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BRITISH STANDARD

BS 7671:2018

Amendment 1:2020

Requirements for Electrical Installations

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IET Wiring Regulations
Eighteenth Edition

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Foreword

This British Standard is published under the direction of the British Electrotechnical Committee (BEC) and the Institution of Engineering and Technology (IET).

Following a full review, this Standard replaced the 17th Edition of the IEE Wiring Regulations BS 7671:2008 as amended. Copyright is held jointly by the IET and BSI.

Technical authority for this Standard is vested in the Joint IET/BSI Technical Committee JPEL/64. This Joint Technical Committee, which is responsible for the work previously undertaken by the IEE Wiring Regulations Committee and the BSI Technical Committee PEL/64, meets the constitutional and operational requirements of both parent bodies. JPEL/64 has the responsibility for the content of this British Standard under the joint authority of the IET and the BSI Standards Board.

All references in this text to the Wiring Regulations or the Regulation(s), where not otherwise specifically identified, shall be taken to refer to BS 7671:2018 Requirements for Electrical Installations as amended by Amendment 1, 2020.

Additions or alterations to regulations owing to the issue of BS 7671:2018 are indicated by a side bar in the margin.

Introduction to Amendment 1:2020

Amendment 1:2020 to BS 7671:2018 Requirements for Electrical Installations was issued on 1st February 2020 and may be implemented immediately. Electrical installations falling within the scope of Section 722, the erection of which is commenced after 31st July 2020, are to comply with BS 7671:2018 incorporating Amendment 1:2020.

Amendment 1:2020 amends Section 722 Electric Vehicle Charging Installations.

Part 2

Definitions relating to Section 722 have been included.

Section 700 General

This overarching section explains the need for Part 7.

Section 722

Electric vehicle charging installations, Section 722 amended, based on HD 60364-7-722:2018.

Section 722 applies to electric vehicle charging installations. It modifies the general requirements for protection against electric shock, and includes specific requirements with regard to PME systems, socket-outlets and connectors, external influences, isolation and switching and RCD protection.

Regulation 722.411.4.1 adds indent (iv) which adds an alternative solution requirement for charging installations.

The requirements of this section do not apply to wireless charging, such as inductive charging.

Appendix 1

References to British Standards for Section 722 have been included.

Index

Entries for Section 722 have been included.

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Editions

EIGHTEENTH EDITION	BS 7671:2018 issued, July 2018. (Blue Cover)
	Amendment 1 issued, February 2020 (electronic)

Preface

BS 7671 Requirements for Electrical Installations takes account of the technical substance of agreements reached in CENELEC. In particular, the technical intent of the following CENELEC Harmonization Document is included:

CENELEC HD	Year	Document reference	BS 7671
HD 60364-7-722	2018	Supplies for electric vehicles	Section 722

Where the above document contains UK special national conditions, those conditions have been incorporated within BS 7671. If BS 7671 is applied in other countries the above document should be consulted to confirm the status of a particular regulation.

BS 7671 will continue to be amended from time to time to take account of the publication of new or amended CENELEC and IEC standards. The opportunity has been taken to revise regulations that experience has shown require clarification or to allow for new technology and methods.

Reference is made throughout BS 7671 to publications of the British Standards Institution, both specifications and codes of practice. Appendix 1 lists these publications and gives their full titles whereas throughout BS 7671 they are referred to only by their numbers.

Where reference is made in BS 7671 to a British Standard which takes account of a CENELEC Harmonization Document, European Norm (EN) or IEC standard, it is understood that the reference also relates to any European national standard similarly derived from the CENELEC standard, although account needs to be taken of any national exemptions.

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Note by the Health and Safety Executive

The Health and Safety Executive (HSE) welcomes the publication of BS 7671:2018, Requirements for Electrical Installations, IET Wiring Regulations 18th Edition and its updating with the first amendment, published in 2020. BS 7671 and the IET/IEE Wiring Regulations have been extensively referred to in HSE guidance over the years. Installations which conform to the standards laid down in BS 7671:2018+A1:2020 are regarded by HSE as likely to achieve conformity with the relevant parts of the Electricity at Work Regulations 1989. Existing installations may have been designed and installed to conform to the standards set by earlier editions of BS 7671 or the IET/IEE Wiring Regulations. This does not mean that they will fail to achieve conformity with the relevant parts of the Electricity at Work Regulations 1989.

Notes on the plan of the 18th Edition

This Edition is based on the plan agreed internationally for the arrangement of safety rules for electrical installations.

The regulation numbering follows the pattern and corresponding references of IEC 60364. The numbering does not, therefore, necessarily follow sequentially. The numbering system used in Part 7 is explained in Section 700.

In the numbering system used, the first digit signifies a Part, the second digit a Chapter, the third digit a Section and the subsequent digits the Regulation number. For example, Section number 413 is made up as follows:

PART 4 - PROTECTION FOR SAFETY

Chapter 41 (first chapter of Part 4) - PROTECTION AGAINST ELECTRIC SHOCK

Section 413 (third section of Chapter 41) - PROTECTIVE MEASURE: ELECTRICAL SEPARATION

Part 1 sets out the scope, object and fundamental principles.

Part 2 defines the sense in which certain terms are used throughout the Regulations, and provides a list of symbols used and a list of abbreviations used in the Standard.

The subjects of the subsequent parts are as indicated below:

Part	Subject
Part 3	Identification of the characteristics of the installation that will need to be taken into account in choosing and applying the requirements of the subsequent Parts. These characteristics may vary from one part of an installation to another and should be assessed for each location to be served by the installation.
Part 4	Description of the measures that are available for the protection of persons, livestock and property, and against the hazards that may arise from the use of electricity.
Part 5	Precautions to be taken in the selection and erection of the equipment of the installation.
Part 6	Inspection and testing.
Part 7	Special installations or locations - particular requirements.

The sequence of the plan should be followed in considering the application of any particular requirement of the Regulations. The general index provides a ready reference to particular regulations by subject, but in applying any one regulation the requirements of related regulations should be borne in mind. Cross-references are provided, and the index is arranged to facilitate this.

In many cases, a group of associated regulations is covered by a side heading which is identified by a two-part number, e.g. 544.2. Throughout the Regulations where reference is made to such a two-part number, that reference is to be taken to include all the individual regulation numbers which are covered by that side heading and include that two-part number.

The Regulations use the IEC decimal point numbering system to make it easier to embody future changes and additions resulting from ongoing international standards work within IEC and CENELEC. In order to identify and accommodate future IEC changes some regulations carry either a 100 or 200 number where 100 numbers represent CENELEC Harmonization Document reference numbers and 200 numbers represent UK-only regulations. Some regulations have not been 'updated' to indicate 100 and 200 numbers; that will only be done when those regulations require a significant rewrite.

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Part 2

DEFINITIONS

Electric vehicle (EV), {722}. Any vehicle propelled by an electric motor drawing current from a rechargeable storage battery or from other portable energy storage devices (rechargeable, using energy from a source off the vehicle such as a residential or public electricity service), which is manufactured primarily for use on public streets, roads or highways.

- **Charging equipment.** An assembly including one or more charging points.
- **Electric vehicle charging point.** The point where the electric vehicle is connected to the fixed installation.

  NOTE: The charging point is a socket-outlet where the charging cable belongs to the vehicle, or a connector, where the charging cable is a fixed part of the electric vehicle supply equipment.
- **Mode 1 charging.** Connection of the EV to the AC supply network utilizing standardized socket-outlets not exceeding 16 A and not exceeding 250 V AC single-phase or 480 V AC three-phase, at the supply side, and utilizing the power and protective earth conductors (according to BS EN 61851-1).
- **Mode 2 charging.** Connection of the EV to the AC supply network utilizing standardized socket-outlets not exceeding 32 A and not exceeding 250 V AC single-phase or 480 V AC three-phase, at the supply side, and utilizing the power and protective earth conductors together with a control pilot function and system of personnel protection against electric shock (RCD) between the EV and the plug or as part of the in-cable control box.
- **Mode 3 charging.** Connection of the EV to the AC supply network utilizing dedicated electric vehicle supply equipment where the control pilot function extends to control equipment in the electric vehicle supply equipment, permanently connected to the AC supply network.
- **Mode 4 charging.** Connection of the EV to the AC supply network utilizing an off-board charger where the control pilot function extends to equipment permanently connected to the AC supply.
- **Vehicle connector.** Part of a vehicle coupler integral with, or intended to be attached to, the flexible cable connected to the AC supply network (mains).
- **Vehicle coupler.** Means of enabling the manual connection of a flexible cable to an EV for the purpose of charging.

  NOTE: A vehicle coupler consists of two parts: a vehicle connector and a vehicle inlet.

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SYMBOLS USED IN THE STANDARD

Symbol	Meaning	Example
C_{max}	is the maximum voltage factor to take account of voltage variations depending on time and place, changing of transformer taps and other considerations. For a low voltage supply given in accordance with the ESQCR, C_{max} is given the value 1.1	A722.2
I_{inst}	is the rms maximum demand current of a single-phase installation (in amperes), including that of the electric vehicle charging load and any other loads, determined in accordance with Regulation 311.1	A722.3
I_m	is the rms maximum neutral current of a three-phase installation (in amperes), including that of the electric vehicle charging load and any other loads, determined in accordance with Regulation 311.1	A722.1
I_{L1} , I_{L2} and I_{L3}	are the rms values of current (in amperes) in lines 1, 2 and 3, respectively, that were used when determining the value of I_m	A722.1
$R_{A\,ev}$	is the sum of the resistances of the earth electrode and the protective conductor connecting it to the main earthing terminal of the installation (in ohms)	A722.3

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PART 7

SPECIAL INSTALLATIONS OR LOCATIONS

CONTENTS

SECTION 700

GENERAL

The particular requirements for each section (special installation or location) in Part 7 supplement or modify the general requirements contained in other parts of BS 7671.

The absence of reference to the exclusion of a part, a chapter, a section or a regulation means that the corresponding general regulations are applicable.

The number appearing after a section number generally refers to the corresponding chapter, section or regulation within Parts 1 to 6. The numbering does not, therefore, necessarily follow sequentially and new numbers have been added as required. Numbering of figures and tables takes the number of the section followed by a sequential number.

SECTION 722

ELECTRIC VEHICLE CHARGING INSTALLATIONS

NOTE: Definitions relating to Section 722 can be found in Part 2 under electric vehicle (EV), {722}.

722.1 Scope

The particular requirements of this section apply to circuits intended to supply electric vehicles for charging purposes.

The requirements of this section do not apply to electric vehicle charging points that:

(i) employ inductive charging

(ii) charge mobility scooters and similar vehicles of 10 A and less.

722.3 Assessment of general characteristics

722.31 Purposes, supplies and structure

722.311 Maximum demand and diversity

722.311.201 Load curtailment, including load reduction or disconnection, either automatically or manually, may be taken into account when determining maximum demand of the installation or part thereof.

722.312 Conductor arrangement and system earthing

722.312.2.1 TN systems

A circuit supplying charging equipment for electric vehicles shall not include a PEN conductor.

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722.4 Protection for safety

722.41 Protection against electric shock

722.410.3 General requirements

722.410.3.5 The protective measures of obstacles and placing out of reach (Section 417) shall not be used.

722.410.3.6 The protective measures of non-conducting location (Regulation 418.1) and earth-free local equipotential bonding (Regulation 418.2) shall not be used.

722.411.4 TN system

722.411.4.1 A PME earthing facility shall not be used as the means of earthing for the protective conductor contact of a charging point located outdoors or that might reasonably be expected to be used to charge a vehicle located outdoors unless one of the following methods is used:

(i) The charging point forms part of a three-phase installation that also supplies loads other than for electric vehicle charging and, because of the characteristics of the load of the installation, the maximum voltage between the main earthing terminal of the installation and Earth in the event of an open-circuit fault in the PEN conductor of the low voltage network supplying the installation does not exceed 70 V rms.

NOTE 1: Annex 722, item A722.2 gives some information relating to (i).

NOTE 2: See also Regulation 641.5 when undertaking an addition or alteration to an existing installation.

(ii) The main earthing terminal of the installation is connected to an installation earth electrode by a protective conductor complying with Regulation 544.1.1. The resistance of the earth electrode to Earth shall be such that the maximum voltage between the main earthing terminal of the installation and Earth in the event of an open-circuit fault in the PEN conductor of the low voltage network supplying the installation does not exceed 70 V rms.

NOTE 3: Annex 722, item A722.3 gives guidance on determining the maximum resistance required for the earth electrode in (ii).

(iii) Protection against electric shock is provided by a device which electrically disconnects the vehicle from the live conductors of the supply and from protective earth in accordance with Regulation 543.3.3.101(ii) within 5 s in the event of the voltage between the circuit protective conductor and Earth exceeding 70 V rms due to an open-circuit fault in the PEN conductor of the low voltage network. The device need not operate if the voltage exceeds 70 V rms for less than 4 s. The device shall provide isolation and be selected in accordance with Table 537.4. Closing or resetting of the device shall be possible only if the voltage between the circuit protective conductor and Earth does not exceed 70 V rms. Equivalent means of functionality could be included within the charging equipment.

NOTE 4: Annex 722, item A722.4 gives guidance on (iii).

(iv) Protection against electric shock in a single-phase installation is provided by a device which electrically disconnects the vehicle from the live conductors of the supply and from protective earth in accordance with Regulation 543.3.3.101(ii) within 5 s in the event of the utilisation voltage at the charging point, between the line and neutral conductors, being greater than 253 V rms or less than 207 V rms. The device shall provide isolation and be selected in accordance with Table 537.4. Equivalent means of functionality could be included within the charging equipment. Closing or resetting of the device shall be possible only if the voltage between line and neutral conductors is in the range 207 to 253 V rms.

(v) Protection against electric shock is provided by the use of an alternative device to those in (iii) or (iv) which does not result in a lesser degree of safety than using (iii) or (iv). Equivalent means of functionality could be included within the charging equipment. The device (or means of functionality) shall operate by electrically disconnecting the vehicle from the live conductors of the supply and from protective earth in accordance with Regulation 543.3.3.101(ii). It shall provide isolation and be selected in accordance with Table 537.4.

NOTE 5: See Section 511. BS 7671 does not deal with the safety requirements for the construction of electrical equipment. Where equipment to be used is not covered by a British or Harmonized Standard or is to be used outside the scope of its standard, it is the responsibility of the electrical installation designer or other person responsible for specifying the installation to establish that the manufacturer of the equipment has ensured that the equipment satisfies the safety objectives of the relevant Directive(s), as it will not benefit from a presumption of conformity afforded by the appropriate product standard.

Where buried in the ground, a protective conductor connected to an earth electrode for the purposes of (ii) or (iii) shall have a cross-sectional area not less than that stated in Table 54.1.

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Protective conductors and exposed-conductive-parts downstream of a protective device provided for the purposes of (iii), (iv) and (v) shall have no connection to:

(a) any protective conductors or exposed-conductive-parts of any circuit not protected by the same protective device; or
(b) any extraneous-conductive-part.

NOTE 6: Creating a TT earthing system for charging equipment or the whole installation as an alternative to using a PME earthing facility with one of methods (i) to (v) above may not be an appropriate solution due to the inability to provide sufficient separation from buried metalwork connected to the supply PEN conductor

722.413 Protective measure: Electrical separation

722.413.1.2 This protective measure shall be limited to the supply of one electric vehicle supplied from one unearthed source. The circuit shall be supplied through a fixed isolating transformer complying with BS EN 61558-2-4.

NOTE: An example of an arrangement for the supply of a Class I electric vehicle charging point from a separated source is shown in Annex A722, Item A722.5.

722.5 Selection and erection of equipment

722.51 Common rules

722.511 Compliance with standards

722.511.1 Where an EV charging point is built into a low voltage switchgear or controlgear assembly the requirements of the relevant part of BS EN 61439 series shall apply.

722.511.101 EV charging equipment shall comply with the appropriate parts of the BS EN 61851 series.

722.512 Operational conditions and external influences

722.512.2 External influences

722.512.2.201 Presence of water (AD)

Where installed outdoors, the equipment shall provide a degree of protection of at least IPX4.

722.512.2.202 Presence of solid foreign bodies (AE)

Where installed outdoors, the equipment shall provide a degree of protection of at least IP4X.

722.512.2.203 Impact (AG)

Equipment installed in public areas and car park sites shall be protected against mechanical damage (impact of medium severity AG3). Protection of the equipment shall be afforded by one or more of the following:

- the position or location shall be selected to avoid damage by any reasonably foreseeable impact
- local or general mechanical protection shall be provided
- equipment shall be installed that complies with a minimum degree of protection against external mechanical impact of IK08 in accordance with the requirements of BS EN 62262.

722.53 Protection, isolation, switching, control and monitoring

722.531 Devices for protection against electric shock by automatic disconnection of supply

722.531.3 Residual current devices (RCDs)

722.531.3.1 RCDs shall disconnect all live conductors.

722.531.3.101 Unless supplied by a circuit using the protective measure of electrical separation, each charging point incorporating a socket-outlet or vehicle connector complying with the BS EN 62196 series shall be protected by an RCD having a rated residual operating current not exceeding 30 mA.

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Except where provided by the EV charging equipment, protection against DC fault currents shall be provided by:

(i) an RCD Type B, or

(ii) an RCD Type A or Type F in conjunction with a residual direct current detecting device (RDC-DD) complying with BS IEC 62955 as appropriate to the nature of the residual and superimposed currents and recommendation of the manufacturer of the charging equipment.

RCDs shall comply with one of the following standards: BS EN 61008-1, BS EN 61009-1, BS EN 60947-2 or BS EN 62423.

NOTE 1: Types of RCD are described in Regulation 531.3.3 in respect of their behaviour when exposed to DC components and frequencies.

NOTE 2: Requirements for the selection and erection of RCDs in the case of supplies using DC vehicle connectors according to the BS EN 62196 series are under consideration.

NOTE 3: An RCD Type A or Type F in conjunction with an RDC-DD can be arranged with the RDC-DD inside the EV charging equipment and the Type A or Type F RCD upstream in either the charging equipment or the installation.

722.533 Devices for protection against overcurrent

722.533.101 Each charging point shall be supplied individually by a final circuit protected by an overcurrent protective device complying with BS EN 60947-2, BS EN 60947-6-2 or BS EN 61009-1 or with the relevant parts of the BS EN 60898 series or the BS EN 60269 series.

NOTE: The electric vehicle charging equipment may have multiple charging points.

722.55 Other equipment

722.55.101 Socket-outlets and connectors

722.55.101.0.201.1 Each AC charging point shall incorporate:

(i) one socket-outlet complying with BS 1363-2 marked 'EV' on its rear and, except where there is no possibility of confusion, a label shall be provided on the front face or adjacent to the socket-outlet or its enclosure stating: 'suitable for electric vehicle charging', or

(ii) one socket-outlet or connector complying with BS EN 60309-2 which is interlocked and classified to clause 6.1.5 of BS EN 60309-1 to prevent the socket contacts being live when accessible, or

(iii) one socket-outlet or connector complying with BS EN 60309-2 which is part of an interlocked self-contained product complying with BS EN 60309-4 and classified to clauses 6.1.101 and 6.1.102 to prevent the socket contacts being live when accessible, or

(iv) one Type 1 vehicle connector complying with BS EN 62196-2 for use with mode 3 charging only, or

(v) one Type 2 socket-outlet or vehicle connector complying with BS EN 62196-2 for use with mode 3 charging only, or

(vi) one Type 3 socket-outlet or vehicle connector complying with BS EN 62196-2 for use with mode 3 charging only.

NOTE: Vehicle manufacturers' instructions should be taken into account when determining the type of socket-outlet to be installed.

722.55.101.0.201.2 Each socket-outlet shall be installed in a distribution board in accordance with Regulation 722.51 or in its appropriate enclosure (e.g. flush or surface mounted socket-outlet box) and mounted in a fixed position.

Portable socket-outlets shall not be used but tethered vehicle connectors are permitted.

722.55.101.3 One socket-outlet or vehicle connector shall supply only one electric vehicle.

722.55.101.4 In EV charging modes 3 and 4, an electrical or mechanical system shall be provided to prevent the plugging/unplugging of the plug unless the socket-outlet or the vehicle connector has been switched off from the supply.

722.55.101.6 Precautions on supply of the fixed installation by the EV

NOTE: Requirements for precautions on supply of the fixed installation by the EV are under consideration.

722.551.7.2 The socket-outlet or vehicle connector shall comply with BS EN 62196 series.

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ANNEX A722 (Informative)

GUIDANCE FOR TN SYSTEMS WHERE PME CONDITIONS APPLY

A722.1 Neutral current of a three-phase installation

Where the power factors of the currents in all three phases are similar and triple harmonics can be neglected, it may be assumed that the neutral current of a three-phase installation is given by:

$$I_m = \sqrt{I_{L1}^2 + I_{L2}^2 + I_{L3}^2 - I_{L1}I_{L2} - I_{L1}I_3 - I_{L2}}$$

NOTE: The maximum neutral current (I_m) occurs under conditions of maximum imbalance, not necessarily maximum overall demand.

A722.2 Load balance

Where triple harmonics can be neglected, condition (i) of Regulation 722.411.4.1 may be assumed to apply where the following condition is met. This formula should take account of C_{max} in line with PD CLC/TR 50480.

$$\frac{I_m U_0 C_{max}}{I_{L1} + I_{L2} + I_{L3}} \leq 70\ V$$

A722.3 Earth electrode resistance

For the purposes of condition (ii) of Regulation 722.411.4.1, the sum of the resistances of the earth electrode and the protective conductor connecting it to the main earthing terminal must meet the following condition, as applicable.

For a single-phase installation:

$$R_{A\,ev} \leq \frac{70\,U_0 C_{max}}{I_{inst}(U_0 C_{max} - 70)}$$

For a three-phase installation:

$$R_{A\,ev} \leq \frac{70 U_0 C_{max}}{I_m U_0 C_{max} - 70(I_{L1} + I_{L2} + I_{L3})}$$

NOTE 1: The above three-phase formula for $R_{A\,ev}$ is valid only where $I_m > \frac{70(I_{L1}+I_{L2}+I_{L3})}{U_0 C_{max}}$. Where this is not the case, this indicates that condition (i) of Regulation 722.411.4.1 applies and that an earth electrode is not required for the purposes of condition (ii) of that regulation.

NOTE 2: The above currents and voltage are magnitudes only; they are not phasors.

NOTE 3: In determining I_m, I_{L1}, I_{L2} and I_{L3}, allowance must be made for single-phase vehicles being charged from three-phase charging points.

A722.4 Guidance on voltage monitoring device described in Regulation 722.411.4.1 (iii)

Regulation 722.411.4.1 (iii) describes a device that measures the voltage between the circuit protective conductor of the electric vehicle charging equipment and Earth. During a PEN failure in the supply network, the neutral of a TN-C-S supply is no longer considered to be reliably connected to Earth, and a device that measures the voltages between the following points will fail to provide equivalent safety to the device described in Regulation 722.411.4 (iii):

(i) the circuit protective conductor and neutral

(ii) the circuit protective conductor and the consumer's main earthing terminal.

Suitable arrangements include measurement of the voltage between either:

(a) the circuit protective conductor and a suitable measurement earth electrode, or

(b) the circuit protective conductor and a reference point derived from the line conductors of a three-phase system, provided that suitable precautions are also taken to disconnect the device when the supply to one or more-line conductors is interrupted.

Where used, measurement earth electrodes should be located at a sufficient distance from other earth electrodes and/or other buried exposed-conductive-parts and/or extraneous-conductive-parts connected to the PME earthing terminal to reduce transfer of earth potential rise on the PME system during a PEN failure.

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Applying Clauses 9.6.1 and 9.6.2 of BS 7430:2011+A1:2015, in conditions where only buried exposed- and/or extraneous-conductive-parts equivalent to vertical and horizontal earth electrodes are being considered, a separation distance of at least 8 m reduces the voltage transfer from the PME earthing system to less than 20 % and, in these conditions, the voltage operated device should be arranged to operate at 56 V.

It is recommended that the minimum separation distance is 2 m, and at this separation distance the device should be arranged to operate at 40 V.

Where other types of earth electrodes are used, separation distances should be increased, or the operating voltage decreased, accordingly, using the guidance in BS 7430.

To protect a person touching the body of an electric vehicle, connected to the charging point, when an open-circuit fault occurs in the PEN conductor of the supply, an enhanced safety provision may be offered. This may be achieved by a device that provides shorter disconnection times, depending on the detected voltage between the circuit protective conductor and Earth but also taking into account the need to limit the risk of unwanted tripping. Examples of shorter disconnection times are shown in Table A722 below. These disconnection times are based on IEC Technical Report IEC TR 60479-5 and also on comparable requirements already included in Chapter 41 of BS 7671.

TABLE A722 – Maximum disconnection times in relation to the voltage between the circuit protective conductor and Earth*

70 V	100 V	200 V	400 V
1 s	0.7 s	0.2 s	0.04 s

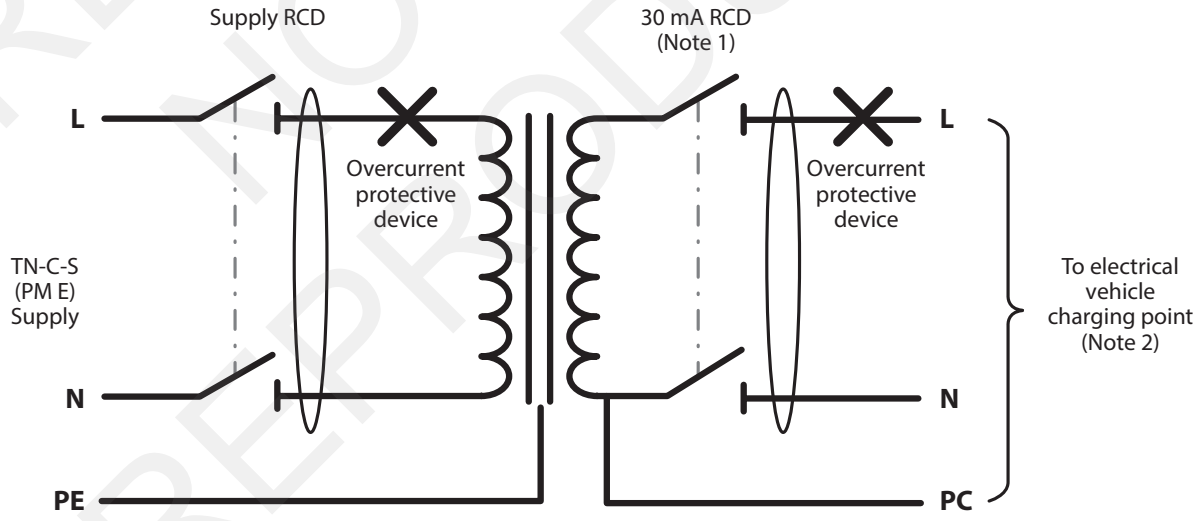
* Total voltage drop across the sensing element of the device and the earth electrode (if any) in series.

A722.5 Example arrangement of a separated system described in Regulation 722.413

An example arrangement of a separated system as described in Regulation 722.413 is shown in Figure A722.

Isolating transformers may have high inrush currents, and overcurrent protective devices in the primary circuit should be selected accordingly to prevent nuisance-tripping.

Fig A722 – Example of a separated system where protective conductor monitoring is required



Key

L	line conductor
N	neutral conductor
PE	protective earthing conductor
PC	protective conductor

NOTE 1: The RCD on the secondary, complying with Regulation 722.531.3.101, should be placed as close as possible to the transformer.

NOTE 2: Only one charging point may be supplied by each transformer, see Regulation 722.413.1.2.

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APPENDIX 1 (Normative)

BRITISH STANDARDS TO WHICH REFERENCE IS MADE IN THIS STANDARD

NOTE: Certain British Standards have been withdrawn since the issue of the previous Edition. From the date of withdrawal, certificates and marks already awarded may continue to apply to production until a date specified in the superseding standard. During the period between these dates, the withdrawn standard may be specified in contracts. However, it should be noted that this appendix may not list such standards, as only current British Standards are listed with some references to superseded standards. Where standards are not dated they are a multiple standard.

BS or EN Number	Title	References
BS 1363-2	Specification for 13 A switched and unswitched socket-outlets	722.55.101.0.201.1(i)
BS 7430:2011+A1:2015	Code of practice for protective earthing of electrical installations	A722.4
BS EN 60269 series	Low-voltage fuses	722.533.101
BS EN 60309-1	Plugs, socket-outlets and couplers for industrial purposes – General requirements	722.55.101.0.201.1(ii)
BS EN 60309-2	Plugs, socket-outlets and couplers for industrial purposes – Dimensional interchangeability requirements for pin and contact-tube accessories	722.55.101.0.201.1(ii) 722.55.101.0.201.1(iii)
BS EN 60309-4	Plugs, socket-outlets and couplers for industrial purposes – Switched socket-outlets and connectors, with or without interlock	722.55.101.0.201.1(iii)
BS EN 60898 series	Specification for circuit-breakers for overcurrent protection for household and similar installations	722.533.101
BS EN 60947-2	Low-voltage switchgear and control gear – Circuit-breakers	722.531.3.101 722.533.101
BS EN 60947-6-2	Multiple function equipment – Control and protective switching devices (or equipment) (CPS)	722.533.101
BS EN 61008-1	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) General rules	722.531.3.101
BS EN 61009-1	Electrical accessories. Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) General rules Supercedes BS EN 61001:2004+A14:2012 but remains current	722.531.3.101 722.533.101
BS EN 61439 series	Low-voltage switchgear and controlgear assemblies General rules (see also BS EN 60439)	722.511.1
BS EN 61558-2-4	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V. Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers	722.413.1.2
BS EN 61851 series	Electric vehicle conductive charging system. General requirements Current but partially replaced with BS EN 62752:2016	722.511.101
BS EN 62196 BS EN 62196-2	Plugs, socket-outlets, vehicle connectors and vehicle inlets. Conductive charging of electric vehicles. Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories	722.531.3.101 NOTE 2 722.551.7.2 722.55.101.0.201.1(iv) 722.55.101.0.201.1(v) 722.55.101.0.201.1(vi)
BS EN 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	722.512.2.203
BS EN 62423	Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses	722.531.3.101
BS IEC 62955	Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicles	722.531.3.101(ii)
PD CLC/TR 50480	Determination of cross-sectional area of conductors and selection of protective devices	A722.2
IEC TR 60479-5	Effects of current on human beings and livestock –. Part 5: Touch voltage threshold values for physiological effects	A722.4

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The following entries are pertinent to Section 722:

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