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**Elektromobilität –
Konformitätsprüfungen zur digitalen Kommunikation zwischen einer
Gleichstrom-Ladestation und einem Elektrofahrzeug zur Regelung der
Gleichstromladung im Verbund-Ladesystem;
Text Englisch, nur auf CD-ROM**

Electromobility –
Conformance tests for digital communication between a d.c. EV charging station and an
electric vehicle for control of d.c. charging in the Combined Charging System;
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Électromobilité –
Communication digitale entre la borne de recharge à courant continu et la véhicule électrique
pour régler la charge à courant continu dans le système de charge combiné (CCS);
Texte en anglais, seulement en CD-ROM

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Das vorliegende Dokument wurde nach den Verfahrensregeln einer Vornorm erstellt.

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Nationales Vorwort

Dieses Dokument (DIN SPEC 70122:2018) wurde vom deutschen Normungsgremium NA 052-00-31 AA „Datenkommunikation“ des DIN-Normenausschusses Automobiltechnik ausgearbeitet.

Das Präsidium des DIN hat mit seinem Beschluss 1/2004 festgelegt, dass von dem in den Regeln der europäischen Normungsarbeit von CEN/CENELEC verankerten Grundsatz, wonach Europäische Normen in den drei offiziellen Sprachen Deutsch, Englisch und Französisch veröffentlicht werden, in begründeten Ausnahmefällen abgewichen und auf die deutsche Sprachfassung verzichtet werden kann.

Diese Vornorm legt Konformitätsprüfungen für die Kommunikation zwischen Ladesäule und Elektrofahrzeug bezüglich Gleichstromladen fest. Die Vornorm basiert auf Anforderungen, die in DIN SPEC 70121 zum Laden mit Gleichstrom von Elektrofahrzeugen festgelegt wurden.

Anwender dieser Vornorm sind zum einen Fahrzeughersteller und deren Lieferanten sowie zum anderen die Energieversorger und Lieferanten von Ladesäulen.

Die Vornorm bezieht sich hauptsächlich auf Anforderungen, welche in der internationalen Normenreihe ISO/IEC 15118 festgelegt werden.

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Zur vorliegenden DIN SPEC wurde kein Entwurf veröffentlicht.

Erfahrungen mit dieser DIN SPEC sind erbeten

— vorzugsweise als Datei per E-Mail an wern@vda.de in Form einer Tabelle. Die Vorlage dieser Tabelle kann im Internet unter **<http://www.din.de/stellungnahme>** abgerufen werden;

oder in Papierform an den Normenausschuss Automobiltechnik, Behrenstr. 35, 10117 Berlin.

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.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

- IEC Electropedia: unter <http://www.electropedia.org/>
- ISO Online Browsing Platform: unter <http://www.iso.org/obp>

3.1

abstrakter Prüffall

(en: abstract test case)

vollständige und unabhängige Spezifikation von Aktionen die notwendig sind, einen speziellen Prüfzweck sicherzustellen

Anmerkung 1 zum Begriff: Diese Spezifikation ist auf einem gewissen Abstraktionsniveau für eine bestimmte abstrakte Prüfmethode festgelegt, in dem in einem stabilen Prüfzustand gestartet und in einem stabilen Prüfzustand geendet wird und dabei eine oder mehrere nachfolgende Verbindungen eingebunden sein können.

Anmerkung 2 zum Begriff: Die Spezifikation sollte in der Art und Weise vollständig sein, um ein Prüfurteil zu ermöglichen, welches eindeutig jedem potentiell überwachbaren Prüfergebnis zugeordnet werden kann (d.h. Reihe von Prüfereignissen).

Anmerkung 3 zum Begriff: Die Spezifikation sollte in der Art und Weise unabhängig sein, dass es möglich ist die abgeleiteten ausführbaren Prüffälle isoliert von anderen Prüffällen dieser Art auszuführen (d.h. die Spezifikation sollte immer die Möglichkeit des Starts und das Beenden im Zustand „Leerlauf“ beinhalten).

Anmerkung 4 zum Begriff: Vergleiche mit ITU-T X.290.

3.2

abstrakte Prüfreihe

ATS

(en: abstract test suite)

Prüfreihe, die sich aus abstrakten Prüffällen zusammensetzt

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.3

Black-Box-Prüfung

(en: black box testing)

Prüfmethode, welche das Verhalten eines SUT untersucht, ohne dabei die interne Implementierung und Struktur des SUT zu berücksichtigen und sich nur auf die offenen Prüfschnittstellen am SUT verlässt

3.4

Konformitätsanforderungen

(en: conformance requirements)

Konformität eines realen Systems, bestehend aus der Konformität zu jeder Anforderung und Konformität zur Reihe

Anmerkung 1 zum Begriff: Reihe von zusammenhängenden Anforderungen, die zusammen das Systemverhalten und dessen Kommunikation festlegen. Konformität eines realen Systems wird deshalb auf zwei Ebenen ausgedrückt: Konformität zu jeder individuellen Anforderung und Konformität zur Reihe. Vorhandene ISO 15118-4 Konformitätsprüfungen beinhalten Anforderungen und Anforderungen an die Übertragungssyntax soweit diese mittels Black-Box Prüfung bestätigt werden können.

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

3.5

normgerechte Implementierung

(en: conforming implementation)

IUT, welche sowohl statische-, als auch dynamische Konformitätsanforderungen befriedigt, die mit den genannten Fähigkeiten in PIC(S) in Einklang sind

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.6

dynamische Konformitätsanforderungen

(en: dynamic conformance requirements)

Anforderungen die festlegt, welches überwachbare Verhalten anhand der relevanten Spezifikation(en) in Bezug auf die Kommunikation erlaubt ist

Anmerkung 1 zum Begriff: Die Anforderungen für diese Konformitätsspezifikation sind in ISO 15118-2 festgelegt.

Anmerkung 2 zum Begriff: Vergleiche mit ITU-T X.290.

3.7

ausführbarer Prüffall

(en: executable test case)

Umsetzung eines abstrakten Prüffalls

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.8

erwartetes Verhalten

(en: expected behavior)

genaue Antwort des SUT anhand der zugrunde liegenden Protokollspezifikation bezogen auf den Stimulus, der im Prüfverhalten festgelegt ist

3.9

Konformitätsaussage zur Implementierung

ICS

(en: implementation conformance statement)

Aussage, die vom Lieferant der Implementierung oder des Systems getroffen wurde, die Konformität nach einer gegebenen Spezifikation ausdrückt, welche Fähigkeiten implementiert wurden

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

Anmerkung 2 zum Begriff: Vergleiche mit ITU-T X.290.

3.10**zusätzliche Prüfinformation zur Implementierung
IXIT**

(en: implementation extra information for testing)

Aussage, die vom Lieferant oder einem Umsetzer einer Implementierung einer IUT getroffen wurde, die alle Informationen (zusätzlich zu den gegebenen ICS) bezogen auf die IUT und deren Testumgebung referenziert oder beinhaltet und dem Prüflabor ermöglicht, eine geeignete Prüfreihe gegen die IUT durchzuführen

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.11**Implementierung unter Prüfung
IUT**

(en: implementation under test)

Implementierung mit einem oder mehreren OSI-Protokolle(s) in einer angrenzenden Nutzer/Anbieter-Beziehung, als der Teil eines realen offenen Systems, welches durch die Prüfung untersucht wird

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.12**Hauptprüfkomponente
MTC**

(en: main test component)

einzelne Prüfkomponente in einer Komponentenprüfkonfiguration, verantwortlich für die Erstellung und Steuerung *paralleler Prüfkomponenten* sowie der Berechnung und Zuordnung des Prüfurteils

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.13**parallele Prüfkomponente
PTC**

(en: parallel test component)

Prüfkomponente, die von der Hauptprüfkomponente erstellt wurde

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.14**Nachbedingung**

(en: post-condition)

Prüfschritte, die für Festlegung des Weges vom Ende des *Prüfverhaltens* bis zum finalen stabilen Zustand des Prüffalls benötigt werden

Anmerkung 1 zum Begriff: Siehe auch *Prüfverhalten*.

3.15**Vorbedingung**

(en: pre-condition)

Prüfschritte, die für Festlegung des Weges vom beginnenden stabilen Zustand des Prüffalls bis zum initialen Zustand, von dem das Prüfverhalten beginnt, benötigt werden

Anmerkung 1 zum Begriff: Siehe auch *Prüfverhalten*.

3.16

Erklärung zur Konformität der Protokollimplementierung

PICS

(en: protocol implementation conformance statement)

ICS, die für eine Implementierung oder System getroffen wurde, die Konformität nach einer gegebenen Protokollspezifikation ausdrückt

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

Anmerkung 2 zum Begriff: Vergleiche mit ITU-T X.290.

3.17

Zusatzinformation für die Prüfung der Protokollimplementierung

PIXIT

(en: protocol implementation extra information for testing)

IXIT, die auf die Konformitätsprüfung nach einer gegebenen Protokollspezifikation bezogen ist

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

Anmerkung 2 zum Begriff: Vergleiche mit ITU-T X.290.

3.18

Laufzeitumgebung

(en: runtime environment)

Umgebung, die Systemanforderungen an das Betriebssystem und die entsprechende Plattform beschreibt

BEISPIEL Prüfsystem.

3.19

semantisch ungültiges Prüfverhalten

SemITB

(en: semantically invalid test behavior)

Prüfschritte, bei denen das Prüfsystem Stimuli an das SUT sendet, welche nach der Protokollspezifikation semantisch ungültig sind

Anmerkung 1 zum Begriff: Diese Art von Prüfverhalten ist in dieser Konformitätsnorm festgelegt und beinhaltet ausdrücklich Anforderungen, die das entsprechende Fehlverhalten des SUT festlegen.

3.20

statische Konformitätsanforderungen

(en: static conformance requirements)

eine der Anforderungen die festlegt, welche Limitierungen der Kombinationen von implementierten Ressourcen in einem realen offenen System erlaubt sind und Konformität zu den relevanten Spezifikation(en) ausdrücken

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.21

zu prüfendes System

SUT

(en: system under test)

reales offenes System, das die IUT beinhaltet

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.22**syntaktisch ungültiges Prüfverhalten****SynITB**

(en: syntactically invalid test behavior)

Prüfschritte, bei denen das Prüfsystem Stimuli an das SUT sendet, die nach der Protokollspezifikation 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)

Reihe von Prüfschritten (Prüfkörper), die notwendig sind um den Prüfzweck sicherzustellen und um Urteile den möglichen Ergebnissen zuzuordnen

3.24**Prüfausführung**

(en: test execution)

Interpretation oder Ausführung einer abstrakten Prüfreihe

Anmerkung 1 zum Begriff: Konzeptionell kann die TE in drei interagierende Einheiten unterteilt werden: eine ausführbare Prüfreihe (ETS), einen Prüfrahmen (TFW) und ein optionales internes Kodierungs-/Dekodierungssystem (EDS).

Anmerkung 2 zum Begriff: Siehe auch ETSI ES 201 873-5 V4.6.1.

3.25**Prüfrahmen****TFW**

(en: test framework)

Einheit, die alle Aktionen von Prüffällen oder Funktionen ausführt

Anmerkung 1 zum Begriff: Der Prüfrahmen interagiert mit den Einheiten Prüfsteuerung (TM), SUT-Adapter (SA) und Programmadapter (PA) über die Prüfsteuerungsschnittstelle (TCI) und die Prüflaufzeitschnittstelle (TRI). Zusätzlich steuert der Prüfrahmen die ausführbare Prüfreihe (ETS) und das Kodierungs-/Dekodierungssystem (EDS). Der Prüfrahmen initialisiert die Adapter sowie die ETS- und EDS-Einheiten. Diese Einheit führt alle notwendigen Aktionen aus, um einen Prüffall oder Funktion mit Parametern in der ETS-Einheit ordnungsgemäß auszuführen. Er befragt die Prüfsteuerungseinheit nach Modulparameterwerten, die für die ETS notwendig sind und sendet aufgezeichnete Informationen dorthin. Der Prüfrahmen sammelt und löst zugeordnete Urteile, die von der ETS-Einheit zurückgegeben werden.

Anmerkung 2 zum Begriff: Siehe auch ETSI ES 201 873-5 V4.6.1.

Anmerkung 3 zum Begriff: In diesem Dokument wird der Prüfrahmen TTCN-3 Laufzeitsystem (T3RTS) verwendet, um einen Prüfrahmen funktionell zu erläutern.

3.26**Prüfziel**

(en: test purpose)

Prosabeschreibung einer gut definierten Zielsetzung einer Prüfung, welche sich auf eine einfache Konformitätsanforderung oder einen Satz von in Beziehung stehenden Konformitätsanforderungen konzentriert, die in der entsprechenden OSI-Spezifikation festgelegt sind

BEISPIEL Überprüfung, ob ein spezifischer Wert eines spezifischen Parameters unterstützt wird.

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

3.27

Prüfsystem

(en: test system)

reales System, welches den Prüfraumen, die abstrakte Prüfreihe, die Prüfausführung und die Adapter sowie die Codecs umfasst

Anmerkung 1 zum Begriff: Typischerweise beinhaltet es auch eine gemeinsame Laufzeitumgebung, basierend auf einem Betriebssystem.

3.28

Prüfssteuerungsschnittstelle

TCI

(en: test control interface)

vier Schnittstellen, welche die Interaktionen der TTCN-3-Abläufe mit der Prüfsteuerung, der Kodierung und Dekodierung, den Umgang mit den Prüfkomponenten und die Aufzeichnung in einem Prüfsystem definieren

Anmerkung 1 zum Begriff: Vergleiche mit ETSI ES 201 873-5 V4.6.1.

3.29

Prüflaufzeitschnittstelle

TRI

(en: test runtime interface)

zwei Schnittstellen, welche die TTCN-3-Prüfsystem Abläufe zwischen dem SUT und dem Programmadapter (PA) sowie dem Systemadapter (SA) in einem Prüfsystem definieren

Anmerkung 1 zum Begriff: Vergleiche mit ETSI ES 201 873-5 V4.6.1.

3.30

Prüfsystemschnittstelle

TSI

(en: test system interface)

Prüfkomponente, welche die Zuordnung der im (abstrakten) TTCN-3-Prüfsystem vorhandenen Ports zu denjenigen bereitstellt, welche vom offenen realen System angeboten werden

Anmerkung 1 zum Begriff: Vergleiche mit ETSI ES 201 873-5 V4.6.1.

3.31

gültiges Prüfverhalten

VTB

(en: valid test behavior)

Prüfschritte, bei denen das Prüfsystem Stimuli an das SUT sendet, die nach der Protokollspezifikation (syntaktisch und semantisch) gültig sind

Anmerkung 1 zum Begriff: Diese Art von Prüfverhalten ist in dieser Konformitätsspezifikation festgelegt.

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

3.32

Urteil

Prüfurteil

(en: verdict, test verdict)

Aussage von „bestanden“, „fehlgeschlagen“ oder „ergebnislos“, wie in einer abstrakten Prüfreihe festgelegt, hinsichtlich auf die Konformität einer IUT bezogen auf den Prüffall, der gerade ausgeführt wird

Anmerkung 1 zum Begriff: Vergleiche mit ITU-T X.290.

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1 Scope

This International Standard 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 DIN SPEC 70121. 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 DIN SPEC 70121 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 DIN SPEC 70121. The behavior tests of the ATS examine an implementation as thoroughly as is practical over the full range of dynamic conformance requirements defined in DIN SPEC 70121 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 all defined ISO/OSI Network Layer.

This part of the standard does not include specific tests of other standards referenced within DIN SPEC 70121, 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 DIN SPEC 70121. 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 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.

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

DIN SPEC 70121, *Electromobility — Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging in the Combined Charging System* (December 2014)

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)

HomePlug GreenPHY Specification, release version 1.1.1, July 4, 2013

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

abstract test case

complete and independent specification of the actions required to achieve a specific test purpose

Note 1 to entry: This specification is defined at the level of abstraction of a particular Abstract Test Method, starting in a stable testing state and ending in a stable testing state and may involve one or more consecutive or concurrent connections.

Note 2 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 3 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).

Note 4 to entry: Compare with ITU-T X.290.

3.2

Abstract Test Suite

ATS

test suite composed of abstract test cases

Note 1 to entry: Compare with ITU-T X.290.

3.3

black box testing

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

3.4

conformance requirements

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

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

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

3.5**conforming implementation**

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

Note 1 to entry: Compare with ITU-T X.290.

3.6**dynamic conformance requirements**

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

Note 1 to entry: The requirements for this conformance specification are defined in DIN SPEC 70121.

Note 2 to entry: Compare with ITU-T X.290.

3.7**executable test case**

realization of an abstract test case

Note 1 to entry: Compare with ITU-T X.290.

3.8**expected behavior**

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

3.9**implementation conformance statement****ICS**

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

Note 1 to entry: The given specification for this conformance specification is DIN SPEC 70121.

Note 2 to entry: Compare with ITU-T X.290.

3.10**implementation extra information for testing****IXIT**

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

Note 1 to entry: Compare with ITU-T X.290.

3.11**implementation under test****IUT**

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

Note 1 to entry: Compare with ITU-T X.290.

3.12

main test component

MTC

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

Note 1 to entry: Compare with ITU-T X.292.

3.13

parallel test component

PTC

test component created by the main test component

Note 1 to entry: Compare with ITU-T X.292.

3.14

post-condition

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

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

3.15

pre-condition

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

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

3.16

protocol implementation conformance statements

PICS

ICS for an implementation or system claimed to conform to a given protocol specification

Note 1 to entry: The given protocol specification for this conformance specification is DIN SPEC 70121.

Note 2 to entry: Compare with ITU-T X.290.

3.17

protocol implementation extra information for testing

PIXIT

IXIT related to testing for conformance to a given protocol specification

Note 1 to entry: The given protocol specification for this conformance specification is DIN SPEC 70121.

Note 2 to entry: Compare with ITU-T X.290.

3.18

runtime environment

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

EXAMPLE *Test system.*

3.19**semantically invalid test behavior****SemITB**

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

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

3.20**static conformance requirements**

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

Note 1 to entry: Compare with ITU-T X.290.

3.21**system under test****SUT**

real open system in which the IUT resides

Note 1 to entry: Compare with ITU-T X.290.

3.22**syntactically invalid test behavior****SynITB**

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

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

3.23**test behavior**

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

3.24**test execution**

interpretation or execution of an abstract test suite

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

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

3.25

test framework

TFW

entity to perform all actions of test cases or functions

Note 1 to entry: The Test Framework interacts with the Test Management (TM), SUT Adaptor (SA) and Platform Adaptor (PA) entities via Test Control Interface (TCI) and Test Runtime Interface (TRI) and additionally manages the Executable Test Suite (ETS) and Encoding/Decoding System (EDS) entities. It initializes adaptors as well as ETS and EDS entities. This entity performs all the actions necessary to properly start the execution of a test case or function with parameters in the ETS entity. It queries the TM entity for module parameter values required by the ETS and sends logging information to it. It also collects and resolves associated verdicts returned by the ETS entity.

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

Note 3 to entry: In this document, the Test Framework TTCN-3 Runtime System (T3RTS) is used to explain a Test Framework functionality.

3.26

test purpose

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

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

Note 1 to entry: Compare with ITU-T X.290.

3.27

test system

real system combining the test framework, abstract test suite, test execution and adapters as well as codecs

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

3.28

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: Compare with ITU-T X.290.

Note 2 to entry: Compare with ETSI ES 201 873-6 V4.6.1.

3.29

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

Note 1 to entry: Compare with ETSI ES 201 873-5 V4.6.1.

3.30

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: Compare with ETSI ES 201 873-6 V4.6.1.

3.31**valid test behavior****VTB**

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 document.

Note 2 to entry: The protocol requirements for this conformance specification are defined in DIN SPEC 70121.

3.32**verdict****test verdict**

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

Note 1 to entry: Compare with 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
CPL	Control Pilot Line
EDS	Encoding/Decoding System
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
MTC	Main Test Component
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PLC	Parallel Test Component
PTC	Parallel Test Component
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
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
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 DIN SPEC 70121 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 DIN SPEC 70121:

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

Where:

- "V2G" represents the DIN SPEC 70121 set of standards,
- "Y" represents the document part of the DIN SPEC 70121 document set, for this document Y = 2,
- "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 DIN SPEC 70121.

[V2G2-DC-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 provides an overview on the test architecture for this standard. The following sub clauses define the interface requirements marked black in Figure for platform and SUT adapters (see sub clauses 6.2, 6.3) as well as the codecs (see sub clause 6.4). The Test Suite is defined in detail in the remainder of this document.

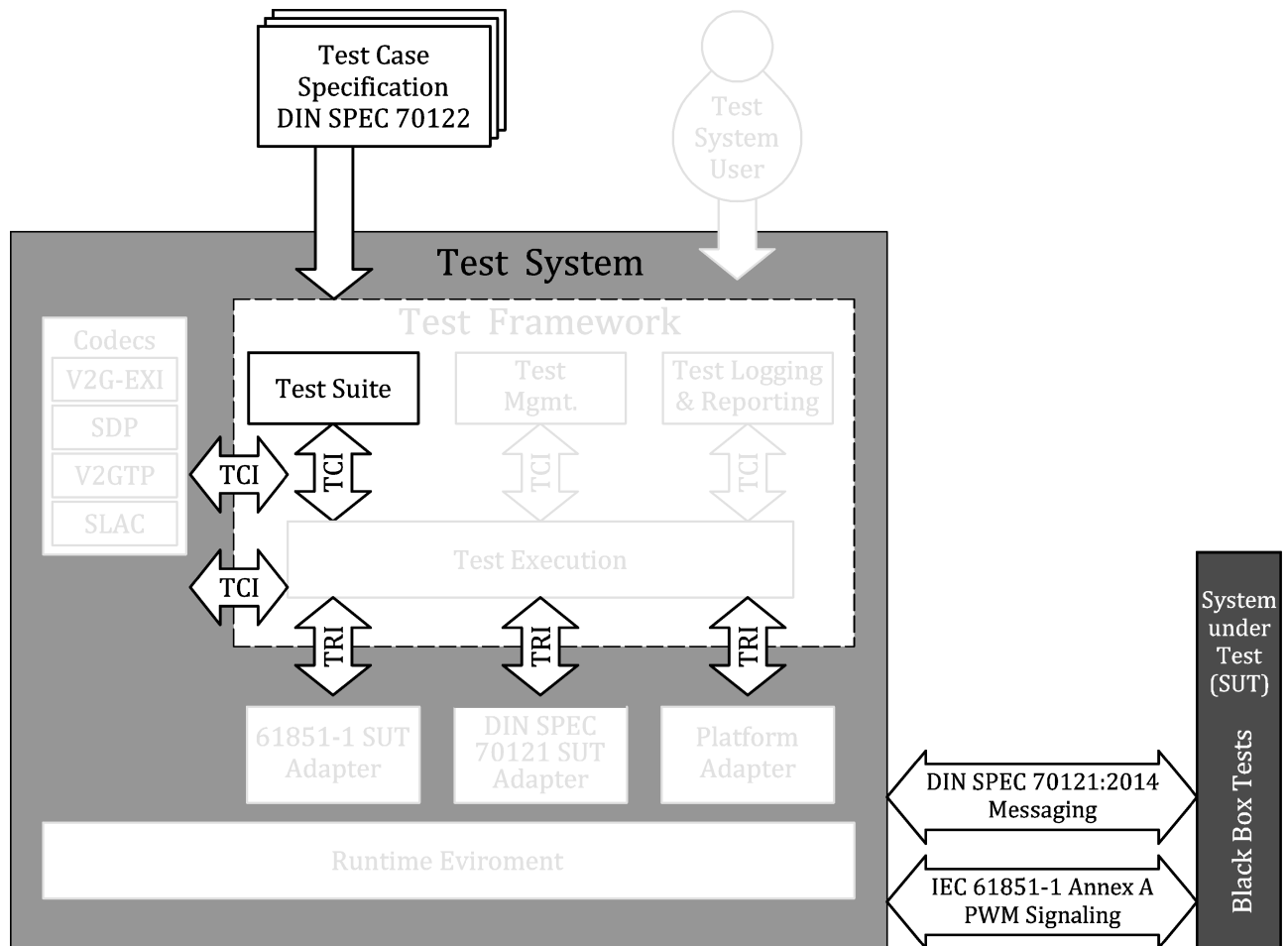


Figure 1 — Test architecture reference model for testing of DIN SPEC 70121

For the scope of this document only the "DIN SPEC 70121 – 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.

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, no external functions are defined for DIN SPEC 70121 conformance testing.

[V2G2-DC-002] The platform adapter of the test system shall implement the TriPlatformPA and the TriPlatformTE interfaces as defined in ETSI ES 201 873-5 V4.6.1 sub clause 6.5.3.

6.3 SUT adapter interfaces

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.

[V2G2-DC-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.

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

[V2G2-DC-004] The IEC 61851-1 SUT adapter shall adapt the HAL 61851-1 functions to a PWM Signal defined in sub clause 7.7.8.

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.

[V2G2-DC-005] The DIN SPEC 70121 SUT adapter shall adapt and send/receive the encoded SDP requests/responses through UDP messages to/from the SUT as defined in DIN SPEC 70121 sub clauses 8.6.2 and 8.9.3.

[V2G2-DC-006] The DIN SPEC 70121 SUT adapter shall adapt and send/receive the encoded V2G messages through a TCP connection to/from the SUT as defined in DIN SPEC 70121 sub clauses 8.6.1.

[V2G2-DC-007] The DIN SPEC 70121 SUT adapter shall adapt the internal port control messages for TCP connection management as defined in Annex Q.4.

NOTE 3 The TCP connection management includes the following functionality:

- Control for TCP port disconnection handling;
- Control for receiving information / status on a given TCP connection;
- Notification of TCP connection status events.

[V2G2-DC-008] The DIN SPEC 70121 SUT adapter shall provide a port map operation (refer to sub clause 7.3.2) with additional parameters for TCP connection configuration as defined in Annex Q.4.

NOTE 4 The TCP connection configuration includes the following functionality:

- Configuration for IP address and port

[V2G2-DC-009] The DIN SPEC 70121 SUT adapter shall send/receive the encoded SLAC request/response messages through raw Ethernet frames to/from the SUT as defined in DIN SPEC 70121 sub clause 8.3.3.3.2 and 8.3.3.4.

[V2G2-DC-010] If a test case requires multiple parallel matching processes (SLAC instances), the DIN SPEC 70121 SUT adapter shall use MAC address spoofing for emulating multiple hosts or directly provide multiple interfaces over the control pilot line.

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.

[V2G2-DC-011] 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 DIN SPEC 70121 conformance testing four codecs (SLAC, V2G-EXI, SDP, V2GTP, see Figure) 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.

[V2G2-DC-012] The V2G-EXI codec shall encode TTCN-3 values as defined in Annex Q.7 into corresponding EXI streams as defined in DIN SPEC 70121 sub clause 8.8.1.

[V2G2-DC-013] The V2G-EXI codec shall decode EXI streams as defined in DIN SPEC 70121 sub clause 8.8.1 into TTCN-3 values as defined in Annex Q.7

[V2G2-DC-014] The SDP codec shall encode TTCN-3 values as defined in Annex Q.6 into corresponding SDP requests/responses as defined in DIN SPEC 70121 sub clauses 8.9.3.3, 8.9.3.4 and 8.9.3.5.

[V2G2-DC-015] The SDP codec shall decode SDP requests/responses as defined in DIN SPEC 70121 sub clauses 8.9.3.3, 8.9.3.4 and 8.9.3.5 into TTCN-3 values as defined in Annex Q.6

[V2G2-DC-016] The V2GTP codec shall encode TTCN-3 values as defined in Annex Q.5 into corresponding V2GTP envelopes as defined in DIN SPEC 70121 sub clause 8.7.3.1.

[V2G2-DC-017] The V2GTP codec shall decode V2GTP envelopes as defined in DIN SPEC 70121 sub clause 8.7.3.1 into TTCN-3 values as defined in Annex Q.5

[V2G2-DC-018] The SLAC codec shall encode TTCN-3 values as defined in Annex Q.3 into corresponding MME frames as defined in DIN SPEC 70121 sub clause 8.3.3.3.2 and 8.3.3.4 and HomePlug GreenPHY Spec. 1.1.1

[V2G2-DC-019] The SLAC codec shall decode MME frames as defined in Annex Q.3 into TTCN-3 values as defined in DIN SPEC 70121 sub clause 8.3.3.3.2 and 8.3.3.4 and HomePlug GreenPHY Spec. 1.1.1

7 Test suite conventions

7.1 General information

This clause defines all conventions that are relevant for conformance tests of SUTs implementing DIN SPEC 70121.

7.2 Test suite structure (TSS)

A test suite is a complete set of test cases, possibly combined into groups or, 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 7.7.6 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.

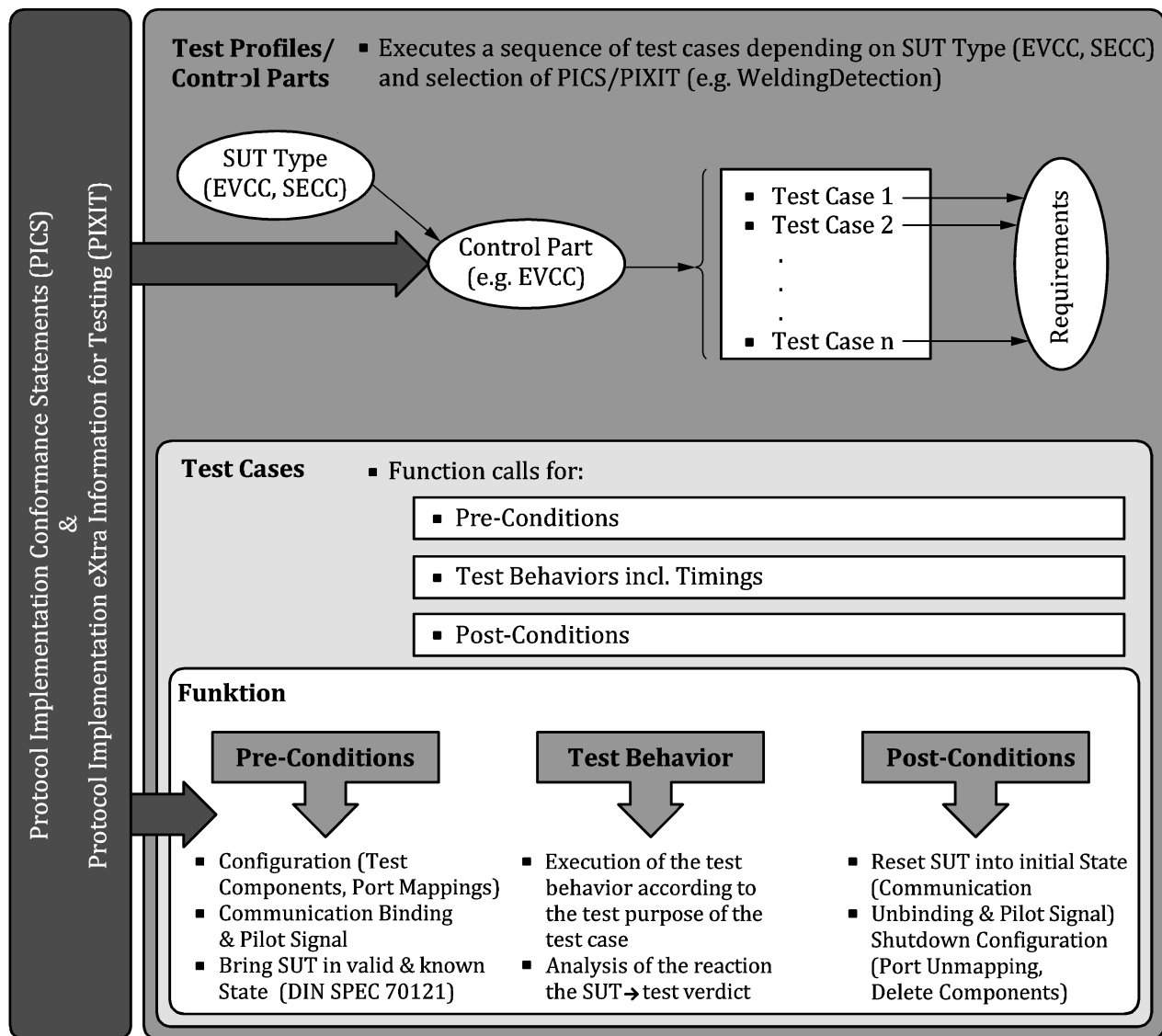


Figure 2 — General overview of the Test Suite Structure (TSS)

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 DIN SPEC 70121 standard and its corresponding requirements.

Hence the Test Suite Structure (TSS) is segmented into subgroups defined according to DIN SPEC 70121 use cases for conformance testing. Table 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
<ctx>	{fullname}	Context (e.g. name of message pattern signal name according to standard)

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 — F	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 G — K	The function annexes contain methods for supporting the test execution as well as the actual pre-, post-conditions and test behaviors of the DIN SPEC 70121 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 Library Functions sub clause contains utility functions used across the test suite for various purposes.
Templates Annex L — P	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 Q	The Data Structures sub clause contains data structures that are needed additionally to the DIN SPEC 70121 data structures.

7.3 Test profiles

This sub clause defines test profiles for conformance with DIN SPEC 70121. 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 DIN SPEC 70121 scenarios. Entities for the SUT, Tester and PTCs are:

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

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

Table 3 — DIN SPEC 70121 test configurations

CF_Part_ID	SUT	Tester	PTCs
CF_02_001	SECC + PLC Bridge	EVCC + PLC Bridge	PTC1=61851
CF_02_002	EVCC + PLC Bridge	SECC + PLC Bridge	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 DIN SPEC 70121. 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 SLAC_Port, V2G_TCP_ALM_SECC_Port, V2G_UDP_SDP_Port, HAL_61851_Port and a HAL_61851_Internal_Port (see Table) are assigned to this component type.
EVCC_Tester (MTC)	This component type is the main type for the tests of an EVCC. A SLAC_Port, V2G_TCP_ALM_EVCC_Port, V2G_UDP_SDP_Port, HAL_61851_Port and a HAL_61851_Internal_Port (see Table) 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) 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
SLAC_Port	This port is used to send/receive SLAC messages defined in DIN SPEC 70121 to/from the EVCC/SECC.
V2G_TCP_ALM_SECC_Port	This port is used to send and receive V2G- Application Layer Messages (ALM) or supportedAppProtocol messages via TCP defined in DIN SPEC 70121 to/from an SECC. This port is also used to send and receive internal TCP port control messages defined in Annex Q.
V2G_TCP_ALM_EVCC_Port	This port is used to send and receive V2G- Application Layer Messages (ALM) or supportedAppProtocol messages via TCP defined in DIN SPEC 70121 to/from an EVCC. This port is also used to send and receive internal TCP port control messages defined in Annex Q.
V2G_UDP_SDP_Port	This port is used to send and receive SDP messages via UDP defined in DIN SPEC 70121 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 a 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.

NOTE The initialization of component variables is out of scope of this standard if the specific data content is not important for the corresponding test case. In this case the data content shall be set to a valid value according to the XSD schema.

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 . The type of the V2G components and ports (EVCC or SECC) depends on the SUT type.

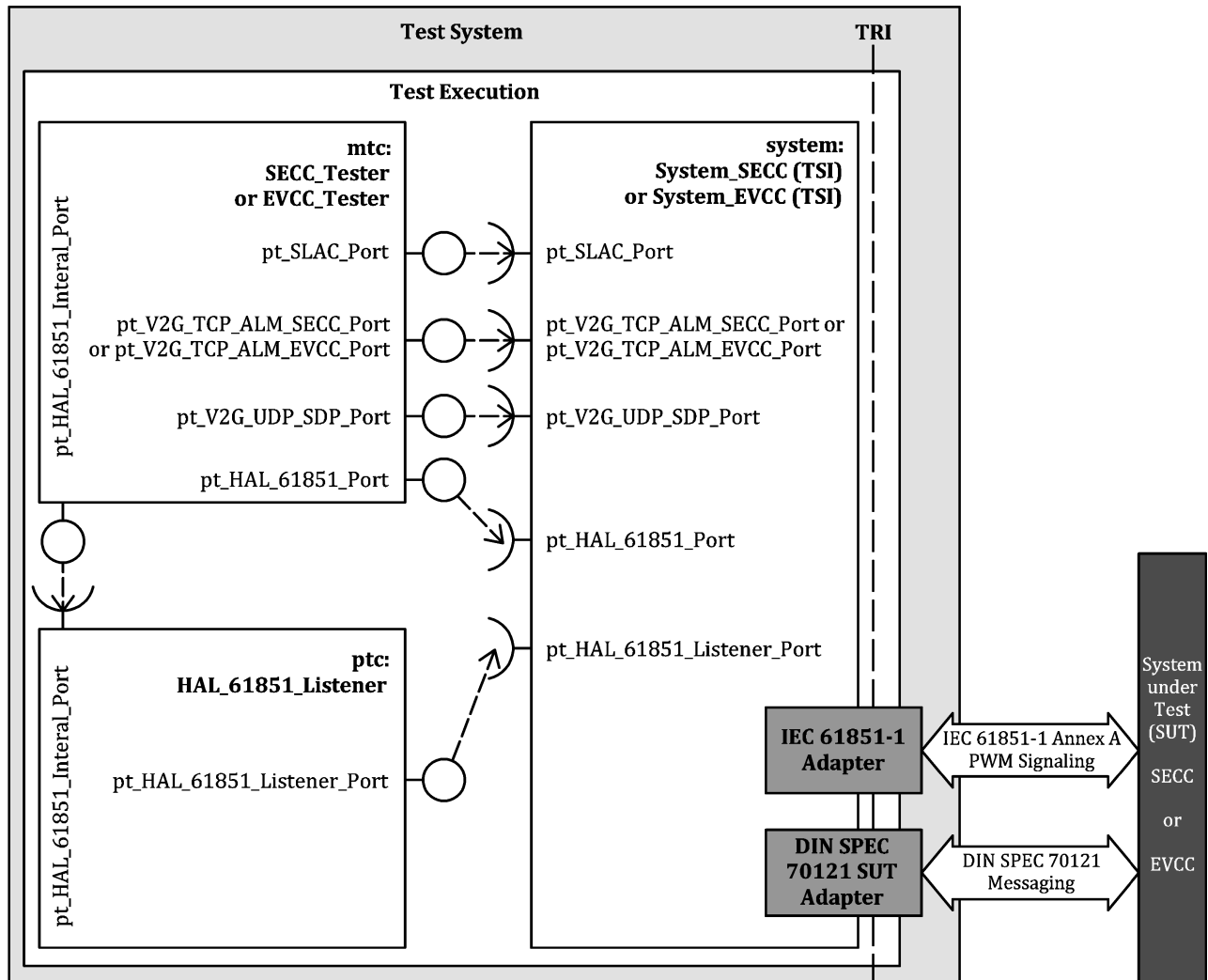


Figure 3 — DIN SPEC 70121 test configuration

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

- The port `pt_SLAC_Port` of the TSI is always mapped to port `pt_SLAC_Port` of the MTC;
- The port `pt_V2G_TCP_ALM_EVCC_Port` of the TSI is always mapped to port `pt_V2G_TCP_ALM_EVCC_Port` of the MTC;
- The port `pt_V2G_TCP_ALM_SECC_Port` of the TSI is always mapped to port `pt_V2G_TCP_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 — Table .

**Table 6 — PICS for test system configurations CF_02_001 and CF_02_002
(SUT either SECC or EVCC)**

PICS	Description
PICS_CMN_InitiateCmAmpMap	Indication for initiating the Amplitude map process Dependency: Parameter only valid for the configuration PIXIT_CMN_CmAmpMap := true
PICS_CMN_V2gtpSdp	Indication for explicit testing V2GTP by using SDP payload
PICS_CMN_V2gtpV2g	Indication for explicit testing V2GTP by using V2G payload
PICS_CMN_LoopCounter	Indication the number of iterations of CurrentDemand loop
PICS_CMN_SlacTimeouts	Indication for enabling Test Group: SLAC timeouts
PICS_CMN_InvalidSlacDataFields	Indication for enabling Test Group: Invalid SLAC data fields
PICS_CMN_InvalidV2gtpDataFields	Indication for enabling Test Group: Invalid V2GTP data fields
PICS_CMN_FailedResponseCodes	Indication for enabling Test Group: V2G fAILED response codes
PICS_CMN_CMN_V2gTimeouts	Indication for enabling Test Group: V2G timeouts
PICS_CMN_StopV2gSessionNCR	Indication for enabling Test Group: Stop V2G Communication Session for non-critical reason
PICS_CMN_InvalidStatesAndDutyCycles	Indication for enabling Test Group: Invalid states and duty cycles
PICS_CMN_PlugType	Indication for testing either type1 or type2 plug type

**Table 6 — PICS for test system configurations CF_02_001
(SUT equals SECC)**

PICS	Description
PICS_SECC_EvStateInChargeProgress	Indication for explicit testing of CP State C/D of IEC 61851-1 Annex A during charging
PICS_SECC_WeldingDetection	Indication for explicit testing of WeldingDetection message

**Table 7 — PICS for test system configurations CF_02_002
(SUT equals EVCC)**

PICS	Description
PICS_EVCC_SDPTimeoutsAndInvalid Data	Indication for enabling Test Group: SDP Timeouts and invalid SDP data fields
PICS_EVCC_InvalidV2GMessagesAnd Data	Indication for enabling Test Group: Invalid V2G messages and data fields

7.3.4 Protocol Implementation extra Information for Testing (PIXIT) Definition

In order to ensure testability of each defined message pair defined in DIN SPEC 70121, 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 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 , Table and Table .

**Table 8 — Selected PIXIT for test system configurations CF_02_001 and CF_02_002
(SUT either SECC or EVCC)**

PIXIT	Description
PIXIT_CMN_CmAmpMap	Indication for explicit testing of Amplitude map process
PIXIT_CMN_EnergyTransferMode	Indication for the selected energy transfer mode for charging Choice: i) dC_extended, ii) dC_core

**Table 9 — Selected PIXIT for test system configurations CF_02_001
(SUT equals SECC)**

PIXIT	Description
PIXIT_SECC_CmValidate	Indication for explicit testing of SECC Validation process Choice: i) none_, ii) cmValidate
PIXIT_SECC_ArchitectureValidationNotRequired	Indication for SECC grid architecture which not requires a validation process Dependency: Parameter only valid for the configuration PIXIT_SECC_CmValidate := cmValidate
PIXIT_SECC_VersionNumberMinor	Indication for the supported VersionNumberMinor of the SUT
PIXIT_SECC_CableCheckOngoing	Indication for explicit testing of the repetition of the CableCheck message sequence Choice: i) ongoing, ii) unknown
PIXIT_SECC_ChargeParameterDiscoveryOngoing	Indication for explicit testing of the repetition of the ChargeParameterDiscovery message sequence Choice: i) ongoing, ii) unknown

**Table 10 — Selected PIXIT for test system configurations CF_02_002
(SUT equals EVCC)**

PIXIT	Description
PIXIT_EVCC_CmValidate	Indication for explicit testing of EVCC Validation process. If PIXIT_EVCC_CMN_CmValidate := cmValidate, test system sends a manipulated attenuation profile (attenuation was increased) to trigger a validation process Choice: i) cmValidate, ii) unknown, iii) none_
PIXIT_EVCC_WeldingDetection	Indication for explicit testing of WeldingDetection message Choice: i) weldingDetection, ii) none_, iii) unknown
PIXIT_EVCC_FallbackValidationNotRequired	Indication for validation fallback handling if the SECC grid architecture not requires a validation process (notRequired) Choice: i) continue_, ii) skip, iii) unknown Dependency: Parameter only valid for the configuration PIXIT_EVCC_CmValidate := cmValidate
PIXIT_EVCC_ConcurrentValidation	Indication for handling if a SECC is occupied by another running validation process Choice: i) retry, ii) iterate, iii) unknown Dependency: Parameter only valid for the configuration PIXIT_EVCC_CmValidate := cmValidate
PIXIT_EVCC_ValidationRetry	Predefined SUT value for time to wait for a retry of the validation process if a SECC is occupied by another running validation process Dependency: Parameter only valid for the configuration PIXIT_EVCC_CmValidate := cmValidate and PIXIT_EVCC_ConcurrentValidation := retry
PIXIT_EVCC_ServiceCategory	Indication for explicit testing of ServiceCategory element Choice: i) serviceCategory, ii) unknown

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 and Table .

[V2G2-DC-020] The test control for testing an SECC shall execute all SECC specific test cases for each PICS/PIXIT configuration, as defined in Table .

Table 11 — SECC PICS/PIXIT configuration

Number	Configuration
1	PIXIT_SECC_CmValidate := cmValidate
2	PIXIT_SECC_CmValidate == none_
3	PIXIT_SECC_CmValidate := cmValidate and PIXIT_SECC_ArchitectureValidationNotRequired := true
4	PICS_CMN_InitiateCmAmpMap := true and PIXIT_CMN_CmAmpMap := true
5	PICS_CMN_InitiateCmAmpMap := false and PIXIT_CMN_CmAmpMap := true
6	PIXIT_CMN_CmAmpMap := false
7	PICS_CMN_V2gtpSdp := true
8	PICS_CMN_V2gtpV2g := true
9	PIXIT_CMN_EnergyTransferMode := dC_extended
10	PIXIT_CMN_EnergyTransferMode := dC_core
11	PIXIT_SECC_ChargeParameterDiscoveryOngoing := unknown
12	PIXIT_SECC_ChargeParameterDiscoveryOngoing := ongoing
13	PICS_SECC_EvStateInChargeProgress := C and PIXIT_SECC_CableCheckOngoing := unknown
14	PICS_SECC_EvStateInChargeProgress := D and PIXIT_SECC_CableCheckOngoing := unknown
15	PICS_SECC_EvStateInChargeProgress := C and PIXIT_SECC_CableCheckOngoing := ongoing
16	PICS_SECC_EvStateInChargeProgress := D and PIXIT_SECC_CableCheckOngoing := ongoing
17	PICS_SECC_WeldingDetection := true
18	PICS_SECC_WeldingDetection := false

[V2G2-DC-021] The test control for testing a EVCC shall execute all EVCC specific test cases for each PICS/PIXIT configuration, as defined in Table .

Table 12 — EVCC PICS/PIXIT configuration

Number	Configuration
1	PIXIT_EVCC_CmValidate := cmValidate
2	PIXIT_EVCC_CmValidate := none_
3	PIXIT_EVCC_CmValidate := unknown
4	PIXIT_EVCC_CmValidate := cmValidate and PIXIT_EVCC_FallbackValidationNotRequired := continue_
5	PIXIT_EVCC_CmValidate := cmValidate and PIXIT_EVCC_FallbackValidationNotRequired := skip
6	PIXIT_EVCC_CmValidate := cmValidate and PIXIT_EVCC_ConcurrentValidation := retry
7	PIXIT_EVCC_CmValidate := cmValidate and PIXIT_EVCC_ConcurrentValidation := iterate
8	PICS_CMN_InitiateCmAmpMap := true and PIXIT_CMN_CmAmpMap := true
9	PICS_CMN_InitiateCmAmpMap := false and PIXIT_CMN_CmAmpMap := true
10	PIXIT_CMN_CmAmpMap := false
11	PICS_CMN_V2gtpSdp := true
12	PICS_CMN_V2gtpV2g := true
13	PIXIT_EVCC_ServiceCategory := unknown
14	PIXIT_EVCC_ServiceCategory := serviceDiscovery
15	PIXIT_CMN_EnergyTransferMode := dC_extended
16	PIXIT_CMN_EnergyTransferMode := dC_core
17	PIXIT_EVCC_WeldingDetection := weldingDetection
18	PIXIT_EVCC_WeldingDetection := none_
19	PIXIT_EVCC_WeldingDetection := unknown

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 DIN SPEC 70121 conformance test suite are defined.

7.4.1 Module identifiers

All modules defined in the TSS shall start with a capital letter. The DIN SPEC 70121 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 . An example for test case module identifier is:

TestCases_SECC_SupportedAppProtocol

Table 13 — DIN SPEC 70121 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 .

Table 14 — ETSI naming convention for test case names

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

The DIN SPEC 70121 test suite specific test case identifier is defined as:

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

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

TC_SECC_VTB_SupportedAppProtocol_001

Table 15 — DIN SPEC 70121 test suite naming convention for test case identifiers

Identifier	Values	Description
<prefix>	TC	see Table
<sut>		System under test
	EVCC	Electric Vehicle Communication Controller
	SECC	Supply Equipment Communication Controller
<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 .

Table 16 — 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 pareameters, which do not assign or refer to templates with wild cards 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 para meters, which do assign	If a template contains attributes which are defined by parameters,	mdw_DNSResponse

	or refer to templates with wildcards or matching expression	constant values or wildcards, then template name begins with keyword mdw (mdw_)	(integer ip)
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The DIN SPEC 70121 test suite specific template identifier is defined as:

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

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

mdw_EVCC_SupportedAppProtocol_001

Table 17 — DIN SPEC 70121 test suite naming convention for template identifiers

Identifier	Values	Description
<prefix>		Type of template (see Table
<sut>		System under test
	EVCC	Electric Vehicle Communication Controller
	SECC	Supply Equipment Communication Controller
	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 .

Table 18 — ETSI naming convention for function names

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

The DIN SPEC 70121 test suite naming convention for test case functions is defined as:

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

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

f_EVCC_VTB_SessionSetup_001

Table 19 — DIN SPEC 70121 test suite naming convention for function names

Identifier	Values	Description
<prefix>		f_ (see Table)
<sut>		System under test
	EVCC	Electric Vehicle Communication Controller
	SECC	Supply Equipment Communication Controller
<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 .

Table 20 — 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 DIN SPEC 70121 test suite specific timer identifier is defined as:

<prefix>_<ctx>

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

tc_V2G_EVCC_Msg_Timer

Table 21 — DIN SPEC 70121 test suite naming convention for timer identifiers

Identifier	Values	Description
<prefix>		Type of timer (see Table)
<ctx>	{fullname}	Context (e.g. name of timer according to DIN SPEC 70121 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 DIN SPEC 70121 test suite naming convention for PICS/PIXIT is defined as:

<pic>_<sut>_<ctx>

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

PICS_CMN_V2gtpSdp

Table 22 — DIN SPEC 70121 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
<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 .

Table 23 — DIN SPEC 70121 test suite conventions on verdict handling

Verdict type	TTCN-3 Definition	DIN SPEC 70121 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 DIN SPEC 70121:

- 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 .

NOTE If the corresponding comment contains information about one specific SUT type (EVCC or SECC), the disregarded SUT type is not applicable for the requirement.

- 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 .

Table 24 — Requirements of DIN SPEC 70121 not considered in the ATS

List of requirement IDs	Comment (no consideration in ATS)
[V2G-DC-292], [V2G-DC-293]	Cannot be tested due to a conflict with [V2G-DC-549]
[V2G-DC-001], [V2G-DC-018], [V2G-DC-038], [V2G-DC-049], [V2G-DC-570], [V2G-DC-577], [V2G-DC-588], [V2G-DC-600], [V2G-DC-675], [V2G-DC-676], [V2G-DC-678], [V2G-DC-705], [V2G-DC-101], [V2G-DC-187], [V2G-DC-213], [V2G-DC-478], [V2G-DC-318], [V2G-DC-319], [V2G-DC-320], [V2G-DC-347], [V2G-DC-636], [V2G-DC-362], [V2G-DC-372], [V2G-DC-376], [V2G-DC-381], [V2G-DC-386], [V2G-DC-413], [V2G-DC-739], [V2G-DC-740], [V2G-DC-741], [V2G-DC-742], [V2G-DC-743], [V2G-DC-744], [V2G-DC-745], [V2G-DC-746], [V2G-DC-747], [V2G-DC-748], [V2G-DC-749]	Cannot be tested explicitly in EVCC black box test configuration
[V2G-DC-102], [V2G-DC-105], [V2G-DC-369], [V2G-DC-371], [V2G-DC-648], [V2G-DC-673]	Cannot be tested explicitly in EVCC black box test configuration due to strong configuration dependency on the SUT
[V2G-DC-002], [V2G-DC-019], [V2G-DC-030], [V2G-DC-564], [V2G-DC-569], [V2G-DC-594], [V2G-DC-601], [V2G-DC-602], [V2G-DC-724], [V2G-DC-110], [V2G-DC-188], [V2G-DC-202], [V2G-DC-204], [V2G-DC-324], [V2G-DC-336], [V2G-DC-346], [V2G-DC-367], [V2G-DC-436], [V2G-DC-438], [V2G-DC-440], [V2G-DC-443], [V2G-DC-445], [V2G-DC-450], [V2G-DC-454], [V2G-DC-457], [V2G-DC-461], [V2G-DC-464], [V2G-DC-468], [V2G-DC-494]	Cannot be tested explicitly in SECC black box test configuration
[V2G-DC-733], [V2G-DC-662], [V2G-DC-663], [V2G-DC-669], [V2G-DC-670]	Cannot be tested explicitly in SECC black box test configuration due to strong configuration dependency on the SUT
[V2G-DC-020], [V2G-DC-031], [V2G-DC-032], [V2G-DC-034], [V2G-DC-035], [V2G-DC-527], [V2G-DC-606], [V2G-DC-611], [V2G-DC-612], [V2G-DC-751], [V2G-DC-752], [V2G-DC-167], [V2G-DC-168], [V2G-DC-170], [V2G-DC-171], [V2G-DC-172], [V2G-DC-174], [V2G-DC-189]	Cannot be tested explicitly in SECC/EVCC black box test configuration
[V2G-DC-534], [V2G-DC-535], [V2G-DC-536], [V2G-DC-537], [V2G-DC-538], [V2G-DC-540], [V2G-DC-541], [V2G-DC-617]	Out of scope of the ATS (The requirements for calibrating the power level of the PLC signal are not considered in the ATS -> see sub clause 8.1)
[V2G-DC-003], [V2G-DC-004], [V2G-DC-005], [V2G-DC-006], [V2G-DC-485], [V2G-DC-575], [V2G-DC-576], [V2G-DC-096], [V2G-DC-097], [V2G-DC-098], [V2G-DC-117], [V2G-DC-118], [V2G-DC-119], [V2G-DC-120], [V2G-DC-121], [V2G-DC-122], [V2G-DC-123], [V2G-DC-124], [V2G-DC-125], [V2G-DC-126], [V2G-DC-127], [V2G-DC-128], [V2G-DC-129], [V2G-DC-130], [V2G-DC-133], [V2G-DC-134], [V2G-DC-135], [V2G-DC-136], [V2G-DC-137], [V2G-DC-139], [V2G-DC-146], [V2G-DC-148], [V2G-DC-217], [V2G-DC-218], [V2G-DC-269], [V2G-DC-671]	Out of scope of this standard (Requirement refers to external RFCs, standards, etc.)
[V2G-DC-310], [V2G-DC-311], [V2G-DC-312], [V2G-DC-313], [V2G-DC-332], [V2G-DC-333], [V2G-DC-337], [V2G-DC-338], [V2G-DC-641], [V2G-DC-642], [V2G-DC-643], [V2G-DC-401], [V2G-DC-422]	Out of scope of this standard (Requirement refers to power flow)
[V2G-DC-014], [V2G-DC-021], [V2G-DC-071], [V2G-DC-072], [V2G-DC-075], [V2G-DC-076], [V2G-DC-077], [V2G-DC-078], [V2G-DC-081], [V2G-DC-088], [V2G-DC-471], [V2G-DC-533], [V2G-DC-562], [V2G-DC-582], [V2G-DC-616]	Out of scope of this standard (Requirements may be validated with dedicated measurement equipment but are not considered in the ATS)

Table 25 — Requirements of DIN SPEC 70121 implicitly covered by the SUT adapters / codecs

List of requirement IDs	Comment (implicitly tested)
[V2G-DC-572], [V2G-DC-573], [V2G-DC-580], [V2G-DC-583], [V2G-DC-149], [V2G-DC-151], [V2G-DC-153], [V2G-DC-154], [V2G-DC-155], [V2G-DC-156], [V2G-DC-157], [V2G-DC-158], [V2G-DC-159], [V2G-DC-182], [V2G-DC-183], [V2G-DC-185], [V2G-DC-186], [V2G-DC-190], [V2G-DC-191], [V2G-DC-192], [V2G-DC-193], [V2G-DC-199], [V2G-DC-205], [V2G-DC-207]	Tested implicitly by DIN 70121 SUT adapter
[V2G-DC-473]	Tested implicitly by DIN 70121 SUT adapter (Duplicated Requirement --> [V2G-DC-158])
[V2G-DC-474]	Tested implicitly by DIN 70121 SUT adapter (Duplicated Requirement --> [V2G-DC-159])
[V2G-DC-162], [V2G-DC-163], [V2G-DC-175], [V2G-DC-176], [V2G-DC-177], [V2G-DC-178], [V2G-DC-179], [V2G-DC-480], [V2G-DC-487], [V2G-DC-198], [V2G-DC-210], [V2G-DC-211], [V2G-DC-225], [V2G-DC-228], [V2G-DC-229]	Tested implicitly by DIN 70121 codec

The resulting test suite coverage in this standard with reference to requirements in DIN SPEC 70121 is summarized in Table . It only includes requirements which are not listed for exclusion in Table or Table . Table defines the relevance of requirements of DIN SPEC 70121 for the ATS, based upon the type of SUT (EVCC or SECC). The following symbols are used in Table :

- 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 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.
- O Requirements that are out of scope for the profile defined in the respective column.

Table 26 — ATS coverage of requirements in DIN SPEC 70121

Requirement ID	Covered in Test Suite		TC ID(s) / Comment
	SECC	EVCC	
[V2G-DC-008]	P	P	Only one message sequence will be considered, so the requirement can only be tested partially Group_[V2G-DC-008]
[V2G-DC-024]	P	-	Internal states cannot be tested explicitly in SECC black box configuration, so the requirement can only be tested partially Group_[V2G-DC-024]
[V2G-DC-029]	P	P	Only a part of the message sequence will be considered, so the requirement can only be tested partially Group_[V2G-DC-029]
[V2G-DC-042]	P	P	Table 2 can only be tested partially

Requirement ID	Covered in Test Suite		TC ID(s) / Comment
	SECC	EVCC	
			Group_[V2G-DC-042]
[V2G-DC-043]	-	X	Requirement is only testable if a corresponding PIXIT is considered TC_EVCC_VTB_CmValidate_001 TC_EVCC_VTB_CmValidate_002 TC_EVCC_VTB_CmValidate_013
[V2G-DC-051]	-	P	The start of the validation process can be tested, so the requirement can only be tested partially. Requirement is only testable if a corresponding PIXIT is considered Group_[V2G-DC-051]_[V2G-DC-737]
[V2G-DC-053]	I	-	Tested indirectly by consideration of requirement [V2G-DC-723] TC_SECC_VTB_CmValidate_001 TC_SECC_VTB_CmValidate_011
[V2G-DC-056]	-	X	Requirement is only testable if a corresponding PIXIT is considered TC_EVCC_VTB_CmValidate_001 TC_EVCC_VTB_CmValidate_002
[V2G-DC-058]	-	X	Requirement is only testable if a corresponding PIXIT is considered TC_EVCC_VTB_CmValidate_001 TC_EVCC_VTB_CmValidate_002
[V2G-DC-059]	-	I	Tested indirectly by consideration of requirement [V2G-DC-599] TC_EVCC_VTB_CmAmpMap_001 TC_EVCC_VTB_CmAmpMap_002 TC_EVCC_VTB_CmAmpMap_007 TC_EVCC_VTB_PLCLinkStatus_001 TC_EVCC_VTB_PLCLinkStatus_002
[V2G-DC-060]	X	X	Group_[V2G-DC-060]
[V2G-DC-061]	I	I	Tested indirectly by consideration of requirement [V2G-DC-546] or [V2G-DC-209] Group_[V2G-DC-061]
[V2G-DC-064]	P	P	Requirement is only testable if a corresponding PIXIT is considered. Only a part of the message sequence (messages between hosts) can be considered, so the requirement can only be tested partially. Group_[V2G-DC-064]
[V2G-DC-065]	P	P	Internal states and processing cannot be tested explicitly in SECC/EVCC black box configuration, so the requirement can only be tested partially TC_EVCC_VTB_PLCLinkStatus_003 TC_SECC_VTB_PLCLinkStatus_005
[V2G-DC-507]	I	-	Tested indirectly by consideration of requirement [V2G-DC-597] Group_[V2G-DC-597]_[V2G-DC-507]
[V2G-DC-519]	P	P	Table 8 can only be tested partially Group_[V2G-DC-519]
[V2G-DC-520]	-	X	TC_EVCC_VTB_CmValidate_001 TC_EVCC_VTB_CmValidate_002
[V2G-DC-521]	N	P	Cannot be tested explicitly in EVCC black box test configuration due to strong configuration dependency on the SUT for the profile defined in the respective column. Requirement definition considers various possible scenarios, so the requirement can only be tested partially for

Requirement ID	Covered in Test Suite		TC ID(s) / Comment
	SECC	EVCC	
			exemplarily selected cases for the profile defined in the respective column TC_EVCC_VTB_CmValidate_002
[V2G-DC-523]	-	P	Requirement is only testable if a corresponding PIXIT is considered. Only one case can be considered, so the requirement can only be tested partially TC_EVCC_VTB_CmValidate_014 TC_EVCC_VTB_CmValidate_015
[V2G-DC-524]	P	P	Only a part of the message sequence will be considered, so the requirement can only be tested partially Group_[V2G-DC-524]
[V2G-DC-525]	P	P	REQ is only testable if a corresponding PIXIT is considered. Table 4 can only be tested partially Group_[V2G-DC-525]
[V2G-DC-526]	P	P	Requirement definition considers various possible scenarios, so the requirement can only be tested partially for exemplarily selected cases Group_[V2G-DC-526]
[V2G-DC-542]	I	I	Tested indirectly by consideration of requirement [V2G-DC-197] or [V2G-DC-209] Group_[V2G-DC-542]
[V2G-DC-543]	X	X	TC_EVCC_VTB_PLCLinkStatus_004 TC_SECC_VTB_PLCLinkStatus_006
[V2G-DC-560]	-	P	Only one case can be considered, so the requirement can only be tested partially Group_[V2G-DC-560]
[V2G-DC-561]	P	-	Only one case can be considered, so the requirement can only be tested partially Group_[V2G-DC-561]
[V2G-DC-568]	X	-	TC_SECC_VTB_PLCLinkStatus_003
[V2G-DC-571]	P	P	Only a part of the message sequence will be considered, so the requirement can only be tested partially Group_[V2G-DC-571]
[V2G-DC-574]	I	-	Tested indirectly by consideration of requirement [V2G-DC-542] TC_SECC_VTB_CmAmpMap_001 TC_SECC_VTB_CmAmpMap_002 TC_SECC_VTB_CmAmpMap_007 TC_SECC_VTB_PLCLinkStatus_001 TC_SECC_VTB_PLCLinkStatus_002
[V2G-DC-578]	X	-	Group_[V2G-DC-578]_[V2G-DC-711]
[V2G-DC-579]	X	-	Requirement is only testable if a corresponding PIXIT is considered TC_SECC_VTB_CmValidate_009
[V2G-DC-581]	P	N	Requirement definition considers various possible scenarios, so the requirement can only be tested partially for exemplarily selected cases for the profile defined in the respective column. Cannot be tested explicitly in EVCC black box test configuration for the profile defined in the respective column.

Requirement ID	Covered in Test Suite		TC ID(s) / Comment
	SECC	EVCC	
			TC_SECC_VTB_PLCLinkStatus_004
[V2G-DC-584]	P	P	Table 6 can only be tested partially (large number of different carrier settings may apply. Can only be tested with random samples). Requirement is only testable if a corresponding PIXIT is considered. Group_[V2G-DC-584]_[V2G-DC-604]
[V2G-DC-585]	P	P	Table 7 can only be tested partially. For Result Code 0x01 and 0x02 no requirement exist. Requirement is only testable if a corresponding PIXIT is considered. Add Test case for ResType 0x00 and 0x01 Group_[V2G-DC-585]_[V2G-DC-608]
[V2G-DC-586]	P	P	Only a part of the message sequence will be considered, so the requirement can only be tested partially Group_[V2G-DC-586]
[V2G-DC-587]	-	P	Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially Group_[V2G-DC-587]
[V2G-DC-589]	-	P	Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially Group_[V2G-DC-589]_[V2G-DC-590]_[V2G-DC-592]
[V2G-DC-590]	-	I	Tested indirectly by consideration of requirement [V2G-DC-592] Group_[V2G-DC-589]_[V2G-DC-590]_[V2G-DC-592]
[V2G-DC-591]	-	I	Tested indirectly by consideration of requirement [V2G-DC-592] Group_[V2G-DC-591]
[V2G-DC-592]	-	P	Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially Group_[V2G-DC-589]_[V2G-DC-590]_[V2G-DC-592]
[V2G-DC-593]	I	-	Tested indirectly by consideration of requirement [V2G-DC-597] Group_[V2G-DC-593]
[V2G-DC-596]	I	-	Tested indirectly by consideration of requirement [V2G-DC-593] TC_SECC_VTB_CmSlacParm_002 TC_SECC_VTB_CmSlacParm_003
[V2G-DC-597]	P	-	Internal timings cannot be tested explicitly in SECC black box configuration, so the requirement can only be tested partially Group_[V2G-DC-597]_[V2G-DC-507]
[V2G-DC-598]	P	-	Requirement definition considers various possible scenarios, so the requirement can only be tested partially for exemplarily selected cases TC_SECC_VTB_AttenuationCharacterization_002
[V2G-DC-599]	-	I	Tested indirectly by consideration of requirement [V2G-DC-197] TC_EVCC_VTB_CmAmpMap_001 TC_EVCC_VTB_CmAmpMap_002 TC_EVCC_VTB_CmAmpMap_007 TC_EVCC_VTB_PLCLinkStatus_001 TC_EVCC_VTB_PLCLinkStatus_002
[V2G-DC-603]	I	-	Tested indirectly by consideration of requirement [V2G-DC-209] TC_SECC_VTB_CmAmpMap_001 TC_SECC_VTB_CmAmpMap_002 TC_SECC_VTB_CmAmpMap_007

Requirement ID	Covered in Test Suite		TC ID(s) / Comment
	SECC	EVCC	
			TC_SECC_VTB_PLCLinkStatus_001
[V2G-DC-604]	P	P	Internal timings cannot be tested explicitly in SECC/EVCC black box configuration, so the requirement can only be tested partially. Requirement is only testable if a corresponding PIXIT is considered Group_[V2G-DC-584]_[V2G-DC-604]
[V2G-DC-605]	P	P	Internal timings cannot be tested explicitly in SECC/EVCC black box configuration, so the requirement can only be tested partially. Requirement is only testable if a corresponding PIXIT is considered. TC_EVCC_VTB_CmAmpMap_003 TC_EVCC_VTB_CmAmpMap_004 TC_SECC_VTB_CmAmpMap_003 TC_SECC_VTB_CmAmpMap_004
[V2G-DC-607]	I	I	Tested indirectly by consideration of requirement [V2G-DC-609] . Requirement is only testable if a corresponding PIXIT is considered. TC_EVCC_VTB_CmAmpMap_004 TC_SECC_VTB_CmAmpMap_004
[V2G-DC-608]	P	P	Internal timings cannot be tested explicitly in SECC/EVCC black box configuration, so the requirement can only be tested partially. Requirement is only testable if a corresponding PIXIT is considered. Group_[V2G-DC-585]_[V2G-DC-608]
[V2G-DC-609]	X	X	REQ is only testable if a corresponding PIXIT is considered TC_EVCC_VTB_CmAmpMap_005 TC_EVCC_VTB_CmAmpMap_006 TC_SECC_VTB_CmAmpMap_005 TC_SECC_VTB_CmAmpMap_006
[V2G-DC-610]	I	I	Can only be tested by proceeding with the next message pattern (SDP request Response handling) Group_[V2G-DC-610]
[V2G-DC-613]	N	I	Tested indirectly by consideration of requirement [V2G-DC-613] for the profile defined in the respective column. Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_VTB_AttenuationCharacterization_014 TC_EVCC_VTB_AttenuationCharacterization_015 TC_EVCC_VTB_CmSlacMatch_013 TC_EVCC_VTB_CmValidate_013
[V2G-DC-614]	N	P	Requirement definition considers various possible scenarios, so the requirement can only be tested partially for exemplarily selected cases for the profile defined in the respective column. Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column TC_EVCC_VTB_AttenuationCharacterization_014 TC_EVCC_VTB_AttenuationCharacterization_015 TC_EVCC_VTB_CmSlacMatch_013 TC_EVCC_VTB_CmValidate_013
[V2G-DC-615]	N	P	Cannot be tested explicitly in SECC black box test configuration for the profile defined in the respective column. Requirement definition considers various possible scenarios, so the requirement can only be

Requirement ID	Covered in Test Suite		TC ID(s) / Comment
	SECC	EVCC	
			tested partially for exemplarily selected cases for the profile defined in the respective column. TC_EVCC_VTB_AttenuationCharacterization_002 TC_EVCC_VTB_AttenuationCharacterization_003
[V2G-DC-674]	-	P	Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially Group_[V2G-DC-674]_[V2G-DC-677]
[V2G-DC-677]	-	P	Group_[V2G-DC-674]_[V2G-DC-677]
[V2G-DC-679]	-	I	Tested indirectly by consideration of requirement [V2G-DC-681] Group_[V2G-DC-679]
[V2G-DC-680]	-	I	Tested indirectly by consideration of requirement [V2G-DC-681] Group_[V2G-DC-680]
[V2G-DC-681]	-	I	Tested indirectly by consideration of requirement [V2G-DC-681] Group_[V2G-DC-681]
[V2G-DC-682]	-	I	Tested indirectly by consideration of requirement [V2G-DC-686] TC_EVCC_VTB_AttenuationCharacterization_004
[V2G-DC-683]	-	P	Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially TC_EVCC_VTB_CmSlacMatch_012
[V2G-DC-684]	-	I	Tested indirectly by consideration of requirement [V2G-DC-681] Group_[V2G-DC-684]
[V2G-DC-685]	-	I	Tested indirectly by consideration of requirement [V2G-DC-681] TC_EVCC_VTB_AttenuationCharacterization_013
[V2G-DC-686]	-	P	Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially TC_EVCC_VTB_AttenuationCharacterization_001 TC_EVCC_VTB_AttenuationCharacterization_002 TC_EVCC_VTB_AttenuationCharacterization_003 TC_EVCC_VTB_AttenuationCharacterization_004
[V2G-DC-687]	-	P	Only one case can be considered, so the requirement can only be tested partially TC_EVCC_VTB_CmSlacMatch_001 TC_EVCC_VTB_CmSlacMatch_002 TC_EVCC_VTB_CmSlacMatch_012 TC_EVCC_VTB_CmSlacMatch_014 TC_EVCC_VTB_CmValidateOrCmSlacMatch_001
[V2G-DC-688]	I	-	Tested indirectly by consideration of requirement [V2G-DC-689] TC_SECC_VTB_AttenuationCharacterization_012
[V2G-DC-689]	I	-	Tested indirectly by consideration of requirement [V2G-DC-689] TC_SECC_VTB_AttenuationCharacterization_012
[V2G-DC-690]	I	-	Tested indirectly by consideration of requirement [V2G-DC-690] Group_[V2G-DC-690]
[V2G-DC-691]	I	-	Tested indirectly by consideration of requirement [V2G-DC-694] Group_[V2G-DC-691]_[V2G-DC-692]

Requirement ID	Covered in Test Suite		TC ID(s) / Comment
	SECC	EVCC	
[V2G-DC-692]	I	-	Tested indirectly by consideration of requirement [V2G-DC-694] Group_[V2G-DC-691]_[V2G-DC-692]
[V2G-DC-693]	I	-	Tested indirectly by consideration of requirement [V2G-DC-694] Group_[V2G-DC-694]_[V2G-DC-693]
[V2G-DC-694]	P	-	Internal timings cannot be tested explicitly in SECC black box configuration, so the requirement can only be tested partially Group_[V2G-DC-694]_[V2G-DC-693]
[V2G-DC-695]	P	-	Internal timings cannot be tested explicitly in SECC black box configuration, so the requirement can only be tested partially Group_[V2G-DC-695]
[V2G-DC-696]	I	-	Tested indirectly by consideration of requirement [V2G-DC-695] Group_[V2G-DC-696]
[V2G-DC-697]	-	P	Requirement is only testable if a corresponding PIXIT is considered. Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially TC_EVCC_VTB_CmValidate_003 TC_EVCC_VTB_CmValidate_004 TC_EVCC_VTB_CmValidate_005
[V2G-DC-698]	-	X	Requirement is only testable if a corresponding PIXIT is considered TC_EVCC_VTB_CmValidate_006
[V2G-DC-699]	-	I	Requirement is only testable if a corresponding PIXIT is considered. Tested indirectly by consideration of requirement [V2G-DC-697] TC_EVCC_VTB_CmValidate_004 TC_EVCC_VTB_CmValidate_005
[V2G-DC-700]	-	P	Requirement is only testable if a corresponding PIXIT is considered. Only one case can be considered, so the requirement can only be tested partially TC_EVCC_VTB_CmValidate_007 TC_EVCC_VTB_CmValidate_008
[V2G-DC-701]	-	P	Requirement is only testable if a corresponding PIXIT is considered. Only one case can be considered, so the requirement can only be tested partially TC_EVCC_VTB_CmValidate_016 TC_EVCC_VTB_CmValidate_017
[V2G-DC-702]	-	X	Requirement is only testable if a corresponding PIXIT is considered TC_EVCC_VTB_CmValidate_015
[V2G-DC-703]	-	P	Requirement is only testable if a corresponding PIXIT is considered. Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially TC_EVCC_VTB_CmValidate_001 TC_EVCC_VTB_CmValidate_002 TC_EVCC_VTB_CmValidate_014
[V2G-DC-704]	-	P	Requirement is only testable if a corresponding PIXIT is considered. Internal timings cannot be tested explicitly in EVCC black box configuration, so the requirement can only be tested partially TC_EVCC_VTB_CmValidate_001