Vojenský technický ústav, s.p. **The certified quality system according to ČSN EN ISO 9001** **Technology Testing Section – Testing Laboratory** **No. 1103 accredited by CIA according to** **CSN EN ISO/IEC 17025** **ELECTRICAL SAFETY TESTING LABORATORY**	**Task/Order No:** **20-19-5-93-3075/24** **Test Report No.:** **194400-028/2020** **Copy No.:** 1 **No. of Pages:** 7 **Annex:** 1/4

TEST REPORT

Name and Address of Submitter (Customer):
R-EVC s.r.o., Mokrá 317, Mokrá – Horákov 664 04

Identification: Portable charging cable for charging electric cars
Type: 1001
Serial Number: 20/08/001
Producer: R-EVC s.r.o., Mokrá 317, Mokrá – Horákov 664 04
Technical Documentation: See following page of this report

Date of Entrance to Test: 30. 3. 2020	**Test Method:** ČSN EN 61851-1 ed. 2: 2011 ČSN EN 60950-1 ed. 2: 2006
Date and Place of Test: 30. 3. – 30. 4. 2020 Electrical Safety Testing Laboratory	**Test Leader:** Testing Laboratory Manager Zbyněk Plch
	Test Carried out by: Testing Laboratory Manager Zbyněk Plch
Date of Issue: 30. 4. 2020	**Authorized by Testing Laboratory Manager:** Zbyněk Plch

Test results:
Partial tests results are listed on the following pages of this report.
The expanded measurement uncertainties are a product of a measurement standard uncertainty and a coverage factor K=2, this corresponds to a coverage probability of 95 % for a normal distribution.

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odštěpný závod VTÚPV
ÚZT – zkušební laboratoř č. 1103
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682 01 VYŠKOV, CZ

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Notes:
The standards used (see Test Method) are Czech versions of European standards:
EN 61851-1: 2011
EN 60950-1: 2006

This document is an English translation of the original Czech version. If there are any ambiguities, please regard the Czech original as valid!

List of measurement instruments used

Instrument	Inventory number
Power Analyzer FLUKE 434	25191-04
Clamp A-meter	25191-05-1
Clamp A-meter	25191-05-2
Clamp A-meter	25191-05-3
Clamp A-meter	25191-05-4
Scopemeter Tektronix DPO 4104	25171
Impulse HV generator RG 540	15054-00
HV probe 40 kV for impulse HV generator RG 540	15054-02
High voltage tester HA 3881J-0-0-0	19160001
Contact resistance tester MPO-01A	96013532
TrueRms Multimetr FLUKE 179	9990343
Data logger ALMEMO 5690-2	25193
Leakage currents meter	96013521-01
Electronic stopwatch QUARTZ	96013473
Clearance gauges (0 to 8 mm)	96013458
Digital slide caliper	051254
Digital tape measure	051255
Test finger jointed No. 1 (diameter 12 mm)	96013525
Sphere of 50 mm diameter with an eyelet (0,5 kg)	96013466
Climatic chamber VLK 02/500	19140005

For pulse test was used uncalibrated device.

Instrument	Inventory number
Impulse HV generator RG 540	15054-00

Notes:
The pulse values were measured with a calibrated oscilloscope and a calibrated probe during the pulse voltage tests. Prior to each pulse voltage test, a no-load pulse was performed to demonstrate the conformity of the pulse with the normalized pulse voltage according to IEC 61180-1.

Documentation provided for testing purposes

- R-EVC - Instructions for use of type 1 and Type 2 charging cables
- Certificate SEZ industrial plugs and sockets ISN 3253 and IVN 3253
- ES Declaration about conformity with regulations: SEZ IVN 3253
- Phoenix Contact EU Declaration of Conformity: EV-T2G3C – standards EN 62196-1 and EN 62196-2
- Phoenix Contact EU Declaration of Compliance RoHS: EV-T2G3C
- Datasheet Phoenix Contact AC charging cable - EV-T2G3C-3AC32A
- EVSE block diagram
- Test report no. 194300-131/2020 issued by Vojenský technický ústav, s.p.

Tests evaluation

The evaluation of the tests is specified in the "Evaluation" column".

Not Applied	NA
Pass	P
Fail	F

The product is considered as meeting the requirements if the measured values of the relevant monitored electrical (eventually other) quantities for which maximum limit values are set, increased by the measurement uncertainty, are lower or equal to the limit values of these quantities specified in the relevant technical standard; or if the measured values of the relevant monitored electrical (eventually other) quantities for which minimum limit values are set, decreased by the measurement uncertainty, are higher or equal to the limit values of these quantities specified in the relevant technical standard. In other cases, the test result is evaluated as not meeting the requirements.

Tests outside the scope of the accreditation

Information on the clause of the standard, by which the equipment was tested outside the scope of the accreditation, is specified in the "Clause No" column.

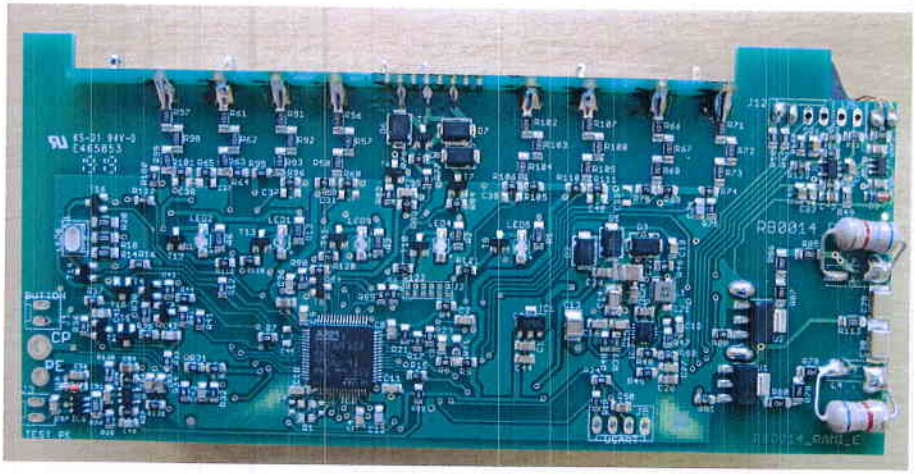
Outside the scope of the accreditation	N

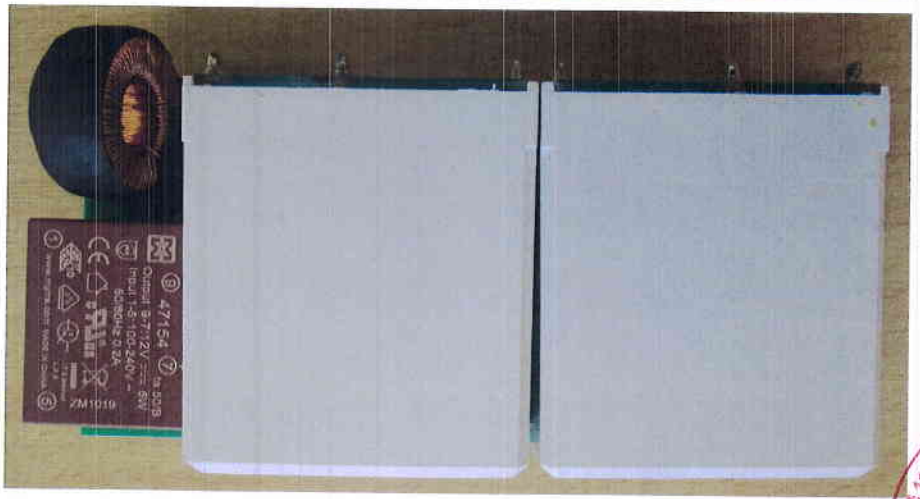
Limit values

Limit values for tests are specified in the relevant clauses of standards ČSN EN 61851-1 ed. 2: 2011 and ČSN EN 60950-1 ed. 2: 2006.

Picture of tested equipment

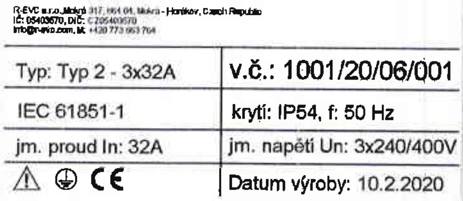
Picture of inner arrangement of tested equipment (control unit)





Electric vehicle conductive charging system Part 1: General requirements ČSN EN 61851-1 ed. 2			
Clause No.	**Requirements**	**Result**	**Evaluation**
11	EVSE requirements		
11.2 N	Classification	The equipment is designed for external use.	-
11.3	IP degrees for basic and universal interfaces		
11.3.1 N	IP degrees for ingress of objects	AC socket Phoenix Contact type EV-T2G3C-3AC32A-7 has declared degree of protection provided by enclosure IP54/IP44.  The SEZ plug type IVN 3253 for connection to the mains has declared degree of protection provided by enclosure IP44.  Evidenced by documentation – see Documentation submitted for tests and marking on the equipment.	P
11.3.2 N	Protection against electric shock		
11.4	Dielectric withstand characteristics		
11.4.1	Dielectric withstand voltage	See Annex No. 1 - Dielectric withstand characteristics.	P
11.4.2	Impulse dielectric withstand (1.2/50 µs)	See Annex No. 1 - Dielectric withstand characteristics.	P
11.5	Insulation resistance	See Annex No. 1 – Insulation resistance.	P
11.6	Clearances and creepage distances	Verified by inspection and measurement. The equipment is designed for external use with degree of pollution 3 and overvoltage category III. Clearances and creepage distances are in accordance with the requirements of ČSN EN 60664-1. Verification of clearances and creepage distances at the control unit was performed on a separately supplied sample, because the final sample was poured in the cover with potting compound.	P

Electric vehicle conductive charging system Part 1: General requirements ČSN EN 61851-1 ed. 2			
Clause No.	**Requirements**	**Result**	**Evaluation**
11.7	Leakage - touch current	Verified by measurement. The test was performed after the wet heat test. Highest measured leakage touch current: 2.78 mA ± 5 % at supply voltage of 440 V AC ± 2 % 50 Hz ± 1 %. The device was supplied via an isolating protective transformer with a limited output current during the test. The measurement was performed at a load of 20 A ± 5%. *Requirement of the standard:* *Leakage touch current* *< 3.5 mA.*	P
11.8	Environmental tests		
11.8.1 N	General	Not applied. Climatic tests were performed as part of the electromagnetic compatibility tests. See Documentation submitted for tests – Test report no. 194300-131/2020.	NA
11.9	Permissible surface temperature	See Annex No. 1 - Permissible surface temperature.	P
11.10 N	Environmental conditions	Not applied within the electrical safety tests.	NA
11.11	Mechanical environmental tests		
11.11.1 N	General	The diameter of the steel ball is 50 mm and the weight of the ball is 500 g ± 25 g. The ball drops freely from the height of 1.3 m ± 0.01 m to the sample - control unit (LEDs upwards). Next, the sample was rotated 90° around each horizontal axis and was subjected to steel ball impacts.	P
11.11.2 N	Mechanical impact		
11.12 N	Electromagnetic compatibility tests	Not applied within the electrical safety tests.	NA
11.13 N	Latching of the retaining device	AC socket Phoenix Contact: Disconnection under load is prevented by the vehicle socket design.	P
11.14 N	Service	Not applied. The device does not contain sockets as required by the standard.	NA

Electric vehicle conductive charging system Part 1: General requirements ČSN EN 61851-1 ed. 2			
Clause No.	**Requirements**	**Result**	**Evaluation**
11.15	Marking and instructions		
11.15.1	Connection instructions	Connection instructions are stated in the user manual.	P
11.15.2	Legibility	The marking is legible by adjusted eyesight and is durable. Verified by inspection. The type plate was wiped by hand for 15 s with a piece of cloth soaked in water and again for 15 s with a piece of cloth soaked in white spirit.	P
11.15.3	Marking of electric vehicle charging station	Type plate:  The marking contains required information.	P
11.16 N	Telecommunication network	Not applied. The device is not intended for connection to a telecommunications network.	NA

Only tests solely concerning the tested equipment are listed in this test report

END OF THE TEST REPORT

Annex No. 1

Dielectric withstand characteristics
Dielectric withstand voltage
cl. 11.4.1 - ČSN EN 61851-1 ed. 2

The test of dielectric properties was made under the following conditions:
The test voltages were always applied between nodes 1 and 2 for 60 s. If multiple terminals are listed in the "Node 1 (2)" column, these terminals are connected to one conductive node.

Ambient temperature during the test: 22.8 ± 0.4 °C.

The following devices were disconnected during the test: Working resistances between the individual phases and the protective conductor.

Test voltage is defined: Un + 1200 V, where Un = 400 V.

Node 1	Node 2	Test voltage	Result
L1, L2, L3, N Connected inputs and outputs	PE	1600 V ± 5 % V AC, 50 Hz	P

There was no insulation breakdown or flashover voltage during the test.

Dielectric withstand characteristics
Impulse dielectric withstand 1.2/50 µs
cl. 11.4.2 - ČSN EN 61851-1 ed. 2

The test of dielectric properties by impulse voltage was made under the following conditions:

- Output impedance of the pulse generator set to: 500 Ω.
- Applied 5 positive and 5 negative pulses with the interval of 5 s ± 0.1 s.
- Ambient temperature during the test: 22.8 ± 0.4 °C.
- Pulse voltage with parameters 1.2/50 µs, amplitude 4 kV.

The test voltages were always applied between nodes 1 and 2. If multiple terminals are listed in the "Node 1 (2)" column, these terminals are connected to one conductive node.

The following devices were disconnected during the test: Working resistances between the individual phases and the protective conductor.

Node 1	Node 2	Test voltage	Result
L1, L2, L3, N Connected inputs and outputs	PE	4000 V ± 2 %	P

There was no insulation breakdown or flashover voltage during the test.

Annex No. 1

Insulation resistance
cl. 11.5 - ČSN EN 61851-1 ed. 2

The test was performed after the wet heat test.
Insulation resistance test was made under the following conditions:
The test voltages were always applied between nodes 1 and 2 for 60 s. If multiple terminals are listed in the "Node 1 (2)" column, these terminals are connected to one conductive node.
Ambient temperature during the test: 22.8 ± 0.4 °C.

The following devices were disconnected during the test: Working resistances between the individual phases and the protective conductor.

Measurement results after the wet heat test:

Node 1	Node 2	Test voltage	Measured insulation resistance	Result
L1, L2, L3, N Connected inputs and outputs	PE	500 V DC ± 5 %	> 10 GΩ	P

Requirement of the standard for stations of protection class I: R ≥ 1 MΩ.

Annex No. 1

Permissible surface temperature
cl. 11.9 - ČSN EN 61851-1 ed. 2

Measuring was done under the following conditions:

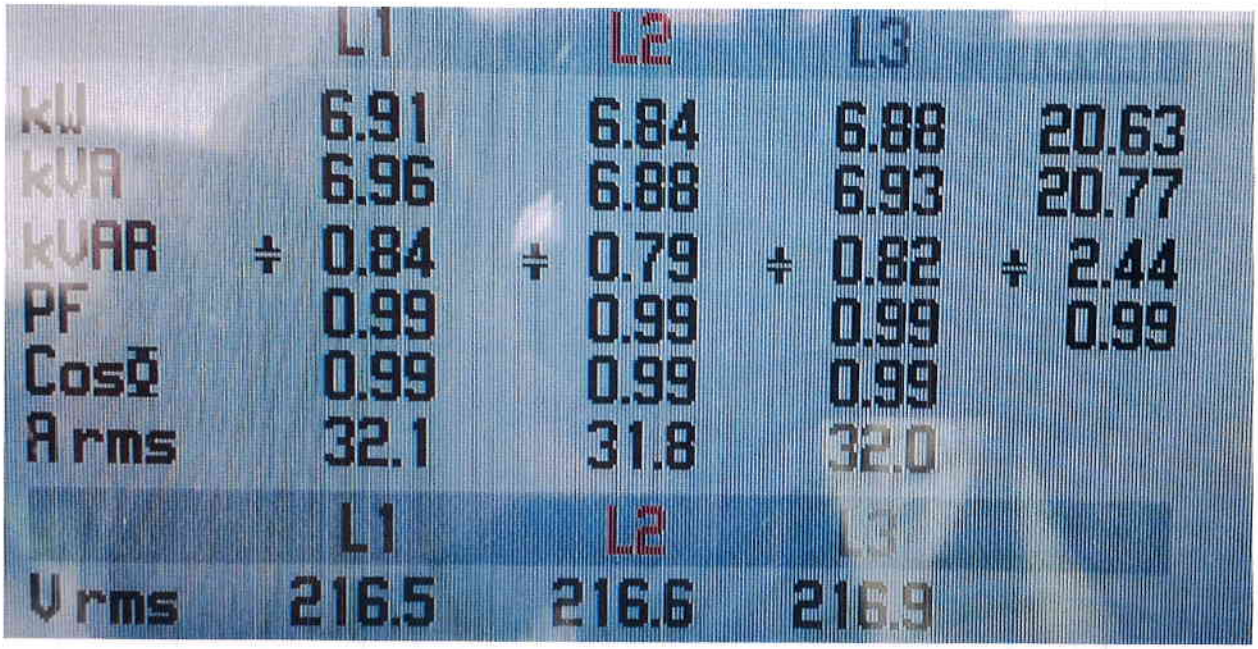
An electric vehicle TESLA Model S was used for loading with a nominal current of 32 A.

The test item was placed in a climatic chamber at a constant ambient temperature of 40.0 ± 0.6 ° C.

A Phoenix Contact AC socket type EV-T2G3C-3AC32A-7 was connected outside the climate chamber, which was connected to the TESLA electric car socket.

The battery capacity in the TESLA electric vehicle was 22 % before the test. After the test, the battery was 80 % (capacity was deliberately reduced to 80% of the charge because of battery life).

Electric readings at the end of the test:



Frequency: 50 Hz
Time measured: 2:30 h

Measurement uncertainty: ± 2 %.

Measurement results:

Placement of measurement sensors	Limit values of temperatures stated by standard ČSN EN 61851-1 [°C]	Maximum measured values (related to ambient temperature +40 °C [°C]	Evaluation
Outer surface of the control unit - upper part	50 metal parts that can be grasped by hand	45.0 ± 0.6	P
Outer surface of the control unit - side part	50 metal parts that can be grasped by hand	45.2 ± 0.6	P
Surface of the button control unit	50 metal parts that can be grasped by hand	43.1 ± 0.6	P
Surface of AC plug SEZ type IVN 3253	60 non-metallic parts that can be grasped by hand	47.2 ± 0.6	P

For technical reasons it was not possible to reach an ambient temperature of 40 °C even for the AC socket Phoenix Contact type EV-T2G3C-3AC32A-7, which was located outside the climate chamber and was plugged into the socket of the electric vehicle. The surface temperature of the socket is converted to this ambient temperature required by the standard.

Measured ambient temperature outside the climate chamber: 18.8 ± 0.6 °C.

Measurement results:

Placement of measurement sensors	Limit values of temperatures stated by standard ČSN EN 61851-1 [°C]	Maximum measured values (related to ambient temperature stated by standard +40 °C) [°C]	Evaluation
Surface of the AC socket Phoenix Contact type EV-T2G3C-3AC32A-7	60 non-metallic parts that can be grasped by hand	44.0 ± 0.6	P

Vojenský technický ústav, s.p.
Úsek zkoušení techniky
Zkušební laboratoř č. 1103

TECHNICAL COMMENTS

on tests results – Test Report No. 194400-028/2020

Tested equipment: Portable charging cable for charging electric cars
Type: 1001
Serial number: 20/08/001

P A S S E D

to meet the **applied** requirements of the standard/standards:
ČSN EN 61851-1 ed. 2: 2011

Comments:

Technical comments on the tests results are of an informatory nature and are outside the scope of the test site accreditation.

In Vyškov: 30. 4. 2020

Person responsible: Zbyněk Plch

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Signature