IEC 60364-7-722

Edition 2.0 2018-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

Installations électriques à basse tension – Partie 7-722: Exigences pour les installations et emplacements spéciaux – Alimentation des véhicules électriques

IEC 60364-7-722:2018-09(en-fr)

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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Installations électriques à basse tension – Partie 7-722: Exigences pour les installations et emplacements spéciaux – Alimentation des véhicules électriques

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LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

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

FOREWORD

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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.

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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.

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.

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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.

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]

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*

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

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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 overcurrent protection for household and similar uses (RCCBs) – Part 1: General rules*

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

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 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 applications*[2]

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

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:

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

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- 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 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
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
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 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

722.31 Purposes, supplies and structure

722.311 Maximum demand and diversity

Add the following:

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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.

722.312 Conductor arrangement and system earthing

722.312.2.1 TN systems

Add the following:

In a TN 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 transfer of energy from/to the electric vehicle.

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 61851-23-1[3] is used.

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:

[3] Under consideration.

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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

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.

722.44 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.

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.

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722.512 Operational conditions and external influences

722.512.2 External influences

Add the following:

722.512.2.101 Presence of water (AD)

When installed outdoors, the equipment shall be selected with a degree of protection of at least IPX4 in order to protect against water splashes (AD4).

722.512.2.102 Presence of solid foreign bodies (AE)

When installed outdoors, the equipment shall be selected or provided with a degree of protection of at least IP4X in order to protect against the ingress of small objects (AE3).

722.512.2.103 Impact (AG)

Equipment installed in public areas shall be protected against mechanical damage considering an impact of high severity (AG3). This protection shall be provided by one or more of the following:

- by locating the equipment to avoid damage by any reasonably foreseeable impact;
- by providing local or general mechanical protection of the equipment;
- by selecting and erecting equipment with a minimum degree of protection against external mechanical impact in accordance with the requirements of IEC 62262 of IK08.

722.53 Selection and erection of electrical equipment – Isolation, switching and control

722.530 Introduction

722.530.3 General and common requirements

Add the following:

722.530.3.101

The requirements of 722.530.3.102 and from 722.531 to 722.535.3 shall be achieved either by the selection and erection of the appropriate equipment in the fixed installation or by the selection of an EV charging station which incorporates the appropriate equipment or a combination of both.

NOTE 1 The requirements for the selection and erection of devices for isolation, switching and control of the wireless power transfer system are covered by IEC 60364-5-53.

NOTE 2 The in-cable control and protection device (IC-CPD) according to IEC 62752 is not designed for use in fixed installations.

722.530.3.102

For circuits described in 722.531.3.101, and if more than one electric vehicle is supplied from the same unearthed supply, it is recommended to use an insulation fault location system (IFLS) according to IEC 61557-9 to detect the faulty circuitry within the shortest possible time.

722.531 Devices for protection against indirect contact by automatic disconnection of supply

722.531.2 Residual current protective devices

Add the following:

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722.531.2.101

RCDs protecting each connecting point in accordance with 722.411.3.3 shall comply at least with the requirements of an RCD type A and shall have a rated residual operating current not exceeding 30 mA.

Where the EV charging station is equipped with a socket-outlet or vehicle connector complying with IEC 62196 (all parts), protective measures against DC fault current shall be taken, except where provided by the EV charging station. The appropriate measures, for each connection point, shall be as follows:

- the use of an RCD type B; or
- the use of an RCD type A in conjunction with a residual direct current detecting device (RDC-DD) complying with IEC 62955; or
- the use of an RCD type F in conjunction with a residual direct current detecting device (RDC-DD) complying with IEC 62955.

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

NOTE Subclause 722.531.2.101 is not applicable in case the connecting point is protected by other protective measures against electric shock such as SELV or electric separation.

722.531.2.1.1

Replace the existing subclause, including the NOTE, as follows:

RCDs shall disconnect all live conductors.

722.531.3 Insulation monitoring devices

Add the following:

722.531.3.101

Except where a protective device is installed to interrupt the circuit in the event of a first earth fault, an insulation monitoring device (IMD) in accordance with IEC 61557-8 shall be provided.

If the IMD is not part of the EV charging station then it is recommended that the IMD provides the following two response values:

- Pre-warning

  If the insulation resistance falls below 300 Ω/V an optical and/or acoustical signal should be issued to the user. An ongoing charging session may continue but a new charging session shall not take place.

- Alarm

  If the resistance falls below 100 Ω/V an optical and/or acoustical signal should be issued to the user. The charging circuit should shut down within 10 s.

722.533 Devices for protection against overcurrent

Add the following:

722.533.101

Except where EV supply equipment in accordance with IEC 61851-1 having more than one connecting point is installed and incorporates the necessary overcurrent protective device required by IEC 61851-1:2017, 13.1, each connecting point shall be supplied individually by a final circuit protected by an overcurrent protective device complying with IEC 60947-2,

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IEC 60947-6-2 or IEC 61009-1 or with the relevant parts of the IEC 60898 series or the IEC 60269 series.

NOTE The EV supply equipment can have multiple connecting points.

722.535 Co-ordination of various protective devices

722.535.3 Discrimination between residual current protective devices

Replace the first paragraph as follows:

Where required for service reasons, selectivity shall be maintained between the RCD protecting a connecting point and an RCD installed upstream.

722.54 Earthing arrangements and protective conductors

722.543 Protective conductors

Add the following:

722.543.101

Control signals on the protective conductor (PE) shall not flow into the fixed electrical installation upstream of the EV charging station; equipment shall be selected accordingly.

NOTE 1 The requirement is to prevent such signals, and the related devices impairing the correct functioning of the devices installed to provide the protective measure of automatic disconnection of supply (e.g. RCD).

NOTE 2 This requirement can be achieved by using a galvanic separation of the control electronics.

NOTE 3 Temporary currents used to perform the test of the continuity of protective conductors for safety purposes are not considered as signal currents.

722.55 Other equipment

Add the following:

722.55.101 Socket-outlets and vehicle connectors

722.55.101.1

Where the connecting point is a socket-outlet or a vehicle connector, it shall comply with:

- IEC 60309-1 or IEC 62196-1, where interchangeability is not required, or
- IEC 60309-2, IEC 62196-2, IEC 62196-3 or IEC TS 62196-4 where interchangeability is required, or
- the national standard for socket-outlets, provided the rated current does not exceed 16 A.

Except where electrical separation is used, each socket-outlet shall have an earthing contact connected to the protective conductor (PE).

722.55.101.2

Every socket-outlet or vehicle connector shall be located as close as practicable to the EV parking place to be supplied.

722.55.101.3

Portable socket-outlets shall not be used.

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722.55.101.4

One socket-outlet or vehicle connector shall supply only one electric vehicle at the same time.

722.55.102 EV charging stations

EV charging stations for public use shall be so designed as to facilitate easy access to the charging point regardless of where the vehicle inlet is located on the electric vehicle.

722.551 Low voltage generating sets

722.551.1 Scope

722.551.1.1

Add the following dashed list item:

– electric vehicle

722.551.2 General requirements

Add the following:

722.551.2.101

Where electric vehicles are intended to feedback energy to the electric installations, the requirements of IEC 60364-8-2[4] apply.

NOTE Additional requirements for circuits intended for feeding back electricity from electric vehicles are under consideration.

722.551.7 Additional requirements for installations where the generating set may operate in parallel with other sources including systems for distribution of electricity to the public

722.551.7.2

Item b) is replaced by:

b) the socket-outlet or vehicle connector shall comply with IEC 62196 (all parts); and

722.6 Verification

722.6.4 Initial verification

722.6.4.1 General

722.6.4.1.1

Add the following:

The existing installation which is influenced shall also be verified with respect to compliance with the requirements of IEC 60364 (all parts) (e.g. requirements for protection against overcurrent due to the increase of load current).

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

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722.6.5.1.1

Add the following:

NOTE Requirement for periodic verifications is a matter for national consideration.

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