

18th Edition 722 Amendment 1: RCDs & RDC-DDs Requirements

Effective RCD protection for an EV sockets relies on the correct specification of the associated EV charging equipment and the RCD. Don't leave it until the installation is being tested, to understand the revised requirements.

Amendment 1 - 722.531.3.101 relates to Mode 2 and 3 charging equipment standards. For Mode 4 charging equipment, refer to the Manufacturer's recommendations for RCD selection.

Background Product Standards

Product reference standards for Mode 2 and Mode 3 charging equipment covering 6 mA DC fault current detection, enabling the safe use of Type A or F RCDs upstream, changed in 2018. Before this date, manufacturers of Mode 2 charging cables and Mode 3 charge points, may not have flagged the risks associated with smooth DC residual currents and the use of Type A RCDs.

RCD Selection for use on new projects: The charging equipment design and EV features determine the Type of RCD required. Check that the protection features provided in the charging equipment, meet the the latest standards i.e. equipment that is already in the supply chain but not yet installed or used, may not meet the standards required by current version of the Wiring Regulations, which affect the RCD selection.

IEC 62752: In-Cable Control and Protection Devices (IC-CPD) for Mode 2 charging cables. Updated in 2018, to include a 6 mA DC detection and switching feature within the IC-CPD

IEC62955: Residual Direct Current Detecting Devices (RDC-DD)* for Mode 3 charging equipment. New standard published 2018 defining product formats and performance requirements.

* Doepke Technical Article 18, dated October 2018, covers the subject of RDC-DDs in greater detail.

<http://www.doepke.co.uk/download/Techpub-18>

Amendment 1 clause 722.531.3.101

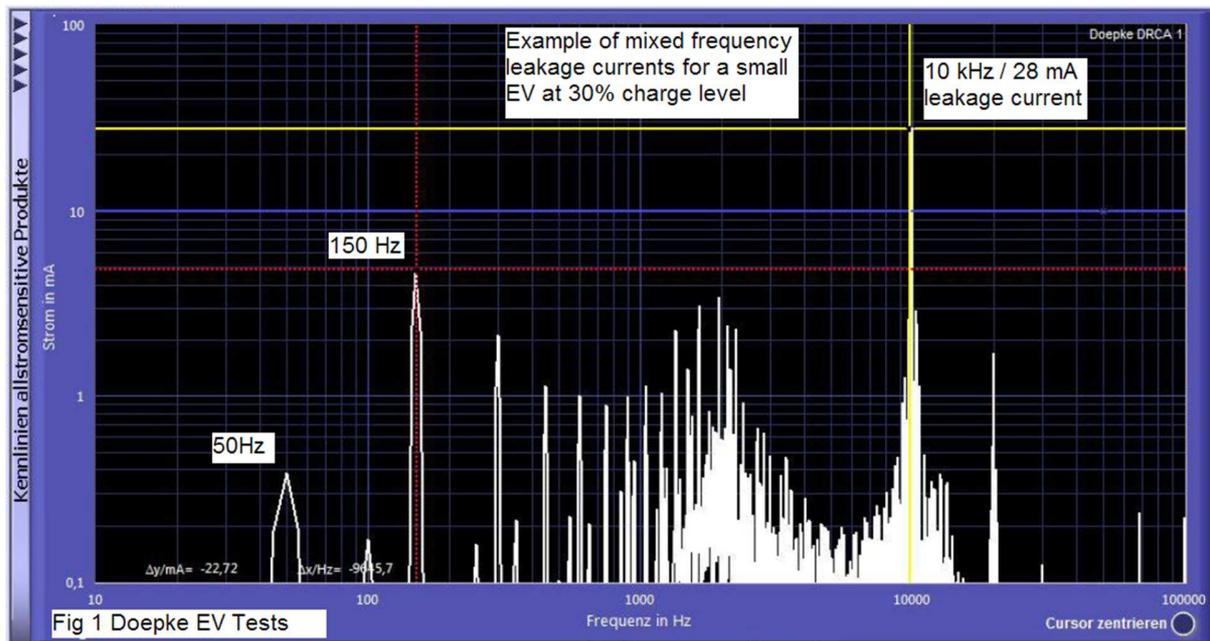
Changes in the above clause, include references to RDC-DDs and Type F RCDs.

RDC-DDs and IEC 62196: Are generally associated with Mode 3 charging. However, there are instances where this feature may have to be provided separately for Mode 2 charging cables, if the cable does not include 6 mA DC detection – see Mode 2 charging below.

Type F RCDs: Refer to (ii) and Note 3 under 722.531.3.101. Certain designs of EV battery charging technology, produce mixed frequency leakage currents

High frequency leakage currents can saturate Type A RCD magnetic circuits, resulting in a change to the tripping characteristics. Refer to the EV Manufacture for advice on RCD selection. This risk has been flagged in the revised standards for EV charging equipment, consequently it has been included in Amendment 1.

See Figure 1 over - Leakage current tests performed on a small EV: In this example, the majority of the leakage current is generated at frequencies greater than 50Hz.



Mode 3 Charging

Manufacturers of Mode 3 charge points can include an RDC-DD in the charge point, or recommend an alternative solution, external to the charge point -see (ii) and Note 3. For example, Tesla specify the use of an AEV RCCB for use with their Mode 3 chargers.

RDC-DDs manufactured to IEC 62955 for use with separate RCDs, must operate within 10s at 6 mA DC (refer to the previous EV article dated August 18 for more detail)

Where the RDC-DD does not include 30 mA protection, the RDC-DD must not operate when subjected to an AC residual current of 30 mA. The reason for this is, that in the event of someone touching a live conductor and earth, the associated 30 mA RDC must operate first and electrically isolate the circuit i.e. an RCD-DD operating a standard contactor in a Mode 3 charge point, does not provide electrical isolation. For example, Doepke’s Type A-EV has been independently certified by VDE to IEC 62955 and includes 30 mA protection for use in Mode 3 applications, providing effective isolation in the event of a fault.



Mode 2 Charging

IC-CPDs used in mode 2 charging cables, manufactured to IEC 62752 – 2018, should include a 6 mA smooth DC detection / disconnection feature. Refer to the labelling on IC-CPD or the Manufacturer's information, to check that the cable includes this feature.

A single Mode 2 charging cable incorporating 6 mA smooth DC detection in the IC-CPD, can be safely connected to a circuit protected by a Type A or F RCD. For Mode 2 charging cables that do not include this feature, a Type AEV or Type FEV RCCB can be used to provide the required level of protection – as per clause 722.531.3.101 (ii).

Understand → Check → Specify → Purchase → Install → Test → Sign off

Effective RCD protection for an EV socket, relies on the correct specification of the associated EV charging equipment and the RCD - see BS7671 clause 133.1.1 , 2 & 3. If you specify and purchase incompatible equipment, it may not become apparent until the testing and sign-off phase. This can be costly, reviewing and changing specifications, purchasing additional products and delays to the completion of the project do not come cheap.

Testing a 30 mA RCD to verify the tripping characteristic, is common practice and is still required by the Regulations. There are conflicting views relating to the need to test the RCD-DD feature, some would say that it is a product and does not require testing, as this is covered by the Product Standard. However not all products sold in the UK, are manufactured to the appropriate standards. The 6 mA DC detection feature provided by a separate RCD-DD, has a direct impact on the ability of the associated RCD to perform its safety function. It may be appropriate and reasonable to test / verify this feature during commissioning, in the same way that we verify the Zs values associated with the RCD sensitivity. The 6 mA test feature included in test instruments suitable for testing / commissioning EV installations – is a simple test, and if the RCD-DD is working correctly, should only add minutes to the time to test.

Conclusion

The selection of any associated RCD "Type" should take the following into account. Certain EVs may have specific charging requirements – for private installations refer to the EV Manufacturer's information, before you quote for the job. Charging Mode 2 or 3 ? Check that the features you expect to get in the charging equipment, are provided in that version and the associated RCD is the correct type. Don't leave it until the installation is being tested, to start asking questions.

Equipment that fails to meet the revised regulations, creates a hidden danger, it will not provide the expected level of protection. Check before you purchase and install.

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