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Date: 28 November 2024

Origin: European

Latest date for receipt of comments: 21 January 2025

Project No. 2024/02002

Responsible committee: AUE/16 Data Communication (Road Vehicles)

Interested committees:

Title: Draft BS EN ISO 15118-4 Road vehicles - Vehicle to grid communication interface. Part 4: Network and application protocol conformance test.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 15118-4

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: Essai de conformité du protocole d'application et du
réseau*

ICS: 43.120

ISO/TC 22/SC 31

Secretariat: **DIN**

Voting begins on:
2024-11-28

Voting terminates on:
2025-02-20

This document is circulated as received from the committee secretariat.

This draft is submitted to a parallel vote in ISO and in IEC.

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Published in Switzerland

Contents

Page

1	Scope	1
2	Normative references	2
3	Terms and definitions	2
4	Abbreviated terms	7
5	Conventions	8
5.1	Requirement structure	8
5.2	Test system description	8
6	Test architecture reference model	8
6.1	General information	8
6.2	Platform adapter interface	9
6.3	SUT adapter interfaces	9
6.4	Codecs	12
7	Test suite conventions	12
7.1	General information	12
7.2	Test suite structure (TSS)	13
7.3	Test profiles	15
7.4	Test suite identifiers	23
7.5	Test suite coverage	29
7.6	Test case description	171
7.7	Test case specification	172
8	Test case descriptions for 15118-2 V2GTP	186
8.1	General information	186
8.2	SECC test cases	186
8.3	EVCC test cases	190
9	Test case descriptions for 15118-2 SDP messages	196
9.1	General information	196
9.2	SECC test cases	196
9.3	EVCC test cases	199
10	Test case descriptions for 15118-2 V2G application layer messages	234
10.1	General information	234
10.2	SECC test cases	234
10.3	EVCC test cases	412
11	Reliability and Robustness Testing	682
11.1	General information	682
11.2	SECC test cases	682
11.3	EVCC test cases	685
Annex A (normative)	Configuration specifications	692
A.1	General information	692
A.2	Parameter configuration	692
A.3	Timer configuration	698
A.4	PICS configuration	699
A.5	PIXIT configuration	700
Annex B (normative)	Test-case specifications for 15118-2 V2GTP	703
B.1	General information	703
B.2	SECC test cases	703
B.3	EVCC test cases	706

Annex C (normative) Test-case specifications for 15118-2 SDP messages	711
C.1 General information	711
C.2 SECC test cases	711
C.3 EVCC test cases	713
Annex D (normative) Test-case specifications for 15118-2 V2G application layer messages	736
D.1 General information	736
D.2 SECC test cases	736
D.3 EVCC test cases	836
Annex E (normative) Test-case specifications for 15118-2 Reliability and Robustness Testing	1005
E.1 General information	1005
E.2 SECC test cases	1005
E.3 EVCC test cases	1009
Annex F (normative) Function specifications for supporting test execution	1017
F.1 General information	1017
F.2 Configuration functions	1017
F.3 Pre-condition functions	1019
F.4 Post-condition functions	1051
F.5 Common behavior functions	1053
F.6 Library functions	1058
Annex G (normative) Function specifications for 15118-2 V2GTP	1068
G.1 General information	1068
G.2 SECC functions	1068
G.3 EVCC functions	1070
Annex H (normative) Function specifications for 15118-2 SDP messages	1074
H.1 General information	1074
H.2 SECC functions	1074
H.3 EVCC functions	1076
Annex I (normative) Function specifications for 15118-2 V2G application layer messages	1080
I.1 General information	1080
I.2 SECC functions	1080
I.3 EVCC functions	1276
Annex J (normative) Function specifications for 15118-2 Reliability and Robustness Testing	1477
J.1 General information	1477
J.2 SECC functions	1477
J.3 EVCC functions	1483
Annex K (normative) Template specifications for V2G TCP/TLS Port Control	1510
K.1 General information	1510
K.2 V2G TCP/TLS port control templates	1510
Annex L (normative) Template specifications for 15118-2 V2GTP	1512
L.1 General information	1512
L.2 Common templates	1512
Annex M (normative) Template specifications for 15118-2 SDP messages	1514
M.1 General information	1514
M.2 Common templates	1514
Annex N (normative) Template specifications for 15118-2 V2G application layer messages ...	1515
N.1 General information	1515
N.2 Common templates	1515
N.3 SECC templates	1527
N.4 EVCC templates	1539
Annex O (normative) Template specifications for Security	1568
O.1 General information	1568
O.2 Common templates	1568

Annex P (normative) Data type definitions 1573

P.1 General information 1573

P.2 Data types for PICS 1573

P.3 Data types for PIXIT 1574

P.4 Data types for V2G TCP/TLS Port Control 1576

P.5 Data types for V2GTP 1576

P.6 Data types for SDP messages 1577

P.7 Data types for V2G messages 1578

P.8 Data types for Security 1598

Annex Q (informative) Overview of changed test cases compared to ISO 15118-4:2018 1600

Bibliography 1612

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).

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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 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 configuration of electrical parameters and power flow related data added (7.7.9)
- new clause on reliability and robustness test cases added (Clause 11 and Annex E);
- complete list of new, removed and updated test cases in this document is provided in Annex Q.

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 complexity resulting from the network and application protocol requirements specified in ISO 15118-2 for the Vehicle-to-Grid Communication Interface (V2G CI) requires a considerable amount of testing to enable interoperability between electric vehicles and charging stations. This document therefore specifies a conformance test suite for the network and application layer protocols of the V2G CI to derive a common and agreed 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 (see NOTE 1). Hence this document focuses on the communication interface and the corresponding requirements given in ISO 15118-2 only.

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 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 a conforming implementation has the required capabilities and that its behavior 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 which result from ISO/OSI cross layer dependencies in the underlying protocol specification (e.g. for sleep mode).

NOTE 4 Even though ISO 15118-2:2014 references IEC 61851-1:2011 Edition 2, this document references IEC 61851-1:2017 Edition 3 because of applicability on the market.

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 specified 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 specified in ISO 15118-2 and within the capabilities of the SUT.

A test architecture is described in correspondence to the ATS. The conformance test cases in this document 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 ISO 15118-5. 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 document do not include the assessment of the performance 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 specified ISO 15118-2. Power flow between the EVSE and the EV is no prerequisite for the test cases specified in 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 15118-1, *Road vehicles — Vehicle to grid communication interface — Part 1: General information and use-case definition*

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*

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

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

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)*

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 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* (3.24)

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.

Note 3 to entry: The specification is 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

a collection of *abstract test cases* (3.1) with reference to a given requirement specification

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

3.3**black box testing**

method of testing that examines the behaviour of a *system under test* (3.20) without considering the internal implementation and structure of the *system under test*, thus relying on the *system under test*'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 is, therefore, 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 15118-2.

3.5**conforming implementation**

system under test (3.20) which satisfies both *static conformance requirements* (3.19) and *dynamic conformance requirements* (3.6), consistent with the capabilities stated in the *protocol implementation conformance statements* (3.16)

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)

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 a *system under test* (3.20) which contains or references all information [in addition to that given in the *implementation conformance statements* (3.9)] related to the *system under test* 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 open system interconnection 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* (3.13) and computing and assigning the *test verdict* (3.30)

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

3.13**parallel test component****PTC**

test component created by the *main test component* (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**

implementation conformance statement (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 15118-2.

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)

3.17**protocol implementation extra information for testing****PIXIT**

implementation extra information for testing (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 15118-2.

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 15118-2.

3.20**system under test****SUT**

real open system in which the *implementation under test* (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 to achieve the test purpose and assign verdicts to the possible outcomes

3.22**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.

3.23**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, system under test adapter and platform adapter entities via test control interface (TCI) and test runtime interface (TRI). It additionally initializes and manages the executable test suite and encoding/decoding system entities. This entity performs all the actions necessary to properly start the execution of a test case or function with parameters in the executable test suite entity. It queries the test management

entity for module parameter values required by the executable test suite and sends logging information to it. It also collects and resolves associated verdicts returned by the executable test suite 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 is used to explain a test framework functionality.

3.24 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.

3.25 test system

real system combining the *test framework* (3.23), *abstract test suite* (3.2), *test execution* (3.22) and adapters as well as codecs

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

3.26 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.

3.27 test runtime interface TRI

two interfaces that define the interaction of the TTCN-3 executable between the system under test (3.20) and the platform adapter and the system adapter in a *test system* (3.25)

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 valid test behavior VTB

test steps where the test system sends stimuli to the *system under test* (3.20) that are valid (syntactically and semantically) according to the protocol requirements

Note 1 to entry: This type of test behavior is specified in this document.

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

3.30**verdict****test verdict**

statement of “pass”, “fail” or “inconclusive”, as specified in an *abstract test case* (3.1), concerning conformance of an *system under test* (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 purpose of this document, the following abbreviations apply:

ALM	Application Layer Message
ATS	Abstract Test Suite
BEV	Battery Electric Vehicle
CA	Certificate Authority
CPL	Control Pilot Line
CRL	Certificate Revocation List
DH	Diffie Hellman
DER	Distinguished Encoding Rules
ECDSA	Elliptic Curve Digital Signature Algorithm
EDS	Encoding/Decoding System
EIM	External Identification Means
EMAID	E-Mobility Account Identifier
ETS	Executable Test Suite
EV	Electric Vehicle
EVCC	Electric Vehicle Communication Controller
EVSE	Electric Vehicle Supply Equipment
EXI	Efficient XML Interchange
HAL	Hardware Abstraction Layer
ICS	Implementation Conformance Statement
ID(s)	Identifier(s)
IUT	Implementation under Test
IXIT	Implementation eXtra Information for Testing
OCSP	Online Certificate Status Protocol
OEM	Original Equipment Manufacturer
PWM	Pulse Width Modulation
MTC	Main Test Component
NACK	Negative Acknowledgement
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PKI	Public Key Infrastructure
PLC	Power Line Communication
PnC	Plug and Charge
PTC	Parallel Test Component
SA	Secondary Actor
SDP	SECC Discovery Protocol
SECC	Supply Equipment Communication Controller

SLAC	Signal Level Attenuation Characterization
SUT	System Under Test
TC	Test Case (abstract or executable)
TCI	Test Control Interface
TCP	Transmission Control Protocol
TE	Test Execution
TFW	Test Framework
TP	Test Purpose
TRI	Test Runtime Interface
TSI	Test System Interface
TSS	Test Suite Structure
TTCN-3	Testing and Test Control Notation version 3
V2G	Vehicle-to-Grid
V2G CI	V2G Communication Interface
V2GTP	V2G Transfer Protocol
VTB	Valid Test Behavior
UDP	User Datagram Protocol
XML	Extensible Markup Language

5 Conventions

5.1 Requirement structure

This document uses unique number identifiers for each individual requirement. This requirement structure allows for easier requirement tracking and management. The following format is used throughout this document:

"[V2G"Y"-XXX]" requirement text

Where:

- "V2G" represents the ISO 15118 series,
- "Y" represents the document part of the ISO 15118 series, for this document Y = 4
- "XXX" represents the individual requirement number and
- "requirement text" includes the actual text of the requirement.

5.2 Test system description

TTCN-3 is used in this document to specify the test system and the abstract test cases in the abstract test suite. However, using TTCN-3 is not mandatory for the implementation of conformance tests of ISO 15118-2.

[V2G4-001] The implementers of conformance tests shall verify that all test objectives implemented in their environment are identical to those described in this document.

6 Test architecture reference model

6.1 General information

Figure 1 provides an overview on the test architecture for this document. Subclauses 6.2, 6.3 and 6.4 specify the interface requirements in Figure 1 for platform adapters, SUT adapters and all applicable codecs.

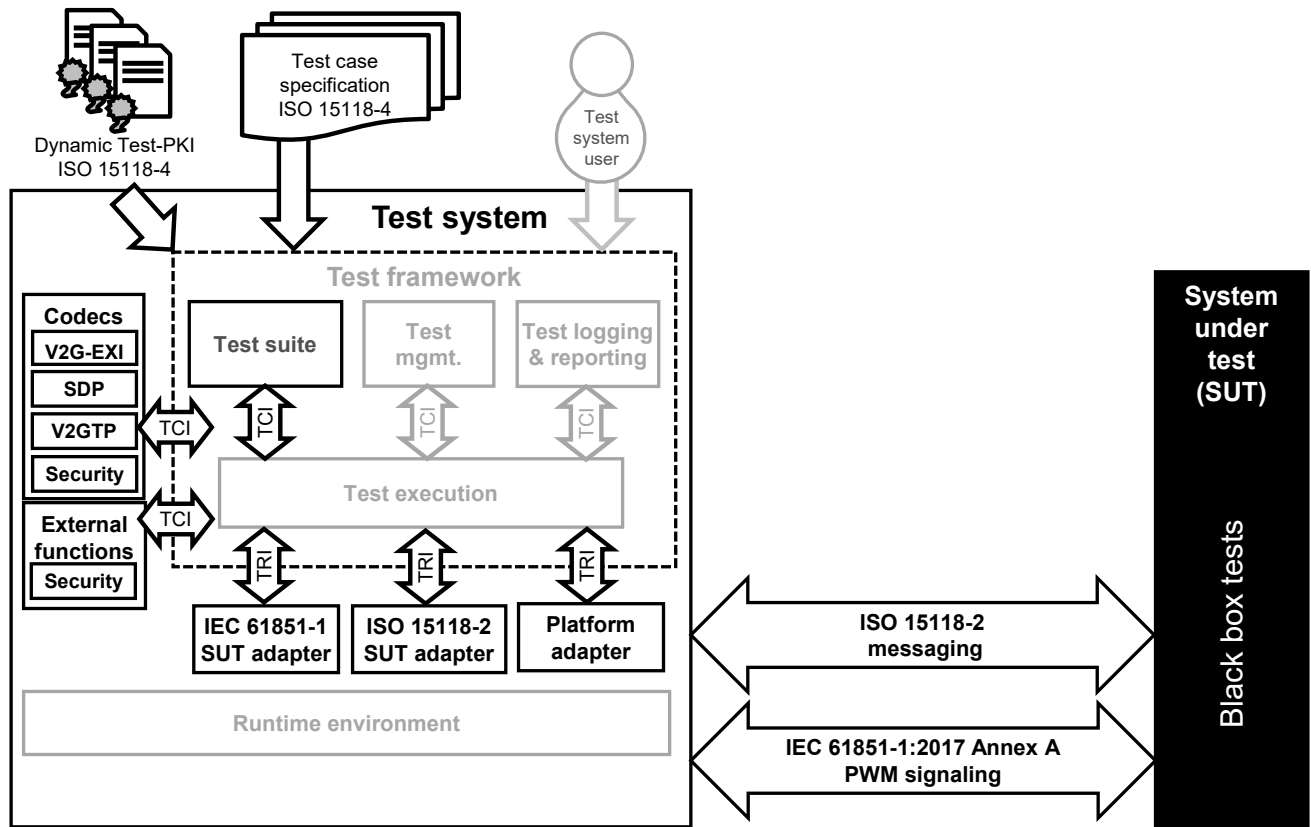


Figure 1 — Test architecture reference model for testing of ISO 15118-2

For the scope of this document only the "ISO 15118-2 – Messaging" interface to the SUT and its dependencies to the corresponding "IEC 61851-1:2017, Annex A – PWM Signaling" interface are relevant. This document therefore limits its scope to the respective SUT adapters and codecs.

6.2 Platform adapter interface

The platform adapter within the test system is responsible for timers and external functions. Besides means for timers, which are typically provided as part of the test framework and runtime environment, there are external functions specified for XML security in 7.7.11 and EIM status control functionality in 7.7.12.

[V2G4-002] The platform adapter of the test system shall implement the TriPlatformPA and the TriPlatformTE interfaces as specified in ETSI ES 201 873-5 V4.6.1:2014, 6.5.3.

6.3 SUT adapter interfaces

6.3.1 General information

The SUT adapter within the test system adapts the TTCN-3 communication operations to the SUT based on an abstract test system interface and implements the real test system interface. It is responsible to propagate message requests and procedure-based calls from the test execution (see Figure 1) to the SUT, and to notify the test execution of any received test events by appending them to its port queues.

[V2G4-003] The SUT adapters of the test system shall implement the TriCommunicationSA and the TriCommunicationTE interfaces as specified in ETSI ES 201 873-5 V4.6.1:2014, 6.5.2.

NOTE 1 The actual implementation of these adapters is out of the scope of this document.

6.3.2 IEC 61851-1 SUT adapter requirements

The IEC 61851-1 SUT adapter implements a parallel test component (PTC) for the control pilot and proximity pilot signalling specified in IEC 61851-1:2017 Annex A. It continuously controls and/or observes the positive voltage (state), frequency, duty cycle and the proximity resistor value during the entire test case execution in accordance with the specified valid range of values as specified in IEC 61851-1:2017, Annex A.

[V2G4-004] The IEC 61851-1 SUT adapter shall adapt the HAL 61851-1 functions to a PWM Signal as specified in 6.3.2.1 to 6.3.2.5.

6.3.2.1 Requirements of IEC 61851-1 SUT adapter for SECC or EVCC testing

[V2G4-022] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to get the current PWM state or associated voltage level.

[V2G4-023] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a call-back function which reports change events of the current PWM state or associated voltage level.

[V2G4-024] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to set the proximity on SUT side.

[V2G4-025] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to get the proximity resistor value from SUT side.

[V2G4-026] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a call-back function which reports change events of the resistor value for the proximity from SUT side.

[V2G4-027] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to get the duty cycle in [%].

[V2G4-028] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a call-back function which reports changes of the duty cycle in [%].

[V2G4-029] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a function to get the frequency in [Hz].

[V2G4-030] The IEC 61851-1 SUT adapter for SECC or EVCC testing shall provide a call-back function which reports change events of the frequency in [Hz].

6.3.2.2 Requirements of IEC 61851-1 SUT adapter for SECC testing

[V2G4-031] The IEC 61851-1 SUT adapter for SECC testing shall provide a function to set the current PWM state or associated voltage level. State B, C and D or the associated voltage level shall be supported, other voltage levels are optional.

6.3.2.3 Requirements of IEC 61851-1 SUT adapter for EVCC testing

[V2G4-032] The IEC 61851-1 SUT adapter for EVCC testing shall provide a function to set the current PWM state or associated voltage level. State E and F or the associated voltage level shall be supported, other voltage levels are optional.

[V2G4-033] The IEC 61851-1 SUT adapter for EVCC testing shall provide a function to set the current duty cycle in [%]. The values 5%, and 7%-98% shall be supported, other values are optional.

[V2G4-034] The IEC 61851-1 SUT adapter for EVCC testing shall provide a function to set current frequency in [Hz]. A value of 1000 Hz +/- 5% shall be supported; other values are optional.

- [V2G4-035] The IEC 61851-1 SUT adapter for EVCC testing shall provide a function to switch on/off the ControlPilot Line to simulate an un-plug or plug-in for the SUT. State A or the associated voltage level shall be supported, other voltage level is optional.

6.3.2.4 Requirements of IEC 61851-1 PTC for SECC or EVCC testing

- [V2G4-036] The IEC 61851 PTC for SECC or EVCC testing shall provide a function which activates the validity monitoring as specified in [V2G4-037], [V2G4-038], [V2G4-039], [V2G4-040], [V2G4-041].
- [V2G4-037] The IEC 61851-1 PTC for SECC or EVCC testing shall provide a function to confirm a change from/to a given PWM state. This function shall wait for receiving a state change event from IEC 61851-1 SUT adapter. If no change event occurs within a given time [ms], the function shall return an error.
- [V2G4-038] The IEC 61851-1 PTC for SECC or EVCC testing shall provide a function to change its valid PWM state condition. This function shall change the internal monitoring condition to a given PWM state, which the IEC 61851-1 PTC will consider as the next valid PWM state.
- [V2G4-039] The IEC 61851-1 PTC for SECC or EVCC testing shall provide a function to change its valid duty cycle range. This function shall change the internal monitoring condition to a given duty cycle range from [%] – to [%], which the IEC 61851-1 PTC will consider as the next valid duty cycle range.

6.3.2.5 Requirements of IEC 61851-1 PTC for SECC testing

- [V2G4-040] The IEC 61851-1 PTC for SECC testing shall provide a function to confirm a given duty cycle in [%]. This function shall wait for receiving a duty cycle change event from IEC 61851-1 SUT adapter. If no change event occurs within a given time [ms], the function shall report an error.
- [V2G4-041] The IEC 61851-1 PTC for SECC testing shall provide a function to change its valid frequency range. This function shall change the internal monitoring condition to a given frequency range from [Hz] – to [Hz], which the IEC 61851-1 PTC will consider as the next frequency range.

6.3.3 ISO 15118-2 SUT adapter requirements

- [V2G4-005] The ISO 15118-2 SUT adapter shall adapt and send/receive the encoded SDP requests/responses through UDP messages to/from the SUT as specified in ISO 15118-2:2014, 7.7.2 and 7.10.1.
- [V2G4-006] The ISO 15118-2 SUT adapter shall adapt and send/receive the encoded V2G messages through a TCP or TLS connection to/from the SUT as specified in ISO 15118-2:2014, 7.7.1 and 7.7.3.
- [V2G4-007] The ISO 15118-2 SUT adapter shall adapt the internal port control messages for TCP and TLS connection management as specified in Annex P.4

NOTE 3 The TCP/TLS connection management includes the following functionalities:

- control for TCP/TLS port disconnection handling;
- control for receiving information / status on a given TCP/TLS connection ;
- notification of TCP/TLS connection status events;
- notification of TLS Handshake status events.

- [V2G4-008] The ISO 15118-2 SUT adapter shall provide a port map operation (refer to 7.3.3) with additional parameters for TCP and TLS connection configuration as specified in Annex P.4.

NOTE 4 The TCP/TLS connection configuration includes the following functionalities:

- configuration for IP address and port;
- configuration for usage of security (TCP/TLS) ;
- configuration for cipherSuite;
- configuration for TLS protocol version;
- configuration for TLS certificate.

NOTE 5 The ISO 15118-3 adapter is specified in ISO 15118-5.

6.4 Codecs

A codec is responsible for the external encoding and decoding of TTCN-3 values into bit strings suitable to be sent to the SUT. The test execution (TE) determines which codec is used and passes the TTCN-3 data to the appropriate encoder to obtain the encoded data. Received data is decoded in this entity by using the appropriate decoder, which translates the received data into TTCN-3 values cf. ETSI ES 201 873-6 V4.5.1, that can be matched against expected behaviors in the form of templates.

[V2G4-009] All codecs in this document shall implement the TCI-CD interface as specified in ETSI ES 201 873-6 V4.6.1:2014, 7.3.2.

NOTE 1 For ISO 15118-2 conformance testing, three codecs (V2G-EXI, SDP, V2GTP, see Figure 1) are used to encode or decode messages consumable by the test system into bit strings / signals consumable by the SUT.

NOTE 2 The exact implementation of these codecs is out of the scope of this document.

[V2G4-010] The V2G-EXI codec shall encode TTCN-3 values as specified in Annex P.7 into corresponding EXI streams as specified in ISO 15118-2:2014, 7.9.1.

[V2G4-011] The V2G-EXI Security codec shall encode TTCN-3 values for X.509 Certificates as specified in Annex P.7 into a corresponding Base64 representation suitable for EXI streams according to ISO 15118-2:2014, 7.9.1.

[V2G4-012] The V2G-EXI codec shall decode EXI streams as specified in ISO 15118-2:2014, 7.9.1 into TTCN-3 values as specified in Annex P.7.

[V2G4-013] The V2G-EXI Security codec shall decode Base64 representation from EXI streams according to ISO 15118-2:2014, 7.9.1 into TTCN-3 values for X.509 Certificates as specified in Annex P.7.

[V2G4-014] The SDP codec shall encode TTCN-3 values as specified in Annex P.6 into corresponding SDP requests/responses as specified in ISO 15118-2:2014, 7.10.1.3, 7.10.1.4 and 7.10.1.5.

[V2G4-015] The SDP codec shall decode SDP requests/responses as specified in ISO 15118-2:2014, 7.10.1.3, 7.10.1.4 and 7.10.1.5 into TTCN-3 values as specified in Annex P.5.

[V2G4-016] The V2GTP codec shall encode TTCN-3 values as specified in Annex P.5 into corresponding V2GTP envelopes as specified in ISO 15118-2:2014, 7.8.3.1.

[V2G4-017] The V2GTP codec shall decode V2GTP envelopes as specified in ISO 15118-2:2014, 7.8.3.1 into TTCN-3 values as specified in Annex P.5.

7 Test suite conventions

7.1 General information

This clause specifies all conventions that are relevant for conformance tests of SUTs implementing ISO 15118-2.

7.2 Test suite structure (TSS)

An abstract test suite is a complete set of abstract test cases, possibly combined into groups or modules (e.g. for use cases or domains like AC, DC charging), that are necessary to perform conformance testing for a given SUT.

Each abstract test case specifies how the SUT is stimulated with specific inputs and furthermore specifies expected reaction(s) for verdict assignment. Depending on the test purpose different pre-conditions and post-conditions are considered for the formulation of the test behavior. The pre-conditions, post-conditions as well as test behaviors are encapsulated into individual functions and stored within separate modules. Thus, an abstract test case is composed by the actual test behavior enveloped by pre- and post-conditions (see 7.7.6 for detail). The corresponding grouping of functions can therefore be assigned to the lowest abstract hierarchical level (see Figure 2). The abstract test cases are assigned to the second level.

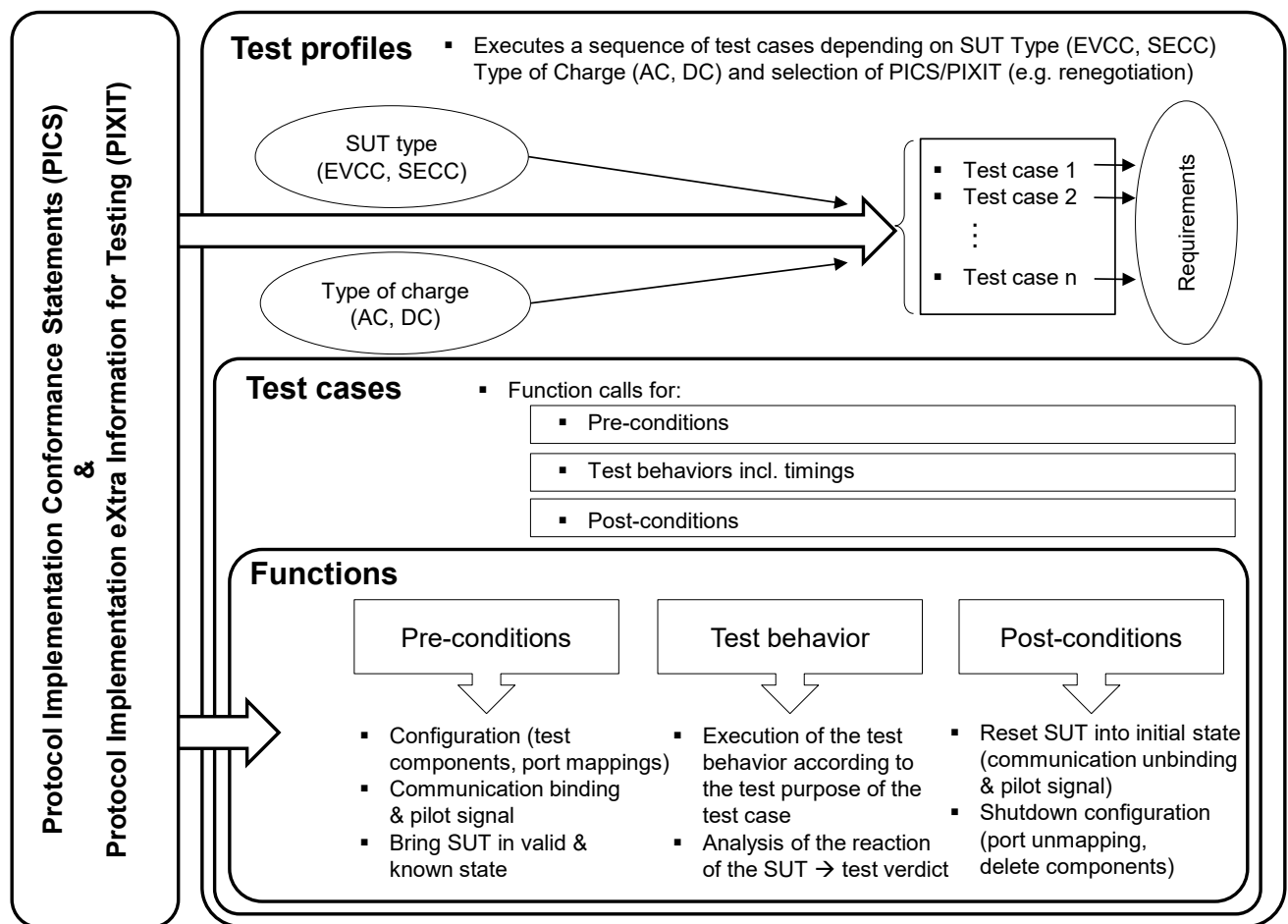


Figure 2 — General overview of the Test Suite Structure (TSS)

The test profile is a collection of self-contained test cases as well as PICS (see 7.3.4) and PIXIT (see 7.3.5) in order to represent a given use case. The selection is based on the use cases of the ISO 15118 series and its corresponding requirements.

Hence the abstract test suite structure (TSS) is segmented into subgroups according to the use cases specified in ISO 15118-1 for conformance testing. Table 1 shows these subgroups, which are used for the organization of the abstract test case specifications as well as for the test suite identifiers (see 7.4 for detail).

Table 1 — Identifiers within the Test Suite Structure (TSS)

Identifiers	Values	Description
<sut>		System under test
	EVCC	Electric Vehicle Communication Controller
	SECC	Supply Equipment Communication Controller
<dom>		Domain
	AC	AC specific behaviors
	DC	DC specific behaviors
	IN	Inductive specific behaviors
	CMN	Common behaviors
<ctx>	{fullname}	Context (e.g. name of message pattern according to ISO 15118-2)

NOTE The domain for inductive charging is not relevant for this document but is introduced for future purposes.

Table 2 describes the Annexes derived for this document.

Table 2 — Test suite structure – Annexes description

Annexes	Description
Configuration Annex A	The configuration annex contains constant definitions timers, PICS and PIXIT definitions. The configuraton described in Annex A applies.
Test cases Annex B - E	The test case annexes contain the TTCN-3 test case files. The EVCC subclauses contain the abstract test cases if the SUT is an EVCC. The SECC subclauses contain the abstract test cases if the SUT is an SECC. The abstract test cases in Annex B- Annex E apply.
Functions Annex F – J	The function annexes contain methods for supporting the test execution as well as the actual pre-, post-conditions and test behaviors of the ISO 15118 conformance tests. The EVCC subclauses contain the test behavior if the SUT is an EVCC. The SECC subclauses contain the test behavior if the SUT is an SECC. The pre-condition sub clause contains functions that are used for defining the pre-conditions of a test behavior. The post-condition subclause contains functions that are used to establish the post-conditions of a test case. The library functions subclause contains utility functions used across the test suite for various purposes. The functions in Annex F - Annex J apply.
Templates Annex K - O	The templates sub clause contains the TTCN-3 template files for matching a SUT's reaction on a stimulus against its expected behavior. The templates in Annex K - Annex O apply.

Data Structures	The data structures sub clause contains data structures that are needed additionally to the data structures of the ISO 15118 series, e.g. used for X.509 certificates. The data structures in Annex P apply.
Annex P	

7.3 Test profiles

7.3.1 General information

This sub clause specifies test profiles for conformance with ISO 15118-2. A test profile consists of a test configuration as well as a selection and assignment of PICS/PIXIT. Depending on the test configuration a set of test components and ports are specified. The test profile furthermore includes a test group defining the set of relevant test cases and the sequence in which they are executed in order to perform a conformance test for a given use case.

7.3.2 Test configurations

The test configuration reflects various ISO 15118 scenarios. Entities for the SUT, test system and PTCs are:

- Electric Vehicle Communication Controller (EVCC)
- Supply Equipment Communication Controller (SECC)
- [PWM Signaling (61851)]

Table 3 shows combinations of such entities defining valid test configurations for this document (CF_Part_ID).

Table 3 — ISO 15118-4 test configurations

CF_Part_ID	SUT	Test system	PTCs
CF_04_001	SECC	EVCC	PTC1=61851
CF_04_002	EVCC	SECC	PTC1=61851

7.3.3 Components and ports

In correspondence to the identified set of relevant test configurations this sub clause specifies test components which reflect the main entities needed for stimulation of the SUT with respect to ISO 15118. Ports are used to connect these components with each other and the SUT. The components are specified in the configuration module and are summarized in Table 4. Port types specify which kind of messages can be sent or received by this port. The corresponding port type definitions are summarized in Table 5.

Table 4 — Component definitions

Components	Description
SECC_Tester (MTC)	This component type is the main type for the tests of an SECC. A V2G_TCP_TLS_ALM_SECC_Port, V2G_UDP_SDP_Port, HAL_61851_Port and a HAL_61851_Internal_Port (see Table 5) are assigned to this component type.
EVCC_Tester (MTC)	This component type is the main type for the tests of an EVCC. A V2G_TCP_TLS_ALM_EVCC_Port, V2G_UDP_SDP_Port,

	HAL_61851_Port and a HAL_61851_Internal_Port (see Table 5) are assigned to this component type.
HAL_61851_Listener (PTC)	The HAL_61851_Listener is responsible for watching the correct IEC 61851 behavior and is used in the form of a parallel test component (PTC). This component uses the HAL_61851_Port (see Table 5) to communicate with an IEC 61851-1 SUT Adapter and the HAL_61851_Internal_Port to communicate with the MTC.

Table 5 — Port type definitions

Port Type	Description
V2G_TCP_TLS_ALM_SECC_Port	This port is used to send and receive V2G- Application Layer Messages (ALM) or supportedAppProtocol messages via TCP/TLS specified in ISO 15118-2 to/from an SECC. This port is also used to send and receive internal TCP/TLS port control messages specified in Annex P.
V2G_TCP_TLS_ALM_EVCC_Port	This port is used to send and receive V2G- Application Layer Messages (ALM) or supportedAppProtocol messages via TCP/TLS specified in ISO 15118-2 to/from an EVCC. This port is also used to send and receive internal TCP/TLS port control messages specified in Annex P.
V2G_UDP_SDP_Port	This port is used to send and receive SDP messages via UDP specified in ISO 15118-2 to/from an EVCC or SECC.
HAL_61851_Port	This port is used to send or receive messages to an IEC 61851 communication unit. The communication unit will interpret these messages and will set the corresponding signaling to the SUT (SECC/EVCC). The specification of the IEC 61851 communication unit is out of the scope of this document.
HAL_61851_Internal_Port	This port is used to synchronize the status of the IEC 61851-1 PWM signal between the MTC (SECC_Tester or EVCC_Tester) and PTC (HAL_61851_Listener_Port). It enables the MTC and PTC to send and receive HAL 61851-1 messages.

These components and ports compose relevant test configurations for this document. Whether the type EVCC_Tester or SECC_Tester is used as MTC depends on the type of the SUT. If the SUT is an EVCC, the MTC uses the type EVCC_Tester. If the SUT is an SECC, the MTC uses the type SECC_Tester. The HAL_61851_Listener combines all necessary listener functionality into one component, independent on whether the MTC represents an SECC_Tester or an EVCC_Tester. The MTC always contains a TTCN-3 test configuration and delimits the lifeline during test execution. Next to using ports for communication purposes, local timers, variables or constants can be assigned to components to store dynamic information in a given executable test case.

In addition to the MTC and PTC and their corresponding port type definitions, a test configuration also consists of respective Test System Interfaces (TSI). An abstract Test System Interface (TSI) is specified as a collection of ports. A TSI has no local timers, constants or variables. Only ports are assigned to it. In a given executable

test case, test components ports can be mapped dynamically to the TSI ports to establish communication channel to the real test system interface. In the test configuration the TSI uses the type System_EVCC or System_SECC depending on the type of the SUT. If the SUT is an EVCC, the TSI uses the type System_EVCC. If the SUT is an SECC, the TSI uses the type System_SECC.

The test configuration is illustrated in Figure 3. The type of the V2G components and ports (EVCC or SECC) depends on the SUT type.

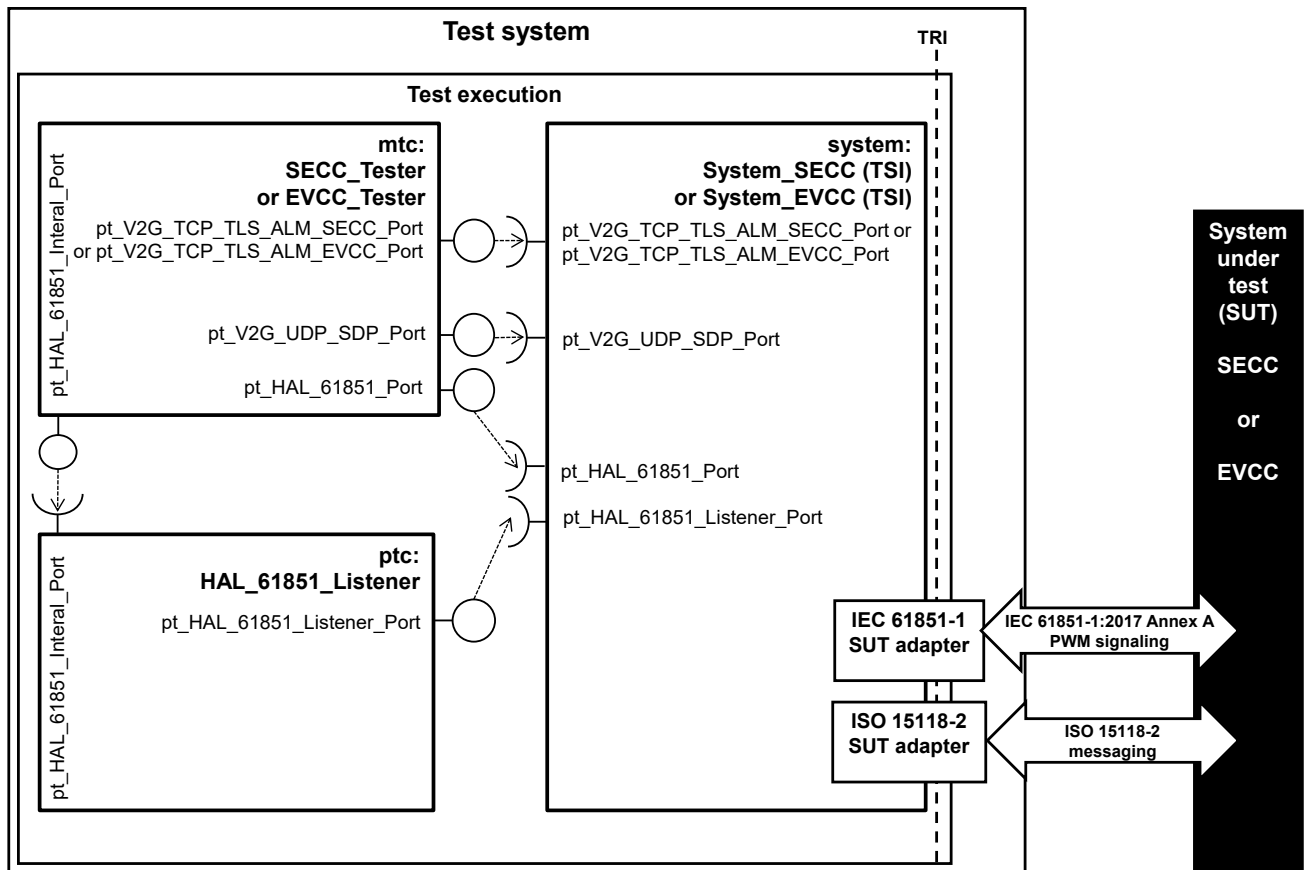


Figure 3 — ISO 15118-4 test configuration

As shown in Figure 3 the port mappings are specified statically as follows:

- The port `pt_V2G_TCP_TLS_ALM_EVCC_Port` of the TSI is always mapped to port `pt_V2G_TCP_TLS_ALM_EVCC_Port` of the MTC.
- The port `pt_V2G_TCP_TLS_ALM_SECC_Port` of the TSI is always mapped to port `pt_V2G_TCP_TLS_ALM_SECC_Port` of the MTC.
- The port `pt_V2G_UDP_SDP_Port` of the TSI is always mapped to port `pt_V2G_UDP_SDP_Port` of the MTC.
- The port `pt_HAL_61851_Port` of the TSI is always mapped to port `pt_HAL_61851_Port` of the MTC.
- The port `pt_HAL_61851_Listener_Port` of the TSI is always mapped to port `pt_HAL_61851_Listener_Port` of the `v_HAL_61851_Listener`. The `pt_HAL_61851_Listener_Port` is from the same type `HAL_61851_Port` as the `pt_HAL_61851_Port`.

- The internal port `pt_HAL_61851_Internal_Port` is not mapped to the TSI. This port is connected between the MTC and PTC.

7.3.4 Protocol Implementation Conformance Statement (PICS) Definition

To evaluate the conformance of a particular implementation, it is necessary to have a statement of the capabilities and options which have been implemented, and any features which have been omitted, so that the implementation can be tested for conformance against relevant requirements, and against those requirements only. Those capabilities and features are typically referred to as Implementation Conformance Statements, ICS. In the context of a communication protocol as specified in ISO 15118-2 such statements are referred to as Protocol Implementation Conformance Statement (PICS) cf. [ITU-T X.290].

All PICS specified in the ATS are summarized in Table 6 - Table 8. These PICS specify selection criteria in the test system for an appropriate test case selection considering a given SUT. The PICS also specify appropriate configuration settings in the test system for each test case.

**Table 6 — PICS for test system configurations CF_04_001 and CF_04_002
(SUT either SECC or EVCC)**

PICS	Description
PICS_CMN_CMN_CombinedTesting	Indication for enabling combined testing including SLAC association & V2G messaging
PICS_CMN_CMN_ChargingMode	Indication for testing either AC or DC charging mode
PICS_CMN_CMN_IdentificationMode	Indication for testing either EIM or PnC identification mode
PICS_CMN_CMN_PlugType	Indication for testing either type1 or type2 plug type
PICS_CMN_AC_CableCapability	Indication for used AC cable type Choice: i) capability13A, ii) capability20A, iii) capability32A, iv) capability63A, v) capability70A NOTE: The choices map to the following Proximity resistor values: – capability13A corresponds to resistor value equal to 1500 Ohm – capability20A corresponds to resistor value equal to 680 Ohm – capability32A corresponds to resistor value equal to 220 Ohm – capability63A corresponds to resistor value equal to 100 Ohm (1-phase) – capability70A corresponds to resistor value equal to 100 Ohm (3-phase)
PICS_CMN_CMN_WakeUp	Indication for the pre-defined wake-up time of the test system within a paused session (test system wakes up the SUT)

PICS_CMN_CMN_Renegotiation	Indication for explicit testing of Renegotiation
PICS_CMN_CMN_Renegotiation LoopIndication	Indicates the number of iterations of the ChargingStatus (AC) or CurrentDemand (DC) loop, when the renegotiation is triggered by the test system (smaller or equal to PICS_CMN_CMN_LoopCounter). NOTE: The minimum value of loop counter is 30
PICS_CMN_CMN_LoopCounter	Indicates the number of iterations of the ChargingStatus (AC) or CurrentDemand (DC) loop NOTE: The minimum value of loop counter is 30

**Table 7 — PICS for test system configurations CF_04_001
(SUT equals SECC)**

PICS	Description
PICS_SECC_CMN_Pause	Indication for enabling a charging pause in SessionStopReq message (ChargingSession)
PICS_SECC_CMN_EIMDone	Indication for the specified state initiating an EIM Authorization Choice: i) beforePlugin, ii) afterPlugin, iii) duringSlac, iv) v2gAuthorization
PICS_SECC_CMN_EvStateInChargeProgress	Indication for explicit testing of State C or D of IEC 61851-1:2017, Annex A during charging
PICS_SECC_DC_WeldingDetection	Indication for explicit testing of WeldingDetection
PICS_SECC_CMN_DepartureTime	Indication for using a departure time in ChargeParameterDiscoveryReq message
PICS_SECC_CMN_MaxEntriesSAScheduleTuple	Indication for enabling a maximal number of expected entries in the SAScheduleTuple (received in ChargeParameterDiscoveryRes message) by using the element MaxEntriesSAScheduleTuple in ChargeParameterDiscoveryReq message

**Table 8 — PICS for test system configurations CF_04_002
(SUT equals EVCC)**

PICS	Description
PICS_EVCC_CMN_PmaxSchedulewithZeroPow	Indication for enabling a PmaxScheduleList with a list element pMax = 0W in SAScheduleList in ChargeParameterDiscoveryRes message NOTE: For this approach the following assumption is considered: The EV triggers a paused session if the EVSE cannot provide

	power for a specified time period. This approach might NOT work for all EVs. In this case all relevant test cases with reference to PICS_EVCC_CMN_PmaxSchedulewithZeroPow are out of the scope of the test execution. Choice: i) sleepWithoutCharge (0W in first element of PmaxScheduleList), ii) sleepAfterCharge (0W in second element of PmaxScheduleList), iii) none_
PICS_EVCC_CMN_ReceiptRequired	Indication for explicit testing of MeteringReceipt message activated by the element ReceiptRequired in ChargingStatusRes (AC) or CurrentDemandRes (DC) message
PICS_CMN_EVCC_SalesTariff	Indication for using a SalesTariff in ChargeParameterDiscoveryRes message

7.3.5 Protocol Implementation extra Information for Testing (PIXIT) Definition

Any additional information required for testing that is not covered in the form of an ICS / PICS, is specified in the form of Implementation extra Information for Testing (IXIT). In the context of a communication protocol as specified in ISO 15118-2 such statements are referred to as Protocol Implementation extra Information for Testing (PIXIT) cf. [ITU-T X.290] and are used to indicate to the SUT that a specific capability of the SUT is tested. In order to ensure testability of each message pair specified in ISO 15118-2, the following set of PIXIT are specified.

NOTE Due to the black box test paradigm in this document, it is not specified how to ensure that a corresponding PIXIT is set on the SUT side for a given executable test case.

All PIXIT specified in the ATS are summarized in Table 9 - Table 11. These PIXITs relate to the SUT and specify what protocol options are implemented in the SUT and what configuration is required for each testcase

Table 9 — Selected PIXIT for test system configurations CF_04_001 and CF_04_002 (SUT either SECC or EVCC)

PIXIT	Description
PIXIT_CMN_CMN_WakeUp	Indication for the wake-up time of the SUT within a paused session (SUT wakes up the test system)
PIXIT_CMN_CMN_PkiName	Indication for selected PKI Choice: i) PKI_1, ii) PKI_2, iii) PKI_3, iv) PKI_4, v) PKI_5, vi) PKI_6, vii) PKI_7
PIXIT_CMN_CMN_Renegotiation	Indication for explicit testing of Renegotiation initiated by the SUT Choice: i) renegotiation, ii) unknown
PIXIT_CMN_CMN_MeterReading	Indication for explicit testing of MeterReading element Choice: i) meterReading, ii) unknown

Table 10 — Selected PIXIT for test system configurations CF_04_001 (SUT equals SECC)

PIXIT	Description
PIXIT_SECC_CMN_VAS	Indication for explicit testing of ServiceDetail message (SUT is supposed to send a serviceList within ServiceDiscoveryRes message) Choice: i) serviceDetail, ii) none_
PIXIT_SECC_CMN_ReceiptRequired	Indication for explicit testing of MeteringReceipt message
PIXIT_SECC_CMN_CertificateHandling	Indication for explicit testing of CertificateInstallation or CertificateUpdate message Choice: i) certInstall, ii) certUpdate, iii) none_
PIXIT_SECC_CMN_SalesTariff	Indication for explicit testing of Sales Tariff elements in ChargeParameterDiscoveryRes message Choice: i) salesTariff, ii) unknown
PIXIT_SECC_CMN_TLS	Indication for explicit testing of TLS in EIM mode
PIXIT_SECC_CMN_VersionNumberMinor	Indication for the supported VersionNumberMinor in SupportedAppProtocolRes message
PIXIT_SECC_CMN_InternetAccess	Indication for support of InternetAccess service in ServiceDiscoveryRes message Choice: i) internetAccess, ii) unknown
PIXIT_SECC_DC_CableCheckOngoing	Indication for explicit testing of the repetition of the CableCheck message sequence Choice: i) ongoing, ii) unknown
PIXIT_SECC_CMN_AuthorizationOngoing	Indication for explicit testing of the repetition of the Authorization message sequence (SUT is not authorized in case of EIM) Choice: i) ongoing, ii) unknown
PIXIT_SECC_CMN_ChargeParameterDiscoveryOngoing	Indication for explicit testing of the repetition of the ChargeParameterDiscovery message sequence Choice: i) ongoing, ii) unknown
PIXIT_SECC_CMN_MeterInfo	Indication for explicit testing of MeterInfo element in ChargingStatusRes (AC) or CurrentDemandRes (DC) message Choice: i) meterInfo, ii) unknown
PIXIT_SECC_CMN_PaymentOption	Indication for supported payment option within ServiceDiscoveryRes message (Only one payment option possible) Choice: i) externalPayment, ii) contract

**Table 11 — Selected PIXIT for test system configurations CF_04_002
(SUT equals EVCC)**

PIXIT	Description
PIXIT_EVCC_CMN_VAS	Indication for explicit testing of ServiceDetail message (SUT sends a ServiceDetailReq message for each service of the received serviceList) Choice: i) serviceDetail, ii) none_, iii) unknown
PIXIT_EVCC_CMN_Pause	Indication for enabling a charging pause in SessionStopReq message (ChargingSession) Choice: i) pause, ii) unknown, iii) none_
PIXIT_EVCC_DC_WeldingDetection	Indication for explicit testing of WeldingDetection message Choice: i) weldingDetection, ii) none_, iii) unknown
PIXIT_EVCC_CMN_TLS	Indication for explicit testing of TLS in EIM mode Choice: i) tls, ii) none_, iii) unknown
PIXIT_EVCC_CMN_CertificateHandling	Indication for explicit testing of CertificateInstallation or CertificateUpdate message Choice: i) certInstall, ii) certUpdate, iii) none_, iv) unknown NOTE: For an automated test execution of multiple certificate installation or certification update processes, a customer interaction in the SUT (e.g. Deletion of installed contract certificates) might be necessary.
PIXIT_EVCC_CMN_DepartureTime	Indication for explicit testing of DepartureTime element in ChargeParameterDiscoveryReq message Choice: i) departureTime, ii) none_, iii) unknown
PIXIT_EVCC_AC_MaxNumberOfPhasesInUse	Indication for explicit testing of MaxNumberOfPhasesInUse element in ChargeParameterDiscoveryReq message Choice: i) maxNumberOfPhasesInUse, ii) unknown
PIXIT_EVCC_CMN_ChargingProfileOptimization	Indication for the SUTs capability to optimize charging profiles based on the received SAScheduleList Choice: i) optimization, ii) none_, iii) unknown
PIXIT_EVCC_CMN_OldSAScheduleTupleID	Indication for explicit testing of using the previous SAScheduleTupleID after renegotiation in PowerDeliveryReq message Choice: i) oldSAScheduleTupleID, ii) unknown

PIXIT_EVCC_CMN_SAScheduleTupleIDMR	Indication for explicit testing SAScheduleTupleID within MeteringReceiptReq message Choice: i) sAScheduleTupleID, ii) unknown
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7.4 Test suite identifiers

7.4.1 General information

The selection of common naming conventions is one simple and often used mechanism to implement test suites which are consistent, maintainable and understandable for multiple users. Therefore, based on common ETSI naming conventions more specific naming conventions for the ISO 15118 conformance test suite are specified.

7.4.2 Module identifiers

All modules specified in the TSS start with a capital letter. The ISO 15118 test suite specific module identifier for template, function or test case modules is specified as:

<modtype>_<sut>_<ctx>

The segments of this identifier are specified in Table 12. An example for test case module identifier is:

TestCases_SECC_SupportedAppProtocol

Table 12 — ISO 15118 test suite naming convention for modules

Identifier	Values	Description
<modtype>		Module type
	TestCases	Module including test cases
	Functions	Module including functions
	Templates	Module including templates
<sut>		System under test
	EVCC	Electric Vehicle Communication Controller
	SECC	Supply Equipment Communication Controller
	CMN	Common (exclusively for template modules)
<ctx>	{ fullname }	Context (e.g. name of message pattern according to ISO 15118-2)

NOTE 1 to entry For module types other than templates, functions or test cases there is no identifier format specified.

7.4.3 Test case identifiers

The naming conventions for test cases are using a prefix, which is specified by ETSI as shown in Table 13.

Table 13 — ETSI naming convention for test case names

Keyword	Definition	Example
testcase name	Every testcase begins with TC (TC_) TC_TestCaseName	TC_SupportedAppProtocol

The ISO 15118 test suite specific test case identifier is specified as:

TC_<sut>_<dom>_<ttyp>_<ctx>_<nn>

The segments of this identifier are described in Table 14. An example for test case identifier is:

TC_SECC_AC_VTB_SupportedAppProtocol_001

Table 14 — ISO 15118 test suite naming convention for test case identifiers

Identifier	Values	Description
<prefix>	TC	see Table 13
<sut>		System under test
	EVCC	Electric Vehicle Communication Controller
	SECC	Supply Equipment Communication Controller
<dom>		Domain
	AC	AC specific behaviors
	DC	DC specific behaviors
	CMN	Common
<ttyp>		Type of testing
	VTB	Valid test behavior
<ctx>	{fullname}	Context (e.g. name of message pattern according to ISO 15118-2)
<nn>	{xxx}	Sequential number from 001 to 999

7.4.4 Template identifiers

The naming conventions for templates are using a prefix, which is specified by ETSI as shown in Table 15.

Table 15 — ETSI naming convention for templates

Keyword	Context	Definition	Example
template name	Templates with concrete attribute values	Every template begins with keyword m (m_)	m_DNSRequest
template name	Templates with wildcards or matching expression	If a template contains or refers to templates with wildcards {* ?} then template name begins with keyword mw (mw_)	mw_DNSResponse
template name	Templates with parameters, which do not assign or refer to templates with wildcards or matching expression	If a template contains attributes which are specified by parameters or constant values, then template name begins with keyword md (md_)	md_DNSResponse (integer ip)
template name	Templates with parameters, which do assign or refer to templates with wildcards or matching expression	If a template contains attributes which are specified by parameters, constant values or wildcards, then template name begins with keyword mdw (mdw_)	mdw_DNSResponse (integer ip)

The ISO 15118 test suite specific template identifier is specified as:

<prefix>_<sut>_<dom>_<dtyp>_<nn>

The segments of this identifier are described in Table 16. An example for template identifier is:

mdw_EVCC_CMN_SupportedAppProtocol_001

Table 16 — ISO 15118 test suite naming convention for template identifiers

Identifier	Values	Description
<prefix>		Type of template (see Table 15)
<sut>		System under test
	EVCC	Electric Vehicle Communication Controller
	SECC	Supply Equipment Communication Controller
	CMN	Common
<dom>		Domain
	AC	AC specific behaviors
	DC	DC specific behaviors
	CMN	Common
<dtyp>	{fullname}	Label of (root) data type according to ISO 15118-2
<nn>	{xxx}	Sequential number from 001 to 999

7.4.5 Function identifiers

The naming conventions for functions are using a prefix, which is specified by ETSI as shown in Table 17.

Table 17 — ETSI naming convention for function names

Keyword	Context	Definition	Example
function name	All functions	Every function begins with f (f_)	f_functionName

The ISO 15118 test suite naming convention for test case functions is specified as:

<prefix>_<sut>_<dom>_<ftyp>_<ttyp>_<ctx>_<nn>

The segments of this identifier are described in Table 18. An example for template identifier is:

f_EVCC_AC_TB_VTB_SessionSetup_001

Table 18 — ISO 15118 test suite naming convention for function names

Identifier	Values	Description
<prefix>		f_ (see Table 17)
<sut>		System under test
	EVCC	Electric vehicle communication controller
	SECC	Supply equipment communication controller
<dom>		Domain
	AC	AC specific behaviors
	DC	DC specific behaviors
	CMN	Common
<ftyp>		Function type
	PR	Pre-condition
	TB	Test behavior
	PO	Post-condition
<ttyp>		Type of testing
	VTB	Valid test behavior
<ctx>	{fullname}	Context (e.g. name of message pattern according to ISO 15118-2)
<nn>	{xxx}	Sequential number from 001 to 999

7.4.6 Timer identifiers

The naming conventions for timers are using a prefix, which is specified by ETSI as shown in Table 19.

Table 19 — ETSI naming convention for timers

Keyword	Context	Definition	Example
timer name	t_	Local timer	t_wait
timer name	tc_	Timer specified within a component	tc_authMin

The ISO 15118 test suite specific timer identifier is specified as:

<prefix>_<ctx>

The segments of this identifier are described in Table 20. An example for timer identifier is:

tc_V2G_EVCC_Msg_Timer

Table 20 — ISO 15118 test suite naming convention for timer identifiers

Identifier	Values	Description
<prefix>		Type of timer (see Table 19)
<ctx>	{fullname}	Context (for example, name of timer according to ISO 15118-2 or if not specified any given name describing the context of the timer, e.g. EVCC_SDP_Timer)

7.4.7 PICS/PIXIT identifiers

The ISO 15118 test suite naming convention for PICS/PIXIT is specified as:

<pic>_<sut>_<dom>_<ctx>

The segments of this identifier are described in Table 21. An example for PICS/PIXIT identifier is:

PICS_CMN_CMN_IdentificationMode

Table 21 — ISO 15118 test suite naming convention for PICS/PIXIT identifiers

Identifier	Values	Description
<pic>		Protocol implementation capability
	PICS	Protocol implementation conformance statement
	PIXIT	Protocol implementation extra information for testing
<sut>		System under test
	EVCC	Electric vehicle communication controller
	SECC	Supply equipment communication controller
	CMN	Common
<dom>		Domain
	AC	AC specific behaviors
	DC	DC specific behaviors
	CMN	Common
<ctx>	{fullname}	Context (e.g. name of message pattern according to ISO 15118-2)

7.4.8 Verdict identifiers

In this sub clause the conventions for test verdicts are specified. The test verdicts specified in this document are listed in Table 22.

Table 22 — ISO 15118 test suite conventions on verdict handling

Verdict type	TTCN-3 Definition	ISO 15118 test suite
none	Is implicitly assigned in the beginning of every test case by default and is reported as a final verdict in the absence of any other verdict assignment during the test case execution.	No TSS specific definition (see TTCN-3 definition).
pass	Means that everything is OK. A verdict given when the observed outcome satisfies the test purpose and is valid with respect to the relevant requirements and with respect to the PICS. [ITU-T X.290]	If in review of a requirement the SUT has a correct behavior, then this verdict type is used.
inconc	A verdict given when the observed outcome is valid with respect to the relevant requirements but prevents the test purpose from being accomplished. [ITU-T X.290]	Means that neither pass nor fail can be reliably assigned.
fail	A verdict given when the observed outcome is syntactically invalid or inopportune with respect to the relevant requirements or the PICS/PIXIT. [ITU-T X.290]	If in review of a requirement the SUT has a wrong behavior, then this verdict type is used.

7.5 Test suite coverage

The following conditions apply in terms of test case coverage for this document regarding requirements specified in ISO 15118-2.

- Requirements that are out of the scope of the ATS according to the conventions specified in this document or cannot be tested in black-box tests are summarized in Table 23.
- Requirements that are not explicitly tested through a dedicated test case in the ATS but implicitly tested by the SUT Adapter/Codec are summarized in Table 24.

Table 23 — Requirements of ISO 15118-2 not considered in the ATS

List of requirement IDs	Comment (no consideration in ATS)
[V2G2-133], [V2G2-162], [V2G2-439], [V2G2-449], [V2G2-663], [V2G2-678], [V2G2-698], [V2G2-703], [V2G2-707], [V2G2-709], [V2G2-719], [V2G2-720], [V2G2-734], [V2G2-735],	Cannot be tested explicitly in EVCC black box test configuration

List of requirement IDs	Comment (no consideration in ATS)
[V2G2-763], [V2G2-784], [V2G2-801], [V2G2-823], [V2G2-870], [V2G2-874], [V2G2-880], [V2G2-882], [V2G2-886], [V2G2-892], [V2G2-897], [V2G2-907], [V2G2-908], [V2G2-910], [V2G2-927], [V2G2-928]	
[V2G2-020], [V2G2-023], [V2G2-076], [V2G2-305], [V2G2-306], [V2G2-446], [V2G2-447], [V2G2-448]	Cannot be tested explicitly in EVCC black box test configuration due to strong configuration dependency on the SUT.
[V2G2-332], [V2G2-335], [V2G2-615], [V2G2-616]	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column. Out of scope of this standard (PIXIT consideration leads to strong increase of TC quantity) for the profile defined in the respective column.
[V2G2-134], [V2G2-146], [V2G2-219], [V2G2-233], [V2G2-234], [V2G2-301], [V2G2-317], [V2G2-322], [V2G2-325], [V2G2-328], [V2G2-336], [V2G2-337], [V2G2-338], [V2G2-444], [V2G2-540], [V2G2-542], [V2G2-544], [V2G2-546], [V2G2-547], [V2G2-549], [V2G2-550], [V2G2-552], [V2G2-553], [V2G2-555], [V2G2-556], [V2G2-558], [V2G2-559], [V2G2-561], [V2G2-562], [V2G2-564], [V2G2-566], [V2G2-567], [V2G2-569], [V2G2-570], [V2G2-572], [V2G2-574], [V2G2-578], [V2G2-579], [V2G2-581], [V2G2-583], [V2G2-585], [V2G2-586], [V2G2-588], [V2G2-589], [V2G2-592], [V2G2-595], [V2G2-596], [V2G2-598], [V2G2-629], [V2G2-639], [V2G2-668], [V2G2-690], [V2G2-726], [V2G2-727], [V2G2-774], [V2G2-796], [V2G2-798], [V2G2-803], [V2G2-808], [V2G2-824], [V2G2-826], [V2G2-853], [V2G2-857], [V2G2-872], [V2G2-877], [V2G2-883], [V2G2-887], [V2G2-902], [V2G2-916], [V2G2-923]	Cannot be tested explicitly in SECC black box test configuration
[V2G2-074], [V2G2-430], [V2G2-722], [V2G2-785], [V2G2-786], [V2G2-805]	Cannot be tested explicitly in SECC black box test configuration due to strong configuration dependency on the SUT.
[V2G2-011], [V2G2-012], [V2G2-089], [V2G2-090], [V2G2-092], [V2G2-094],	Cannot be tested explicitly in SECC/EVCC black box test configuration

List of requirement IDs	Comment (no consideration in ATS)
[V2G2-096], [V2G2-135], [V2G2-640], [V2G2-760], [V2G2-830], [V2G2-835], [V2G2-868], [V2G2-869], [V2G2-878], [V2G2-911], [V2G2-925]	
[V2G2-867]	Cannot be tested explicitly in SECC/EVCC black box test configuration .
[V2G2-280], [V2G2-281]	Cannot be tested explicitly in SECC/EVCC black box test configuration due to strong configuration dependency on the SUT.
[V2G2-318], [V2G2-324], [V2G2-333], [V2G2-334], [V2G2-339], [V2G2-340], [V2G2-749], [V2G2-755], [V2G2-772], [V2G2-775], [V2G2-802], [V2G2-806], [V2G2-807]	Out of scope of this standard (PIXIT consideration leads to strong increase of TC quantity)
[V2G2-001], [V2G2-002], [V2G2-003], [V2G2-014], [V2G2-016], [V2G2-017], [V2G2-037], [V2G2-038], [V2G2-039], [V2G2-040], [V2G2-041], [V2G2-042], [V2G2-043], [V2G2-044], [V2G2-045], [V2G2-046], [V2G2-047], [V2G2-049], [V2G2-050], [V2G2-051], [V2G2-052], [V2G2-053], [V2G2-054], [V2G2-055], [V2G2-057], [V2G2-058], [V2G2-059], [V2G2-060], [V2G2-061], [V2G2-062], [V2G2-063], [V2G2-064], [V2G2-065], [V2G2-067], [V2G2-070], [V2G2-071], [V2G2-163], [V2G2-164], [V2G2-638], [V2G2-649], [V2G2-650], [V2G2-693], [V2G2-694], [V2G2-695], [V2G2-810], [V2G2-811], [V2G2-843], [V2G2-844], [V2G2-850], [V2G2-873], [V2G2-876], [V2G2-885], [V2G2-924]	Out of scope of this standard (Requirement refers to external RFCs, standards, etc.)
[V2G2-289], [V2G2-290], [V2G2-291], [V2G2-292], [V2G2-314], [V2G2-315], [V2G2-329], [V2G2-330], [V2G2-480], [V2G2-643], [V2G2-644], [V2G2-674], [V2G2-676], [V2G2-743], [V2G2-761], [V2G2-777], [V2G2-833], [V2G2-834], [V2G2-837], [V2G2-838], [V2G2-851], [V2G2-858], [V2G2-859], [V2G2-860],	Out of scope of this standard (Requirement refers to power flow)

List of requirement IDs	Comment (no consideration in ATS)
[V2G2-862], [V2G2-863], [V2G2-865], [V2G2-866]	
[V2G2-035], [V2G2-036]	Out of scope of this standard (Requirements refers to ISO 15118-5)

Table 24 — Requirements of ISO 15118-2 implicitly covered by the SUT adapters / codecs

List of requirement IDs	Comment (implicitly tested)
[V2G2-010]	Cannot be tested explicitly in SECC/EVCC black box test configuration for the profile defined in the respective column. Tested implicitly by V2G codec for the profile defined in the respective column
[V2G2-073], [V2G2-075], [V2G2-077], [V2G2-078], [V2G2-079], [V2G2-080], [V2G2-081], [V2G2-083], [V2G2-084], [V2G2-085], [V2G2-124], [V2G2-125], [V2G2-128], [V2G2-129], [V2G2-131], [V2G2-132], [V2G2-136], [V2G2-137], [V2G2-138], [V2G2-139], [V2G2-143], [V2G2-149], [V2G2-151], [V2G2-155], [V2G2-156], [V2G2-174], [V2G2-622], [V2G2-809], [V2G2-816]	Tested implicitly by 15118-2 SUT adapter
[V2G2-097], [V2G2-098], [V2G2-099], [V2G2-100], [V2G2-101], [V2G2-102], [V2G2-171], [V2G2-440], [V2G2-445], [V2G2-600], [V2G2-697], [V2G2-825]	Tested implicitly by V2G codec
[V2G2-651]	Tested implicitly by V2G codec. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column.

The resulting test suite coverage in this document with reference to requirements in ISO 15118-2 is summarized in Table 25. It only includes requirements which are not listed for exclusion in Table 23 or Table 24. Table 25 specifies the relevance of requirements of ISO 15118-2 for the ATS, based upon the type of SUT (EVCC or SECC), the authentication profile (EIM or PnC) and AC or DC charging. The following symbols are used in Table 25:

- X Indicates requirements that are covered in the ATS with one or more test cases.
- I Indicates requirements that are indirectly covered in the ATS but other than those listed in Table 24 can be directly associated to one or more test cases in the ATS.
- P Indicates requirements that are only partially covered by one or more test cases in the ATS.
- N Requirements that are not testable for the profile in the respective column.
- Requirements that are not applicable for the profile in the respective column.
- O Requirements that are out of the scope of the ATS for the profile in the respective column.

Table 25 — ATS coverage of requirements in ISO 15118-2

Requirement t ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-004]	N	N	X	X	N	N	X	X	Cannot be tested explicitly in SECC/EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-353]_[V2G2-354]_[V2G2-004]_[V2G2-009]_[V2G2-656]_[V2G2-926]_[V2G2-822]
[V2G2-005]	-	-	P	P	-	-	X	X	The verification of this requirement consists of two different test cases, so the requirement can only be tested partially for the profile defined in the respective column Group_[V2G2-005]_[V2G2-007]
[V2G2-006]	-	-	-	-	-	-	X	X	Group_[V2G2-006]_[V2G2-652]_[V2G2-909]
[V2G2-007]	-	-	P	P	-	-	X	X	The verification of this requirement consists of two different test cases, so the requirement can only be tested partially for the profile defined in the respective column Group_[V2G2-005]_[V2G2-007]
[V2G2-008]	-	-	-	-	I	I	I	I	Tested indirectly through test for requirement [V2G2-166]. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column TC_EVCC_CMN_VTB_SupportedAppProtocol_001
[V2G2-009]	N	N	X	X	N	N	X	X	Cannot be tested explicitly in SECC/EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-353]_[V2G2-354]_[V2G2-004]_[V2G2-009]_[V2G2-656]_[V2G2-926]_[V2G2-822]
[V2G2-018]	-	-	-	-	I	I	I	I	Tested indirectly through test for requirement [V2G2-142] Group_[V2G2-142]_[V2G2-623]_[V2G2-018]_[V2G2-019]
[V2G2-019]	-	-	-	-	I	I	I	I	Tested indirectly through test for requirement [V2G2-142] Group_[V2G2-142]_[V2G2-623]_[V2G2-018]_[V2G2-019]
[V2G2-021]	-	-	-	-	X	X	X	X	Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column TC_EVCC_CMN_VTB_SupportedAppProtocol_001
[V2G2-022]	-	-	-	-	P	P	P	P	Only one case can be considered, so the requirement can only be tested partially TC_EVCC_CMN_VTB_SupportedAppProtocol_001 TC_EVCC_CMN_VTB_SupportedAppProtocol_004 TC_EVCC_CMN_VTB_SupportedAppProtocol_005
[V2G2-024]	-	-	-	-	X	X	X	X	TC_EVCC_CMN_VTB_SupportedAppProtocol_001 TC_EVCC_CMN_VTB_SupportedAppProtocol_004 TC_EVCC_CMN_VTB_SupportedAppProtocol_005
[V2G2-025]	-	-	-	-	X	X	X	X	Group_[V2G2-728]_[V2G2-025]
[V2G2-026]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-168] TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_002 TC_SECC_CMN_VTB_SupportedAppProtocol_006 TC_SECC_CMN_VTB_SupportedAppProtocol_004
[V2G2-027]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-027] TC_SECC_CMN_VTB_SDP_001 TC_SECC_CMN_VTB_SDP_002 TC_SECC_CMN_VTB_SDP_007 TC SECC CMN VTB SDP 003

Requirement t ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-029]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-723] TC_SECC_CMN_VTB_SDP_004 TC_SECC_CMN_VTB_SDP_005 TC_SECC_CMN_VTB_SDP_006
[V2G2-030]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-168] TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_002 TC_SECC_CMN_VTB_SupportedAppProtocol_006 TC_SECC_CMN_VTB_SupportedAppProtocol_004
[V2G2-031]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-168] TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_002 TC_SECC_CMN_VTB_SupportedAppProtocol_006 TC_SECC_CMN_VTB_SupportedAppProtocol_004
[V2G2-032]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-032] TC_SECC_CMN_VTB_SupportedAppProtocol_005
[V2G2-033]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-168] TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_002 TC_SECC_CMN_VTB_SupportedAppProtocol_006 TC_SECC_CMN_VTB_SupportedAppProtocol_004
[V2G2-034]	X	X	X	X	-	-	-	-	Group_[V2G2-729]_[V2G2-034]
[V2G2-068]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-168]. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_002 TC_SECC_CMN_VTB_SupportedAppProtocol_006 TC_SECC_CMN_VTB_SupportedAppProtocol_004
[V2G2-082]	X	X	X	X	X	X	X	X	Group_[V2G2-082]_[V2G2-086]
[V2G2-086]	X	X	X	X	X	X	X	X	Group_[V2G2-082]_[V2G2-086]
[V2G2-087]	P	P	P	P	P	P	P	P	Table 9 and Table 10 can only be tested partially TC_EVCC_CMN_VTB_V2GTPSDP_001 TC_EVCC_CMN_VTB_V2GTPSessionSetup_001 TC_SECC_CMN_VTB_V2GTPSDP_001 TC_SECC_CMN_VTB_V2GTPSessionSetup_001
[V2G2-088]	P	P	P	P	P	P	P	P	Requirement definition considers various possible scenarios, so the requirement can only be tested partially for exemplarily selected cases TC_EVCC_CMN_VTB_V2GTPSessionSetup_001 TC_SECC_CMN_VTB_V2GTPSessionSetup_001
[V2G2-103]	-	-	X	X	-	-	X	X	Group_[V2G2-103]_[V2G2-104]
[V2G2-104]	-	-	P	P	-	-	P	P	Internal states cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially Group_[V2G2-103]_[V2G2-104]
[V2G2-108]	-	-	-	-	-	-	X	X	TC_EVCC_CMN_VTB_PaymentDetails_001 TC_EVCC_CMN_VTB_PaymentDetails_002

Requirement ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-117]	-	-	-	-	-	-	X	X	Group_[V2G2-117]_[V2G2-119]_[V2G2-764]_[V2G2-765]_[V2G2-766]_[V2G2-767]_[V2G2-768]_[V2G2-769]_[V2G2-770]_[V2G2-771]
[V2G2-119]	-	-	-	-	-	-	X	X	Group_[V2G2-117]_[V2G2-119]_[V2G2-764]_[V2G2-765]_[V2G2-766]_[V2G2-767]_[V2G2-768]_[V2G2-769]_[V2G2-770]_[V2G2-771]
[V2G2-121]	-	-	-	-	-	-	I	I	Tested indirectly through test for requirement [V2G2-500]/[V2G2-501] and [V2G2-503] TC_EVCC_CMN_VTB_Authorization_010 TC_EVCC_CMN_VTB_Authorization_011
[V2G2-122]	-	-	-	-	-	-	I	I	Tested indirectly through test for requirement [V2G2-500]/[V2G2-501] and [V2G2-503] TC_EVCC_CMN_VTB_Authorization_010 TC_EVCC_CMN_VTB_Authorization_011
[V2G2-123]	X	X	X	X	-	-	-	-	TC_SECC_CMN_VTB_SDP_001 TC_SECC_CMN_VTB_SDP_002 TC_SECC_CMN_VTB_SDP_007 TC_SECC_CMN_VTB_SDP_003
[V2G2-126]	-	-	-	-	X	X	X	X	TC_EVCC_CMN_VTB_SDP_006
[V2G2-127]	-	-	-	-	P	P	P	P	Subclause 7.8.3.1 can only be tested partially TC_EVCC_CMN_VTB_V2GTPSDP_001
[V2G2-130]	P	P	P	P	-	-	-	-	Subclause 7.8.3.1 can only be tested partially TC_SECC_CMN_VTB_V2GTPSDP_001
[V2G2-140]	-	-	-	-	X	X	X	X	TC_EVCC_CMN_VTB_V2GTPSDP_001
[V2G2-141]	-	-	-	-	X	X	X	X	TC_EVCC_CMN_VTB_V2GTPSDP_001
[V2G2-142]	-	-	-	-	X	X	X	X	Group_[V2G2-142]_[V2G2-623]_[V2G2-018]_[V2G2-019]
[V2G2-144]	P	P	P	P	-	-	-	-	Requirement definition considers various possible scenarios, so the requirement can only be tested partially for exemplarily selected cases TC_SECC_CMN_VTB_SDP_001 TC_SECC_CMN_VTB_SDP_002 TC_SECC_CMN_VTB_SDP_007 TC_SECC_CMN_VTB_SDP_003
[V2G2-145]	-	-	-	-	P	P	P	P	Requirement definition considers various possible scenarios, so the requirement can only be tested partially for exemplarily selected cases TC_EVCC_CMN_VTB_SDP_007
[V2G2-147]	X	X	X	X	-	-	-	-	TC_SECC_CMN_VTB_SDP_001 TC_SECC_CMN_VTB_SDP_002 TC_SECC_CMN_VTB_SDP_007 TC_SECC_CMN_VTB_SDP_003
[V2G2-150]	X	X	X	X	-	-	-	-	TC_SECC_CMN_VTB_SDP_001 TC_SECC_CMN_VTB_SDP_002 TC_SECC_CMN_VTB_SDP_007 TC_SECC_CMN_VTB_SDP_003
[V2G2-152]	X	X	X	X	-	-	-	-	TC_SECC_CMN_VTB_V2GTPSDP_001
[V2G2-153]	X	X	X	X	-	-	-	-	TC_SECC_CMN_VTB_V2GTPSDP_001

Requirement ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-154]	X	X	X	X	-	-	-	-	TC_SECC_CMN_VTB_SDP_001 TC_SECC_CMN_VTB_SDP_002 TC_SECC_CMN_VTB_SDP_007 TC_SECC_CMN_VTB_SDP_003
[V2G2-157]	-	-	-	-	I	I	I	I	Tested indirectly through test for requirement [V2G2-161] Group_[V2G2-157]_[V2G2-160]_[V2G2-161]
[V2G2-158]	-	-	-	-	I	I	I	I	Tested indirectly through test for requirement [V2G2-157] and an initiated paused session. Requirement is only testable if a corresponding PIXIT is considered Group_[V2G2-158]_[V2G2-731]
[V2G2-159]	-	-	-	-	I	I	I	I	Tested indirectly through test for requirement [V2G2-160] Group_[V2G2-159]
[V2G2-160]	-	-	-	-	X	X	X	X	Group_[V2G2-157]_[V2G2-160]_[V2G2-161]
[V2G2-161]	-	-	-	-	I	I	I	I	Group_[V2G2-157]_[V2G2-160]_[V2G2-161] Group_[V2G2-161]
[V2G2-165]	X	X	X	X	X	X	X	X	Group_[V2G2-165]_[V2G2-178]
[V2G2-166]	-	-	-	-	X	X	X	X	TC_EVCC_CMN_VTB_SupportedAppProtocol_001 TC_EVCC_CMN_VTB_SupportedAppProtocol_004 TC_EVCC_CMN_VTB_SupportedAppProtocol_005
[V2G2-167]	-	-	-	-	X	X	X	X	TC_EVCC_CMN_VTB_SupportedAppProtocol_001 TC_EVCC_CMN_VTB_SupportedAppProtocol_004 TC_EVCC_CMN_VTB_SupportedAppProtocol_005
[V2G2-168]	X	X	X	X	-	-	-	-	TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_002 TC_SECC_CMN_VTB_SupportedAppProtocol_006 TC_SECC_CMN_VTB_SupportedAppProtocol_004
[V2G2-169]	P	P	P	P	-	-	-	-	Priority handling cannot be tested explicitly in SECC black box test configuration, so the requirement can only be tested partially TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_006 TC_SECC_CMN_VTB_SupportedAppProtocol_004
[V2G2-170]	X	X	X	X	-	-	-	-	Requirement is only testable if a corresponding PIXIT is considered TC_SECC_CMN_VTB_SupportedAppProtocol_006
[V2G2-172]	X	X	X	X	-	-	-	-	TC_SECC_CMN_VTB_SupportedAppProtocol_002
[V2G2-173]	-	-	-	-	X	X	X	X	TC_EVCC_CMN_VTB_SupportedAppProtocol_002
[V2G2-175]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_SupportedAppProtocol_001 TC_EVCC_CMN_VTB_SupportedAppProtocol_004 TC_EVCC_CMN_VTB_SupportedAppProtocol_005
[V2G2-176]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_002 TC_SECC_CMN_VTB_SupportedAppProtocol_006 TC_SECC_CMN_VTB_SupportedAppProtocol_004
[V2G2-178]	P	P	P	P	P	P	P	P	Only one case can be considered, so the requirement can only be tested partially

Requirement ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
									Group_[V2G2-165]_[V2G2-178]
[V2G2-179]	X	X	X	X	X	X	X	X	Group_[V2G2-179]_[V2G2-180]_[V2G2-181]_[V2G2-183]
[V2G2-180]	X	X	X	X	X	X	X	X	Group_[V2G2-179]_[V2G2-180]_[V2G2-181]_[V2G2-183]
[V2G2-181]	X	X	X	X	X	X	X	X	Group_[V2G2-179]_[V2G2-180]_[V2G2-181]_[V2G2-183]
[V2G2-182]	X	X	X	X	X	X	X	X	Group_[V2G2-182]
[V2G2-183]	X	X	X	X	X	X	X	X	Group_[V2G2-179]_[V2G2-180]_[V2G2-181]_[V2G2-183]
[V2G2-188]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-188]_[V2G2-189]_[V2G2-485]
[V2G2-189]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-188]_[V2G2-189]_[V2G2-485]
[V2G2-190]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-190]_[V2G2-191]_[V2G2-543]_[V2G2-192]
[V2G2-191]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-190]_[V2G2-191]_[V2G2-543]_[V2G2-192]
[V2G2-192]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-190]_[V2G2-191]_[V2G2-543]_[V2G2-192]
[V2G2-193]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_ServiceDiscovery_001
[V2G2-194]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_ServiceDiscovery_001
[V2G2-195]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-195]_[V2G2-196]
[V2G2-196]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-195]_[V2G2-196]
[V2G2-197]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_ServiceDetail_002 TC_EVCC_CMN_VTB_ServiceDetail_001
[V2G2-198]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_ServiceDetail_002 TC_EVCC_CMN_VTB_ServiceDetail_001
[V2G2-199]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column. Group_[V2G2-199]_[V2G2-200]

Requirement ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-200]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column. Group_[V2G2-199]_[V2G2-200]
[V2G2-201]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-201]_[V2G2-202]_[V2G2-431]_[V2G2-349]_[V2G2-350]_[V2G2-351]_[V2G2-352]
[V2G2-202]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-201]_[V2G2-202]_[V2G2-431]_[V2G2-349]_[V2G2-350]_[V2G2-351]_[V2G2-352]
[V2G2-203]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-203]_[V2G2-204]
[V2G2-204]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-203]_[V2G2-204]
[V2G2-205]	-	-	N	N	-	-	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_CertificateHandlingAndPaymentDetails_001 TC_EVCC_CMN_VTB_PaymentDetails_001 TC_EVCC_CMN_VTB_PaymentDetails_002 TC_EVCC_CMN_VTB_PaymentDetails_003
[V2G2-206]	-	-	N	N	-	-	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_CertificateHandlingAndPaymentDetails_001 TC_EVCC_CMN_VTB_PaymentDetails_001 TC_EVCC_CMN_VTB_PaymentDetails_002 TC_EVCC_CMN_VTB_PaymentDetails_003
[V2G2-208]	-	-	X	X	-	-	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-208]_[V2G2-209]
[V2G2-209]	-	-	X	X	-	-	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-208]_[V2G2-209]
[V2G2-210]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_Authorization_002 TC_EVCC_CMN_VTB_Authorization_001 TC_EVCC_CMN_VTB_Authorization_010 TC_EVCC_CMN_VTB_Authorization_011
[V2G2-211]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_CMN_VTB_Authorization_002 TC_EVCC_CMN_VTB_Authorization_001 TC_EVCC_CMN_VTB_Authorization_010 TC_EVCC_CMN_VTB_Authorization_011

Requirement ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-212]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-212]_[V2G2-213]
[V2G2-213]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-212]_[V2G2-213]
[V2G2-214]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-214]_[V2G2-216]
[V2G2-215]	-	-	-	-	X	X	X	X	Requirement is only testable if a corresponding PIXIT is considered. Group_[V2G2-215]
[V2G2-216]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-214]_[V2G2-216]
[V2G2-218]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-218]_[V2G2-220]
[V2G2-220]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-218]_[V2G2-220]
[V2G2-221]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-221]_[V2G2-222]_[V2G2-286] [V2G2-510]
[V2G2-222]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-221]_[V2G2-222]_[V2G2-286] [V2G2-510]
[V2G2-223]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-223]_[V2G2-226]
[V2G2-224]	X	X	X	X	-	-	-	-	Requirement definition considers various possible scenarios, so the requirement can only be tested partially for exemplarily selected cases TC_SECC_AC_VTB_PowerDelivery_001 TC_SECC_AC_VTB_PowerDelivery_002 TC_SECC_DC_VTB_PowerDelivery_001
[V2G2-225]	X	X	X	X	-	-	-	-	TC_SECC_AC_VTB_PowerDelivery_010 TC_SECC_DC_VTB_PowerDelivery_007
[V2G2-226]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-223]_[V2G2-226]
[V2G2-227]	-	-	-	-	-	-	X	X	TC_EVCC_CMN_VTB_CertificateUpdate_001
[V2G2-228]	-	-	N	N	-	-	X	X	Cannot be tested explicitly in SECC black box test configuration. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column. TC_EVCC_CMN_VTB_CertificateUpdate_001

Requirement ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-229]	-	-	N	N	-	-	X	X	Cannot be tested explicitly in SECC black box test configuration. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column. TC_EVCC_CMN_VTB_CertificateUpdate_001
[V2G2-230]	-	-	-	-	-	-	I	I	Tested indirectly through test for requirement [V2G2-501] and [V2G2-503] TC_EVCC_CMN_VTB_Authorization_011
[V2G2-231]	-	-	X	X	-	-	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-231]_[V2G2-232]
[V2G2-232]	-	-	X	X	-	-	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-231]_[V2G2-232]
[V2G2-235]	-	-	N	N	-	-	X	X	Cannot be tested explicitly in SECC black box test configuration. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column. TC_EVCC_CMN_VTB_CertificateInstallation_001
[V2G2-236]	-	-	N	N	-	-	X	X	Cannot be tested explicitly in SECC black box test configuration. Requirement is only testable if a corresponding PIXIT is considered for the profile defined in the respective column. TC_EVCC_CMN_VTB_CertificateInstallation_001
[V2G2-237]	-	-	X	X	-	-	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-237]_[V2G2-238]
[V2G2-238]	-	-	X	X	-	-	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-237]_[V2G2-238]
[V2G2-239]	N	N	N	N	X	X	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-239]_[V2G2-738]
[V2G2-240]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-240]_[V2G2-241]
[V2G2-241]	X	X	X	X	N	N	N	N	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-240]_[V2G2-241]
[V2G2-242]	N	-	N	-	X	-	X	-	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-242]
[V2G2-243]	X	-	X	-	N	-	N	-	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-243]_[V2G2-244]
[V2G2-244]	X	-	X	-	N	-	N	-	Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column Group_[V2G2-243]_[V2G2-244]
[V2G2-245]	-	-	N	N	-	-	X	X	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column Group_[V2G2-245]_[V2G2-246]