



IEC 62893-1

Edition 1.0 2017-11

INTERNATIONAL STANDARD

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 43.120; 29.060.20

ISBN 978-2-8322-5067-9

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
3.1 Definitions relating to insulating and sheathing materials	7
3.2 Definitions relating to the tests.....	8
4 Code designation.....	8
5 Rated voltage	8
6 Marking	9
6.1 Indication of origin	9
6.2 Continuity of marks	9
6.3 Durability	9
6.4 Legibility	9
7 Core identification	10
7.1 General.....	10
7.2 Identification by colours	10
7.2.1 General requirements	10
7.2.2 Colour scheme for power cores	10
7.2.3 Colour combination green and yellow	10
7.3 Core identification by numbers.....	10
7.3.1 General requirements	10
7.3.2 Preferred arrangement of marking	11
7.3.3 Durability	11
8 General requirements for the construction of cables	11
8.1 Conductors	11
8.1.1 Material	11
8.1.2 Construction	11
8.1.3 Check on construction	11
8.1.4 Electrical resistance	11
8.2 Sizes of cable	11
8.3 Insulation	12
8.3.1 Material	12
8.3.2 Application to the conductor	12
8.3.3 Thickness	12
8.3.4 Mechanical properties before and after ageing	12
8.4 Filler (optional).....	14
8.4.1 Material	14
8.4.2 Application.....	14
8.5 Assembly	14
8.6 Metallic screen (optional).....	14
8.7 Sheath.....	15
8.7.1 Material	15
8.7.2 Application.....	15
8.7.3 Thickness	15
8.7.4 Mechanical properties before and after ageing	15
8.8 Tests on completed cables.....	18

8.8.1	Electrical properties	18
8.8.2	Overall dimensions	20
8.8.3	Mechanical strength of flexible cables	20
8.8.4	Tests under fire conditions.....	21
8.8.5	Assessment of halogens	21
8.8.6	Shrinkage test	21
8.8.7	Compatibility test	21
8.8.8	Cold impact test.....	21
8.8.9	Crush resistance test.....	21
Annex A (normative) Requirements for compatibility test.....		22
A.1	Test conditions	22
A.2	Requirements	22
Bibliography.....		23
Figure 1 – Core marking by numbers		11
Table 1 – Examples of maximum permitted voltages against rated voltage of cable		9
Table 2 – Requirements for insulating compounds		13
Table 3 – Requirements for the non-electrical test for sheathing compounds		16
Table 4 – Requirements for electrical tests		19
Table 5 – Mechanical load for flexing test		20
Table A.1 – Requirements for compatibility test		22

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 1: General requirements

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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.

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*

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

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*