

INTERNATIONAL STANDARD



Low-voltage electrical installations –
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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	2
722 Supplies for electric vehicles.....	6
722.1 Scope	6
722.2 Normative references	6
722.3 Terms and definitions	8
 722.30 Assessment of general characteristics	8
722.31 Purposes, supplies and structure	8
722.311 Maximum demand and diversity	10
722.312 Conductor arrangement and system earthing	10
722.314 Division of installation.....	10
722.4 Protection for safety	10
722.41 Protection against electric shock.....	10
722.411 Protective measure: automatic disconnection of supply	11
722.413 Protective measure: electrical separation	11
722.44 Protection against voltage disturbances and electromagnetic disturbances.....	12
722.443 Protection against transient overvoltages of atmospheric origin or due to switching.....	12
722.444 Measures against electromagnetic influences.....	12
722.5 Selection and erection of electrical equipment.....	11
722.51 Common rules.....	12
722.511 Compliance with standards	12
722.512 Operational conditions and external influences.....	12
722.53 Selection and erection of electrical equipment – Isolation, switching and control.....	13
722.530 Introduction	13
722.531 Devices for protection against indirect contact by automatic disconnection of supply	13
722.533 Devices for protection against overcurrent	15
722.535 Co-ordination of various protective devices	15
722.54 Earthing arrangements and protective conductors	15
722.543 Protective conductors	15
722.55 Other equipment.....	15
722.551 Low voltage generating sets	16
722.6 Verification	17
Annex A (informative) List of notes concerning certain countries.....	18
Bibliography	28

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

Part 7-722: Requirements for special installations or locations – Supplies for electric vehicles

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60364-7-722 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) introduction of requirements for electrical installations incorporating wireless power transfer systems;
- b) clarification of the requirements regarding the protective measure placing out of reach in order to allow the use of pantographs in areas accessible to the public;
- c) introduction of requirements covering the case where the EV may operate as a source in parallel with other sources.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
64/2285/FDIS	64/2318/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60364 series, published under the general title *Low voltage electrical installations*, can be found on the IEC website.

The reader's attention is drawn to the fact that Annex A lists all of the “in-some-country” clauses on differing practices of a less permanent nature relating to the subject of this standard.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

For the purpose of this part of IEC 60364 (IEC 60364-7-722) the requirements of the general Parts 1 to 6 of IEC 60364 apply.

The IEC 60364-7-7XX parts of IEC 60364 contain particular requirements for special installations or locations which are based on the requirements of the general parts of IEC 60364 (IEC 60364-1 to IEC 60364-6). These IEC 60364-7-7XX parts are considered in conjunction with the requirements of the general parts.

The particular requirements of this part of IEC 60364 supplement, modify or replace certain of the requirements of the general parts of IEC 60364 being valid at the time of publication of this part. The absence of reference to the exclusion of a part or a clause of a general part means that the corresponding clauses of the general part are applicable (undated reference).

Requirements of other 7XX parts being relevant for installations covered by this part also apply. This part may therefore also supplement, modify or replace certain of these requirements valid at the time of publication of this part.

The clause numbering of this part follows the pattern and corresponding references of IEC 60364. The numbers following the particular number of this part are those of the corresponding parts, or clauses of the other parts of the IEC 60364 series, valid at the time of publication of this part, as indicated in the normative references of this document (dated reference).

If requirements or explanations additional to those of the other parts of the IEC 60364 series are needed, the numbering of such items appears as 722.101, 722.102, 722.103, etc.

NOTE In the case where new or amended general parts with modified numbering were published after this part was issued, the clause numbers referring to a general part in this Part 722 may no longer align with the latest edition of the general part. Dated references should be observed.

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

Part 7-722: Requirements for special installations or locations – Supplies for electric vehicles

722 Supplies for electric vehicles

722.1 Scope

The particular requirements of this document apply to

- circuits intended to supply energy to electric vehicles, and
- circuits intended for feeding back electricity from electric vehicles ~~into the supply network.~~

~~NOTE The requirements for feeding back electricity from electric vehicles into the supply network are under consideration.~~

~~Inductive charging is not covered.~~

Circuits covered by this document are terminated at the connecting point.

NOTE 1 The requirements for EV supply equipment for conductive charging and the relevant charging modes are described in IEC 61851 (all parts). The requirements for EV supply equipment for wireless power transfer are described in IEC 61980 (all parts).

NOTE 2 This document does not cover the assessment of the risk of explosion due to the possible production of hydrogen/other flammable gases during the battery recharging phase.

722.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60269 (all parts), *Low voltage fuses*

IEC 60309-1:1999, *Plugs, socket-outlets and couplers for industrial purposes – Part 1: General requirements*

IEC 60309-2, *Plugs, socket-outlets and couplers for industrial purposes – Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-4-41:2005, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*
IEC 60364-4-41:2005/AMD1:2017

IEC 60364-8-2, *Low-voltage electrical installations – Part 8-2: Prosumer's low-voltage electrical installations*¹

¹ Under preparation. Stage at the time of publication IEC RFDIS 60364-8-2:2018.

IEC 60898 (all parts), *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations*

IEC 60947-2, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-6-2, *Low-voltage switchgear and controlgear – Part 6-2: Multiple function equipment – Control and protective switching devices (or equipment) (CPS)*

IEC 61008-1, *Residual current circuit-breakers without integral ~~overvoltage~~ overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules*

IEC 61009-1, *Residual current operated circuit-breakers with integral ~~overvoltage~~ overcurrent protection for household and similar uses (RCBOs) – Part 1: General rules*

~~IEC 61140:2001, Protection against electric shock – Common aspects for installation and equipment~~

IEC 61557-8, *Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems*

~~IEC 61557-9, Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 9: Equipment insulation fault location in IT systems~~

IEC 61558-2-4, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers*

IEC 61851 (all parts), *Electric vehicle conductive charging system*

IEC 61980 (all parts), *Electric vehicle wireless power transfer (WPT) systems*

IEC 62196 (all parts), *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles*

IEC 62196-1, *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 1: General requirements*

IEC 62196-2, *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories*

IEC 62196-3, *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 3: Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contact-tube vehicle couplers*

IEC TS 62196-4, *Plugs, socket-outlets, vehicle connectors and vehicles inlet – Conductive charging of electric vehicles – Part 4: Dimensional compatibility and interchangeability requirements for DC pin and contact-tube accessories for class II or class III applications²*

IEC 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

² Under preparation. Stage at the time of publication IEC TS BPUB 62196-4:2018.

IEC 62423, *Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses*

IEC 62955, *Residual direct current detecting device (RDC-DD) to be used for mode 3 charging of electric vehicle*

722.3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

722.3.1

electric vehicle

electric road vehicle

EV

~~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~~

~~Note 1 to entry: In ISO publications, the term "electric road vehicle" is used for "electric vehicle."~~

~~[SOURCE: IEC 61851-1:2010, 3.8]~~

any vehicle propelled by an electric motor drawing current from a rechargeable energy storage system (RESS), intended primarily for use on public roads

[SOURCE: ISO 17409:2015, 3.19, modified — "rechargeable energy storage system" has been added.]

722.3.2

connecting point

~~point where one electric vehicle is connected to the fixed installation~~

~~Note 1 to entry: The connecting point is a socket outlet or a vehicle connector.~~

~~Note 2 to entry: The connecting point may be part of the fixed installed electric vehicle supply equipment in accordance with the IEC 61851 series.~~

terminating point in the fixed installation where energy is transferred to/from one electric vehicle

EXAMPLE A socket-outlet, a vehicle connector or a wireless power transfer device.

Note 1 to entry: The connecting point may be part of the fixed installed EV supply equipment.

722.3.3

mode 1 charging

~~connection of the EV to the a.c. supply network (mains) utilizing standardized socket outlets not exceeding 16 A and not exceeding 250 V a.c. single phase or 480 V a.c. three phase, at the supply side, and utilizing the live and protective earth conductors~~

~~[SOURCE: IEC 61851-1:2010, 6.2 "EV charging modes, mode 1 charging"]~~

722.3.4

~~mode 2 charging~~

~~connection of the EV to the a.c. supply network (mains) utilizing standardized single phase or three phase socket outlets not exceeding 32 A and not exceeding 250 V a.c. single phase or 480 V a.c. three phase, and utilizing the live 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 a part of the in-cable control box~~

[SOURCE: IEC 61851-1:2010, 6.2 "EV charging modes, mode 2 charging", modified]

722.3.5

~~mode 3 charging~~

~~connection of the EV to the a.c. supply network (mains) 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 a.c. supply network (mains)~~

[SOURCE: IEC 61851-1:2010, 6.2 "EV charging modes, mode 3 charging"]

722.3.6

~~mode 4 charging~~

~~connection of the EV to the a.c. supply network (mains) utilizing an off-board charger where the control pilot function extends to equipment permanently connected to the a.c. supply~~

[SOURCE: IEC 61851-1:2010, 6.2 "EV charging modes, mode 4 charging"]

722.3.7.3

demand factor

ratio, expressed as a numerical value or as a percentage, of the maximum demand of a circuit or a group of circuits within a specified period, to the corresponding total installed load of the circuit(s)

Note 1 to entry: In using this term, it is necessary to specify to which level of the system it relates.

[SOURCE: IEC 60050-691:1973, 691-10-05, modified — ~~the word "circuit" has replaced the word "installation"~~ The term "installation" has been replaced with the term "circuit"].

722.3.4

EV charging station

stationary part of EV supply equipment connected to the supply network

[SOURCE: IEC 61851-1:2017, 3.1.5, modified — The note has been deleted.]

722.3.5

EV supply equipment

equipment or a combination of equipment, providing dedicated functions to supply electric energy from a fixed electrical installation or supply network to an EV for the purpose of charging

[SOURCE: IEC 61851-1:2017, 3.1.1, modified — The examples have been deleted.]

722.3.6

load control

electrical (energy) management system ensuring that the sum of load currents of dedicated circuits does not exceed a predetermined value

~~722.30 Assessment of general characteristics~~

722.31 Purposes, supplies and structure

722.311 Maximum demand and diversity

Add the following:

It shall be considered that in normal use each single connecting point is used at its rated current or at the configured maximum charging current of the charging station. The means for configuration of the maximum charging current shall only be made by the use of a key or a tool and only be accessible to skilled or instructed persons.

NOTE For this application the demand factor of the final circuit supplying the connecting point (e.g. the socket-outlet) is equal to 1.

Since all the connecting points of the installation can be used simultaneously, the diversity factor of the distribution circuit shall be taken as equal to 1 unless a load control is included in the EV supply equipment or installed upstream or a combination of both. ~~However, this factor may be reduced where load control is available.~~

722.312 Conductor arrangement and system earthing

722.312.2.1 TN systems

Add the following:

In a TN system, ~~the final circuit supplying a connecting point shall be a TN-S system~~ a circuit supplying a connecting point shall not include a PEN conductor.

722.314 Division of installation

Add the following:

722.314.101

A dedicated circuit shall be provided for the ~~connection~~ transfer of energy from/to the electric vehicles.

722.4 Protection for safety

722.41 Protection against electric shock

722.410.3 General requirements

722.410.3.5

Replace the existing text by the following:

The protective measure obstacles as specified in IEC 60364-4-41:2005, Clause B.2 shall not be applied.

The protective measure placing out of reach, as specified in IEC 60364-4-41:2005, Clause B.3 may only be applied where an automatic connection system in accordance with IEC 61851-23-1³ is used.

³ Under consideration.

722.410.3.6

The protective measures as specified in IEC 60364-4-41:2005 and IEC 60364-4-41:2005/AMD1:2017, Annex C shall not be applied.

722.411 Protective measure: automatic disconnection of supply

722.411.3 Requirements for fault protection

722.411.3.3 Additional protection

Replace the existing text by the following:

Each AC connecting point shall be individually protected by a residual current device (RCD) with a rated residual operating current not exceeding 30 mA.

NOTE This requirement implies that this RCD is not used for protecting other connecting points or current-using equipment.

722.413 Protective measure: electrical separation

722.413.3 Requirements for fault protection

Add the following:

~~722.413.3.101~~—The circuit shall be supplied through a fixed isolating transformer complying with IEC 61558-2-4.

~~NOTE~~—In mode 4 (d.c. charging), requirements for the isolating transformer are under consideration.

722.413.3.2

Replace the requirements as follows:

The separated circuit shall be supplied through an isolating transformer complying with IEC 61558-2-4, and the voltage of the separated circuit shall not exceed 500 V.

~~722.41.B~~—~~Obstacles and placing out of reach~~

~~722.41.B.2~~—~~Obstacles~~

~~Replace the existing text by the following:~~

~~Protection by obstacles shall not be used.~~

~~722.41.B.3~~—~~Placing out of reach~~

~~Replace the existing text by the following:~~

~~Protection by placing out of reach shall not be used.~~

~~722.41.C.1~~—~~Non-conducting location~~

~~Replace the existing text by the following:~~

~~Protection by non-conducting location shall not be used.~~

~~722.41.C.2~~—~~Protection by earth-free local equipotential bonding~~

~~Replace the existing text by the following:~~

~~Protection by earth-free local equipotential bonding shall not be used.~~

~~**722.41.C.3 Electrical separation for the supply of more than one item of current-using equipment**~~

~~Replace the existing text by the following:~~

~~Electrical separation shall not be used for the supply of more than one electric vehicle.~~

722.44 Protection against voltage disturbances and electromagnetic disturbances

722.443 Protection against transient overvoltages of atmospheric origin or due to switching

722.443.4 Overvoltage control

Add the following after the first paragraph:

A connecting point accessible to the public is considered as part of a public service and therefore shall be protected against transient overvoltages.

722.444 Measures against electromagnetic influences

722.444.1 General

Add the following:

722.444.1.101

The equipment for wireless power transfer shall not impair the safety and the proper functioning of the electrical installation and shall be installed according to the manufacturer's instructions.

[IEC 60364-7-722:2018](https://standards.iteh.ai/IEC/60364-7-722/2018)

[https://standards.iteh.ai/IEC/60364-7-722:2018](https://standards.iteh.ai/IEC/60364-7-722/2018)

722.5 Selection and erection of electrical equipment

722.51 Common rules

722.511 Compliance with standards

Add the following:

722.511.101

For conductive power transfer, EV charging stations shall comply with the appropriate parts of the IEC 61851 series.

722.511.102

Wireless power transfer (WPT) systems for EVs shall comply with the appropriate parts of the IEC 61980 series.

722.512 Operational conditions and external influences

722.512.2 External influences

Add the following: