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Entwurf

**Straßenfahrzeuge –
Kommunikationsschnittstelle zwischen Fahrzeug und Ladestation –
Teil 4: Konformitätsprüfungen für das Netzwerk- und
Anwendungsprotokoll;
Englische Fassung prEN ISO 15118-4:2016, nur auf CD-ROM**

Road vehicles –

Vehicle to grid communication interface –

Part 4: Network and application protocol conformance test;

English version prEN ISO 15118-4:2016, only on CD-ROM

Véhicules routiers –

Interface de communication entre véhicule et réseau électrique –

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

Version anglaise prEN ISO 15118-4:2016, seulement en CD-ROM

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DIN-Normenausschuss Automobiltechnik (NAAutomobil)

Nationales Vorwort

Dieses Dokument (prEN ISO 15118-4:2016) wurde vom Technischen Komitee ISO/TC 22 „Road vehicles“ ausgearbeitet, dessen Sekretariat von AFNOR gehalten wird, und wurde vom Technischen Komitee CEN/TC 301 „Straßenfahrzeuge“ übernommen, dessen Sekretariat von AFNOR (Frankreich) gehalten wird.

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Um den Energieverbrauch von Fahrzeugen zu senken, werden Fahrzeuge mit elektrischem Teil- oder Kompletantrieb entwickelt. Um die Batterien dieser Fahrzeuge aufladen zu können, wird eine spezielle Lade-Infrastruktur benötigt.

Während verschiedene Teilaspekte in der Normung von Elektrofahrzeugen und Infrastruktur bei ISO und IEC bereits behandelt wurden, beschäftigt sich diese Normenreihe mit dem Informationsaustausch zwischen Elektrofahrzeug und Lade-Infrastruktur. Kommunikation ist für das effektive Aufladen von Fahrzeugen sowie die Entwicklung effizienter und komfortabler Abrechnungssysteme unabdingbar.

Dieser Teil der Normenreihe beschreibt spezifische Prüfungen basierend auf den Kommunikationsanforderungen, die in ISO/IEC 15118-2 beschrieben sind. Die Norm dient Systemlieferanten als Grundlage, die Systemkonformität von Kommunikationssteuerungen entweder in Elektrofahrzeugen oder in Ladesäulen nachzuweisen.

Nationaler Anhang NA (informativ)

Begriffe

3 Begriffe

Für die Anwendung dieses Dokuments gelten die Begriffe nach ISO 15118-1, ISO 15118-2, ISO 15118-3 und die folgenden Begriffe:

3.1

Abstrakter Prüffall

(en: abstract test case)

eine vollständige und unabhängige Spezifikation von Aktionen die notwendig sind, eine spezifische Prüfabsicht sicherzustellen und auf einem Abstraktionsniveau einer bestimmten Abstraktionsprüfmethode, von Anfang bis Ende in einem stabilen Prüfzustand, definiert ist. Diese Spezifikation darf in eine oder mehrere nachfolgende oder zusammenhängende Verbindungen involviert sein, siehe (ITU-T X.290)

Anmerkung 1 zum Begriff: Die Spezifikation sollte in der Art und Weise vollständig sein, dass es ausreicht ein für jede potentiell überwachbare Prüfung eindeutig zugeordnetes Prüfergebnis zu ermöglichen (z. B. Reihe von Prüfereignissen)..

Anmerkung 2 zum Begriff: Die Spezifikation sollte in der Art und Weise unabhängig sein, dass es möglich ist die abgeleiteten durchführbaren Prüfungen isoliert von weiteren Prüfungen durchzuführen (z. B. sollte die Spezifikation immer die Möglichkeit des Starts und das Beenden im Zustand „Leerlauf“ beinhalten).

3.2

Abstrakte Prüfreihe

ATS

(en: abstract test suite)

eine Prüfreihe die abstrakte Prüffälle umfasst, siehe (ITU-T X.290)

3.3

Black-Box Prüfung

(en: black box testing)

eine Methode der Prüfung und Untersuchung eines Prüflings ohne dabei die interne Implementierung und Struktur des Prüflings zu berücksichtigen. Die Prüfung einer Black-Box verlässt sich ausschließlich die Prüfung der offenen Schnittstellen des Prüflings.

3.4

Konformitätsanforderungen

(en: conformance requirements)

ISO/IEC 15118-4 definiert eine Menge von zusammenhängenden Anforderungen, welche zusammen das Systemverhalten und dessen Kommunikation festlegen. Konformität eines realen Systems wird deshalb auf zwei Ebenen ausgedrückt, Konformität zu jeder individuellen Anforderung und Konformität zu einem Satz. Verfügbare ISO/IEC 15118-4 Konformitätsprüfungen beinhalten Anforderungen und übertragen Syntax-Anforderungen so lange diese mittels *Black-Box Prüfungen* überprüft werden können

Anmerkung 1 zum Begriff: Siehe auch *statische Konformitätsanforderungen* und *dynamische Konformitätsanforderungen*.

3.5

Konformitätsimplementierung

(en: conformance implementation)

eine Prüfimplementierung (IUT, en: Implementation Under Test), welche sowohl statische wie dynamische Konformitätsanforderungen befriedigt und konsistent mit den Fähigkeiten nach der Protokollimplementierung Konformitätsaussage (PICs, en: Protocol Implementation Conformance Statement) ist, siehe (ITU-T X.290)

3.6

dynamische Konformitätsanforderungen

(en: dynamic conformance requirements)

eine der Anforderungen welche festlegt, welches überwachbare Verhalten bei der betroffenen Spezifikation, in den meisten Fällen auf Kommunikation bezogen, erlaubt ist, siehe (ITU-T X.290)

Anmerkung 1 zum Begriff: Die Anforderungen dieser Konformitätsspezifikation sind in ISO/IEC 15118/2 beschrieben.

3.7

ausführbarer Prüffall

(en: Executable test case)

die Verwirklichung eines abstrakten Prüffalles, siehe (ITU-T X.290)

3.8

erwartetes Verhalten

(en: Expected behavior)

ein bestimmtes, nach ISO/IEC 15118-2 erwartetes Verhalten eines Prüflings nach dem ein vordefinierter Stimulus gesendet wurde, um einen Test erfolgreich zu bestehen. Das erwartete Verhalten beschreibt die genaue Antwort des Prüflings auf solch einen Stimulus

3.9

Implementierungskonformitätsaussage

ICS

(en: implementation conformance statement)

eine vom Lieferanten einer Implementierung oder eines Systems getätigte Aussage die vorgibt, zu einer gegebenen Spezifikation konform zu sein und aussagt, welche Funktionen implementiert wurden, siehe (ITU-T X.290)

Anmerkung 1 zum Begriff: Die vorgegebene Spezifikation für diese Konformitätsspezifikation ist die ISO/IEC 15118-2.

3.10

Implementierungszusatzinformation für Prüfungen

IXIT

(en: implementation extra information for testing)

eine vom Lieferanten oder eines Umsetzers einer Prüfimplementierung getätigte Aussage, welche alle Informationen (zusätzlich zu denen in der ICS gegebenen) bezogen auf die Prüfimplementierung und dessen Testumgebung beinhaltet oder referenziert und ein Prüflabor befähigt, die entsprechende Prüfreihe gegen die Prüfimplementierung durchzuführen, siehe (ITU-T X.290)

3.11

Prüfimplementierung

IUT

(en: implementation under test)

eine Implementierung eines oder mehreren OSI-Protokolls(en) in einer angrenzenden Nutzer/ Anbieter Beziehung, als Teil eines realen offenen Systems welches durch Prüfungen untersucht wird, siehe (ITU-T X.290)

3.12

Hauptprüfkomponente

MTC

(en: main test component)

einzelne Prüfkomponente in einer Prüfkomponentenkonfiguration, die Erstellung und Steuerung von parallelen Prüfkomponenten sowie Berechnung und Erstellung des Prüfergebnisses verantwortlich ist, siehe (ITU-T X.292)

3.13

Parallele Prüfkomponente

PTC

(en: parallel test component)

Prüfkomponente, die von einer Hauptprüfkomponente erstellt wurde, siehe (ITU-T X.292)

3.14

Nachbedingung

(en: post-condition)

die Prüfschritte die notwendig sind, um die Wege vom Ende der Hauptprüfung bis zur Vollendung des stabilen Zustandes für den Prüffall festzulegen

Anmerkung 1 zum Begriff: Siehe auch *Prüfverhalten*.

3.15

Vorbedingung

(en: pre-condition)

die Prüfschritte die notwendig sind, um die Wege vom Start des stabilen Zustandes des Prüffalles bis zum initialen Zustand von dem die Hauptprüfung beginnt

Anmerkung 1 zum Begriff: Siehe auch *Prüfverhalten*.

3.16

Protokoll zur Implementierungskonformitätsaussage

PICS

(en: protocol implementation conformance statement)

eine ICS für eine Implementierung oder ein System was vorgibt, konform zu einer gegebenen Spezifikation zu sein, siehe (ITU-T X.290)

Anmerkung 1 zum Begriff: Die vorgegebene Spezifikation für diese Konformitätsspezifikation ist die ISO/IEC 15118-2.

3.17

Protokoll zur Implementierungszusatzinformation für Prüfungen

PIXIT

(en: protocol implementation extra information for testing)

eine IXIT bezogen zu Konformitätsprüfung nach einer gegebenen Spezifikation, siehe (ITU-T X.290)

Anmerkung 1 zum Begriff: Die vorgegebene Spezifikation für diese Konformitätsspezifikation ist die ISO/IEC 15118-2.

3.18

Laufzeitumgebung

(en: runtime environment)

beschreibt das Betriebssystem und entsprechende Programmanforderungen eines Systems (z. B. Prüfsystem)

3.19

semantisch ungültiges Prüfverhalten

SemITB

(en: Semantically invalid test behavior)

ein semantisch ungültiges Prüfverhalten legt Prüfschritte fest, bei dem das Prüfsystem einen Stimuli an das SUT sendet, welche nach den Protokollanforderungen semantisch ungültig sind

Anmerkung 1 zum Begriff: Diese Art von Prüfverhalten ist in dieser Konformitätsnorm festgelegt und umfasst explizit Anforderungen, welche die entsprechende Fehlerbehandlung des Prüfsystems definieren.

3.20

statische Konformitätsanforderungen

(en: static conformance requirements)

eine der Anforderungen, welche die Kombinationsbegrenzungen der implementierten Fähigkeiten festlegt, die in einem offenen realen System erlaubt sind das vorgibt, konform zu der relevanten Spezifikation(en) zu sein, siehe (ITU-T X.290)

3.21

Prüfsystem

SUT

(en: System under test)

das real offene System, welches die Prüfümplementierung beinhaltet, siehe (ITU-T X.290)

3.22

syntaktisch ungültiges Prüfverhalten

SynITB

(en: syntactically invalid test behavior)

ein syntaktisch ungültiges Prüfverhalten legt Prüfschritte fest, bei dem das Prüfsystem einen Stimuli an das SUT sendet, welche nach den Protokollanforderungen syntaktisch ungültig sind

Anmerkung 1 zum Begriff: Diese Art von Prüfverhalten ist nicht in dieser Konformitätsnorm festgelegt, siehe Codec-Anforderungen.

3.23

Prüfverhalten

(en: test behavior)

der Satz von Prüfschritten (Hauptprüfung) die notwendig sind um die Prüfabsicht zu erreichen und um Urteile für die möglichen Ergebnisse zu bestimmen

3.24

Prüfausführung

(en: test execution)

die Prüfdurchführungsumgebung (TE) ist für die Interpretation oder Ausführung einer abstrakten Prüfreihe verantwortlich. Konzeptionell kann die TE in drei interaktive Umgebungen unterteilt werden: eine ausführbare Prüfreihe (ETS), ein Prüfraumen (TFW) und eine optionale interne Kodierungs/Dekodierungsumgebung (EDS)

Anmerkung 1 zum Begriff: Siehe auch ETSI ES 201 873-5 V4.6.1

3.25

Prüfrahmen

TFW

(en: test framework)

der Prüfrahmen interagiert mit der Prüfsteuerungs- (TM), SUT-Adapter- (SA) und den Programmadapterumgebungen (PA) über die Prüfsteuerungsschnittstelle (TCI) und die Prüflaufzeitschnittstelle (TRI). Zusätzlich steuert der Prüfrahmen die ausführbare Prüfreihe (ETS) und die Kodierungs/Dekodierungssystemumgebung (EDS). Der Prüfrahmen initialisiert die Adapter sowie die ETS und EDS Umgebungen. Die Umgebung führt alle notwendigen Aktionen aus, um einen Prüffall oder Funktion mit Parametern in der ETS Umgebung ordnungsgemäß auszuführen. Er befragt die Prüfsteuerungsumgebung nach Modulparameterwerten, die für die ETS notwendig sind und sendet aufgezeichnete Informationen. Der Prüfrahmen sammelt und löst zugeordnete Urteile, die von der ETS Umgebung zurückgegeben werden.

Anmerkung 1 zum Begriff: Siehe auch ETSI ES 201 873-5 V4.6.1

Anmerkung 2 zum Begriff: In dieser Norm wird der Prüfrahmen TTCN-3 Laufzeitsystem (T3RTS) verwendet, um die Prüfrahmenfunktionalität zu erklären

3.26

Prüfab sicht

(en: Test purpose)

eine Prosabeschreibung einer gut beschriebenen Prüf-Zielsetzung, welche sich auf eine einfache Konformitätsanforderung oder einen Satz von bezogenen Konformitätsanforderungen konzentriert, die in den entsprechenden OSI-Spezifikationen festgelegt sind (z. B. Überprüfung das ein spezifischer Wert eines spezifischen Parameters unterstützt wird), siehe (ITU-T X.290)

3.27

Prüfsystem

(en: Test system)

ein Prüfsystem ist ein reales System, welches den Prüfrahmen, die abstrakte Prüfreihe, die Prüfausführung und die Adapter sowie die Codecs umfasst. Es kann auch eine gemeinsame Laufzeitumgebung, basierend auf einem Betriebssystem beinhalten

3.28

Prüfsteuerungsschnittstelle

TCI

(en: Test Control Interface)

vier Schnittstellen, welche die Interaktionen der TTCN-3 Abläufe mit der Prüfsteuerung festlegen, die Kodierung und Dekodierung, der Umgang mit den Prüfkomponenten und die Aufzeichnung in einem Prüfsystem, siehe [ETSI ES 201 873-5 V4.6.1]

3.29

Prüflaufzeitschnittstelle

TRI

(en: Test Runtime Interface)

zwei Schnittstellen, welche die Interaktionen der TTCN-3 Abläufe zwischen dem SUT und dem Programmadapter (PA) sowie dem Systemadapter (SA) in einem Prüfsystem festlegt, siehe [ETSI ES 201 873-5 V4.6.1]

3.30

Prüfsystemschnittstelle

TSI

(en: Test System Interface)

Prüfkomponente, welche die Zuordnung der Ports, die im (abstrakten) TTCN-3-Prüfsystem für die festlegt, welche vom offenen realen System angeboten werden, siehe [ETSI ES 201 873-5 V4.6.1]

3.31

gültiges Prüfverhalten

VTB

(en: Valid test behavior)

ein gültiges Prüfverhalten legt Prüfschritte fest, bei denen das Prüfsystem Stimuli an den Prüfling sendet, die nach den Protokollanforderungen gültig sind (syntaktisch und semantisch)

Anmerkung 1 zum Begriff: Diese Art von Prüffall ist in dieser Konformitätsnorm beschrieben.

Anmerkung 2 zum Begriff: Die Protokollanforderungen für diese Prüfnorm sind in ISO/IEC 15118-2 festgelegt.

3.32

(Prüf) Urteil

(en: (Test) verdict)

eine Aussage über „erfolgreich durchlaufen“, „durchgefallen“ oder „ergebnislos“, wie in einem abstrakten Prüffall beschrieben, bezogen auf die Konformität einer Prüfümplementierung wenn der Prüffall ausgeführt wird, siehe (ITU-T X.290)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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The committee responsible for this document is ISO/TC22 *Road vehicles* / SC31 *Data communication*.

ISO 15118 consists of the following parts:

- *Part 1: General information and use-case definition*
- *Part 2: Network and application protocol requirements*
- *Part 3: Physical layer and Data Link layer requirements*
- *Part 4: Network and application protocol conformance tests*
- *Part 5: Physical and data link layer conformance tests*
- *Part 8: Physical layer and data link layer requirements for wireless communication*

Introduction

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

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

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

1 Scope

This document specifies conformance tests in the form of an Abstract Test Suite (ATS) for a System Under Test (SUT) implementing an EVCC or SECC according to ISO/IEC 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/IEC 15118-2 and against what the supplier states the SUT implementation's capabilities are.

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

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

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

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61851-1, *Electric vehicle conductive charging system — Part 1: General requirements (Ed 2.0 2010)*

ISO/IEC 15118-1:2013, *Road vehicles — Vehicle to grid communication interface — Part 1: General information and use-case definition*

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

ISO/IEC 15118-3:2015, *Road vehicles — Vehicle-to-Grid Communication Interface — Part 3: Physical and data link layer requirements*

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

ITU-T X.292, *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications — The Tree and Tabular Combined Notation (TTCN)* (May 2002)

ETSI ES 201 873-1 V4.6.1, *TTCN-3: Core Language* (June 2014)

ETSI ES 201 873-3 V3.2.1, *TTCN-3: Graphical Presentation Format* (February 2007)

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)

ETSI ES 201 873-9 V4.6.1, *TTCN-3: Using XML schema with TTCN-3* (June 2015)

W3C EXI 1.0, *Efficient XML Interchange (EXI) Format 1.0*, W3C Recommendation (March 2011)

W3C XML Signature Syntax and Processing Version 1.1, - W3C Recommendation (April 2013)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15118-1, ISO 15118-2, ISO 15118-3 and the following apply.

3.1

Abstract test case

A complete and independent specification of the actions required to achieve a specific test purpose, 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. This specification may involve one or more consecutive or concurrent connections, cf. [ITU-T X.290].

NOTE 1 to entry The specification should be complete in the sense that it is sufficient to enable a test verdict to be assigned unambiguously to each potentially observable test outcome (i.e. sequence of test events).

NOTE 2 to entry The specification should be independent in the sense that it should be possible to execute the derived executable test case in isolation from other such test cases (i.e. the specification should always include the possibility of starting and finishing in the “idle” state).

3.2

Abstract test suite

ATS

A test suite composed of abstract test cases, cf. [ITU-T X.290].

3.3

Black box testing

A method of testing that examines the behavior of an SUT without considering the internal implementation and structure of the SUT. Black box testing therefore purely relies on the SUT's open interface for testing.

3.4

Conformance requirements

ISO/IEC 15118-2 forms a set of interrelated requirements which together define the behavior of the system and its communication. Conformance of a real system will, therefore, be expressed at two levels, conformance to each individual requirement and conformance to the set. Applicable ISO/IEC 15118-4 conformance tests include requirements and transfer syntax requirements as far as they can be validated by *black box testing*.

NOTE 1 to entry See also *static conformance requirements* and *dynamic conformance requirements*.

3.5

Conforming implementation

An IUT which satisfies both static and dynamic conformance requirements, consistent with the capabilities stated in the PICS(s), cf. [ITU-T X.290]

3.6

Dynamic conformance requirements

One of the requirements which specifies what observable behavior is permitted by the relevant specification(s) in instances of communication, cf. [ITU-T X.290].

NOTE 1 to entry The requirements for this conformance specification are defined in ISO/IEC 15118-2.

3.7

Executable test case

A realization of an abstract test case, cf. [ITU-T X.290].

3.8

Expected behavior

After sending a predefined stimulus to the SUT, a certain behavior of the SUT is expected corresponding to ISO/IEC 15118-2 in order to successfully pass a test. The expected behavior describes the exact response of the SUT to such a stimulus.

3.9

Implementation conformance statement

ICS

A statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented, cf. [ITU-T X.290].

NOTE 1 to entry The given specification for this conformance specification is ISO/IEC 15118-2.

3.10

Implementation extra information for testing

IXIT

A statement made by a supplier or implementer of an IUT which contains or references all of the information (in addition to that given in the ICS) related to the IUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the IUT, cf. [ITU-T X.290].

3.11

Implementation under test

IUT

An implementation of one or more OSI protocols in an adjacent user/provider relationship, being that part of a real open system which is to be studied by testing, cf. [ITU-T X.290].

3.12

Main test component

MTC

Single Test Component in a Test Component Configuration responsible for creating and controlling Parallel Test Components and computing and assigning the test verdict, cf. [ITU-T X.292].

3.13

Parallel test component

PTC

Test component created by the main test component, cf. [ITU-T X.292].

3.14

Post-condition

The test steps needed to define the paths from the end of the test body up to the finishing stable state for the test case.

NOTE 1 to entry See also *Test behavior*.

3.15

Pre-condition

The test steps needed to define the path from the starting stable state of the test case up to the initial state from which the test body will start.

NOTE 1 to entry See also *Test behavior*.

3.16

Protocol implementation conformance statements

PICS

An ICS for an implementation or system claimed to conform to a given protocol specification, cf. [ITU-T X.290].

NOTE 1 to entry The given protocol specification for this conformance specification is ISO/IEC 15118-2.

3.17

Protocol implementation extra information for testing

PIXIT

An IXIT related to testing for conformance to a given protocol specification, cf. [ITU-T X.290].

NOTE 1 to entry The given protocol specification for this conformance specification is ISO/IEC 15118-2.

3.18

Runtime environment

Describes the operating system and corresponding platform requirements of a system (e.g. Test system).

3.19

Semantically invalid test behavior

SemITB

A semantically invalid test behavior defines test steps where the test system sends stimuli to the SUT that are semantically invalid according to the protocol requirements.

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

3.20

Static conformance requirements

One of the requirements that specify the limitations on the combinations of implemented capabilities permitted in a real open system which is claimed to conform to the relevant specification(s), cf. [ITU-T X.290].

System under test

SUT

The real open system in which the IUT resides, cf. [ITU-T X.290].

3.21

Syntactically invalid test behavior

SynITB

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

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

3.22

Test behavior

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

3.23

Test execution

The Test Execution (TE) entity is responsible for the interpretation or execution of an abstract test suite. 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 1 to entry See also ETSI ES 201 873-5 V4.6.1.

3.24

Test framework

TFW

The Test Framework interacts with the Test Management (TM), SUT Adaptor (SA) and Platform Adaptor (PA) entities via Test Control Interface (TCI) and Test Runtime Interface (TRI). Additionally, it manages the Executable Test Suite (ETS) and Encoding/Decoding System (EDS) entities. The Test Framework initializes adaptors as well as ETS and EDS entities. This entity performs all the actions necessary to properly start the execution of a test case or function with parameters in the ETS entity. It queries the TM entity for module parameter values required by the ETS and sends logging information to it. It also collects and resolves associated verdicts returned by the ETS entity.

NOTE 1 to entry See also ETSI ES 201 873-5 V4.6.1.

NOTE 2 to entry In this standard, the Test Framework TTCN-3 Runtime System (T3RTS) is used to explain a Test Framework functionality.

3.25

Test purpose

A prose description of a well-defined objective of testing, focusing on a single conformance requirement or a set of related conformance requirements as specified in the appropriate OSI specification (e.g. verifying the support of a specific value of a specific parameter), cf. [ITU-T X.290].

3.26

Test system

The test system is a real system combining the test framework, abstract test suite, test execution and adapters as well as codecs. It may also contain a common runtime environment based on an operating system.

3.27

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, cf. [ETSI ES 201 873-6 V4.6.1].

3.28

Test Runtime Interface

TRI

Two interfaces that define the interaction of the TTCN-3 Executable between the SUT and the Platform Adapter (PA) and the System Adapter (SA) in a test system, cf. [ETSI ES 201 873-5 V4.6.1].

3.29

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, cf. [ETSI ES 201 873-6 V4.6.1].

3.30

Valid test behavior

VTB

A valid test behavior defines test steps where the test system sends stimuli to the SUT that are valid (syntactically and semantically) according to the protocol requirements.

NOTE 1 to entry This type of test behavior is defined in this conformance standard.

NOTE 2 to entry The protocol requirements for this conformance specification are defined in ISO/IEC 15118-2.

3.31

(Test) Verdict

A statement of “pass”, “fail” or “inconclusive”, as specified in an abstract test case, concerning conformance of an IUT with respect to that test case when it is executed, cf. [ITU-T X.290].

4 Symbols and 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)
ITB	Invalid Test Behavior
IUT	Implementation under Test
IXIT	Implementation eXtra Information for Testing
OCSP	Online Certificate Status Protocol
OEM	Original Equipment Manufacturer
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
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 part of ISO/IEC 15118 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 part of ISO/IEC 15118:

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

Where:

- "V2G" represents the ISO/IEC 15118 set of standards,
- "Y" represents the document part of the ISO/IEC 15118 document set, 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 define/specify the test system and the test cases inside the test suite. However, using TTCN-3 is not mandatory for the implementation of conformance tests for ISO/IEC 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 standard. The following sub clauses define the interface requirements marked black in Figure 1 for platform and SUT adapters (see sub

The diagram illustrates the Test System architecture for Black Box Tests. It shows the interaction between various components within the Test System and the System under Test (SUT).

Test System Components:

- Dynamic Test-PKI ISO/IEC 15118-4:** Represented by a stack of documents with gears, indicating cryptographic operations.
- Test Case Specification ISO/IEC 15118-4:** Represented by a stack of documents, providing the test cases.
- Test System User:** Represented by a person icon, interacting with the system.
- Test Framework:** A dashed box containing:
 - Test Suite:** Interacts with the Test Case Specification and Test Execution via TCI (Test Case Interface) and TRI (Test Result Interface).
 - Test Mgmt.:** Interacts with Test Suite and Test Execution via TRI.
 - Test Logging & Reporting:** Interacts with Test Execution via TRI.
 - Test Execution:** The central component that executes the test suite, receiving TCI from the Test Suite and TRI from the Test Suite, Test Mgmt., and Test Logging & Reporting.
- Codecs:** A stack of components (V2G-EXI, SDP, V2GTP, Security) that interface with the Test Suite and Test Execution via TCI.
- External Functions:** A stack of components (Security) that interface with the Test Suite and Test Execution via TCI.
- Adapters:** Three adapters (61851-1 SUT Adapter, 15118-2 SUT Adapter, Platform Adapter) that interface with the Test Execution via TRI.
- Runtime Environment:** The base environment for the Test System.

System under Test (SUT):

- Black Box Tests:** Represented by a large black box on the right.
- ISO/IEC 15118-2 Messaging:** A large double-headed arrow indicating communication between the Test System and the SUT.
- IEC 61851-1 Annex A PWM Signaling:** A large double-headed arrow indicating communication between the Test System and the SUT.

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

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, no external functions are defined for ISO/IEC 15118 conformance testing.

6.3 SUT adapter interfaces

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

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[V2G4-004] The IEC 61851-1 SUT adapter shall adapt the HAL 61851-1 functions to a PWM Signal defined in sub clause 7.7.7.

NOTE 2 The IEC 61851-1 SUT adapter may need additional hardware for adapting the message-based HAL 61851-1 communication to PWM Signaling according to IEC 61851-1 Annex A.

[V2G4-005] The ISO/IEC 15118-2 SUT adapter shall adapt and send/receive the encoded SDP requests/responses through UDP messages to/from the SUT as defined in ISO/IEC 15118-2 sub clauses 7.7.2 and 7.10.1.

[V2G4-006] The ISO/IEC 15118-2 SUT adapter shall adapt and send/receive the encoded V2G messages through a TCP or TLS connection to/from the SUT as defined in ISO/IEC 15118-2 sub clauses 7.7.1 and 7.7.3.

[V2G4-007] The ISO/IEC 15118-2 SUT adapter shall adapt the internal port control messages for TCP and TLS connection management as defined in Annex **0.3**

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

- 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/IEC 15118-2 SUT adapter shall provide a port map operation (refer to sub clause 7.3.2) with additional parameters for TCP and TLS connection configuration as defined in Annex **0.3**.

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

- 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/IEC 15118-3 adapter is defined in Part 5 of this standard. It may need additional hardware to adapt between different Layer 2 communication technologies (e.g. Ethernet to HomePlug Green PHY)

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 shall be 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 standard shall implement the TCI-CD interface as defined in ETSI ES 201 873-6 V4.6.1 sub clause 7.3.2.

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

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

- [V2G4-010]** The V2G-EXI codec shall encode TTCN-3 values as defined in Annex **0.6** into corresponding EXI streams as defined in ISO/IEC 15118-2 sub clause 7.9.1.
- [V2G4-011]** The V2G-EXI Security codec shall encode TTCN-3 values for X.509 Certificates as defined in Annex **0.6** into a corresponding Base64 representation suitable for EXI streams according to ISO/IEC 15118-2 sub clause 7.9.1.
- [V2G4-012]** The V2G-EXI codec shall decode EXI streams as defined in ISO/IEC 15118-2 sub clause 7.9.1 into TTCN-3 values as defined in Annex **0.6**.
- [V2G4-013]** The V2G-EXI Security codec shall decode Base64 representation from EXI streams according to ISO/IEC 15118-2 sub clause 7.9.1 into TTCN-3 values for X.509 Certificates as defined in Annex **0.6**.
- [V2G4-014]** The SDP codec shall encode TTCN-3 values as defined in Annex **0.5** into corresponding SDP requests/responses as defined in ISO/IEC 15118-2 sub clauses 7.10.1.3, 7.10.1.4 and 7.10.1.5.
- [V2G4-015]** The SDP codec shall decode SDP requests/responses as defined in ISO/IEC 15118-2 sub clauses 7.10.1.3, 7.10.1.4 and 7.10.1.5 into TTCN-3 values as defined in Annex **0.4**.
- [V2G4-016]** The V2GTP codec shall encode TTCN-3 values as defined in Annex **0.4** into corresponding V2GTP envelopes as defined in ISO/IEC 15118-2 sub clause 7.8.3.1.
- [V2G4-017]** The V2GTP codec shall decode V2GTP envelopes as defined in ISO/IEC 15118-2 sub clause 7.8.3.1 into TTCN-3 values as defined in Annex **0.4**.

7 Test suite conventions

7.1 General information

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

7.2 Test suite structure (TSS)

A test suite is a complete set of 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.

In each test case, the SUT is stimulated with specific inputs and the reactions are observed and evaluated. Depending on the test purpose different pre-conditions and post-conditions must be 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, a complete test case is composed by the actual test behavior enveloped by pre- and post-conditions (see sub clause 7.7.5 for detail). The corresponding grouping of functions can therefore be assigned to the lowest abstract hierarchical level (see Figure 2). The test cases are defined on the second level.

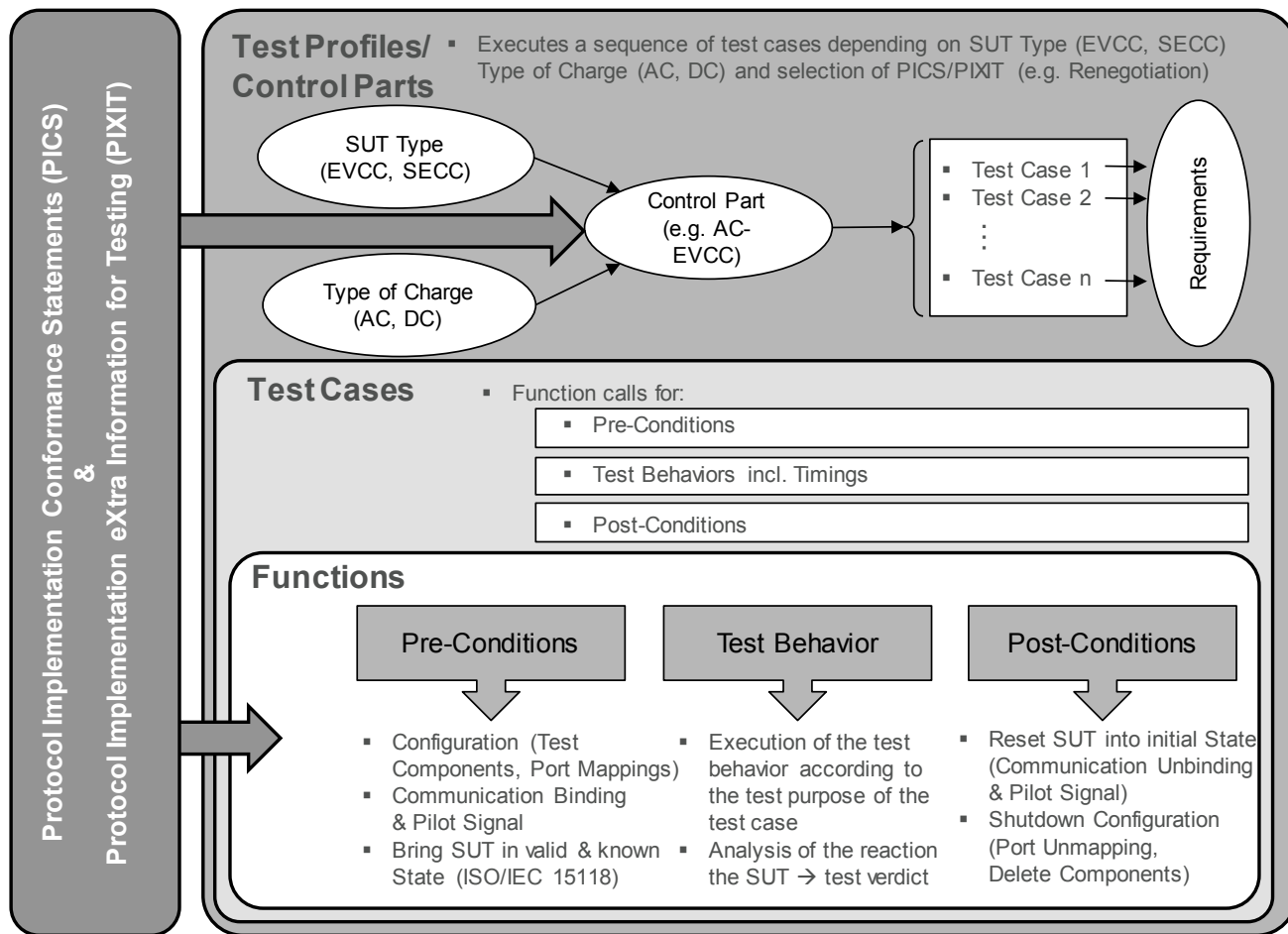


Figure 2 — General overview of the Test Suite Structure (TSS)

The test profile is a collection of self-contained test cases as well as PICS (see sub clause 7.3.3) and PIXIT (see sub clause 7.3.4) in order to represent a given use case. The selection is based on the use cases of the ISO/IEC 15118 standard and its corresponding requirements.

Hence the Test Suite Structure (TSS) is segmented into subgroups defined according to ISO/IEC 15118 use cases for conformance testing. Table 1 shows these subgroups, which are used for the organization of the test case specifications as well as for the test suite identifiers (see sub clause 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 signal name according to standard)

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

Table 2 — Test suite structure – Annexes description

Annexes	Description
Configuration Annex A	The configuration annex contains constant definitions timers and PICS and PIXIT definitions.
Control Part Annex B	The control part annex describes the execution order of modeled test cases (test groups). The EVCC control part sub clauses contain the test groups if the SUT is an EVCC. The SECC control part sub clauses contain the test groups if the SUT is an SECC.
Test Cases Annex C - E	The test case annexes contain the TTCN-3 test case files. The EVCC sub clauses contain the test cases if the SUT is an EVCC. The SECC sub clauses contain the test cases if the SUT is an SECC.
Functions Annex F - I	The function annexes contain the test behavior of the ISO/IEC 15118 conformance tests. The EVCC sub clauses contain the test behavior if the SUT is an EVCC. The SECC sub clauses 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 sub clause contains functions that are used to establish the post-conditions of a test case. The Common Behavior sub clause contains the functions that encapsulate common functionality for either EVCC or SECC tests. The IEC 61851 Service Functions sub clause contains utility functions for handling signaling according to IEC 61851-1 Annex A. The Library Functions sub clause contains utility functions used across the test suite for various purposes.
Templates Annex J - N	The Templates sub clause contains the TTCN-3 template files for matching a SUT's reaction on a stimulus against its expected behavior.
Data Structures Annex O	The Data Structures sub clause contains data structures that are needed additionally to the ISO/IEC 15118 data structures e.g. used by the IEC 61851-1 Annex A HAL interface or for X.509 Certificates.

7.3 Test profiles

This sub clause defines test profiles for conformance with ISO/IEC 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 defined. 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.

7.3.1 Test configurations

The test configuration reflects various ISO/IEC 15118 scenarios. Entities for the SUT, Tester 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 standard (CF_Part_ID).

Table 3 — ISO/IEC 15118-4 test configurations

CF_Part_ID	SUT	Tester	PTCs
CF_04_001	SECC	EVCC	PTC1=61851
CF_04_002	EVCC	SECC	PTC1=61851

7.3.2 Components and ports

In correspondence to the identified set of relevant test configurations this sub clause defines test components which reflect the main entities needed for stimulation of the SUT with respect to ISO/IEC 15118. Ports are used to connect these components with each other and the SUT. The components are predefined in the configuration module. Port types define which kind of messages can be sent or received by this port.

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 defined in ISO/IEC 15118-2 to/from an SECC. This port is also used to send and receive internal TCP/TLS port control messages defined in Annex O.
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 defined in ISO/IEC 15118-2 to/from an EVCC. This port is also used to send and receive internal TCP/TLS port control messages defined in Annex O.
V2G_UDP_SDP_Port	This port is used to send and receive SDP messages via UDP defined in ISO/IEC 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 scope of this standard.
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 standard. Whether the type EVCC_Tester or SECC_Tester shall be used as MTC depends on the type of the SUT. If the SUT is an EVCC, the MTC shall use the type EVCC_Tester. If the SUT is an SECC, the MTC shall use 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 may be assigned to components to store dynamic information during test case execution.

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. During the test case execution 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.

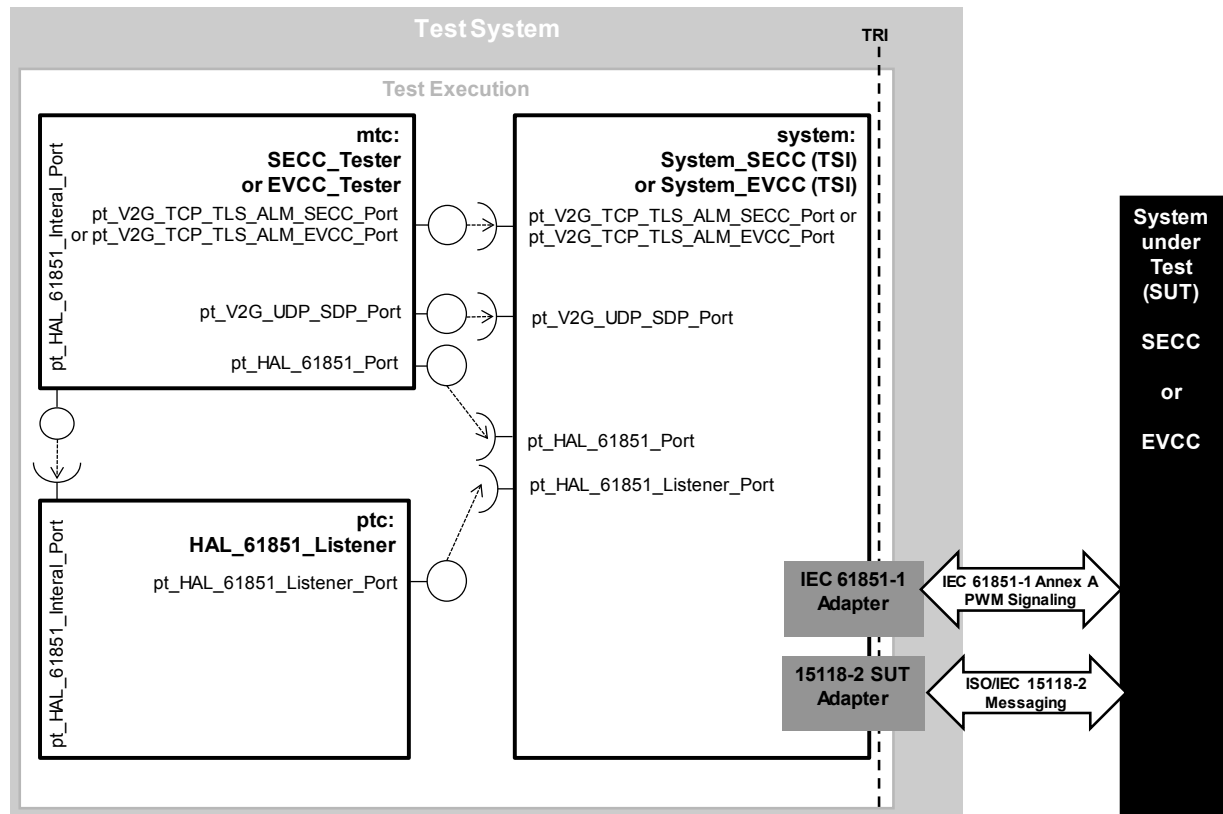


Figure 3 — ISO/IEC 15118-4 test configuration

As shown in Figure 3 the port mappings are defined 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.

7.3.3 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. Such a statement is called a Protocol Implementation Conformance Statement (PICS) cf. [ITU-T X.290].

All PICS defined in the ATS are summarized in Table 6 - Table 8.

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

PICS	Description
PICS_CMN_CMN_V2gtpSdp	Indication for explicit testing V2GTP by using SDP payload
PICS_CMN_CMN_V2gtpV2g	Indication for explicit testing V2GTP by using V2G payload
PICS_CMN_CMN_Identification Mode	Indication for testing either EIM or PnC identification mode
PICS_CMN_CMN_Renegotiation	Indication for explicit testing of Renegotiation
PICS_CMN_CMN_Renegotiation LoopIndication	Indicates the iteration of the ChargingStatus (AC) or CurrentDemand (DC) loop, when ReNegotiation shall be triggered (shall be smaller or equal to PICS_CMN_CMN_LoopCounter).
PICS_CMN_CMN_LoopCounter	Indicates the number of iterations of the ChargingStatus (AC) or CurrentDemand (DC) loop
PICS_CMN_CMN_ChargingMode	Indication for testing either AC or DC charging mode
PICS_CMN_CMN_InvalidV2gtp DataFields	Indication for enabling Test Group: Invalid V2GTP data fields
PICS_CMN_CMN_SDPTimeouts AndInvalidData	Indication for enabling Test Group: SDP Timeouts and invalid SDP data fields
PICS_CMN_CMN_FailedResponseCodes	Indication for enabling Test Group: V2G FAILED response codes
PICS_CMN_CMN_V2gTimeouts	Indication for enabling Test Group: V2G timeouts
PICS_CMN_CMN_PkiName	Indication for selected PKI

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

PICS	Description
PICS_SECC_CMN_EvStateInChargeProgress	Indication for explicit testing of State C/D of IEC 61851-1 Annex A during charging
PICS_SECC_DC_WeldingDetection	Indication for explicit testing of WeldingDetection message (DC-specific)
PICS_SECC_CMN_DepartureTime	Indication for using a departure time
PICS_SECC_CMN_Pause	Indication for enabling a charging pause
PICS_SECC_CMN_TLS	Indication for enabling TLS in EIM mode

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

PICS	Description
PICS_EVCC_CMN_ReceiptRequired	Indication for explicit testing of MeteringReceipt message
PICS_EVCC_CMN_InvalidStatesAndDutyCycles	Indication for enabling Test Group: Invalid states and duty cycles

7.3.4 Protocol Implementation extra Information for Testing (PIXIT) Definition

In order to ensure testability of each defined message pair defined in ISO/IEC 15118-2, the following set of PIXIT are defined in addition to PICS in this standard. PIXIT are used to indicate to the SUT that a specific capability of the SUT is tested.

NOTE 1 to entry Due to the black box test paradigm in this standard, it is not defined how to ensure that a corresponding PIXIT is set on the SUT side for a given test case execution.

All PIXIT defined in the ATS are summarized in Table 9 - Table 11.

**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_VAS	Indication for explicit testing of ServiceDetail message
PIXIT_CMN_CMN_CertificateHandling	Indication for explicit testing of CertificateInstallation or CertificateUpdate message

PIXIT_CMN_CMN_PkiName	Indication for selected PKI
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**Table 10 — Selected PIXIT for test system configurations CF_04_001
(SUT equals SECC)**

PIXIT	Description
PIXIT_SECC_CMN_ReceiptRequired	Indication for explicit testing of MeteringReceipt message

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

PIXIT	Description
PIXIT_EVCC_DC_WeldingDetection	Indication for explicit testing of WeldingDetection message
PIXIT_EVCC_CMN_TLS	Indication for explicit testing of TLS in EIM mode

7.3.5 Test control

The control part calls the test cases with actual parameters and controls their execution. Program statements PICS/PIXIT are used to specify the selection and execution order of the test cases (see **Annex B**). For each use case all valid PICS/PIXIT configurations are summarized in Table 12 - Table 15.

[V2G4-018] The test control for testing an AC SECC shall execute all common and all AC SECC specific test cases for each PICS/PIXIT configuration, as defined in Table 12.

Table 12 — SECC AC PICS/PIXIT configuration

Configuration	EIM	PnC
1	PICS_CMN_CMN_V2gtpSdp := true and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_V2gtpSdp := true and PICS_CMN_CMN_ChargingMode := aC
2	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
3	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_IdentificationMode := pnC and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := aC
4	PIXIT_CMN_CMN_VAS := none_ and PICS_CMN_CMN_ChargingMode := aC	PIXIT_CMN_CMN_VAS := none_ and PICS_CMN_CMN_ChargingMode := aC
5	PIXIT_CMN_CMN_VAS := serviceDetail and	PIXIT_CMN_CMN_VAS := serviceDetail and

	PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_ChargingMode := aC
6	PICS_SECC_CMN_Pause := true and PICS_CMN_CMN_ChargingMode := aC	PIXIT_CMN_CMN_CertificateHandling := certInstall and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
7	PICS_SECC_CMN_DepartureTime := true and PICS_CMN_CMN_ChargingMode := aC	PIXIT_CMN_CMN_CertificateHandling := certUpdate and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
8	PICS_SECC_CMN_DepartureTime := false and PICS_CMN_CMN_ChargingMode := aC	PIXIT_CMN_CMN_CertificateHandling := none_ and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
9	PICS_SECC_CMN_EvStateInChargeProgress := C and PICS_CMN_CMN_ChargingMode := aC	PICS_SECC_CMN_Pause := true and PICS_CMN_CMN_ChargingMode := aC
10	PICS_SECC_CMN_EvStateInChargeProgress := D and PICS_CMN_CMN_ChargingMode := aC	PICS_SECC_CMN_DepartureTime := true and PICS_CMN_CMN_ChargingMode := aC
11	PIXIT_SECC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := aC	PICS_SECC_CMN_DepartureTime := false and PICS_CMN_CMN_ChargingMode := aC
12	PICS_CMN_CMN_Renegotiation := true and PICS_CMN_CMN_RenegotiationLoopIndication < PICS_CMN_CMN_LoopCounter and PICS_CMN_CMN_ChargingMode := aC	PICS_SECC_CMN_EvStateInChargeProgress := C and PICS_CMN_CMN_ChargingMode := aC
13	PICS_CMN_CMN_V2gtpV2g := true and PICS_CMN_CMN_ChargingMode := aC	PICS_SECC_CMN_EvStateInChargeProgress := D and PICS_CMN_CMN_ChargingMode := aC
14	PICS_CMN_CMN_ChargingMode := aC	PIXIT_SECC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := aC
15	PICS_CMN_CMN_IdentificationMode := eIM and PICS_SECC_CMN_TLS := false and PICS_CMN_CMN_ChargingMode := aC	PIXIT_SECC_CMN_ReceiptRequired := true and PICS_CMN_CMN_IdentificationMode == pnC and PICS_CMN_CMN_ChargingMode := aC
16	PICS_CMN_CMN_IdentificationMode := eIM and PICS_SECC_CMN_TLS := true and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_Renegotiation := true and PICS_CMN_CMN_RenegotiationLoopIndication < PICS_CMN_CMN_LoopCounter and PICS_CMN_CMN_ChargingMode := aC
17	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_SECC_CMN_TLS := true and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_V2gtpV2g := true and PICS_CMN_CMN_ChargingMode := aC
18		PICS_CMN_CMN_ChargingMode := aC
19		PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
20		PICS_CMN_CMN_PkiType := PKI-1 and PIXIT_CMN_CMN_PkiType := PKI-1

21		PICS_CMN_CMN_PkiType := PKI-2 and PIXIT_CMN_CMN_PkiType := PKI-2
22		PICS_CMN_CMN_PkiType := PKI-3 and PIXIT_CMN_CMN_PkiType := PKI-3
23		PICS_CMN_CMN_PkiType := PKI-4 and PIXIT_CMN_CMN_PkiType := PKI-4
24		PICS_CMN_CMN_PkiType := PKI-5 and PIXIT_CMN_CMN_PkiType := PKI-5
25		PICS_CMN_CMN_PkiType := PKI-6 and PIXIT_CMN_CMN_PkiType := PKI-6
26		PICS_CMN_CMN_PkiType := PKI-7 and PIXIT_CMN_CMN_PkiType := PKI-7

[V2G4-019] The test control for testing a DC SECC shall execute all common and all DC SECC specific test cases for each PICS/PIXIT configuration, as defined in Table 13.

Table 13 — SECC DC PICS/PIXIT configuration

Configuration	EIM	PnC
1	PICS_CMN_CMN_V2gtpSdp := true and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_V2gtpSdp := true and PICS_CMN_CMN_ChargingMode := dC
2	PICS_CMN_CMN_IdentificationMode := eIM and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
3	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_IdentificationMode := pnC and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := dC
4	PIXIT_CMN_CMN_VAS := none_ and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_VAS := none_ and PICS_CMN_CMN_ChargingMode := dC
5	PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := dC
6	PICS_SECC_CMN_Pause := true and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_CertificateHandling := certInstall and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
7	PICS_SECC_CMN_DepartureTime := true and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_CertificateHandling := certUpdate and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
8	PICS_SECC_CMN_DepartureTime := false and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_CertificateHandling := none_ and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
9	PICS_SECC_CMN_EvStateInChargeProgress := C and	PICS_SECC_CMN_Pause := true and

	PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_ChargingMode := dC
10	PICS_SECC_CMN_EvStateInChargeProgress := D and PICS_CMN_CMN_ChargingMode := dC	PICS_SECC_CMN_DepartureTime := true and PICS_CMN_CMN_ChargingMode := dC
11	PIXIT_SECC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := dC	PICS_SECC_CMN_DepartureTime := false and PICS_CMN_CMN_ChargingMode := dC
12	PICS_CMN_CMN_Renegotiation := true and PICS_CMN_CMN_RenegotiationLoopIndication < PICS_CMN_CMN_LoopCounter and PICS_CMN_CMN_ChargingMode := dC	PICS_SECC_CMN_EvStateInChargeProgress := C and PICS_CMN_CMN_ChargingMode := dC
13	PICS_SECC_DC_WeldingDetection := true and PICS_CMN_CMN_ChargingMode := dC	PICS_SECC_CMN_EvStateInChargeProgress := D and PICS_CMN_CMN_ChargingMode := dC
14	PICS_SECC_DC_WeldingDetection := false and PICS_CMN_CMN_ChargingMode := dC	PIXIT_SECC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := dC
15	PICS_CMN_CMN_V2gtpV2g := true and PICS_CMN_CMN_ChargingMode := dC	PIXIT_SECC_CMN_ReceiptRequired := true and PICS_CMN_CMN_IdentificationMode == pnC and PICS_CMN_CMN_ChargingMode := dC
16	PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_Renegotiation := true and PICS_CMN_CMN_RenegotiationLoopIndication < PICS_CMN_CMN_LoopCounter and PICS_CMN_CMN_ChargingMode := dC
17	PICS_CMN_CMN_IdentificationMode := eIM and PICS_SECC_CMN_TLS := false and PICS_CMN_CMN_ChargingMode := dC	PICS_SECC_DC_WeldingDetection := true and PICS_CMN_CMN_ChargingMode := dC
18	PICS_CMN_CMN_IdentificationMode := eIM and PICS_SECC_CMN_TLS := true and PICS_CMN_CMN_ChargingMode := dC	PICS_SECC_DC_WeldingDetection := false and PICS_CMN_CMN_ChargingMode := dC
19	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_SECC_CMN_TLS := true and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_V2gtpV2g := true and PICS_CMN_CMN_ChargingMode := dC
20		PICS_CMN_CMN_ChargingMode := dC
21		PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
22		PICS_CMN_CMN_PkiType := PKI-1 and PIXIT_CMN_CMN_PkiType := PKI-1
23		PICS_CMN_CMN_PkiType := PKI-2 and PIXIT_CMN_CMN_PkiType := PKI-2
24		PICS_CMN_CMN_PkiType := PKI-3 and PIXIT_CMN_CMN_PkiType := PKI-3

25		PICS_CMN_CMN_PkiType := PKI-4 and PIXIT_CMN_CMN_PkiType := PKI-4
26		PICS_CMN_CMN_PkiType := PKI-5 and PIXIT_CMN_CMN_PkiType := PKI-5
27		PICS_CMN_CMN_PkiType := PKI-6 and PIXIT_CMN_CMN_PkiType := PKI-6
28		PICS_CMN_CMN_PkiType := PKI-7 and PIXIT_CMN_CMN_PkiType := PKI-7

[V2G4-020] The test control for testing an AC EVCC shall execute all common and all AC EVCC specific test cases for each PICS/PIXIT configuration, as defined in Table 14.

Table 14 — EVCC AC PICS/PIXIT configuration

Configuration	EIM	PnC
1	PICS_CMN_CMN_V2gtpSdp := true and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_V2gtpSdp := true and PICS_CMN_CMN_ChargingMode := aC
2	PICS_CMN_CMN_IdentificationMode := eIM and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
3	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_IdentificationMode := pnC and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := aC
4	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := none_ and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_IdentificationMode := pnC and PIXIT_CMN_CMN_VAS := none_ and PICS_CMN_CMN_ChargingMode := aC
5	PICS_CMN_CMN_Renegotiation := true and PICS_CMN_CMN_ChargingMode := aC	PIXIT_CMN_CMN_CertificateHandling := certInstall and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
6	PICS_EVCC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := aC	PIXIT_CMN_CMN_CertificateHandling := certUpdate and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
7	PICS_CMN_CMN_Renegotiation := true and PICS_EVCC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := aC	PIXIT_CMN_CMN_CertificateHandling := none_ and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
8	PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_Renegotiation := true and PICS_CMN_CMN_ChargingMode := aC
9	PICS_CMN_CMN_V2gtpV2g := true and PICS_CMN_CMN_ChargingMode := aC	PICS_EVCC_CMN_ReceiptRequired := true and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
10	PICS_CMN_CMN_ChargingMode := aC	PICS_EVCC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := aC

11	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_EVCC_CMN_TLS := false	PICS_CMN_CMN_Renegotiation := true and PICS_EVCC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := aC
12	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_EVCC_CMN_TLS := true and PICS_CMN_CMN_ChargingMode := aC	PICS_CMN_CMN_Renegotiation := true and PICS_EVCC_CMN_ReceiptRequired := true and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
13	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PIXIT_EVCC_CMN_TLS := true and PICS_CMN_CMN_ChargingMode := aC	PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := aC
14		PICS_CMN_CMN_V2gtpV2g := true and PICS_CMN_CMN_ChargingMode := aC
15		PICS_CMN_CMN_ChargingMode := aC
16		PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := aC
17		PICS_CMN_CMN_PkiType := PKI-1 and PIXIT_CMN_CMN_PkiType := PKI-1
18		PICS_CMN_CMN_PkiType := PKI-2 and PIXIT_CMN_CMN_PkiType := PKI-2
19		PICS_CMN_CMN_PkiType := PKI-3 and PIXIT_CMN_CMN_PkiType := PKI-3
20		PICS_CMN_CMN_PkiType := PKI-4 and PIXIT_CMN_CMN_PkiType := PKI-4
21		PICS_CMN_CMN_PkiType := PKI-5 and PIXIT_CMN_CMN_PkiType := PKI-5
22		PICS_CMN_CMN_PkiType := PKI-6 and PIXIT_CMN_CMN_PkiType := PKI-6
23		PICS_CMN_CMN_PkiType := PKI-7 and PIXIT_CMN_CMN_PkiType := PKI-7

[V2G4-021] The test control for testing a DC EVCC shall execute all common and all DC EVCC specific test cases for each PICS/PIXIT configuration, as defined in Table 15.

Table 15 — EVCC DC PICS/PIXIT configuration

Configuration	EIM	PnC
1	PICS_CMN_CMN_V2gtpSdp := true and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_V2gtpSdp := true and PICS_CMN_CMN_ChargingMode := dC

2	PICS_CMN_CMN_IdentificationMode := eIM and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
3	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_IdentificationMode := pnC and PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := dC
4	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := none_ and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_IdentificationMode := pnC and PIXIT_CMN_CMN_VAS := none_ and PICS_CMN_CMN_ChargingMode := dC
5	PICS_CMN_CMN_Renegotiation := true and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_CertificateHandling := certInstall and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
6	PICS_EVCC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_CertificateHandling := certUpdate and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
7	PICS_CMN_CMN_Renegotiation := true and PICS_EVCC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_CertificateHandling := none_ and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
8	PIXIT_EVCC_DC_WeldingDetection := weldingDetection and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_Renegotiation := true and PICS_CMN_CMN_ChargingMode := dC
9	PIXIT_EVCC_DC_WeldingDetection := none_ and PICS_CMN_CMN_ChargingMode := dC	PICS_EVCC_CMN_ReceiptRequired := true and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
10	PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := dC	PICS_EVCC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := dC
11	PICS_CMN_CMN_V2gtpV2g := true and PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_Renegotiation := true and PICS_EVCC_CMN_ReceiptRequired := false and PICS_CMN_CMN_ChargingMode := dC
12	PICS_CMN_CMN_ChargingMode := dC	PICS_CMN_CMN_Renegotiation := true and PICS_EVCC_CMN_ReceiptRequired := true and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
13	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_EVCC_CMN_TLS := false and PICS_CMN_CMN_ChargingMode := dC	PIXIT_EVCC_DC_WeldingDetection := weldingDetection and PICS_CMN_CMN_ChargingMode := dC
14	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_EVCC_CMN_TLS := true and PICS_CMN_CMN_ChargingMode := dC	PIXIT_EVCC_DC_WeldingDetection := none_ and PICS_CMN_CMN_ChargingMode := dC
15	PICS_CMN_CMN_IdentificationMode := eIM and PIXIT_CMN_CMN_VAS := serviceDetail and PIXIT_EVCC_CMN_TLS := true and PICS_CMN_CMN_ChargingMode := dC	PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_ChargingMode := dC

16		PICS_CMN_CMN_V2gtpV2g := true and PICS_CMN_CMN_ChargingMode := dC
17		PICS_CMN_CMN_ChargingMode := dC
18		PIXIT_CMN_CMN_VAS := serviceDetail and PICS_CMN_CMN_IdentificationMode := pnC and PICS_CMN_CMN_ChargingMode := dC
19		PICS_CMN_CMN_PkiType := PKI-1 and PIXIT_CMN_CMN_PkiType := PKI-1
20		PICS_CMN_CMN_PkiType := PKI-2 and PIXIT_CMN_CMN_PkiType := PKI-2
21		PICS_CMN_CMN_PkiType := PKI-3 and PIXIT_CMN_CMN_PkiType := PKI-3
22		PICS_CMN_CMN_PkiType := PKI-4 and PIXIT_CMN_CMN_PkiType := PKI-4
23		PICS_CMN_CMN_PkiType := PKI-5 and PIXIT_CMN_CMN_PkiType := PKI-5
24		PICS_CMN_CMN_PkiType := PKI-6 and PIXIT_CMN_CMN_PkiType := PKI-6
25		PICS_CMN_CMN_PkiType := PKI-7 and PIXIT_CMN_CMN_PkiType := PKI-7

7.4 Test suite identifiers

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/IEC 15118 conformance test suite are defined.

7.4.1 Module identifiers

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

<modtype>_<sut>_<ctx>

The segments of this identifier are defined in Table 16. An example for test case module identifier is:

TestCases_SECC_SupportedAppProtocol

Table 16 — ISO/IEC 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 signal name according to standard)

NOTE For module types other than templates, functions or test cases there is no identifier format defined.

7.4.2 Test case identifiers

The naming conventions for test cases are using a prefix, which is defined by ETSI as shown in Table 17.

Table 17 — ETSI naming convention for test case names

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

The ISO/IEC 15118 test suite specific test case identifier is defined as:

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

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

TC_SECC_AC_VTB_SupportedAppProtocol_001

Table 18 — ISO/IEC 15118 test suite naming convention for test case identifiers

Identifier	Values	Description
<prefix>	TC	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
<ttyp>		Type of testing
	VTB	Valid test behavior
	ITB	Invalid test behavior
<ctx>	{fullname}	Context (e.g. name of message pattern signal name according to standard)
<nn>	{xxx}	Sequential number from 001 to 999

7.4.3 Template identifiers

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

Table 19 — 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 defined 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 defined by parameters, constant values or wildcards, then template name begins with keyword mdw (mdw_)	mdw_DNSResponse (integer ip)

The ISO/IEC 15118 test suite specific template identifier is defined as:

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

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

mdw_EVCC_CMN_SupportedAppProtocol_001

Table 20 — ISO/IEC 15118 test suite naming convention for template identifiers

Identifier	Values	Description
<prefix>		Type of template (see Table 19)
<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 standard
<nn>	{xxx}	Sequential number from 001 to 999

7.4.4 Function identifiers

The naming conventions for functions are using a prefix, which is defined by ETSI as shown in Table 21.

Table 21 — ETSI naming convention for function names

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

The ISO/IEC 15118 test suite naming convention for test case functions is defined as:

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

The segments of this identifier are described in Table 22. An example for template identifier is:

f_EVCC_AC_VTB_SessionSetup_001

Table 22 — ISO/IEC 15118 test suite naming convention for function names

Identifier	Values	Description
<prefix>		f_ (see Table 21)
<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
	ITB	Invalid test behavior
<ctx>	{fullname}	Context (e.g. name of message pattern signal name according to standard)
<nn>	{xxx}	Sequential number from 001 to 999

7.4.5 Timer identifiers

The naming conventions for timers are using a prefix, which is defined by ETSI as shown in Table 23.

Table 23 — ETSI naming convention for timers

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

The ISO/IEC 15118 test suite specific timer identifier is defined as:

<prefix>_<ctx>

The segments of this identifier are described in Table 24. An example for timer identifier is:

tc_V2G_EVCC_Msg_Timer

Table 24 — ISO/IEC 15118 test suite naming convention for timer identifiers

Identifier	Values	Description
<prefix>		Type of timer (see Table 23)
<ctx>	{fullname}	Context (e.g. name of timer according to ISO/IEC 15118-2 or if not part of the standard any given name describing the context of the timer, e.g. EVCC_SDP_Timer)

7.4.6 PICS/PIXIT identifiers

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

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

The segments of this identifier are described in Table 25. An example for PICS/PIXIT identifier is:

PICS_CMN_CMN_IdentificationMode

Table 25 — ISO/IEC 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 signal name according to standard)

7.4.7 Verdict identifiers

In this sub clause the conventions for test verdicts are defined. The test verdicts defined in this standard are listed in Table 26.

Table 26 — ISO/IEC 15118 test suite conventions on verdict handling

Verdict type	TTCN-3 Definition	ISO/IEC 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 shall be 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 shall be used.

7.5 Test suite coverage

The following conditions apply in terms of test case coverage for this standard regarding requirements defined in ISO/IEC 15118-2:

- Requirements that are out of scope according to the conventions defined in this standard or cannot be tested in black-box tests are summarized in Table 27.
- 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 28.

Table 27 — Requirements of ISO/IEC 15118-2 not considered in the ATS

List of requirement IDs	Comment (no consideration in ATS)
[V2G2-020], [V2G2-023], [V2G2-076], [V2G2-133], [V2G2-158], [V2G2-162], [V2G2-215], [V2G2-289], [V2G2-290], [V2G2-291], [V2G2-292], [V2G2-293],	Cannot be tested explicitly in EVCC black box test configuration

List of requirement IDs	Comment (no consideration in ATS)
[V2G2-296], [V2G2-297], [V2G2-298], [V2G2-305], [V2G2-306], [V2G2-439], [V2G2-446], [V2G2-447], [V2G2-448], [V2G2-449], [V2G2-618], [V2G2-620], [V2G2-633], [V2G2-635], [V2G2-637], [V2G2-646], [V2G2-650], [V2G2-660], [V2G2-663], [V2G2-673], [V2G2-675], [V2G2-678], [V2G2-686], [V2G2-698], [V2G2-703], [V2G2-707], [V2G2-709], [V2G2-717], [V2G2-718], [V2G2-720], [V2G2-731], [V2G2-734], [V2G2-735], [V2G2-739], [V2G2-740], [V2G2-742], [V2G2-743], [V2G2-744], [V2G2-748], [V2G2-749], [V2G2-761], [V2G2-763], [V2G2-776], [V2G2-784], [V2G2-794], [V2G2-801], [V2G2-823], [V2G2-829], [V2G2-837], [V2G2-838], [V2G2-841], [V2G2-842], [V2G2-870], [V2G2-886], [V2G2-928]	
[V2G2-029], [V2G2-032], [V2G2-068], [V2G2-074], [V2G2-134], [V2G2-146], [V2G2-170], [V2G2-219], [V2G2-233], [V2G2-234], [V2G2-301], [V2G2-307], [V2G2-308], [V2G2-309], [V2G2-315], [V2G2-317], [V2G2-318], [V2G2-324], [V2G2-325], [V2G2-328], [V2G2-329], [V2G2-330], [V2G2-333], [V2G2-334], [V2G2-336], [V2G2-337], [V2G2-338], [V2G2-339], [V2G2-340], [V2G2-429], [V2G2-430], [V2G2-444], [V2G2-465], [V2G2-480], [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], [V2G2-621], [V2G2-627], [V2G2-665], [V2G2-668], [V2G2-674], [V2G2-676], [V2G2-687], [V2G2-688], [V2G2-690], [V2G2-696], [V2G2-712], [V2G2-713], [V2G2-722], [V2G2-725], [V2G2-727], [V2G2-733], [V2G2-755], [V2G2-762], [V2G2-772], [V2G2-774], [V2G2-775], [V2G2-785], [V2G2-786], [V2G2-796], [V2G2-798], [V2G2-802], [V2G2-803], [V2G2-805], [V2G2-806], [V2G2-807], [V2G2-808], [V2G2-826], [V2G2-833], [V2G2-834], [V2G2-851], [V2G2-852], [V2G2-853], [V2G2-854], [V2G2-855], [V2G2-857], [V2G2-858], [V2G2-859], [V2G2-860], [V2G2-862], [V2G2-863], [V2G2-865], [V2G2-866], [V2G2-877], [V2G2-883], [V2G2-887], [V2G2-902], [V2G2-904], [V2G2-905], [V2G2-906], [V2G2-916], [V2G2-918], [V2G2-919], [V2G2-920]	Cannot be tested explicitly in SECC black box test configuration
[V2G2-011], [V2G2-012], [V2G2-089], [V2G2-090], [V2G2-092], [V2G2-094], [V2G2-096], [V2G2-135], [V2G2-280], [V2G2-281], [V2G2-284], [V2G2-288], [V2G2-314], [V2G2-316], [V2G2-321], [V2G2-322], [V2G2-332], [V2G2-335], [V2G2-606], [V2G2-607], [V2G2-612], [V2G2-613], [V2G2-615], [V2G2-616], [V2G2-639], [V2G2-760], [V2G2-777], [V2G2-830], [V2G2-831], [V2G2-835], [V2G2-878]	Cannot be tested explicitly in SECC/EVCC black box test configuration
[V2G2-001], [V2G2-002], [V2G2-003], [V2G2-014], [V2G2-016], [V2G2-017], [V2G2-037], [V2G2-038],	Out of scope of this standard (Requirement refers to external RFCs, standards, etc.)

List of requirement IDs	Comment (no consideration in ATS)
[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], [V2G2-643], [V2G2-644], [V2G2-649], [V2G2-693], [V2G2-694], [V2G2-695], [V2G2-810], [V2G2-811], [V2G2-843], [V2G2-844], [V2G2-850], [V2G2-873], [V2G2-876], [V2G2-885], [V2G2-924]	
[V2G2-035], [V2G2-036], [V2G2-719], [V2G2-726]	Out of scope of this standard (Requirements refers to ISO/IEC 15118-5)

Table 28 — Requirements of ISO/IEC 15118-2 implicitly covered by the SUT adapters / codecs

List of requirement IDs	Comment (implicitly tested)
[V2G2-651]	Cannot be tested explicitly in 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
[V2G2-010]	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

The resulting test suite coverage in this standard with reference to requirements in ISO/IEC 15118-2 is summarized in Table 29. It only includes requirements which are not listed for exclusion in Table 27 or Table 28. Table 29 defines the relevance of requirements of ISO/IEC 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 29:

- 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 28 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 defined in the respective column.

- Requirements that are not applicable for the profile defined in the respective column.
- 0 Requirements that are out of scope for the profile defined in the respective column.

Table 29 — ATS coverage of requirements in ISO/IEC 15118-2

Requirement ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-004]	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]
[V2G2-005]	-	-			-	-	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]_[V2G2-006]_[V2G2-652]_[V2G2-909]
[V2G2-006]	-	-	-	-	-	-	X	X	Group_[V2G2-005]_[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_[V2G2-007]
[V2G2-008]	-	-	-	-	N	N	I	I	Tested indirectly through test for requirement [V2G2-166] 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]
[V2G2-018]	-	-	-	-	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]	-	-	-	-	N	N	X	X	Cannot be tested explicitly in EVCC black box test configuration 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
[V2G2-024]	-	-	-	-	X	X	X	X	TC_EVCC_CMN_VTB_SupportedAppProtocol_001
[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
[V2G2-027]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-147] TC_SECC_CMN_VTB_SDP_001 TC_SECC_CMN_VTB_SDP_002 TC_SECC_CMN_VTB_SDP_003

Requirement ID	Covered in Test Suite								TC ID(s) / Comment
	SECC				EVCC				
	EIM		PnC		EIM		PnC		
	AC	DC	AC	DC	AC	DC	AC	DC	
[V2G2-030]	I	I	I	I	-	-	-	-	Tested indirectly through test for requirement [V2G2-168] TC_SECC_CMN_VTB_SupportedAppProtocol_001 TC_SECC_CMN_VTB_SupportedAppProtocol_002
[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
[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
[V2G2-034]	X	X	X	X	-	-	-	-	Group_[V2G2-729]_[V2G2-034]
[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]	-	-	-	-	-	-			
[V2G2-104]	-	-	-	-	-	-			
[V2G2-108]	-	-	-	-	-	-	X	X	TC_EVCC_CMN_VTB_PaymentDetails_001 TC_EVCC_CMN_VTB_PaymentDetails_002
[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_003