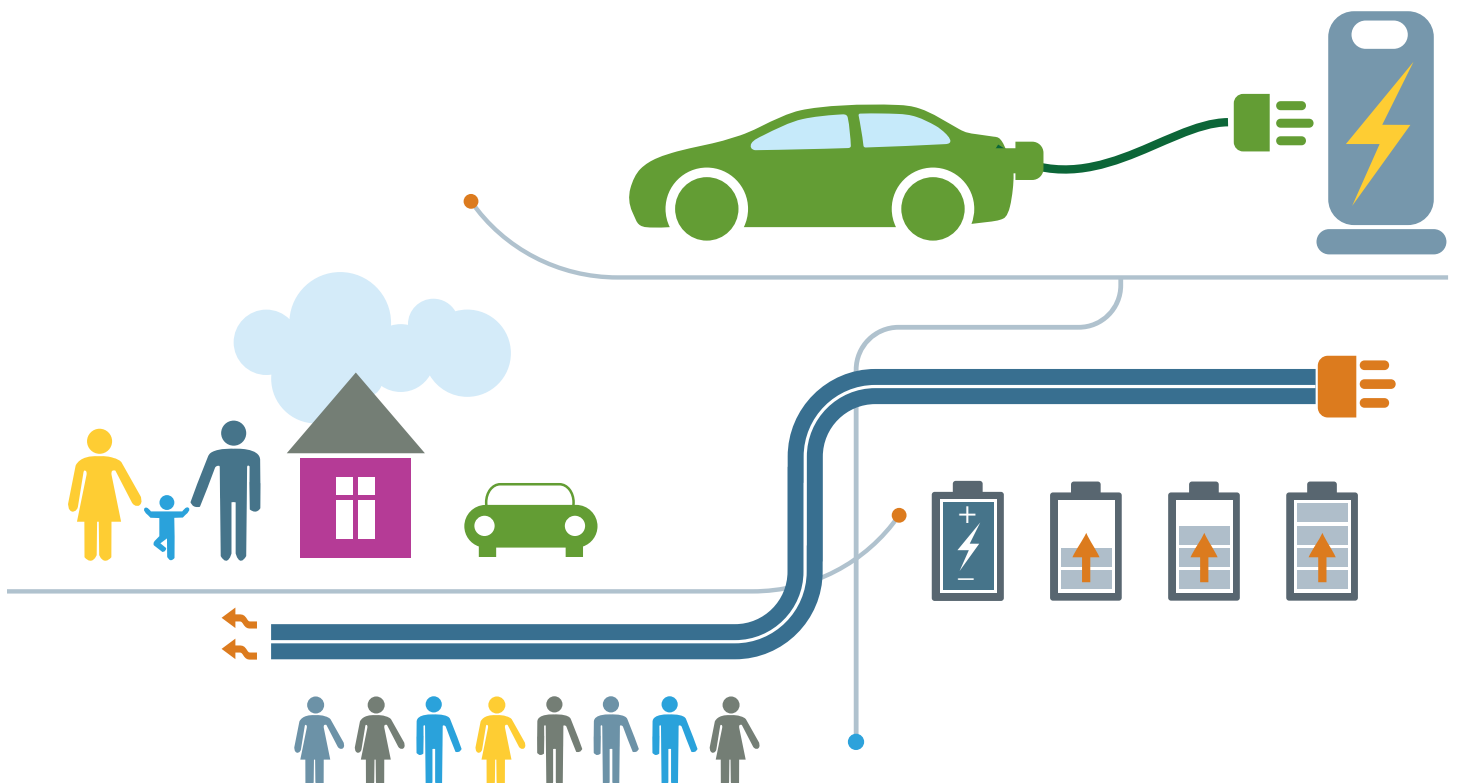


TECHNICAL BULLETIN

PROTECTIVE EARTH DISCONNECTION WHEN CARRYING OUT ELECTRIC VEHICLE CHARGING



ABOUT BEAMA

BEAMA is the UK trade association for manufacturers and providers of energy infrastructure technologies, systems, and services. We represent more than 200 companies, from start-ups and SMEs to large multinationals. Our members provide generation, transmission and distribution equipment, heating and ventilation products, EV infrastructure, electrical systems, and flexibility assets in networks and the built environment. We promote regulation, markets and products that support a safe, smart, and secure low-carbon energy system. We have a strong track record in the development and implementation of standards to promote safety and product performance for the benefit of manufacturers and their customers.

This Technical Bulletin provides manufacturers, installers and end users guidance on aspects relating to electric vehicle charging.

This Technical Bulletin has been produced by BEAMA's Electric Vehicle Infrastructure Group, part of the Flexible Energy Systems sector, operating under the guidance and authority of BEAMA.

A full list of other BEAMA Guides can be found on the BEAMA website: www.beama.org.uk

ACKNOWLEDGEMENTS

BEAMA would like to thank BSI, IEC and IET for allowing references to their standards.

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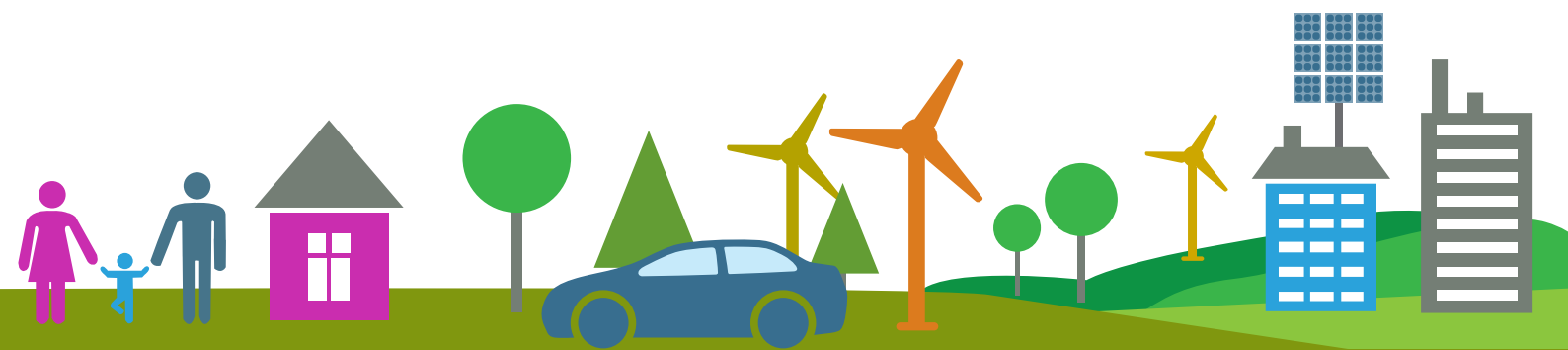
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COMPANIES INVOLVED IN THE PREPARATION OF THIS GUIDE



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1. Scope of this guidance

This Technical Bulletin covers BEAMA members' understanding relating to electric vehicle charging and the requirements for the disconnecting of the protective earth within an installation containing an electric vehicle charge point.

2. Applicable standards

BS 7671:2018 8+A1:2020 Requirements for Electrical Installations. IET Wiring Regulations. These are the wiring requirements for electrical installations in the UK. In this document, references to BS 7671 Section 722 relate to the requirements for electric vehicle charging installations.

BS EN IEC 61851-1:2019 – Electric vehicle conductive charging system Part 1: General requirements. This is the product standard that applies to EV supply equipment for charging electric road vehicles.

3. Protective Earth

3.1. Background

The protective earth is an important part of any electrical installation. The requirements are specified in BS 7671 Section 722 for the installation and in BS EN IEC 61851-1 for the EV supply equipment.

Earth electrodes have been the mechanism for providing protection, but it is recognised that the location can make it difficult to meet the specified impedance requirement. Therefore, an alternative approach has been specified in BS 7671.

BS 7671 Regulation 722.411.4.1 specifies conditions under which the protective earth should be disconnected if the requirements specified are met. These conditions allow an alternative approach to using an earth electrode. BS 7671 Regulation 722.411.4.1 (iii) states 'Equivalent means of functionality could be included within the charging equipment'.

BS EN IEC 61851-1 Sub-clause 8.4 explicitly states for Modes 3 and 4 that the "protective earthing conductors shall not be switched".

EN IEC 61851-1 is listed as a designated standard affording presumption of conformity with the principal elements of the safety objectives of The Electrical Equipment (Safety) Regulations 2016 (as amended) (Statutory Instrument 2016 No. 1101). These Regulations apply to EV supply equipment.

3.2. BEAMA Members' Understanding

Products have been developed to meet the requirements of Section 722 of BS 7671. At the present time there are no product standards for such products, so the design and compliance with requirements are solely down to the designer. These products are subject to The Electrical Equipment (Safety) Regulations 2016 (as amended) covering product safety, and the UKCA marking, and conformity will need to be demonstrated by the manufacturer.

At the current time, products developed to meet the requirements of BS 7671 Section 722 cannot be incorporated within an EV supply equipment that states it is fully compliant with BS EN 61851-1 because clause 8.4 of BS EN 61851-1 states that:

For Modes 3 and 4, permanently connected EV supply equipment, protective earthing conductors shall not be switched.

Until any such update or revision to BS EN IEC 61851, BEAMA notes the BSI guidance as follows:

Clause 8.4 of BS EN IEC 61851-1:2019 states that “For Modes 3 and 4 permanently connected EV supply equipment, protective earthing conductors shall not be switched.” This clause conflicts with UK’s IET Wiring Regulations (BS 7671:2018+A1:2020 Requirements for Electrical Installations. IET Wiring Regulations) which permits the switching of protective conductors under certain conditions. Users should follow the guidance given in BS 7671.¹

The ability to switch the protective earthing conductor may therefore be considered an optional build variant. A device without this function would be the default international product and shall conform to BS EN IEC 61851-1. A device with this function enabled would be a variant specifically for the UK market conforming with BS EN IEC 61851-1 and it would need to enable conformity with the related requirements of BS 7671.

Considering the apparent contradiction between BS EN IEC 61851-1 and BS 7671, the manufacturer is faced with a choice; either to follow the product standard by installing a separate protective earthing function alongside the charging device or to incorporate this function into the device itself. We acknowledge that a product with an inbuilt PEN Fault Detection Device does not meet the current requirements of sub-clause 8.4 of BS EN IEC 61851-1. However, we also note the guidance in BS 7671 that permits the switching of protective conductors under certain conditions. Therefore, BEAMA has called on BSI to work to resolve this apparent contradiction as swiftly as possible via a UK only deviation (a Special National Condition) to sub-clause 8.4 of BS EN IEC 61851-1.

Until such time as BS EN IEC 61851-1 is amended to take account of existing products, or additional guidance² is provided specific to these requirements in the UK market, manufacturers and installers of a product comprising a PEN Fault Detection Device must satisfy themselves as to the safety of the product and its installation and fulfill all safety provisions they deem appropriate as required by The Electrical Equipment (Safety) Regulations 2016 (as amended).

¹ <https://shop.bsigroup.com/ProductDetail/?pid=0000000000030414455> retrieved 10/05/2021

² The Institute of Engineering and Technology (IET) is considering a specification for Open PEN detection devices



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