

INTERNATIONAL STANDARD

Charging cables for electric vehicles of rated voltages up to and including
0,6/1 kV –
Part 1: General requirements

IEC 62893-1:2017
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CHARGING CABLES FOR ELECTRIC VEHICLES
OF RATED VOLTAGES UP TO AND
INCLUDING 0,6/1 kV –**

Part 1: General requirements

FOREWORD

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International Standard IEC 62893-1 has been prepared by IEC technical committee 20: Electric cables.

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

FDIS	Report on voting
20/1761/FDIS	20/1772/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 62893 series, published under the general title *Charging cables for electric vehicles of rated voltages up to and including 0,6/1 kV*, can be found on the IEC website.

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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

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CHARGING CABLES FOR ELECTRIC VEHICLES OF RATED VOLTAGES UP TO AND INCLUDING 0,6/1 kV –

Part 1: General requirements

1 Scope

This part of IEC 62893 specifies construction, dimensions and test requirements for cables with extruded insulation and sheath having a voltage rating of up to and including 0,6/1 kV AC or up to and including 1 500 V DC for flexible applications under harsh conditions for the power supply between the electricity supply point of the charging station and the electric vehicle (EV).

The EV charging cable is intended to supply power and, if needed, communication (for details see the IEC 62196 series and IEC 61851-1) to an EV or plug-in hybrid vehicle (PHEV). The charging cables are applicable for charging modes 1 to 4 of IEC 61851-1. Ordinary duty cables with rated voltage 300/500 V are only permitted for charging mode 1 of IEC 61851-1. Maximum conductor temperature for the cables in this part of IEC 62893 is 90 °C.

The particular types of cables are specified in IEC 62893-3 (modes 1 to 3 for AC charging) and in the future IEC 62893-4 (mode 4 for DC charging).

These parts are collectively referred to hereafter as “the particular specifications”.

The test methods specified are given in IEC 62893-2, IEC 60245-2, IEC 60332-1-2, IEC 62821-1:2015, Annex B, and in the relevant parts of IEC 60811, as listed in the normative references.

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 60245-2:1994, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 2: Test methods*

IEC 60228:2004, *Conductors of insulated cables*

IEC 60332-1-2:2004, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

IEC 60332-1-2:2004/AMD1:2015

IEC 60811-401, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 401: Miscellaneous tests – Thermal ageing methods – Ageing in an air oven*

IEC 60811-403, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 403: Miscellaneous tests – Ozone resistance test on cross-linked compounds*

IEC 60811-404, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 404: Miscellaneous tests – Mineral oil immersion tests for sheaths*

IEC 60811-501, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 501: Mechanical tests – Tests for determining the mechanical properties of insulating and sheathing compounds*

IEC 60811-505:2012, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 505: Mechanical tests – Elongation at low temperature for insulations and sheaths*

IEC 60811-507, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 507: Mechanical tests – Hot set test for cross-linked materials*

IEC 60811-508:2012, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 508: Mechanical tests – Pressure test at high temperature for insulation and sheaths*

IEC 60811-509, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 509: Mechanical tests – Test for resistance of insulations and sheaths to cracking (heat shock test)*

IEC 62821-1:2015, *Electric cables – Halogen-free, low smoke, thermoplastic insulated and sheathed cables of rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 62893-2:2017, *Charging cables for electric vehicles of rated voltages up to and including 0,6/1 kV – Part 2: Test methods*

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ISO 48, *Rubber, vulcanized or thermoplastic – Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

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ISO 7619-1, *Rubber, vulcanized or thermoplastic – Determination of indentation hardness – Part 1: Durometer method (Shore hardness)*

ISO 14572:2011, *Road vehicles – Round, sheathed, 60 V and 600 V screened and unscreened single or multi-core cables – Test methods and requirements for basic- and high-performance cables*

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>

3.1 Definitions relating to insulating and sheathing materials

3.1.1

halogen-free compound

compound not containing halogens which meets the requirements given in this document

3.1.2**type of compound**

category in which a compound is placed according to its properties, as determined by specific tests

Note 1 to entry: The type designation is not directly related to the composition of the compound.

3.1.3**EVI**

designation of insulation compound for cables in this document

3.1.4**EVM**

designation of sheathing compound for cables in this document

3.1.5**control core (CC) and pilot core (CP)**

designation for those cores in the cable that serve the basic control function to operate an EV supply system

Note 1 to entry: For further information see IEC 61851-1.

3.2 Definitions relating to the tests**3.2.1****type tests (symbol T)**

tests required to be carried out before supplying a type of cable covered by this document on a general commercial basis in order to demonstrate satisfactory performance characteristics to meet the intended application

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Note 1 to entry: Type tests are of such a nature that, after they have been made, they need not be repeated unless changes are made in the cable materials or design which might change the performance characteristics.

3.2.2**sample tests (symbol S)**

tests carried out on samples of completed cable or components taken from a completed cable, adequate to verify that the finished product meets the design specifications

3.2.3**routine test (symbol R)**

tests carried out by the manufacturer on each manufactured length of cable to check that each length meets the specified requirements

4 Code designation

The cables shall be marked, for example: IEC 62893 IEC 121.

NOTE The code designations for specific cable types are given in the particular specification, for instance in IEC 62893-3.

5 Rated voltage

The rated voltage of a cable is the reference voltage for which the cable is designed.

The rated voltage in an alternating current system is expressed by the combination of two values U_0/U , expressed in volts, where:

- a) U_0 is the r.m.s. value between any insulated conductor and “earth” (metal covering of the cable or the surrounding medium);
- b) U is the r.m.s. value between any two phase conductors of a multicore cable or of a system of single core cables.

In an alternating current system, the rated voltage of a cable or cord shall be at least equal to the nominal voltage of the system for which it is intended. This condition applies to the values of both U_0 and U .

The maximum permanent operating voltage of the system (AC or DC) is stated in Table 1.

Table 1 – Examples of maximum permitted voltages against rated voltage of cable

Rated voltage of cable U_0/U	Maximum permanent permitted operating voltage of the system			
	AC	3-phase AC	DC	
	Conductor-earth	Conductor-conductor	Conductor-earth	Conductor-conductor
	U_0 max	U max		
300/500 V	320 V	550 V	410 V	820 V
450/750 V	480 V	825 V	620 V	1240 V
0,6/1 kV	0,7 kV	1,2 kV	0,9 kV	1,8 kV

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6 Marking

6.1 Indication of origin

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Cables shall be provided with an indication of the manufacturer, which shall be either an identification thread or a repetitive marking of the manufacturer's name or trademark.

Marking may be by printing or by reproduction in relief on or in the insulation or sheath.

6.2 Continuity of marks

Each specified mark shall be regarded as continuous if the distance between the end of the mark and the beginning of the next identical mark does not exceed

- 550 mm if the marking is on the outer sheath of the cable;
- 275 mm if the marking is on the insulation or on a tape within the sheathed cable.

6.3 Durability

Printed markings shall be durable. Compliance with this requirement shall be checked by the test given in 1.8 of IEC 60245-2:1994.

6.4 Legibility

All markings shall be legible.

The colours of the identification threads shall be easy to recognize or easily made recognizable, if necessary, by cleaning with petrol or other suitable solvent.