

CharIN Umbrella Document for Charging System Basic and Extended DC EV

of Charging Interface Initiative e.V.

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Abbreviations

AC	Alternating current
BS	Basic Signaling
CARB	California Air Resources Board
CCS	Combined Charging System
CCTS	CCS Conformance Test System
CP	Control Pilot
DC	Direct current
DIN	German Institute for Standardization
ECU	Electronic Control Unit
Ed	Edition
EIM	External Identification Means (External payment)
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
FC	Fast Charging
HLC	High Level Communication
HPC	High Power Charging
IC-CPD	In-Cable Control and Protection Device
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
OEM	Original Equipment Manufacturer, here automotive manufacturers
PE	Protective Earth
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation Extra Information for Testing
PLC	Power Line Communication
PnC	Plug and Charge
PP	Proximity Pilot
PWM	Pulse Width Modulation
QAP	Quality Assurance Plan



RFID	Radio Frequency Identification
SAE	Society of Automotive Engineers
SECC	Supply Equipment Communication Controller
EVCC	Electric Vehicle Communication Controller
SUT	System under Test
US	United States of America

1. Introduction

1.1. General

The Combined Charging System (CCS) is based on open and universal standards for EVs and EVSEs. CharIN is promoting the CCS as an internationally competitive system for DC and AC charging. To ensure reliable, safe and robust charging with the CCS, CharIN has acted to close gaps in existing charging standards by providing implementation guides, and, where considered necessary, to specify conformance and interoperability Test Cases for electric vehicles (EV) and electric vehicle supply equipment (EVSE) that implement CCS. In addition, CharIN provides a hardware specification for Test Systems and has developed a qualification process for a CharIN CCS Test System (CCTS) that tests conformance of the charging behavior of an EV or an EVSE at the charging interface with the requirements in existing standards and in related CharIN guides.

1.2. Purpose and scope of this document

The document provides a guideline for conformance and interoperability testing of Electric Vehicles supporting High Level Communication for DC charging.

The following standards contain relevant requirements and therewith constitute the implementation baseline for Electric Vehicles, as recommended by CharIN:

Combo type 1	Combo type 2	NACS	Document No.	Edition	Short description
X	X		IEC 61851-1	Ed.3	Annex A&B, CP, PP, PWM
X	X	X	IEC 61851-23	Ed.2	Safety, power transfer systems C
X	X	X	IEC 61851-24	Ed.2	DC digital communication system C
X	X	X	DIN 70121	Ed.2	DC PLC physical layer & protocol
X	X	X	ISO 15118-2	2014 (Ed.1)	AC/DC V2G communication protocol
X	X	X	ISO 15118-3	2014 (Ed.1)	AC/DC PLC physical layer
X			SAE J1772	202401	CP, PP, PWM, coupler
		X	SAE J3400	202409	North American Charging System
X			SAE J2847/2	202309	V2G communication protocol
X			SAE J2953/1	202305	CP, PP, PWM, IOP
X	X		IEC 62196-1	Ed.4	AC/DC plugs, couplers, type 1&2
X	X		IEC 62196-3	Ed.2	DC combo plugs, couplers, type 1&2

Table 1 List of standards that constitute the implementation baseline for DC CCS charging.

The following standards contain Test Case specifications related to the implementation baseline for DC Charging System EV's.

Combo type 1	Combo type 2	NACS	Document No.	Edition	Short description
X	X		IEC 61851-1	Ed.3	Annex A, CP, PP, PWM
X	X	X	IEC 61851-23	Ed.2	Safety, power transfer systems C
X	X	X	IEC 61851-24	Ed.2	DC digital communication system C
X	X	X	DIN 70122	Ed.1	DC PLC physical layer & protocol
X	X	X	ISO 15118-4	2018 (Ed.1)	AC/DC V2G communication protocol
X	X	X	ISO 15118-5	2018 (Ed.1)	AC/DC PLC physical layer
X			SAE J1772	202401	CP, PP, PWM, coupler
		X	SAE J3400	202409	North American Charging System
X		X	SAE J2953/3	202502	IOP
X			ISO/DIS 15118-4	2023-10-24 (Ed.2)	Reliability

Table 2 List of standards that contain Test Case specifications

In the current edition of this guideline, the following charging functions of a DC CCS EV are in focus

- proximity detection (PP) according to IEC 61851-1 Ed.3 and IEC 61851-23 Ed.2 (system C).
- basic signaling (BS) using pulse width modulation (PWM) on the control pilot (CP) line according to IEC 61851-1 Ed.3 and SAE J1772: Jan 2024.
- power line communication (PLC) according to the DIN SPEC 70121:2014 and ISO 15118-3:2014 with ISO 15118-2:2014.
- DC power transfer sequences and performance of power transfer according to IEC 61851-23 Ed.2 (system C).

In addition to these standards, CharIN has drafted the following implementation guides:

- CharIN “Implementation Guide to DIN SPEC 70121:2014”
- CharIN “DC CCS Power Classes V6, 2018-06-24”

Test Cases for DC CCS EV are defined in the following documents:

- DIN SPEC 70122:2018 Communication Test Cases
- ISO 15118-4:2018 (Ed.1)

- ISO 15118-5:2018 (Ed.1)
- IEC 61851-1 Ed.3, Annex A.4
- IEC 61851-23 Ed.2, Annex CC.7
- SAE J1772: Jan 2024
- ISO/DIS 15118-4 Ed.2 – 2023-10-24

In addition, CharIN has drafted the following Test Case documents:

- CharIN Test Cases for DIN SPEC 70121:2014 Implementation Guide version 1.1.3 2021
- CharIN Test Case Modification Guide Version V1.0
- CharIN EV Conformance Test Specification for Basic Signaling v0.9.1

The Test Case specifications referenced herein focus on the interoperability between EVs and EVSEs at the charging interface as well as the safety and reliability of the charging process.

1.3. Validity of this document

Considerable effort is undertaken to transfer the changes to requirements that are proposed in the CharIN guides, as well as the CharIN Test Case specifications into the next editions of the respective standards. If documents referenced herein are substituted by new editions, a new edition of this guide may be provided if required.

2. Requirements for Test System HW and SW

The following figure gives an example for a test system architecture.

In principle, it can be divided into the communication controller and the power unit.

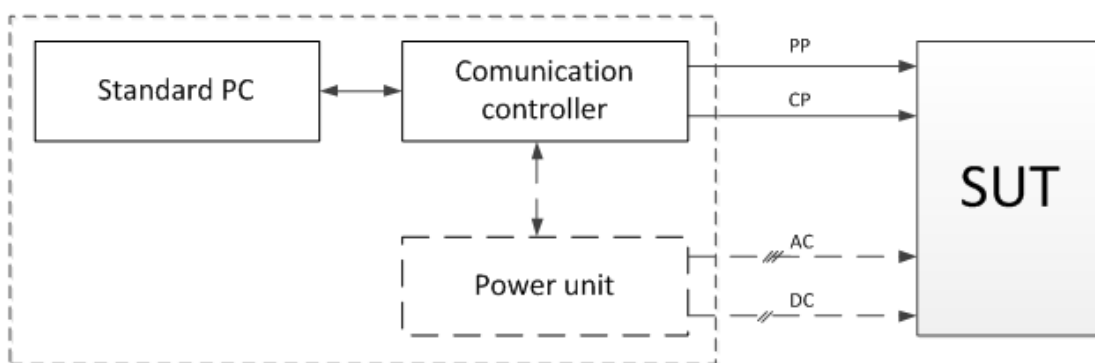


Figure 2 - Test System Architecture

The Test System used for DC CCS EV Conformance Testing must fulfill the requirements for DC EV tests given in the CharIN Function Set List in the “**CharIN CCTS Specification V1.0**”.

This document is provided and maintained by CharIN Conformance Test Group vendor team and can be found on the CharIN SVN Server.

3. Conformance and Interoperability Test for DC Charging System EV

Conformance and interoperability Tests for DC Charging System EV can be done on

- Vehicle level with a minimum power flow (no ECU only test)

CharIN is the core authority of the certification system for Testing houses and Test Systems to prove capability for DC Charging System EV Basic and Extended Conformance Testing. The main role of CharIN is to control, monitor, and surveil all entities, namely testing houses and CCTS vendors, in the certification system.

CharIN provides labels like “DC Charging System EV Basic and Extended accredited Testing house” or “DC Charging System EV Basic and Extended accredited Conformance Test System”.

3.1. Conformance Tests

Conformance tests specified in this document are derived from published standards such as IEC 61851-1 Ed.3, IEC 61851-23 Ed.2, SAE J1772:Jan2024, DIN 70122:2018, ISO 15118-4:2018 and ISO 15118-5:2018. In addition, conformance tests are derived from “CharIN Test Cases for DIN SPEC 70121:2014 Implementation Guide V.1.1.3” and CharIN Test Case Modification Guide Version 1.0.

Conformance test cases are expected to result in a pass verdict and confirm that requirements of the standards have been correctly implemented.

3.2. Interoperability Tests

Interoperability tests specified in this document are derived from field experience and extend conformance test cases. Generally, interoperability test cases improve the robustness of a successful charging session. A failed interoperability test case does not constitute a non-conformance, and addressing the issue is at the discretion of the OEM.

3.3. Test Case Revisioning

The reference source of tests for this program will evolve over time. New test cases might be added, or test cases undergo a revision or are being extended. To keep track of the references and revisions, a revisioning system is applied to the EV program.

3.3.1. CharIN internal numbering of Test Case documents

The following references apply for the CharIN Conformance Test DC Charging System Basic and Extended EV. The document versions/revisions might increase over time.

Document Number	Version as of 18.12.2025	Date of Document	Type of document	Document
#1	1.0.0	2014	Requirements Communication	DIN SPEC 70121 Ed.2
#2	2.0.0	2023	Requirements System level	IEC 61851-23 Ed.2
#3	3.0.0	2017	Requirements System level	IEC 61851-1 Ed.3
#4	1.1.0	January 2020	Communication Guide	CharIN Implementation Guide to DIN SPEC 70121:2014
#5	1.0.0	2018	Test Cases Communication	DIN SPEC 70122 Ed.1
#6	1.1.3	07/2021	Test Cases Communication Guide	CharIN Test Cases for DIN SPEC 70121:2014 Implementation Guide
#7	1.0.0	2014	Requirements Network and application protocol requirements	ISO 15118-2 Ed.1

#8	1.0.0	2015	Requirements Physical and data link layer requirements	ISO 15118-3 Ed.1
#9	1.0.0	2018	Test Cases Network and application protocol conformance test	ISO 15118-4 Ed.1
#10	1.0.0	2018	Requirements Physical layer and data link layer conformance test	ISO 15118-5 Ed.1
#11	1.0.	10.2025	Test Cases Communication Guide	CharIN Test Case Modification Guide
#12	8.0.0	01.2024	Requirements System level	SAE J1772
#13	0.9.1	10.10.202 5	Test Cases Basic signaling	CharIN EV Conformance Test Specification for Basic Signaling v0.9.1
#14	4.0.0	05.2022	Requirements Connectors	IEC 62196-1 Ed.4
#15	6	2022	Vehicle Coupler Tests	CharIN Conformance Tests – Vehicle Coupler Version 6

Table 3 – Reference version numbering

3.3.2. CharIN EV program and certificate reference

Date	Program and Conformance Certificate version	Conformance Test Document revision used for Baseline version
18.12.2025	1.0.0	1.0.0_2.0.0_3.0.0_1.1.0_1.0.0_1.1.3_1.0.0_1.0.0_1.0.0_1.0.0_1.0.0_1.0_8.0.0_0.9.1_4.0.0_6
xx.xx.2025	1.X.X	
xx.xx.2025	1.X.X	

Table 4 – CT Baseline version

The program version shall be listed on the certificate or declaration as the basis for establishing conformance. The version number of this document shall correspond with the Program and Conformance Certificate version.

3.4. Testing Guidelines

3.4.1. Guideline for test verdicts to obtain robust test results

3.4.1.1. Handling of “Inconclusive” test result:

In CharIN Conformance testing, an “Inconclusive” verdict is not allowed. An “Inconclusive” test result might be created when:

- Certain parameters of the Test Case implementation affect the test results, for instance, timing parameters of CP state changes. In that case, the Test Case implementation needs to be revised against the behavior of the specific SUT.
- There are issues with the set or measurement tolerance, accuracy, or uncertainty, for instance if a measured test parameter (such as timing, or duty cycle) is close to the boundary between a pass and fail value. In that case, the set/measurement tolerance of the test system might be adjusted, or the implementation of the SUT might be adjusted to be more robust against testing.
- The test configuration is incorrect, i.e. PIXIT, PICS.

If testers receive “Inconclusive” test results, deeper analysis is required, and more test trials are allowed. After 3 trials, if the test result is still “Inconclusive”, it shall be treated as “Failed” verdict.

Regarding tolerance, accuracy, and uncertainty issues, it shall be processed with the QAP of testing houses, which have been accredited or certified against ISO 17025 or ISO 9001.

If testers find any test objective issues, they have the main duty to report it to the CharIN Focus Group Conformance test/Interoperability and support the activities to resolve the issue.

3.4.1.2. Handling of “Sporadic” errors (e.g. charging stop during reliability test):

Sporadic errors during Test Case execution may occur. Deeper analysis is allowed, and Test Cases may be repeated 3 times to resolve sporadic issues.

If a Test Case fails, the 3rd time (e.g. SUT still makes the sporadic charging stop) the whole test verdict shall be treated as “Failed” and a new HW/SW may be provided, requiring a complete retest.

3.4.2. Guideline for power flow configuration for communication tests

If there is no clear information in test cases for power flow configuration during the CurrentDemand routine, testers should set power flow configuration as follows.

Option 1:

- Current: Mid value of Min. and Max. of SUT (from ChargeParameterDiscovery)

If this option is selected the test system shall ensure that all testcases with power flow, e.g. current demand cycles are stopped by ramping down the current following IEC 61851-23 Ed. 2 Table CC.9 – Sequence description for normal shutdown or pause after energy transfer by EV or EV supply equipment time stamp t100 ► t101 followed by t101 ► t102.

Option 2:

- Current: Default 10A (ChargeParameterDiscoveryRes with EVSEMaximumCurrentLimit = 10A)

If this option is selected the test system shall ensure that all testcases with power flow, e.g. current demand cycles are stopped following IEC 61851-23 Ed. 2 Table CC.9 – Sequence description for normal shutdown or pause after energy transfer by EV or EV supply equipment time stamp t100 ► t101 followed by t101 ► t102.

The selected option shall be stated in the test report and indication whether the charging session had been stopped by the SUT or by the test system (Stop initiation by EV or by EVSE).

3.4.3. Guideline for ChargeParameterDiscovery

For testing against this document, the test system shall mirror the ChargeParameterDiscoveryReq value transmitted by the EV, except for EVSEMaximumCurrent and EVSEMaximumPower which shall be aligned with the test system capability or the testing as indicated in 4.4.2 above.

3.4.4. Guideline for setting CurrentDemand LoopCounter

For test cases that require CurrentDemand iterations the following iterations are recommended to be used:

- ISO 15118-3 PICS_CMN_CMN_LoopCounter; Recommended default value = 100
- DIN 70122 PICS_CM_LoopCounter : Recommended default value = 100

Use of values other than the recommended shall be stated in the test report.

3.4.5. Guidelines for value ranges for message elements

The maximum values of table 68 – ISO 15118-2 shall not be considered for the test verdict. A SUT that communicates values outside of the defined maximum values shall not cause a “Fail” verdict.

3.4.6. Guidelines for PIXIT settings

The tester shall ensure that the correct PIXIT settings are selected for the implementation under testing. If an implementation is declared to support more than one capability, e.g. External Identification Means (EIM) and Plug and Charge (PnC), both capabilities shall be tested by selecting the appropriate PIXIT's.

3.5. Declaration of Conformity

3.5.1. Supplier Declaration of Conformity

The program may be used to declare conformity with a set of test cases. The program supports declaring conformity with all Priority 1 test cases that are applicable to the SUT. A supplier's declaration (SDoC) may be used by the supplier to declare that a product complies with the requirements of this document.

Alternatively, the supplier may also declare compliance with Priority 1 test cases provided that all applicable test cases have been passed.

3.6. Protocol Implementation Conformance Statement (PICS)

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); The test system needs to support testing of those features and options, and they may be indicated with so called PIXIT information. It is up to the tester to select the different PIXIT options to ensure that a specific capability of the SUT is tested in accordance with the relevant section of the applicable standards.

The following capabilities, options, and PIXIT configurations are relevant.

Support for	DIN	ISO	Relevant PIXIT configuration
Validation process (CmValidate)	X	X	PIXIT_EVCC_CMN_CmValidate PIXIT_EVCC_CMN_FallbackValidationFailed PIXIT_EVCC_CMN_FallbackValidationNotRequired PIXIT_EVCC_CMN_ConcurrentValidation PIXIT_EVCC_CMN_ValidationRetry
Amplitude map process (CmAmpMap)	X	X	PIXIT_CMN_CMN_CmAmpMap
Welding detection	X	X	PIXIT_EVCC_DC_WeldingDetection
Value added services (VAS)		X	PIXIT_EVCC_CMN_VAS
Renegotiation		X	PIXIT_CMN_CMN_Renegotiation PIXIT_EVCC_CMN_NewSAScheduleTupleID
Sleep mode (pause)		X	PIXIT_EVCC_CMN_Pause PICS_EVCC_CMN_PmaxSchedulewithZeroPow PIXIT_CMN_CMN_WakeUp PIXIT_EVCC_CMN_Pause
Sales tariffs		X	PICS_CMN_EVCC_SalesTariff
Charging profile optimization		X	PIXIT_EVCC_CMN_DepartureTime PIXIT_EVCC_CMN_ChargingProfileOptimization
Plug and charge		X	PICS_EVCC_CMN_ReceiptRequired PIXIT_CMN_CMN_MeterReading PIXIT_EVCC_CMN_SAScheduleTupleID MR

Contract installation		X	PIXIT_EVCC_CMN_CertificateHandling
Contract update		X	PIXIT_EVCC_CMN_CertificateHandling

Table 5: List of relevant PIXIT configurations

4. Conformance Test for DC Charging System EV

4.1. Application of test cases

The test cases under this section may be used for conformance testing. Test cases referring to PIXIT settings shall only be executed if the SUT supports that functionality, e.g. Validation shall be executed only if the user of this document specifically declares support for that functionality (refer to section 3.6)

The first version of this program focusses on interoperability. This means

- sending of messages should conform to standard requirements to the largest extent possible,
- receiving messages should be robust against wrong but uncritical parameters and timings,

Priority 1 are allocated based on the following characteristics

- high level of interoperability.
- robustness (good case higher priority than error cases).
- criticality of error (e.g. safety has highest priority).
- possibility of occurrence in the field.

Prioritization can be used to focus on the most important Test Cases if testing time is limited.

Priority 2 test cases are allocated based on the following characteristics

- robustness of implementations (error cases included).
- conformance with standards.
- criticality of error.
- possibility of occurrence in the field.

This document version does not contain priority 2 test cases. They will be included in the next version.

4.2. Use of Basic Signaling test Annex A

The testing for basic signaling conformance and interoperability is for informative purposes only for the first edition of this document. The defined test cases are not yet mature enough to be applied widely and pending expected changes from IEC 61851-23 Ed.2 to the upcoming IEC 61851-23 Ed.3 may impact the currently defined expected response of the EV with regards to timings and CP state changes.

We encourage the industry to test against the defined test case to gain data and observation that help to improve the test cases.

4.3. Physical layer and data link layer conformance test

4.3.1. Priority 1 Tests – Physical layer and data link layer conformance test – Common

The testcases apply to ISO implementations, DIN implementations, and combined ISO and DIN implementations. Identifiers labelled ISO, DIN, CharIN_1 and CharIN_2 in the reference column refer to ISO 15118-5:2018 (Ed.1), DIN 70122:2018, CharIN Test Cases for DIN SPEC 70121:2014 Implementation Guide Version 1.1.3 and CharIN Test Case Modification Guide v1.0.0, respectively.

The test cases are applicable for all implementations.

TC No.	Test Case Identifier	Reference	Remark
1	TC_EVCC_VTB_CmSlacParm_001	DIN	
2	TC_EVCC_CMN_VTB_CmSlacParm_001	ISO	
3	TC_EVCC_CMN_VTB_CmSlacParm_010	ISO	The test case shall be considered pass if the EV repeats the sequence for minimum of 10 secs (minimum time specified in ISO 15118-3) or longer
4	TC_EVCC_CMN_VTB_CmSlacParm_012	ISO	
5	TC_EVCC_CMN_VTB_CmSlacParm_013	ISO	
6	TC_EVCC_CMN_VTB_CmSlacParm_014	ISO	
7	CharIN_TC_EVCC_VTB_AttenuationCharacterization_004	CharIN_1	
8	TC_EVCC_CMN_VTB_AttenuationCharacterization_001	ISO	
9	TC_EVCC_CMN_VTB_AttenuationCharacterization_002	ISO	
10	TC_EVCC_VTB_CmSlacMatch_012	DIN	
11	CharIN_TC_EVCC_VTB_CmSlacMatch_014	CharIN_1	
12	TC_EVCC_CMN_VTB_CmSlacMatch_002	ISO	
13	TC_EVCC_CMN_VTB_PLCLinkStatus_001	ISO	
14	TC_EVCC_CMN_VTB_PLCLinkStatus_005	ISO	

Table 6: Priority 1 Tests – Physical DataLink conformance tests

Note: Above listed test cases from ISO 15118-5:2018 (Ed.1) apply also to DIN-only EV implementations, and above listed test cases from DIN SPEC 70122:2018 apply also to ISO-only EV implementations.

4.3.2. Priority 2 Tests – Physical layer and data link layer conformance test – Common

The document may be extended with priority 2 tests in the future.

4.4. SDP and V2GTP conformance test

4.4.1. Priority 1 Tests – SDP and V2GTP conformance test – Common

The testcases apply to ISO implementations, DIN implementations, and combined ISO and DIN implementations. Identifiers labelled ISO in the reference column refer to ISO 15118-5:2018 (Ed.1).

The test cases are applicable for all implementations.

TC No.	Test Case Identifier	Reference	Remark
1	TC_EVCC_CMN_VTB_SDP_001	ISO	PIXIT_EVCC_CMN_TLS := none_
2	TC_EVCC_CMN_VTB_SDP_004	ISO	PIXIT_EVCC_CMN_TLS := tls
3	CharIN_TC_EVCC_CMN_VTB_SDP_005 (replaces TC_EVCC_CMN_VTB_SDP_005)	ISO	The test case shall be considered Pass if the SUT repeats sending SDP requests for 5 times or more
4	TC_EVCC_CMN_VTB_SDP_006	ISO	
5	TC_EVCC_CMN_VTB_V2GTPSDP_001	ISO	
6	TC_EVCC_CMN_VTB_V2GTPSessionSetup_001	ISO	

Table 7: Priority 1 Tests – SDP and V2GTP conformance tests

4.4.2. Priority 2 Tests – SDP and V2GTP conformance test – Common

The document may be extended with priority 2 tests in the future.

4.5. V2G Network and application protocol conformance test

4.5.1. Priority 1 Tests – DIN V2G messages conformance tests

The testcases apply to DIN implementations. Identifiers labelled DIN, CharIN_1 and CharIN_2 in the reference column refer to DIN SPEC 70122:2018, CharIN Test Cases for DIN SPEC 70121:2014 Implementation Guide Version 1.1.3 and CharIN Test Case Modification Guide v1.0.0, respectively.

The test cases are applicable for all DIN implementations.

TC No.	Test Case Identifier	Reference	Remark
1	TC_EVCC_VTB_SupportedAppProtocol_001	DIN	
2	CharIN_TC_EVCC_VTB_SessionSetup_001	CharIN_1	
3	TC_EVCC_VTB_ServiceDiscovery_001	DIN	
4	CharIN_TC_EVCC_VTB_ServiceDiscovery_013	CharIN_1	
5	CharIN_TC_EVCC_VTB_ServiceDiscovery_014	CharIN_1	
6	TC_EVCC_VTB_ServicePaymentSelection_001	DIN	
7	TC_EVCC_VTB_ContractAuthentication_001	DIN	
8	TC_EVCC_VTB_ContractAuthentication_006	DIN	
9	CharIN_TC_EVCC_VTB_ContractAuthentication_015 (replaces CharIN_TC_EVCC_VTB_ContractAuthentication_007)	CharIN_2	The test case shall be considered Pass if the SUT does not close the TCP connection before the V2G_EVCC_Ongoing_Timer is expired
10	TC_EVCC_VTB_ChargeParameterDiscovery_001	DIN	
11	TC_EVCC_VTB_ChargeParameterDiscovery_008	DIN	
12	CharIN_TC_EVCC_VTB_CableCheck_001	CharIN_1	
13	CharIN_TC_EVCC_VTB_CableCheck_009	CharIN_1	
14	CharIN_TC_EVCC_VTB_CableCheck_015	CharIN_1	

15	CharIN_TC_EVCC_VTB_CableCheck_016	CharIN_1	
16	CharIN_TC_EVCC_VTB_CableCheck_017	CharIN_1	
17	CharIN_TC_EVCC_VTB_CableCheck_019	CharIN_1	
18	CharIN_TC_EVCC_VTB_CableCheck_020	CharIN_1	
19	CharIN_TC_EVCC_VTB_PreCharge_001	CharIN_1	
20	CharIN_TC_EVCC_VTB_PreCharge_014 (replaces CharIN_TC_EVCC_VTB_PreCharge_006)	CharIN_2	The test case shall be considered Pass if the SUT does not terminate before V2G_EVCC_PreCharge_Timeout =7s. A V2G_EVCC_PreCharge_Timeout =10s is highly recommended
21	TC_EVCC_VTB_PreCharge_011	DIN	
22	CharIN_TC_EVCC_VTB_PreChargeOrPowerDelivery_001	CharIN_1	
23	TC_EVCC_VTB_CurrentDemand_001	DIN	
24	CharIN_TC_EVCC_VTB_CurrentDemand_016 (replaces CharIN_TC_EVCC_VTB_CurrentDemand_005)	CharIN_2	The test case shall be considered Pass if the SUT did not terminate the session before V2G_Msg_Timeout (par_V2G_EVCC_Msg_Timeout_CurrentDemandReq is expired. Implementing a V2G_EVCC_Msg_Timeout_CurrentDemandReq of 0.5s instead of 0.25s is highly recommended
25	TC_EVCC_VTB_CurrentDemand_010	DIN	
26	TC_EVCC_VTB_CurrentDemand_011	DIN	
27	CharIN_TC_EVCC_VTB_CurrentDemandOrPowerDelivery_001	CharIN_1	
28	CharIN_TC_EVCC_VTB_CurrentDemandOrPowerDelivery_012	CharIN_1	The test case shall be considered pass if the SUT does not send a message sooner than 100 ms and not later than 1 second after receiving a response message
29	CharIN_TC_EVCC_VTB_CurrentDemandOrPowerDelivery_013	CharIN_1	The test case shall be considered pass if the SUT does not send a message sooner than 100 ms and not later than 1 second after receiving a response message

30	CharIN_TC_EVCC_VTB_CurrentDemandOrPowerDelivery_014	CharIN_1	The test case shall be considered pass if the SUT does not send a message sooner than 100 ms and not later than 1 second after receiving a response message
31	CharIN_TC_EVCC_VTB_CurrentDemandOrPowerDelivery_020 (replaces CharIN_TC_EVCC_VTB_CurrentDemandOrPowerDelivery_016)	CharIN_2	The test case shall be considered pass if the SUT does not send a message sooner than 100 ms and not later than 1 second after receiving a response message

Table 8: Priority 1 Tests – DIN V2G messages conformance tests

4.5.2. Priority 2 Tests – DIN V2G messages conformance tests

The document may be extended with priority 2 tests in the future.

4.5.3. Priority 1 Tests – Common conformance tests – ISO EIM / PNC V2G messages

The test cases are applicable for all ISO implementations that support EIM and/or PnC. Identifiers labelled ISO and CharIN_2 in the reference column refer to ISO 15118-4:2018 (Ed.1), and CharIN Test Case Modification Guide v1.0.0, respectively.

TC No.	Test Case Identifier	Reference	Remark
1	TC_EVCC_CMN_VTB_SupportedAppProtocol_001	ISO	PIXIT_EVCC_CMN_TLS := true
2	TC_EVCC_CMN_VTB_SessionSetup_001	ISO	
3	TC_EVCC_CMN_VTB_SessionSetup_008	ISO	
4	TC_EVCC_CMN_VTB_ServiceDiscovery_001	ISO	
5	CharIN_TC_EVCC_CMN_VTB_Authorization_009 (replaces TC_EVCC_CMN_VTB_Authorization_009)	CharIN_2	The test case shall be considered Pass if the SUT does not close the TCP connection before the V2G_EVCC_Ongoing_Timer is expired
6	TC_EVCC_DC_VTB_ChargeParameterDiscovery_001	ISO	
7	CharIN_TC_EVCC_DC_VTB_ChargeParameterDiscovery_007 (replaces TC_EVCC_DC_VTB_ChargeParameterDiscovery_007)	CharIN_2	The test case shall be considered Pass if the SUT does not close the TCP connection before the V2G_EVCC_Ongoing_Timer is expired
8	TC_EVCC_DC_VTB_CableCheck_001	ISO	

TC No.	Test Case Identifier	Reference	Remark
9	TC_EVCC_DC_VTB_PreCharge_001	ISO	
10	CharIN_TC_EVCC_DC_VTB_PreCharge_006 (replaces TC_EVCC_DC_VTB_PreCharge_006)	CharIN_2	The test case shall be considered Pass if the SUT does not terminate before V2G_EVCC_PreCharge_Timeout =7s. A V2G_EVCC_PreCharge_Timeout of at least 10s is highly recommended
11	CharIN_TC_EVCC_DC_VTB_PreChargeOrPowerDelivery_001 (replaces TC_EVCC_DC_VTB_PreChargeOrPowerDelivery_001)	CharIN_2	
12	TC_EVCC_DC_VTB_CurrentDemand_001	ISO	
13	CharIN_TC_EVCC_DC_VTB_Reliability_008 (replaces TC_EVCC_DC_VTB_Reliability_001)	CharIN_2	Reduced number of executions and time between consecutive charging sessions at least 20 seconds or as indicated by OEM

Table 9: Priority 1 Tests – Common conformance tests – ISO EIM/PnC V2G messages

4.5.4. Priority 2 Tests – Common conformance tests – ISO EIM / PNC V2G messages

The document may be extended with priority 2 tests in the future.

4.5.5. Priority 1 Tests – ISO – EIM – V2G messages conformance tests

The test cases are applicable for all ISO implementations that support EIM. Identifiers labelled ISO in the reference column refer to ISO 15118-4:2018 (Ed.1).

TC No.	Test Case Identifier	Reference	Remark
1	TC_EVCC_CMN_VTB_SupportedAppProtocol_004	ISO	
2	TC_EVCC_CMN_VTB_ServiceDetailAndPaymentSelection_002	ISO	
3	TC_EVCC_CMN_VTB_Authorization_002	ISO	

Table 10: Priority 1 Tests – ISO – EIM V2G messages conformance tests

4.5.6. Priority 2 Tests – ISO – EIM – V2G messages conformance tests

The document may be extended with priority 2 tests in the future.

4.5.7. Priority 1 Tests – ISO – PnC – V2G messages conformance tests

The test cases are applicable for all ISO implementations that support PnC. Identifiers labelled ISO in the reference column refer to ISO 15118-4:2018 (Ed.1).

TC No.	Test Case Identifier	Reference	Remark
1	TC_EVCC_CMN_VTB_ServiceDetail_001	ISO	
2	TC_EVCC_CMN_VTB_ServiceDetailAndPaymentSelection_001	ISO	
3	TC_EVCC_CMN_VTB_PaymentDetails_003	ISO	
4	TC_EVCC_CMN_VTB_Authorization_001	ISO	

Table 11: Priority 1 Tests – ISO – PnC V2G messages conformance tests

4.5.8. Priority 2 Tests – ISO – PnC – V2G messages conformance tests

The document may be extended with priority 2 tests in the future.

4.5.9. Priority 1 Tests – ISO – PnC – V2G messages conformance tests

PIXIT_EVCC_CMN_CertificateHandling

The test cases are applicable for all ISO implementations that support certificate handling. Identifiers labelled ISO in the reference column refer to ISO 15118-4:2018 (Ed.1).

TC No.	Test Case Identifier	Reference	Remark
1	TC_EVCC_CMN_VTB_CertificateInstallation_001	ISO	
2	TC_EVCC_CMN_VTB_CertificateUpdate_001	ISO	
3	TC_EVCC_CMN_VTB_PaymentDetails_001	ISO	

TC No.	Test Case Identifier	Reference	Remark
4	TC_EVCC_CMN_VTB_PaymentDetails_002	ISO	
5	TC_EVCC_CMN_VTB_CertificateHandlingAndPaymentDetails_001	ISO	
6	TC_EVCC_CMN_VTB_Authorization_010	ISO	
7	TC_EVCC_CMN_VTB_Authorization_011	ISO	

Table 12: Priority 1 Tests – ISO – PnC V2G messages conformance tests - PIXIT_EVCC_CMN_CertificateHandling

4.5.10. Priority 2 Tests – ISO – PNC – V2G messages conformance tests PIXIT_EVCC_CMN_CertificateHandlings

The document may be extended with priority 2 tests in the future.

4.6. Interoperability Test Cases

Interoperability test cases may be defined in the future.

4.7. EV Conformance Test Cases Connector

The document maybe extended with tests addressing the connector in the future



Annex A

Informative

A.1 EV Conformance Test Cases Basic Signaling

A.1.1 Priority 1 - IEC 61851-1 DC CCS EV Test cases

An EV supporting DC CCS shall be tested for conformance and interoperability with the requirements and tolerance outlined in IEC 61851-1 and SAE J1772 respectively and must pass all the following Test Cases related to IEC 61851-1 from “CharIN EV Conformance Test Specification for Basic Signaling” document to comply with the Priority 1 AC Basic Signaling Test Cases.

TC No.	Test Case Identifier	Remark
1	EV_DC_min-max_CP-state_tolerances	
2	EV_DC_CP_circuit_state_C_OutputLow	
3	EV_DC_invalid_DutyCycle	To be proposed to be tested at upcoming CharIN Festivals

Table 13: Test Case list IEC 61851-1 - Basic Control Pilot

A.1.2 Priority 2 - IEC 61851-1 DC CCS EV Test cases

The document maybe extended with priority 2 tests in the future.

A.1.3 Priority 1 - IEC 61851-23 DC CCS EV Test cases

An EV supporting DC CCS must pass all the following Test Cases related to IEC61851-23 from “CharIN EV Conformance Test Specification for Basic Signaling” to comply with the Priority 1 DC Basic Signaling Test Cases

TC No.	Test Case Identifier	Remark
1	CharIN_TC_EVCC_CMN_VTB_EmergencyShutdown_EnergyTransferStage_PWM_OFF_001	To be proposed to be tested at upcoming CharIN Festivals
2	CharIN_TC_EVCC_CMN_VTB_EmergencyShutdown_EnergyTransferStage_State_E_001	
3	CharIN_TC_EVCC_CMN_VTB_EmergencyShutdown_EnergyTransferStage_State_F_001	To be proposed to be tested at upcoming CharIN Festivals

TC No.	Test Case Identifier	Remark
4	CharIN_TC_EVCC_CMN_VTB_EmergencyShutdown_SpecialEmergency_002	
5	CharIN_TC_EVCC_pause_by_SECC_after_Precharge_before_energy_transfer_001	
6	CharIN_TC_EVCC_TCP_close_by_SECC_during_energy_transfer_001	To be proposed to be tested at upcoming CharIN Festivals
7	CharIN_TC_RestartMethode_all_TCP_loss_001	To be proposed to be tested at upcoming CharIN Festivals

Table 14: Test Case list IEC 61851-23 – DC charging

A.1.4 Priority 2 - IEC 61851-23 DC CCS EV Test cases

The document maybe extended with priority 2 tests in the future.



5. Reference

This document was created by the FG Conformance Test & IOP of the CharIN association.