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IC-CPDs Mobile Charger Connect, Mobile Charger Plus und Mobile Charger – Recurring inspection in accordance with EN 50699:2020

Scope:

IC-CPD models Mobile Charger Connect and Mobile Charger Plus by eSystems MTG GmbH, as well as the Mobile Charger by Aptiv PLC. For Mode 3 charging cables from Harting Stiftung & C. KG, the test step "5. RCD check" is omitted.

Status: 18 June 2024

Normative Background:

With the replacement of DIN VDE 0701-0702:2008 by EN 50699:2020, the requirements for recurring tests of charging stations = ACSEV (low voltage switchgear and control gear assembly for electric vehicles charging stations) were removed from the scope of EN 50699:2020. The test methods described in this document refer to IC-CPDs (In cable-control-protection device), which according to EN 50699 § 5.9 can be classified as "portable" RCD (Residual Current Device) and thus still fall within the scope of EN 50699:2020.

Objective:

This testing instruction describes the measurements that should be performed to ensure the operational safety of the devices. Some measurement methods and expected measurement values may differ from EN 50699:2020.



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Notes:

The measurement should only be carried out with a testing device that is suitable for recurring inspections of IC-CPDs. The measuring device must be capable of measuring and displaying the specified target values (e.g., GMC-I/Gossen Metrawatt PROFITEST EMOBILITY or equivalent testing devices). According to the Central Association of the German Motor Vehicle Industry, the recurring tests on the aforementioned IC-CPDs may be carried out by persons with a minimum qualification of "2S" as per "DGUV Information 209-093". The testing personnel must familiarize themselves with the characteristics and use of the measuring device in order to perform the measurements listed in the following instructions. Depending on the measuring device used, specific considerations may need to be taken into account. The testing personnel must be able to perform the measurements and evaluate the accuracy of the measured results based on their experience, training, and qualifications. The insulation test PE (protective earth) against CP (control pilot) is generally not allowed, as such a test setup will lead to the destruction of the Mode 2 charging cable.

Additional information:

Regular inspections and periodic tests should only be carried out by electrically competent persons, such as qualified electricians. They check the condition of the IC-CPDs (In cable control and protection device) against the applicable safety standards for electrical equipment, e.g. EN 50699:2020, BS 7671 – Requirements for Electrical Installations (IET Wiring Regulations) or other local country requirements.



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The parameters specified in this testing instruction only apply to the following IC-CPD types of Mode 2 charging cables from eSystems MTG GmbH & Aptiv PLC:

Mobile Charger Connect:

Porsche	Audi	Bentley	Power (kW)	Number of phases	Max. current (A)
9Y0.971.675.BG	8V4.971.675.BG	36A.971.675.K	11	3	16
9Y0.971.675.BE	8V4.971.675.BE	36A.971.675.F	7.2	1 2	32 16
9Y0.971.675.BJ	8V4.971.675.BJ	36A.971.675.L	22	3	32
MCC11E3 A*	MCC11E3 A*	MCC11E3 A*	11	3	16
MCC72E2 A*	MCC72E2 A*	MCC72E2 A*	7.2	1 2	32 16
MCC22E3 A*	MCC22E3 A*	MCC22E3 A*	22	3	32
* stands for upcoming design changes and can be any letter					

Mobile Charger Plus:

Porsche	Power (kW)	Number of phases	Max. current (A)
PMCP72 A*	7.2	1	32
PMCP11 A*	7.2	1	32
	11	3	16
* stands for upcoming design changes and can be any letter			

Mobile Charger:

Typename	Porsche	Audi	Skoda	VW	Lamborghini	Bentley	Power (kW)	Number of phases	Max current (A)
MCB36E1 *	9Y0.971.675.AK	8V4.971.675.AK	-	-	-	-	3,6	1	16
MCB72E1 *	9Y0.971.675.AN	8V4.971.675.AN	5LA.971.675.A	000.054.412.AN	47B.971.675	36A.971.675.AN	7,2	1	32
MCB72E2 *	9Y0.971.675.AP	8V4.971.675.AP	-	-	47B.971.675.*	-	7,2	2	16
MCB11E3 *	9Y0.971.675.AS	8V4.971.675.AS	5LA.971.675	000.045.412.AS	-	36A.971.675.AS	11	3	16
* stands for upcoming design changes and can be any letter									



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1. General Information about the Test Sample

Description of the sample	
Part number of the sample	
Serial number of the sample	
Part number of the attached cables	
Used measuring equipment	
Calibration date of the measuring equipment	
Serial number of the measuring equipment	
Associated workshop order	

2. Visual Inspection

Steps	Result
No damage to the enclosure and protective cover detectable that may allow access to live or dangerous moving parts	
No signs of overloading, overheating, or improper use	
No signs of improper alteration	
No signs of contamination, corrosion and improper aging	
Legibility of all safety-relevant markings or symbols and the identification data	
The relevant accessories (e.g. detachable or fixed connection cables) are without defects	
Remarks:	

3. Measurement of resistance of PE wiring

Steps ^{a)}	Nominal value	Actual value in Ω	Result
Infrastructure cable	$\leq 0,3 \Omega$		
Vehicle cable	$\leq 0,3 \Omega$		

^{a)} The cables must be separated from the IC-CPD at detachable connections. The measurement is carried out on all cables detached from the IC-CPD in accordance with EN 50699:2020 §5.3 with 0.2 A. The measurement is carried out on the cable. With the Mobile Chargers Connect, both the cable on the infrastructure and on the vehicle side can be detached from the IC-CPD and measured. With the Mobile Chargers and Mobile Chargers Basis Plus, only the infrastructure cable can be detached and measured. The PE cannot be measured in the entire network of cables and IC-CPD, as the PE is monitored in the IC-CPD and can be switched by means of a relay.



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4. Measurement of insulation resistance

Infrastructure cable			
Steps ^{b)}	Nominal value	Actual value in MΩ	Result
Insulation testing L1 – L2	500 V DC, Min 5 MΩ		
Insulation testing L1 – L3	500 V DC, Min 5 MΩ		
Insulation testing L1 – N	500 V DC, Min 5 MΩ		
Insulation testing L1 – PE	500 V DC, Min 5 MΩ		
Insulation testing L2 – L3	500 V DC, Min 5 MΩ		
Insulation testing L2 – N	500 V DC, Min 5 MΩ		
Insulation testing L2 – PE	500 V DC, Min 5 MΩ		
Insulation testing L3 – N	500 V DC, Min 5 MΩ		
Insulation testing L3 – PE	500 V DC, Min 5 MΩ		
Insulation testing N – PE	500 V DC, Min 5 MΩ		

Vehicle cable				
Steps ^{b)}	Nominal value for cable of Mobile Charger Connect	Nominal value of Mobile Charger & Mobile Charger Plus	Actual value in MΩ	Result
Insulation testing L1 – L2	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing L1 – L3	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing L1 – N	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing L1 – PE	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing L2 – L3	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing L2 – N	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing L2 – PE	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing L3 – N	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing L3 – PE	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		
Insulation testing N – PE	500 V DC, Min 5 MΩ	500 V DC, Min 1 MΩ		

^{b)} Detachable cables are disconnected from the IC-CPD and then only the cable is measured. Mobile Chargers and Mobile Charger Plus have a fixed cable on the side of the vehicle. The expected measured values on the permanently attached cables are lower due to the downstream electronics (see table). The measurements are made with 500 V DC. It must be ensured that all conductors are measured against each other. The lowest measured value for the actual value must be entered.



5. RCD-Test

AC residual current detection

AC-Residual current ^{c)}	Disconnecting time (Guideline for $1 \cdot I_{\Delta N}$ is 0,3 seconds)	Cut off current measured $< I_{\Delta N}$	Result
$1 \cdot I_{\Delta N}$			

DC residual current detection (smooth DC)

DC-Residual current ^{c)}	Disconnecting time (Guideline for $1 \cdot I_{\Delta N}$ is 10 seconds)	Cut off current measured $< I_{\Delta N}$	Result
$1 \cdot I_{\Delta N}$			

^{c)} For this measurement, all cables must be connected to the IC-CPD again. The RCD tests include both a shutdown time check and a shutdown current. On the back of the IC-CPD, the nominal residual current for AC and DC residual currents of the installed RCD is indicated on the label (alternatively you can also find it in the operating instructions). $I_{\Delta N}$ describes the nominal residual current (depending on the RCD type) at which the RCD must trip at the latest. A suitable measuring method must be selected to test the installed RCD (see manual of the measuring equipment used). The manual of the test case should describe at which points the fault current is fed in, otherwise this should be requested from the manufacturer of the measuring equipment.

6. Functional test

Steps	Result
Charging ^{d)}	
Switch phases ^{e)}	
Disconnect PE wiring ^{f)}	

^{d)} The IC-CPD is connected to the infrastructure as well as to the charging socket of a suitable vehicle. If the charging process starts without error messages and the vehicle is charged, this test step has been passed.

^{e)} By means of a measuring case, the error state "conductor replacement" must be set. In this process, the phase L1 and the PE conductor are swapped. The ICCPD then has to shut down. If the measuring case does not support this fault state, this step can be skipped.

^{f)} By means of a measuring case, the error state "PE separated" must be set. In the process, the PE conductor is interrupted on the infrastructure side. According to the manual, the IC-CPD to be tested must indicate the error (display information or LED signature). If the measuring case does not support this fault state, this step can be skipped.

7. Final Result

Passed	Failed

Date: _____

Signature of the examiner: _____

Stamp: