Title: Tesla Wall Connector 3.0 Residual Current Device (RCD) Function

Product: Wall Connector 3.0

Date: 2024-06-26

Author: Compliance Engineering

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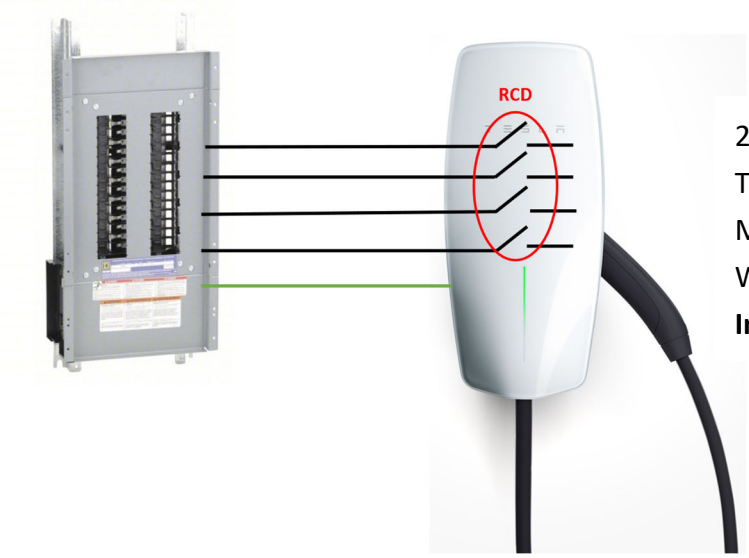
Purpose:

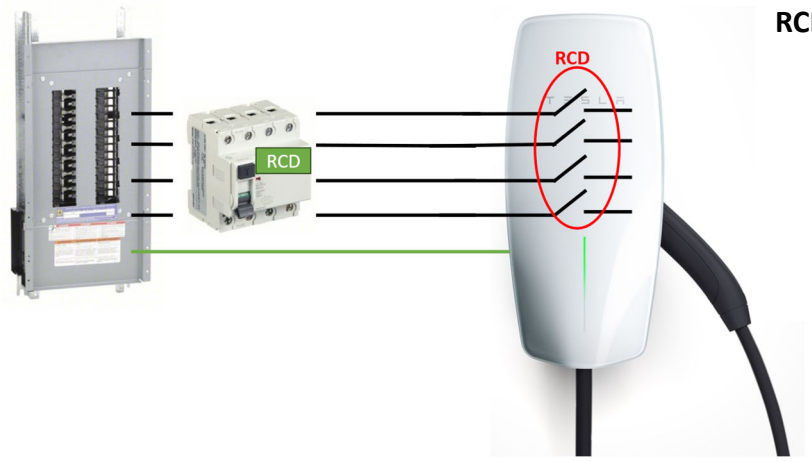
A review of RCD code compliance for the Tesla Wall Connector 3.0, Electric Vehicle Supply Equipment that features a product integrated RCD alternative to the installation of an external RCD.

Tesla Wall Connector 3.0 product with integrated RCD:



200-240V 1-Phase (L-N), 346-415V 3-Phase (L-L)
TN/TT/IT, 50-60Hz
Maximum 32A (Adjustable)
Wi-Fi (2.4GHz, 802.11b/g/n)
Integrated RCD: (Type A + DC 6mA)

External RCD installation:



RCD:

- Type B RCD; or
- Type A RCD, in conjunction with an RDC-DD complying IEC 62955; or
- Type F RCD, in conjunction with an RDC-DD complying IEC 62955.

Product Standards:

IEC 61851-1:2017	Electric vehicle conductive charging system Part 1: General requirements
IEC 62955:2018	Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles
HD/IEC 60364-7-722:2018	Requirements for special installations or locations – Supplies for electric vehicles
UL 2231-1:2021 2nd Ed.	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits; Part 1: General Requirements
UL 2231-2:2020 2nd Ed.	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems

Abbreviations:

EVSE	Electric Vehicle Supply Equipment
RCD	Residual Current Device
RDC-DD	Residual Direct Current Detecting Device
UL (NB)	Underwriters Laboratories (Notified Body)

Definitions:

Residual current device - RCD[1]

Mechanical switching device designed to make, carry and break currents under normal service conditions and to cause the opening of the contacts when the residual current attains a given value under specified conditions.

Residual direct current detecting device - RDC-DD[2]

Detection device having at least the functionality of detection and evaluation of 6 mA DC residual currents and switching of the monitored circuit.

RCD Type A

Detects and interrupts residual currents caused by alternating sinusoidal waveforms and pulsating direct currents, but not smooth direct currents.

RCD Type B

Detects and interrupts residual currents caused by smooth direct currents, in addition to alternating sinusoidal waveforms and pulsating direct currents.

RCD Type F

Detects and interrupts residual currents caused by high-frequency currents, in addition to alternating sinusoidal waveforms and pulsating direct currents.

UL Notified Body

An organization designated by an EU country or through a mutual recognition agreement that certifies whether products meet European Union regulations and industry standards.

[1] Defined in IEC 61851-1:2017

[2] Defined in IEC 62955:2018

Installation standard requirements:

European states adopt the standard HD/IEC 60364-7-722:2018 which governs EVSE electrical installations. HD/IEC 60364-7-722:2018, Clause § 722.531.2.101 Residual current protective devices, require protective measures against AC and DC fault current. There are optional approaches defined in the standard that are mandated at each connection point which shall be one of the following:

- Provided by the EV charging station in accordance with IEC 61851-1 Clause 8.5 Residual Current Protective Device*; or
- RCD Type B; or
- RCD Type A in conjunction with a RCD-DD complying with IEC 62955; or
- RCD Type F in conjunction with a RCD-DD complying with IEC 62955.

*HD/IEC 60364-7-722:2018 Clause § 722.531.2.101 Residual Current Protective Devices.

Product with integrated RCD:

The Tesla Wall Connector has been designed with safety as a top priority and integrates both AC and DC fault current protection. The integrated fault current protective device has been evaluated and tested in accordance with the product standard IEC 61851-1:2017 clause § 8.5 Residual Current Protective Devices.

The referenced IEC CB Certificate[3] confirms the European Notified Bodies independent evaluation of the Tesla Wall Connector 3, meeting the RCD protective measures of Type A (≤30mA) and DC (6 mA) thresholds in accordance with the EV Charging Station standard IEC 61851-1:2017.

In addition, the Notified Body has issued a positive statement of opinion[4] on the compliance of the EV charging station with integrated RCD function in accordance with HD/IEC 60364-7-722.

Summary:

The Tesla Wall Connector 3 with integrated RCD protective functions; Type A (≤30mA) and DC (6mA), meet the requirements of the product safety standard IEC 61851-1:2017, and the European installation standard HD/IEC 60364-7-722:2018, Clause § 722.531.2.101 Residual Current Protective Devices, without the need to install an external RCD protective device. The use of an external RCD protective device at the connection point can be installed, although not mandatory**.

**Note: Local wiring regulations applicable to site installation will always take precedence.

[3] VoC_Tesla_WallConnector_IEC61851-1 _Attachment 1

[4] UL Attestation Letter_Attachment 2

Attachment 1:

VoC_Tesla_WallConnector_IEC61851-1

	Ref. Certif. No.
IEC IECEE	DK-117879-A1-UL

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

CB TEST CERTIFICATE

Product	Permanently Installed Mode C Charger for Electric Vehicles
Name and address of the applicant	TESLA INC 3500 DEER CREEK RD PALO ALTO, CA 94304 UNITED STATES
Name and address of the manufacturer	TESLA INC 3500 DEER CREEK RD PALO ALTO, CA 94304 UNITED STATES
Name and address of the factory Note: *When more than one factory, please report on page 2*	MAINTEK COMPUTER (SUZHOU) CO LTD 233 JIN FENG RD, NEW DISTRICT, SUZHOU, JIANGSU, 215011 CHINA ☐ Additional Information on page 2
Ratings and principal characteristics	32A 200-240Vac (L-N)/ 346-415Vac (L-L), 3-Phase, 50-60Hz (maximum)
Trademark (if any)	Tesla
Customer's Testing Facility (CTF) Stage used	
Model / Type Ref.	1529455-XX-X, 1457768-XX-X, where "X" represents alphanumeric characters reserved for manufacturer's marketing options not related to safety.
Additional information (if necessary may also be reported on page 2)	The report was revised to include corrections. ☒ Additional Information on page 2
A sample of the product was tested and found to be in conformity with	IEC 61851-1:2017
As shown in the Test Report Ref. No. which forms part of this Certificate	E351001-D7 issued on 2022-06-02

This CB Test Certificate is issued by the National Certification Body

☐ UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
☒ UL (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
☐ UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
☐ UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

For full legal entity names see www.ul.com/ncbnames

Date: 2022-08-11
Original Issue Date: 2021-08-31

Signature: Jan-Erik Storgaard

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	Ref. Certif. No.
IEC IECEE	DK-117879-A1-UL

Additionally evaluated to: EN IEC 61851-1:2019
National Differences specified in the CB Test Report.

Summary of Modifications:
- Correct description of electrical ratings;
- Addition of new marking label;
- Addition of EV Cable;
- Correction to EV Connector part number;
- Correction to EMC Report designation;
- Correction to Summary of Compliance section

Additional information (if necessary)

☐ UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
☒ UL (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
☐ UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
☐ UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

For full legal entity names see www.ul.com/ncbnames

Date: 2022-08-11
Original Issue Date: 2021-08-31

Signature:
Jan-Erik Storgaard

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Attachment 2:

UL Attestation Letter

UL Solutions

Safety. Science. Transformation.™

June 11th, 2024

Tesla Inc

47400 Kato Road
Fremont, CA 94538, USA

To whom it may concern,

In regards to IEC 60364 Low-voltage electrical installations – Part 7-722: Requirements for special installations or locations – Supplies for electric vehicles standard RCD requirements, specifically IEC 60364-7-722:2018 Section 722.531.2.101 which states that RCDs protecting each connecting point in accordance with 722.411.3.3 shall comply at least with the requirements of an RCD type A and shall have a rated residual operating current not exceeding 30 mA, note that UL issued report No. E351001-D7 shows that, permitted under IECEE guidelines, the Tesla Wall Connector PN: 1529855-XX-X and 1457768-XX-X Personnel Protection functions were evaluated accordingly to the UL 2231-1/ -2 with stricter requirements based on 20mA threshold, as opposed to 30mA threshold.

In regards to requirement where the EV charging station is equipped with a socket-outlet or vehicle connector complying with IEC 62196 (all parts), it is understood that protective measures against DC fault current shall be taken, except where provided by the EV charging station. The appropriate measures, for each connection point, is required as follows:

- the use of an RCD type B; or
- the use of an RCD type A in conjunction with a residual direct current detecting device (RDC-DD) complying with IEC 62955; or
- the use of an RCD type F in conjunction with a residual direct current detecting device (RDC-DD) complying with IEC 62955.

The Tesla Wall Connector features RCD Type A + DC 6mA. Note that DC fault current protective requirement for each connection point is not applicable for this specific product because the Tesla Wall connector provides DC fault current protection, as evaluated under IEC 61851-1 CB Report number E351001-D7 Correction 1 provided with CB Certificate DK-117879-A1-UL dated 2022-06-02.

Furthermore, at the time the IEC 61851-1 CB certificate was issued, and presently, the applicable end-product standard IEC 61851-1:2017 Third Edition mentions IEC 62955 as a proposed future standard under consideration. In lieu of IEC 62955, since presently it only carries future consideration status, the more well established UL 2231-1,-2 Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems, which has been in use for over two decades, was used to evaluate the Tesla product which was found to fully comply with the requirements.

It is based on evaluation, testing, and supporting data that the product has been deemed to feature a compliant protective system suitable for its intended application.

Sincerely,

Diana Trayers
Senior Project Engineer
Regional Lead Reviewer | UL-CFSP in Automotive
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W: UL Solutions – EIA Division