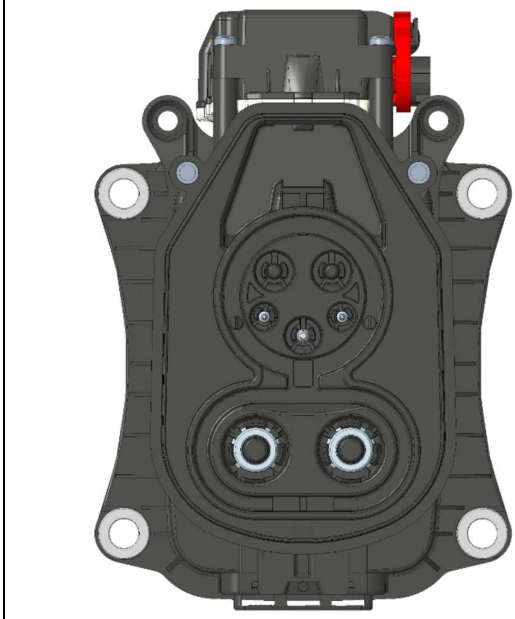
Class 1



Product Specification Vehicle Charge Inlet Type CCS1-Box Mount

TABLE OF CONTENTS

| Indicates Change

1. SCOPE

1.1. Introduction

The TE CCS1 charging inlet was designed to power electric and hybrid vehicles that comply with standard IEC 62196-3.

The maximum rated current for AC is 80A at the maximum voltage of 250V.

The maximum rated current for DC is 500A continuously with cooled connector and 1000V.

The maximum rated current for DC is 700A for limited time with cooled connector and 1000V.

The content of this specification covers the technical characteristics, performance and test requirements for the EV CHARGE INLET Combined Charging System Type 1 further mentioned as CCS1 (Box mount version).

When tests are performed the following specifications and standards shall be used. All inspections shall be performed using the applicable inspection plan and customer drawing.

2. APPLICABLE DOCUMENTS

The following mentioned documents are part of this specification. Unless otherwise specified, the latest edition of the documents applies. In the event of CONFLICT between the requirements of this specification and the information contained in the referenced documents, this specification shall take precedence.

2.1. TE CONNECTIVITY DOCUMENTS

General Requirements

Requirement	Description
109-1 Rev. J	General Requirements for Testing

Table 1

Drawings

For more information see CD drawings.

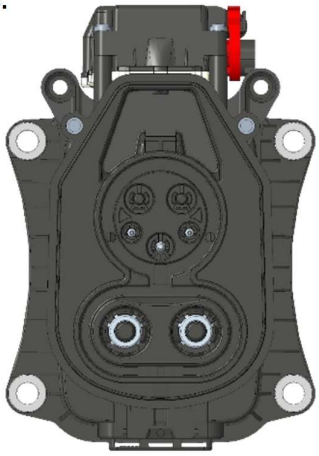


Figure 1

Drawing	Description
C-2480725	CCS1 CHARGE INLET BOX MOUNT

Table 2

Specifications

Specification	Description
114-97879	Application Spec. Vehicle Charge Inlet CCS1
114-13000	Micro MATE-N-LOK Connectors
108-94519	Actuator-Specification

Table 3

2.2. Other Documents

Specification	Description
IEC 62196-1: 2022	General requirements
IEC 62196-2: 2016/02	Dimensional compatibility and interchangeability requirements for AC pin and contact-tube accessories
IEC 62196-3: 2014/06	Dimensional compatibility and interchangeability requirements for DC and AC/DC pin and contact-tube vehicle couplers
IEC TS 62196-3-1: 2020/03	Vehicle connector, vehicle inlet and cable assembly for DC charging intended to be used with a thermal management system

Table 4

3. REQUIREMENTS

3.1. Design and Construction

The product has been designed to withstand its environment and the effects it has on it.

3.2. Material

The Material data is available in the IMDS (International Material Data System of the Automotive Industry).

3.3. Product Ratings

Dimensions

Mating-Face Geometry	compatible with IEC 62196-2:2016 Sheet 2-I and IEC 62196-3 Sheet 3-IIIa
Screw Points	See Drawing.

Environmental conditions

Ambient temperature (active, during charging)	-30 °C …. +50 °C
Ambient temperature (passive, no charging)	-40 °C …. +85 °C
Max. altitude	5000m above sea-level
Protection degree	IP67-Dust and water ingress protection IP6K9K-Dust and water ingress protection

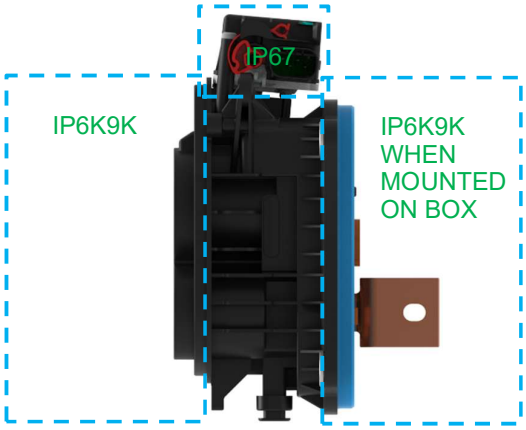


Figure 2

Electrical Properties

Max. charging performance	19 kW (AC) / 500 kW (DC)
Type of charging current	AC / DC
Number of AC-phases	1
Number of Terminals	7 (PE, L1, L2/N, DC+, DC-, CS, CC)
Rated current	80A AC / 500A DC
Rated voltage	250V AC / 1000V DC
Signal pin rated current	2A
Signal pin rated voltage	30V
Type of signal transmission	Analog
Insulation resistance of adjacent contacts	200MΩ
Resistant coding	acc. IEC 61851-1
Light option	-

Mechanical Properties

Mating / un-mating endurance	<= 10000 cycles
Insertion force	<100N (depending on connector)
Retention force	<100N (depending on connector)
Mechanical Stability of charging socket	Max. 500N in all directions (max. Lever length 100mm)

Temperature Sensor

Temperature Sensor Type	PT1000
Type of Sensor	DIN EN 60751 Recommended measuring current nominal 0.1mA / max. 1mA continuous or corresponding pulse/pause ratio.
Sensor tolerance at recommended measuring current	+/-20 Ohm @ $T_{amb.}$ 25°C +/- 5°C
Temperature Sensor Offset DC (steady state)	max -5K
Temperature Sensor Offset AC (steady state)	-12K TYP.
Proposed Shutdown DC	continuous monitored dT/dt (Temperature rise per time) > 1,5K/sec • Delta T between DC+ and DC- >10K • 85°C measured temperature at sensor (Equivalent to max. contact temperature 90°C)
Proposed Shutdown AC	78°C measured temperature at sensor (Equivalent to max. contact temperature 90°C)

Actuator

See TE Actuator-Specification TE-108-94519

Installation

Orientation	See pictures.
Max. Angle	180°-60°/+5°

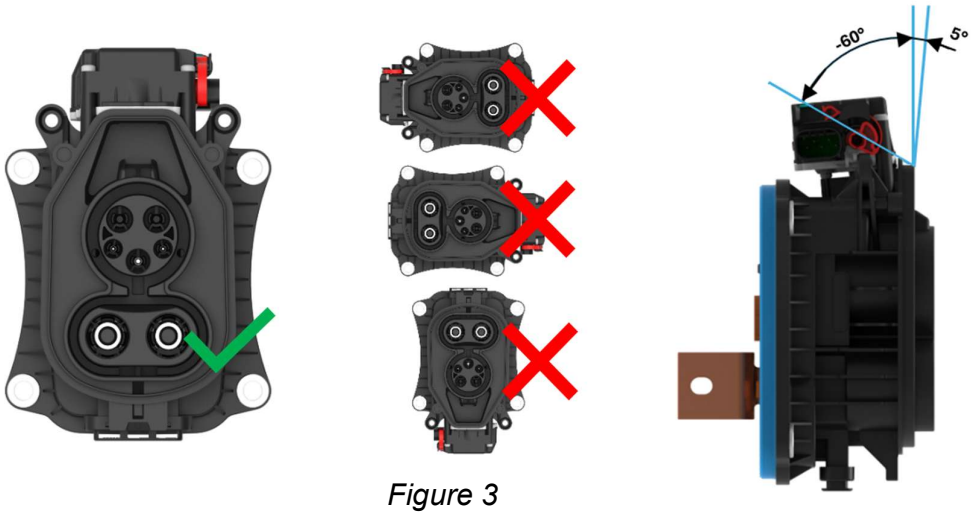


Figure 3

3.4. Performance and Test Description

The product shall be designed to meet the electrical, mechanical, and environmental performance requirements specified in *Table 5*. All tests shall be performed in the room temperature, unless otherwise specified.

3.5. Test Requirements and procedures summary:

General tests

Test Items	Requirements	Procedures
OPTICAL INSPECTIONS		
Visual and Dimensional examination	Meets requirements of product drawing	Acc. To DIN EN 60512-1-1:2003-01, E 0.1
MECHANICAL INSPECTIONS		
Mechanical stability of the charging socket	Max. Force at initial crack; >500N.	At a mated condition of dummy plug and charge inlet HSG, Max. initial breakage force applied on the dummy plug at 100mm distance recorded. As per Special mechanical test
Function of the Primary and Secondary lock / latch play	The latch must be checked by pulling the inserted pins ≤ 10N	The primary locking latch device must latch with an audible click while pins insertion and checked by pulling the pins by force ≤10N Acc. to **TE 209-160012**
	At the final stop, it must be possible to lock the secondary locking device.	At final position of secondary lock, it should be locked. Acc. to **TE 209-160012**
Actuation forces of the secondary lock	Closing forces of the secondary lock Closing Force of Sec. Lock AC F_C < 50N Closing Force of Sec. Lock DC F_C < 50N	The secondary lock actuation from pre-lock to end-lock F_C < 50N Acc. to **TE 209-160012**
	Closing NOK forces of the secondary lock, selectively loaded Closing NOK Force of Sec. Lock AC $F_{C\ NOK} > F_C + 50N$ Closing NOK Force of Sec. Lock DC $F_{C\ NOK} > F_C + 50N$	The secondary lock actuation from pre-lock to end-lock at contact pin half insertion $F_{C\ NOK} > F_C + 50N$ Acc. to **TE 209-160012**

<table>
<tr><td rowspan="3">Contact retention in the charge inlet housing</td><td>Contact insertion forces

Value Determination</td><td>Acc. to TE 209-160012</td></tr>
<tr><td>Contact removal force, Primary lock only

Contact Ø1.5, CP and CS $F_{S\leq 1mm}$ > 120N
Contact Ø2.8, PE $F_{S\leq 1mm}$ > 120N
Contact Ø3.6, AC $F_{S\leq 1mm}$ > 120N
Contact Ø8, DC $F_{S\leq 1mm}$ > 180N</td><td>Acc. to TE 209-160012</td></tr>
<tr><td>Contact removal force, Primary and secondary lock

Value Determination</td><td>-</td></tr>
<tr><td colspan="3">ENVIRONMENTAL INSPECTIONS</td></tr>
<tr><td>Humidity</td><td>The product requirements shall be maintained during the test.

The test is concluded with functional test in normal climate.</td><td>Acc. to IEC 60068-2-78

Temp 65°C
93% humidity
100h</td></tr>
<tr><td>ICE Water splash test</td><td>Heat the DUT in a hot air oven at Tmax (85°C) for the specified holding time (t_h).

Then splash the DUT with ice water

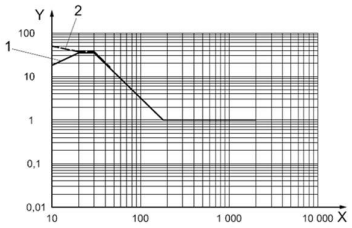
for 3 s.

Check the resistance value and Actuator functioning as per given below before and after the ice water splash

<table>
<tr><th>Test Item</th><th colspan="2">Test Pins (Wire Color)</th><th>Resistance Measurement CCS1 @T amb. = 25° ± 5°</th></tr>
<tr><td>TAC</td><td>10 (Yellow)</td><td>8 (Grey)</td><td>1097Ω ±20Ω</td></tr>
<tr><td>TDC+</td><td>6 (Orange)</td><td>8 (Grey)</td><td>1097Ω ±20Ω</td></tr>
<tr><td>TDC-</td><td>9 (Red)</td><td>8 (Grey)</td><td>1097Ω ±20Ω</td></tr>
<tr><td>R5</td><td>11 (Black)</td><td>7 (Blue)</td><td>2700Ω ±80Ω</td></tr>
<tr><td>Proxi</td><td>Proxi</td><td>7 (Blue)</td><td>0Ω +1Ω</td></tr>
<tr><td>CP</td><td>CP</td><td>12 (Violet)</td><td>0Ω +1Ω</td></tr>
</table>

Wiring Schedule for Actuator Cable
<table>
<tr><th colspan="2">Test Pins (Wire Color)</th><th>Voltage input</th><th>Function</th></tr>
<tr><td>PIN 1 (White)</td><td>PIN 4 (Grey/Orange)</td><td>-</td><td>-</td></tr>
<tr><td>-Ve</td><td>+Ve</td><td rowspan="2">12V DC</td><td>Un Locking</td></tr>
<tr><td>+Ve</td><td>-Ve</td><td>Locking</td></tr>
<tr><td colspan="2"></td><td>Sense Resistance</td><td></td></tr>
<tr><td rowspan="4">PIN 2 (Black/Blue)</td><td rowspan="4">PIN 3 (Green)</td><td>11.000 kOhm ± 5%</td><td>Locked</td></tr>
<tr><td>2.194 kOhm ± 5%</td><td>Drive</td></tr>
<tr><td>1.540 kOhm ± 5%</td><td>Fault</td></tr>
<tr><td>0.989 kOhm ± 5%</td><td>Unlocked</td></tr>
</table>
</td><td>Acc. To ISO 16750-4 test ref no. 5.4</td></tr>
</table>

ELECTRICAL INSPECTIONS		
Functional Test	Measure the 2,7kOhm Coding-Resistor, R5 Measure the resistance of the signal pins to the related 12pos header pins. Check the PCB socket contacts for wear Measure the three temperature sensors and validate versus actual charge inlet temperature Drive actuator in lock and unlock position as per drawing Measure contact resistance for all power contact terminals (AC, PE, and DC)	As per customer drawing

Note: - Box related tests need to be performed at vehicle level. Below results are only for reference (taken from general market cable variant inlet).		
Vibration Test  **Key** X frequency, Hz Y power spectral density, $(m/s^2)^2/Hz$ 1 standard random test profile 2 additional profile in case of $f_n < 30$ Hz	No physical damage of housings and contacts, no derogation of function; the connection may not open during the test. Test VII Commercial vehicle, sprung masses, Table 12 **Table 12 — Values for PSD and frequency** **Frequency Hz** / **PSD $(m/s^2)^2/Hz$** 10 / 18 20 / 36 30 / 36 180 / 1 2 000 / 1 NOTE r.m.s. acceleration value = 57,9 m/s^2.	Acc. To ISO16750-3:2012, 4.1.2.7 (Acceleration 57.9 m/s² (5.9g))

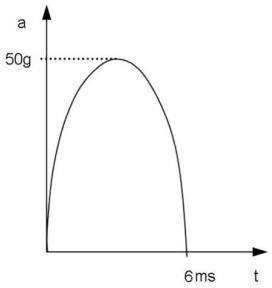
Mechanical shock  	Operation mode not in function Level of sharpness level 2 Acceleration 500 m/s² (50g) Pulse form half-sinusoidal Pulse duration 6 ms Number of axes 3 axis (X, Y, Z) Shocks per axis 10 shocks (10 per direction) Total number of shocks 30 shocks	Acc. to ISO 16750-1, 4.2.2.2 (10 successive shocks in 3 axis X, Y and Z is 30 shocks)
ELECTRICAL INSPECTIONS		
Temperature Shock	The product requirements shall be maintained during the test. T_{min} - 40°C, T_{max} 85°C Dwell Time - 45min each, 144 cycles	Acc. to IEC 60068-2-2 (Vibration) Acc. to IEC 60068-2-14 (Environment)
Insulation Resistance	R_{iso} > 200MΩ at 1000V DC	Acc. to ISO 60512-3-1
Temperature Rise	Temperature Rise with HPC (High power charging) cooling system Supplied current 500A to inlet, Monitoring T-rise, terminal temp. 90°C max.	-
ENVIRONMENTAL INSPECTIONS		
Aging in Dry Heat	The product requirements shall be maintained during the test.	Acc. To IEC 60068-2-2 Temp 85°C Test Duration - 120 h
Degree of Protection	Grade Dust (with flap closed) - IP5KX - IP6KX Water (with flap removed) - IPX5 - IPX6 - IPX7 - IPX9K 1) No medium must penetrate in quantities, which do not impair performance and study (possible use of water finding paste and visual inspection)	Acc. To below specs ISO 20653 – High velocity water ISO 20654 – Strong high velocity water ISO 20656 – High pressure/steam-jet cleaning ISO 20655 – Temporary Immersion ISO 20657 – Dust protection ISO 20659 – Dust Tight

Table 5

4. TEMPERATURE RISE CURVES:

4.1. 500A T-Rise curve

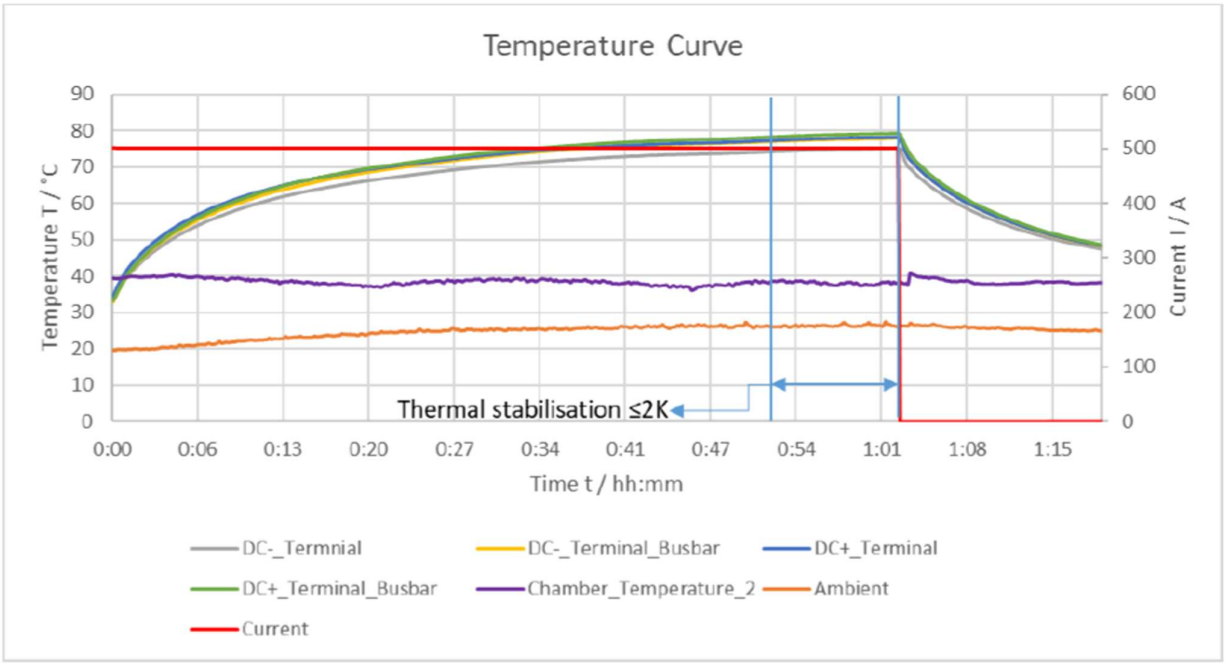


Figure 4

4.2. 700A T-Rise curve

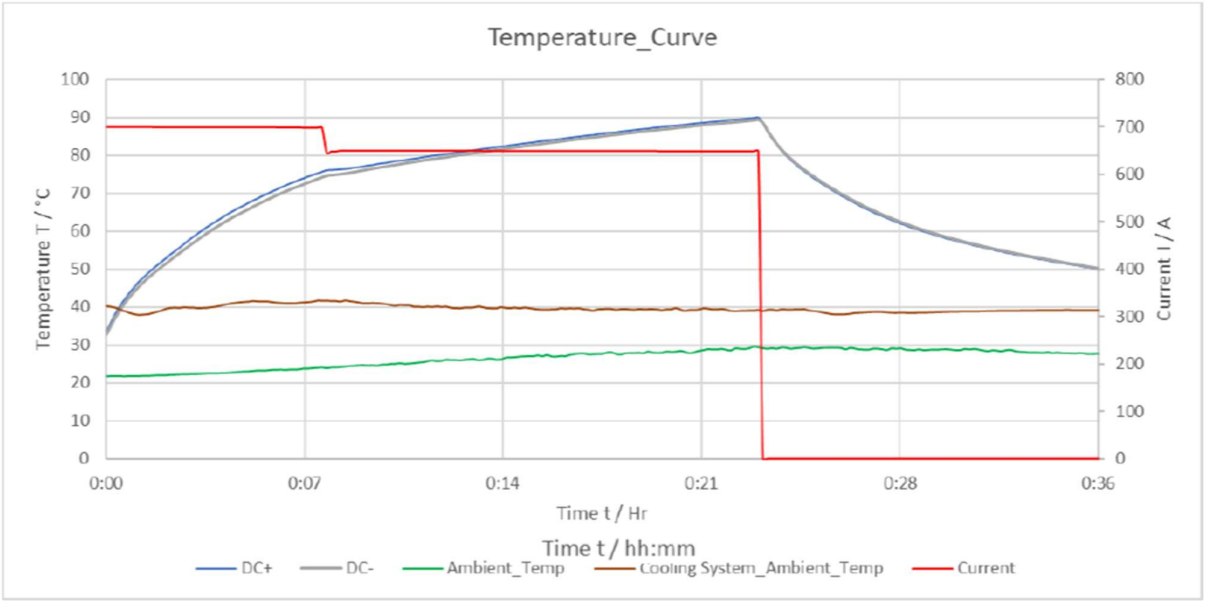


Figure 5

At 8 min, our coolant returns flow temperature from DC- and DC+ crossing safety temperature limit of 85˚C as per our Huber and Suhner HPC500 cooling system safety manual. Current was reduced by 50A(From 700A to 650A) to keep coolant return temperature within 85˚C.

Comments:

* - Deviation is communicated and accepted by customer.

LTR	REVISION RECORD	DWN	APP	DATE
1	REV A: INITIAL DOCUMENT	SUBHAS H	KASHYAP P B	04/06/2026