
Vtiči, vtičnice, konektorji in uvodnice na vozilih - Kabelsko napajanje električnih vozil - 1. del: Splošne zahteve

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

Stecker, Steckdosen, Fahrzeugkupplungen und Fahrzeugstecker - Konduktives Laden von Elektrofahrzeugen - Teil 1: Allgemeine Anforderungen

Fiches, socles de prise de courant, prises mobiles de véhicule et socles de connecteur de véhicule - Charge conductive des véhicules électriques - Partie 1: Règles générales

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ICS:

29.120.30	Vtiči, vtičnice, spojke	Plugs, socket-outlets, couplers
43.120	Električna cestna vozila	Electric road vehicles

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en,fr,de

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23H/461/CDV

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IEC SC 23H : PLUGS, SOCKET-OUTLETS AND COUPLERS FOR INDUSTRIAL AND SIMILAR APPLICATIONS, AND FOR ELECTRIC VEHICLES	
SECRETARIAT: France	SECRETARY: Mr Bertrand Doignon
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 69	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: iTeh STANDARD PREVIEW (standards.iteh.ai)	
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<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING	
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TITLE:

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

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

If necessary, comments will be reviewed in an MT 8 meeting in April 2020

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**PLUGS, SOCKET-OUTLETS, VEHICLE
CONNECTORS AND VEHICLE INLETS –
CONDUCTIVE CHARGING OF ELECTRIC VEHICLES –****Part 1: General requirements****FOREWORD**

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175 Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter
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201 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is
202 indispensable for the correct application of this publication.

203 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of
204 patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

205 International Standard IEC 62196-1 has been prepared by subcommittee 23H: Plugs, socket-
206 outlets and couplers for industrial and similar applications, and for electric vehicles, of IEC
207 technical committee 23: Electrical accessories.

208 This fourth edition cancels and replaces the third edition published in 2014 and constitutes a
209 technical revision.

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

212 a) deletion of references to Universal AC and DC Interfaces;

- 213 b) additional requirements for contact materials and plating;
 214 c) changes to the Temperature rise test to include additional points of measurement;
 215 d) additional tests for accessories to address thermal stresses and stability, mechanical wear
 216 and abuse, and exposure to contaminants.
 217 e) Editing to relocate information and requirements for DC charging in IEC 62196-3.

218 The text of this standard is based on the following documents:

FDIS	Report on voting
23H/---/FDIS	23H/---/RVD

219

220 A list of all the parts in the IEC 62196 series, under the general title *Plugs, socket-outlets,*
 221 *vehicle connectors and vehicle inlets – Conductive charging of electric vehicles*, can be found
 222 on the IEC website.

223 Subsequent parts of IEC 62196 deal with the requirements of particular types of accessories.
 224 The clauses of these particular requirements supplement or modify the corresponding clauses
 225 in Part 1.

226 In this standard, the following print types are used:

- 227 – requirements proper: in roman type;
 228 – *test specifications: in italic type*;
 229 – notes: in smaller roman type.

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

- 233 • reconfirmed,
- 234 • withdrawn,
- 235 • replaced by a revised edition, or
- 236 • amended.

237

238

INTRODUCTION

239 IEC 61851 series specifies requirements for EV conductive charging systems.

240 IEC 62196 series specifies the requirements for plugs, socket-outlets, vehicle connectors,
241 vehicle inlets and cable assemblies as described in the IEC 61851 series.

242 Some charging can be achieved by direct connection from an electric vehicle to standard
243 socket-outlets connected to a supply network (mains or electrical grid).

244 Some modes of charging require a dedicated supply and charging equipment incorporating
245 control and communication circuits.

246 IEC 62196 covers the mechanical, electrical and performance requirements for plugs, socket
247 outlets, vehicle connectors and vehicle inlets for the connection between the EV supply
248 equipment and the electric vehicle.

249 IEC 62196 series consists of the following parts:

250 – Part 1: General requirements, comprising clauses of a general character.

251 – Part 2: Dimensional compatibility and interchangeability requirements for AC pin and
252 contact-tube accessories.

253 – Part 3: Dimensional compatibility and interchangeability requirements for DC and AC/DC
254 pin and contact-tube vehicle couplers.

255 – Part 3-1²: Vehicle connector, vehicle inlet and cable assembly intended to be used with a
256 thermal management system for DC charging.

257 – Part 4¹: Dimensional compatibility and interchangeability requirements for DC pin and
258 contact-tube accessories for Class II or Class III applications.

259 – Part 6²: Dimensional compatibility and interchangeability requirements for DC pin and
260 contact-tube couplers for applications using a system of protective electrical separation.

261

1 Publication of Part 4 is dependent on the publication of IEC 61851-23 ed.2. Stage at the time of publication: IEC CDV 61851-23:2019.

2 Under preparation.

PLUGS, SOCKET-OUTLETS, VEHICLE CONNECTORS AND VEHICLE INLETS – CONDUCTIVE CHARGING OF ELECTRIC VEHICLES –

Part 1: General requirements

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1 Scope

271 This part of IEC 62196 is applicable to plugs, socket-outlets, vehicle connectors, vehicle inlets
272 herein referred to as “accessories”, and cable assemblies for electric vehicles (EV), intended
273 for use in conductive charging systems which incorporate control means, with a rated
274 operating voltage not exceeding

- 275 – 690 V AC 50 Hz to 60 Hz, at a rated current not exceeding 250 A,
- 276 – 1 500 V DC at a rated current not exceeding 800 A.

277 These accessories and cable assemblies are intended to be installed by instructed persons
278 (IEV 195-04-02) or skilled persons (IEV 195-04-01) only

279 These accessories and cable assemblies are intended to be used for circuits specified in
280 IEC 61851 series, which operate at different voltages and frequencies and which may include
281 extra-low voltage and communication signals.

282 These accessories and cable assemblies are to be used at an ambient temperature between
283 $-30\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$.

284 NOTE 1 In some countries, other requirements may apply.
<https://standards.iteh.ai/catalog/standards/sist/edd7eef0-5221-49c3-b142->

285 NOTE 2 In the following countries, $+35\text{ }^{\circ}\text{C}$ applies: SE
<https://standards.iteh.ai/catalog/standards/sist/edd7eef0-5221-49c3-b142->

286 NOTE 3 The manufacturer may declare higher temperature providing necessary information.

287 These accessories are intended to be connected only to cables with copper or copper-alloy
288 conductors.

289 The accessories covered by this part of IEC 62196 are intended for use in electric vehicle
290 supply equipment in accordance with IEC 61851 series.

291 This part of IEC 62196 does not apply to standard plug and socket-outlets used for mode 1
292 and mode 2 according to IEC 61851-1:2017 6.2.

293 NOTE 4 In the following countries, mode 1 is not allowed: UK, US, CA, SG

2 Normative references

295 The following documents, in whole or in part, are normatively referenced in this document and
296 are indispensable for its application. For dated references, only the edition cited applies. For
297 undated references, the latest edition of the referenced document (including any
298 amendments) applies.

299 IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

- 300 IEC 60068-2-30, *Environmental testing – Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h*
301 *+ 12 h cycle)*
- 302 IEC 60068-2-60, *Environmental testing – Part 2-60: Tests - Test Ke: Flowing mixed gas*
303 *corrosion test*
- 304 IEC 60112, *Method for the determination of the proof and the comparative tracking indices of*
305 *solid insulating materials*
- 306 IEC 60227 (all parts), *Polyvinyl chloride insulated cables of rated voltages up to and including*
307 *450/750 V*
- 308 IEC 60228:2004, *Conductors of insulated cables*
- 309 IEC 60245-4, *Rubber insulated cables of rated voltages up to and including 450/750 V –*
310 *Part 4: Cords and flexible cables*
- 311 IEC 60269-1, *Low-voltage fuses – Part 1: General requirements*
- 312 IEC 60269-2, *Low-voltage fuses – Part 2: Supplementary requirements for fuses for use by*
313 *authorised persons (fuses mainly for industrial application) – Examples of standardized*
314 *systems of fuses A to K*
- 315 IEC 60309-4:2006, *Plugs, socket-outlets and couplers for industrial purposes – Part 4:*
316 *Switched socket-outlets and connectors with or without interlock*
- 317 IEC 60449, *Voltage bands for electrical installations of buildings*
- 318 IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*
- 319 IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1:*
320 *Principles, requirements and tests*
- 321 IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use*
322 *of coating, potting or moulding for protection against pollution*
- 323 IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods –*
324 *Glow-wire flammability test method for end-products*
- 325 IEC 60695-10-2, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test*
- 326 IEC 61032:1997, *Protection of persons and equipment by enclosures - Probes for verification*
- 327 IEC 61851-1:2017, *Electric vehicle conductive charging system – Part 1: General*
328 *requirements*
- 329 IEC 61851-23:2014, *Electric vehicle conductive charging system – Part 23: d.c. electric*
330 *vehicle charging station*
- 331 IEC 62893-1:2017, *Charging cables for electric vehicles for rated voltages up to and including*
332 *0,6/1 kV - Part 1: General requirements*

333 IEC 62893-2:2017, *Charging cables for electric vehicles for rated voltages up to and including*
334 *0,6/1 kV - Part 2: Test methods*

335 IEC 62893-3:2017, *Charging cables for electric vehicles for rated voltages up to and including*
336 *0,6/1 kV - Part 3: Cables for AC charging according to modes 1, 2 and 3 of IEC 61851-1 of*
337 *rated voltages up to and including 450/750 V*

338 ISO 1456, *Metallic and other inorganic coatings – Electrodeposited coatings of nickel, nickel*
339 *plus chromium, copper plus nickel and of copper plus nickel plus chromium*

340 ISO 2081, *Metallic and other inorganic coatings – Electroplated coatings of zinc with*
341 *supplementary treatments on iron or steel*

342 ISO 2093, *Electroplated coatings of tin – Specification and test methods*

343 ISO 4521:2008, *Metallic and other inorganic coatings -- Electrodeposited silver and silver*
344 *alloy coatings for engineering purposes -- Specification and test methods*

345 ISO 4522-1:2008, *Metallic coatings - Test methods for electrodeposited silver and silver alloy*
346 *coatings - Part 1: Determination of coating thickness*

347 **3 Terms and definitions**

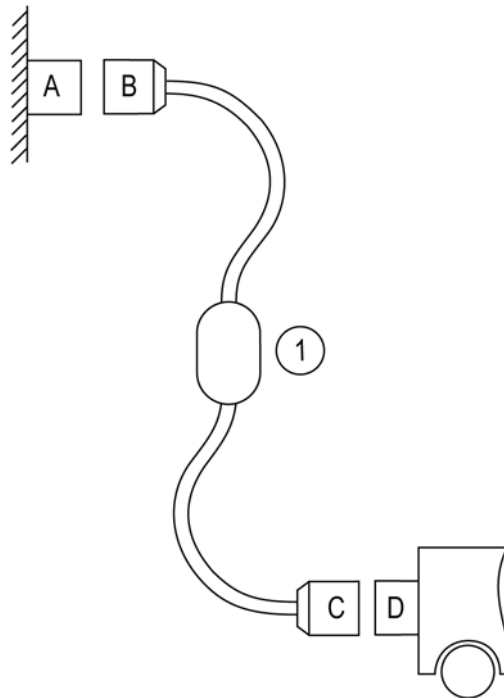
348 For the purposes of this document, the terms and definitions given in IEC 61851-1:2017 as
349 well as the following apply. **(standards.iteh.ai)**

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

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

354 NOTE 1 Where the terms voltage and current are used, they imply root mean square (RMS) values, unless
355 otherwise specified.

356 NOTE 2 The application of accessories is shown in Figure 1.



357

Key

- 1 In-cable control and protective device (IC-CPD)
- A Socket-outlet
- B Plug
- C Vehicle connector
- D Vehicle inlet

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Figure 1 – Diagram showing the use of the accessories

360

3.1361 **cable assembly**

362 assembly consisting of flexible cable or cord fitted with a plug and/or a vehicle connector, that
363 is used to establish the connection between the EV and the supply network or an EV charging
364 station

365

Note 1 to entry: A cable assembly can be detachable or be a part of the EV or of the EV charging station.

366

367

Note 2 to entry: A cable assembly can include one or more cables, with or without a fixed jacket, which can be in a flexible tube, conduit or wire way.

368

[Source 61851-1:2017, 3.5.2]

369

3.2370 **plug**

371 part integral with or intended to be attached to one flexible cable connected to the electric
372 vehicle or to a vehicle connector

373

374

Note 1 to entry: It may include mechanical, electrical or electronic components and circuitry, which perform control functions.

375

3.3376 **socket-outlet**

377 part intended to be installed with the fixed wiring, or incorporated in equipment

378 Note 1 to entry: In French, the resulting assembly when a plug is inserted into a socket-outlet is called "prise de
379 courant"

380 **3.4**
381 **vehicle connector**
382 **electric vehicle connector**
383 part integral with, or intended to be attached to, one flexible cable

384 **3.5**
385 **vehicle inlet**
386 **electric vehicle inlet**
387 part incorporated in, or fixed to, the electric vehicle

388 Note 1 to entry: The resulting assembly when a vehicle connector is inserted into a vehicle inlet is called a "vehicle
389 coupler".

390 **3.6**
391 **shutter**
392 movable part incorporated into an accessory arranged to automatically shield at least the live
393 contacts when the accessory is withdrawn from the complementary accessory

394 [SOURCE: IEC 60884-1:2002, IEC 60884-1/AMD2:2013, 3.27, modified – "socket-outlet" has
395 been replaced by "accessory" in order to cover socket-outlets, plugs, vehicle connectors and
396 vehicle inlets.]

397 **3.7**
398 **insulated end cap**
399 part made of insulating material, (located at the tip of a contact), ensuring a protection against
400 access to hazardous live parts

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401 **3.8**
402 **pilot contact**
403 auxiliary electric contact for use in a control, signalling, monitoring or interlock function

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[https://standards.iteh.ai/catalog/standards/sist/edd7eef0-5221-49c3-b142-](https://standards.iteh.ai/catalog/standards/sist/edd7eef0-5221-49c3-b142-e98ebc0d5ccb/osist-pr-en-iec-62196-1-2020)

[e98ebc0d5ccb/osist-pr-en-iec-62196-1-2020](https://standards.iteh.ai/catalog/standards/sist/edd7eef0-5221-49c3-b142-e98ebc0d5ccb/osist-pr-en-iec-62196-1-2020)

404 Note 1 to entry: Pilot contact is not considered to be a pole.

405 [SOURCE: IEC 60309-4:2006, 2.108, modified – "signalling" has been added.]

406 **3.9**
407 **compatibility**
408 **compatible**
409 ability of accessories to join together and be functional

410 Note 1 to entry: Non-compatible accessories may physically join together, but not be functional.

411 **3.10**
412 **retaining means**
413 device (e.g. mechanical or electromechanical) which holds a plug or vehicle connector in
414 position when it is in proper engagement, and prevents its unintentional withdrawal

415 EXAMPLE See standard sheets in IEC 62196-2 and -3.

416 **3.11**
417 **latching device**
418 part of the interlock mechanism provided to hold a plug in the socket-outlet or to hold a vehicle
419 connector in the vehicle inlet and to prevent its intentional or unintentional withdrawal

420 EXAMPLE See standard sheets 2-II and 2-IIIId in IEC 62196-2:2011 and 3-IIIC in IEC 62196-3:2014.