coverage, this document only covers normative sections and requirements in ISO 15118-20. This document can additionally refer to specific tests for requirements on referenced standards (e.g. IETF RFCs, W3C Recommendation, etc.) as long as they are relevant in terms of conformance for implementations according to ISO 15118-20. However, it is explicitly not intended to widen the scope of this conformance specification to such external standards, if it is not technically necessary for the purpose of conformance testing for ISO 15118-20. Furthermore, the conformance tests specified in this document 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 abstract test cases specified in this document only consider the communication protocol and the system's behaviour specified in ISO 15118-20. The power flow between the EVSE and the EV is not considered.

**NOTE 1** Practical limitations make it impossible to specify an exhaustive test suite, and economic considerations can restrict testing even further. Hence, the purpose of this document is to increase the probability that different implementations are able to 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. Instead, it gives confidence that a conforming implementation has the required capabilities and that its behaviour conforms consistently in representative instances of communication.

**NOTE 2** This document generally refers to system under test (SUT) instead of implementation under test (IUT), due to the black box testing paradigm adopted in this document and related certification processes.

**NOTE 3** This document has some interdependencies to the conformance tests specified in ISO 15118-5 and ISO 15118-9 which result from ISO/OSI cross layer dependencies in the underlying protocol specification (e.g. for sleep mode).

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### 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 15118-1:2019, *Road vehicles — Vehicle to grid communication interface — Part 1: General information and use-case definition*

ISO 15118-3:2015, *Road vehicles — Vehicle to grid communication interface — Part 3: Physical and data link layer requirements*

ISO 15118-5:2018, *Road vehicles — Vehicle to grid communication interface — Part 5: Physical layer and data link layer conformance test*

ISO 15118-8:2020, *Road vehicles — Vehicle to grid communication interface — Part 8: Physical layer and data link layer requirements for wireless communication*

ISO 15118-9:2022, *Road vehicles — Vehicle to grid communication interface — Part 9: Physical and data link layer conformance test for wireless communication*

ISO/DIS 15118-10:2023, *Road vehicles — Vehicle to grid communication interface — Part 10: Physical layer and data link layer requirements for single-pair Ethernet*

ISO 15118-20:2022, *Road vehicles — Vehicle to grid communication interface — Part 20: 2nd generation network layer and application layer requirements*

IEC 61851-1:2017, *Electric vehicle conductive charging system - Part 1: General requirements*

ETSI ES 201 873-5 V4.9.1<sup>1)</sup>, *Methods for Testing and Specification (MTS) — The Testing and Test Control Notation version 3 — Part 5: TTCN-3 Runtime Interface (TRI) (April 2022)*

ETSI ES 201 873-6, V4.13.1<sup>2)</sup>, *Methods for Testing and Specification (MTS) — The Testing and Test Control Notation version 3 — Part 6: TTCN-3 Control Interface (TCI) (April 2022)*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15118-1, ISO 15118-3, ISO 15118-8, ISO 15118-10, ISO 15118-20 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

##### **abstract test case**

complete and independent specification of the actions required to achieve a specific *test purpose* (3.25)

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 can involve one or more consecutive or concurrent connections.

1) Available at [https://www.etsi.org/deliver/etsi\\_es/201800\\_201899/20187305/04.09.01\\_60/es\\_20187305v040901p.pdf](https://www.etsi.org/deliver/etsi_es/201800_201899/20187305/04.09.01_60/es_20187305v040901p.pdf).

2) Available at [https://www.etsi.org/deliver/etsi\\_es/201800\\_201899/20187306/04.13.01\\_60/es\\_20187306v041301p.pdf](https://www.etsi.org/deliver/etsi_es/201800_201899/20187306/04.13.01_60/es_20187306v041301p.pdf).

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Note 3 to entry: The specification is to 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 is independent in the sense that it is possible to execute the derived executable test case in isolation from other such test cases (i.e. the specification always includes the possibility of starting and finishing in the “idle” state).

### 3.2

#### **abstract test suite**

##### **ATS**

test suite composed of *abstract test cases* (3.1)

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

### 3.3

#### **black box testing**

method of testing that examines the behaviour of an *SUT* (3.20) without considering the internal implementation and structure of the SUT, thus relying on the SUT's open interface for testing

### 3.4

#### **conformance requirement**

requirement for implementation of a real open system which is claimed to conform to the relevant specification(s) that can be validated by *black box testing* (3.3)

Note 1 to entry: The set of conformance requirements together define the behavior of the system and its communication. Conformance of a real open system will, therefore, be expressed at two levels, conformance to each individual requirement and conformance to the set. In this document, applicable conformance tests include requirements as far as they can be validated by *black box testing* (3.3).

Note 2 to entry: See also *static conformance requirements* (3.20) and *dynamic conformance requirements* (3.6).

Note 3 to entry: The requirements for this conformance specification are specified in ISO 15118-20.

### 3.5

#### **conforming implementation**

SUT which satisfies both *static conformance requirements* (3.19) and *dynamic conformance requirements* (3.6), consistent with the capabilities stated in the PICS(s)

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

### 3.6

#### **dynamic conformance requirement**

requirement 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 specified in ISO 15118-2.

### 3.7

#### **executable test case**

realization of an *abstract test case* (3.1)

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

### 3.8

#### **expected behavior**

exact response of the *SUT* (3.20) according to the underlying protocol specification to the stimulus defined in the *test behavior* (3.21)

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### 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 *SUT* (3.20) which contains or references all information (in addition to that given in the *ICS* (3.9)) related to the *SUT* and its testing environment, which will enable the test laboratory to run an appropriate test suite against the *SUT*

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 *MTC* (3.12)

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* (3.21) up to the finishing stable state for the *abstract test case* (3.1)

### 3.15 pre-condition

test steps needed to define the path from the starting stable state of the *abstract test case* (3.1) up to the initial state from which the *test behavior* (3.21) will start

### 3.16 protocol implementation conformance statement PICS

*ICS* (3.9) 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 15118-20.

Note 3 to entry: In the context of this document, PICS specify the configuration of the Test System (e.g. what test cases need to be executed and what configuration is required for each testcase)

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### 3.17

#### protocol implementation extra information for testing

##### PIXIT

*I*XIT (3.10) 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 15118-20.

Note 3 to entry: In the context of this document, PIXIT specify the configuration of the System under Test (SUT) (e.g. what protocol options are implemented and what configuration is required for each testcase)

### 3.18

#### runtime environment

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

EXAMPLE Test system.

### 3.19

#### static conformance requirement

requirement that specifies 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.

Note 2 to entry: The requirements for this conformance specification are specified in ISO 15118-20.

### 3.20

#### system under test

##### SUT

real open system in which the *I*UT (3.11) resides

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

### 3.21

#### 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

### 3.22

#### test control interface

##### TCI

four interfaces that define the interaction of the TTCN-3 executable with the test management, the coding and decoding, the test component handling and the logging in a test system

Note 1 to entry: See ETSI ES 201 873-6 V4.6.1.

### 3.23

#### test execution

##### TE

interpretation or execution of an *abstract test suite* (3.2)

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.

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### 3.24

#### test framework

##### TFW

an entity to perform all actions of *executable test cases* (3.7) 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 performs all the actions necessary to properly start the execution of a test case or function with parameters in the ETS entity. It queries the TM entity for module parameter values required by the ETS and sends logging information to it. It also collects and resolves associated verdicts returned by the ETS entity.

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

Note 3 to entry: In this document, the test framework TTCN-3 runtime system (T3RTS) is used to explain a test framework functionality.

### 3.25

#### test purpose

prose description of a well-defined objective of testing, focusing on a single *static conformance requirement* (3.19) or *dynamic conformance requirement* (3.6) or a set as specified in the appropriate OSI specification

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

EXAMPLE Verifying the support of a specific value of a specific parameter.

### 3.26

#### test system

real system combining the *test framework* (3.24), *abstract test suite* (3.2), *test execution* (3.23) and adaptors as well as codecs

Note 1 to entry: Typically also containing a common runtime environment based on an operating system.

### 3.27

#### test runtime interface

##### TRI

two interfaces that define the interaction of the TTCN-3 executable between the SUT and the platform adaptor (PA) and the system adaptor (SA) in a *test system* (3.26)

Note 1 to entry: See ETSI ES 201 873-6 V4.6.1.

### 3.28

#### test system interface

##### TSI

test component that provides a mapping of the ports available in the (abstract) TTCN-3 test system to those offered by a real test system

Note 1 to entry: See ETSI ES 201 873-6 V4.6.1.

### 3.29

#### verdict

##### test verdict

statement of “pass”, “fail” or “inconclusive”, as specified in an *abstract test case* (3.1), concerning conformance of an *SUT* (3.20) with respect to that test case when it is executed

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

## 4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply: