
Vtiči, vtičnice, konektorji in uvodnice na vozilih - Kabelsko napajanje električnih vozil - 2. del: Zahteve za dimenzijsko skladnost pribora s trni in cevastimi kontakti za izmenični tok (AC)

Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility requirements for AC pin and contact-tube accessories

Stecker, Steckdosen, Fahrzeugkupplungen und Fahrzeugstecker - Konduktives Laden von Elektrofahrzeugen - Teil 2: Maßliche Kompatibilitätsanforderungen an Wechselfspannungssteckvorrichtungen mit Stiften und Buchsen

Fiches, socles de prise de courant, prises mobiles de véhicule et socles de connecteurs de véhicules - Charge conductive des véhicules électriques - Partie 2: Exigences dimensionnelles de compatibilité pour les appareils à broches et alvéoles pour courant alternatif

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TITLE:

Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility requirements for AC pin and contact-tube accessories

PROPOSED STABILITY DATE: 2030

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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**Part 2: Dimensional compatibility requirements
for AC pin and contact-tube accessories**

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FOREWORD

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IEC 62196-2 has been prepared by IEC subcommittee 23H: Plugs, socket-outlets and couplers for industrial and similar applications, and for electric vehicles, of IEC technical committee 23: Electrical accessories. It is an International Standard.

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This fourth edition cancels and replaces the third edition published in 2022. This edition constitutes a technical revision.

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

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a) addition of new tests for latching devices;

b) corrections to standard sheets;

133

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

Draft	Report on voting
23H/502/FDIS	23H/506/RVD

135
136 Full information on the voting for its approval can be found in the report on voting indicated in
137 the above table.

138 The language used for the development of this International Standard is English.

139 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
140 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available
141 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
142 described in greater detail at www.iec.ch/standardsdev/publications.

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

146 This document is to be read in conjunction with IEC 62196-1:2022. The clauses of the particular
147 requirements in this document supplement or modify the corresponding clauses in IEC 62196-
148 1:2022. Where the text indicates "addition" to or "replacement" of the relevant requirement, test
149 specification or explanation of IEC 62196-1:2022, these changes are made to the relevant text
150 of IEC 62196-1:2022, which then becomes part of this document. Where no change is
151 necessary, the words "Clause X of IEC 62196-1:2022 is applicable" are used.

152 Subclauses, figures, tables, or notes which are additional to those in IEC 62196-1:2022 are
153 numbered starting from 201.

154 In this document, the following print types are used:

- 155 – requirements proper: in roman type;
- 156 – *test specifications: in italic type;*
- 157 – notes: in smaller roman type.

158 The committee has decided that the contents of this document will remain unchanged until the
159 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
160 specific document. At this date, the document will be

- 161 • reconfirmed,
- 162 • withdrawn,
- 163 • replaced by a revised edition, or
- 164 • amended.

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INTRODUCTION

168 IEC 61851 (all parts) specifies requirements for electric vehicle (EV) conductive supply
169 equipment.

170 IEC 62196 (all parts) specifies the requirements for plugs, socket-outlets, vehicle connectors,
171 vehicle inlets and cable assemblies as described in IEC 61851 (all parts).

172 Some charging using on-board vehicle chargers can be achieved by direct connection from an
173 electric vehicle to an AC supply network using common socket-outlets or by the use of
174 equipment incorporating control and communication circuits.

175 To support the connection of AC power for such vehicles, this document provides the standard
176 interface configurations of AC vehicle couplers and accessories to be used in conductive
177 charging of electric vehicles, taking the most frequent charging situations into consideration.

178 IEC 62196 consists of the following parts:

- 179 – Part 1: General requirements, comprising clauses of a general character.
- 180 – Part 2: Dimensional compatibility requirements for AC pin and contact-tube accessories.
- 181 – Part 3: Dimensional compatibility requirements for DC and AC/DC pin and contact-tube
182 vehicle couplers.
- 183 – Part 4: Dimensional compatibility requirements for DC pin and contact-tube accessories for
184 Class II or Class III applications.
- 185 – Part 6: Dimensional compatibility requirements for DC pin and contact-tube vehicle couplers
186 intended to be used for DC EV supply equipment where protection relies on electrical
187 separation.

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

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193 **Part 2: Dimensional compatibility requirements**
194 **for AC pin and contact-tube accessories**

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198 **1 Scope**

199 This part of IEC 62196 applies to EV plugs, EV socket-outlets, vehicle connectors and vehicle
200 inlets with pins and contact-tubes of standardized configurations, herein referred to as
201 accessories. These accessories have a nominal rated operating voltage not exceeding
202 480 V AC, 50 Hz to 60 Hz, and a rated current not exceeding 63 A three phase or 70 A single
203 phase, for use in conductive charging of electric vehicles.

204 This document covers the basic interface accessories for vehicle supply as specified in
205 IEC 62196-1:2022.

206 NOTE 1 The term "Electric road vehicles (EV)" comprises all road vehicles, including plug-in hybrid road vehicles
207 (PHEV) that derive all or part of their energy from the rechargeable energy storage systems (RESS).

208 These accessories are intended to be used for circuits specified in IEC 61851-1:2017, which
209 operate at different voltages and frequencies, and which can include extra-low voltage (ELV)
210 and communication signals.

211 The use of these accessories for bidirectional power transfer is under consideration.

212 This document applies to accessories to be used in an ambient temperature between $-30\text{ }^{\circ}\text{C}$
213 and $+40\text{ }^{\circ}\text{C}$.

214 NOTE 2 In the following country, other requirements regarding the lower temperature may apply: NO.

215 NOTE 3 In the following country, $-40\text{ }^{\circ}\text{C}$ applies: SE.

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

218 Vehicle inlets and vehicle connectors described in this document are intended to be used for
219 charging in modes 1, 2 and 3, cases B and C. The EV socket-outlets and EV plugs covered by
220 this document are intended to be used for charging mode 3 only, case A and B.

221 The modes and permissible connections are specified in IEC 61851-1:2017.

222 **2 Normative references**

223 Clause 2 of IEC 62196-1:202X applies, except as follows:

224 *Addition:*

225 IEC 62196-1:202X, *Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive*
226 *charging of electric vehicles – Part 1: General requirements*

227 **3 Terms and definitions**

228 Clause 3 of IEC 62196-1:202X applies.

229 **4 General**

230 Clause 4 of IEC 62196-1:202X applies.

231 **5 Ratings**

232 Clause 5 of IEC 62196-1:202X applies, except as follows:

233 **5.1 Preferred rated operating voltage ranges**

234 *Replacement:*

235 *Replace the existing text and title of IEC 62196-1:202X, 5.1 with the following:*

236 **5.1 Rated operating voltage ranges**

237 Rated operating voltages are as follows:

- 238 – 30 V (signal or control purposes only)
- 239 – 250 V AC
- 240 – 480 V AC

241 **5.2 Preferred rated currents**

242 *Replacement:*

243 *Replace the existing title of IEC 62196-1:202X, 5.2 and the existing text of Subclause 5.2.1 with*
244 *the following:*

245 **5.2 Rated currents**

246 **5.2.1 General**

247 The rated currents are as follows:

- 248 – 10 A single phase
- 249 – 13 A single phase
- 250 – 16 A single and three phase
- 251 – 20 A single and three phase
- 252 – 30 A or 32 A single and three phase
- 253 – 60 A or 63 A single and three phase
- 254 – 70 A single phase only

255 NOTE 1 In the following country, the branch circuit overcurrent protection device is based upon 125 % of the
256 accessory rating: US.

257 NOTE 2 Reference to "30 A or 32 A" and "60 A or 63 A" rating is made in accordance with national requirements.

258 **6 Connection between the power supply and the electric vehicle**

259 Clause 6 of IEC 62196-1:202X applies, except as follows:

260 **6.1 Interfaces**

261 *Replacement:*

262 *Replace the existing text of IEC 62196-1:202X, 6.1 with the following:*

263 This Clause 6 provides a description of the physical conductive electrical interface requirements
264 between the vehicle and the power supply, which allows the following design at the vehicle
265 interface:

- 266 – a basic interface that provides for current ratings up to 63 A AC three-phase and up to 70 A
267 AC single phase.

268 Different configuration types for the basic interface may allow different application of mode and
269 current ratings. See introduction to relevant standard sheets for more details.

270 **6.2 Basic interface**

271 *Replacement:*

272 *Replace the existing text of IEC 62196-1:202X, 6.2 with the following:*

273 There is one type of vehicle inlet:

- 274 – basic

275 The basic interface may contain up to seven power or signal contacts, with unique physical
276 configurations of contact positions for single or three phases. The electrical ratings and their
277 function are described in Table 201 and Table 202. The electrical ratings and their function are
278 described in the standard sheets.

279 Each vehicle inlet shall only mate with the corresponding type of vehicle connector. Each EV
280 plug shall only mate with the corresponding type of EV socket-outlet.

281 The accessories, configuration types 1, 2, 3, or 4 are rated as follows:

- 282 – configuration type 1 vehicle coupler is rated 250 V, 32 A single phase;
- 283 – configuration type 2 vehicle coupler, EV socket-outlet and EV plug are rated:
 - 284 • 250 V, 13 A or 20 A or 32 A or 63 A or 70 A single phase,
 - 285 • 480 V, 13 A or 20 A or 32 A or 63 A, three phase.
- 286 – configuration type 3 vehicle coupler, EV socket-outlet and EV plug are rated:
 - 287 • 250 V, 16 A or 32 A, single phase,
 - 288 • 480 V, 32 A or 63 A three phase.
- 289 - Configuration type 4 vehicle couplers are rated:
 - 290 • 250 V, 10 A, 16 A, or 32 A single phase,
 - 291 • 480 V, 16 A, 32 A, or 63 A three phase.

292 **Table 201 – Overview of the basic vehicle interface,**
293 **configuration type 1, single phase**

Position number ^a	AC	Functions ^c
1	250 V 32 A ^b	L1 (mains 1)
2	250 V 32 A	L2 (mains 2) / N (neutral)
3	Rated for fault	PE (ground/earth)
4	30 V 2 A	CP (Control pilot)
5	30 V 2 A	CS (Connection switch)
^a Position number does not refer to the location and/or identification of the contact in the accessory. ^b In the following country, the branch circuit overcurrent protection is based upon 125 % of the device rating: US. ^c For contacts 4 and 5, environmental conditions may demand larger conductor cross-sections.		

295
296**Table 202 – Overview of the basic vehicle interface,
configuration types 2, 3 and 4, three phase or single phase**

Position number ^f	U_{max}	Three phase			Single phase			Functions
		I_{max}^a			I_{max}^a			
	V AC	A			A			
		Type 2	Type 3	Type 4	Type 2 ^b	Type 3	Type 4	
1	480	63			70	63	32	L1 (mains 1) ^b
2	480	63			- ^c	- ^c	- ^c	L2 (mains 2)
3	480	63			- ^c	- ^c	- ^c	L3 (mains 3)
4	480	63			70	63	32	N (neutral) ^{b, e}
5	—	Rated for fault						PE (ground/earth)
6	30	2						CP (Control pilot)
7	30	2						PP (Proximity) ^d or CS (Connection switch) ^d

^a In the following country, the branch circuit overcurrent protection is based upon 125 % of the device rating: US.

^b For single phase charging, contacts 1 and 4 shall be used.

^c Unused contacts need not be installed. Not provided for Standard Sheets 2-IIIa and 2-IIIb.

^d Not provided for Standard Sheet 2-IIIa.

^e For single phase system supply phase to phase this contact can be used for L2 (mains 2).

^f Position number does not refer to the location and/or identification of the contact in the accessory.

297

6.3 DC Interface*Not applicable***6.4 Combined interface***Not applicable.***Addition:***Add the following new subclause:***6.201 Communication and control pilot function**

The control pilot and proximity detection or connection contacts are intended to be used in accordance with IEC 61851-1:2017.

7 Classification of accessories

Clause 7 of IEC 62196-1:202X applies, except as follows:

7.4 According to electrical operation*Replacement:**Replace the existing text of IEC 62196-1:202X, 7.4 with the following:*

- 312 – suitable for making and breaking an electrical circuit under load for up to 32 A configurations
- 313 types 1 and 3;
- 314 – not suitable for making and breaking an electrical circuit under load for configuration type 1
- 315 and 2;

- 316 – not suitable for making and breaking an electrical circuit under load for 63 A configuration
317 type 3;
- 318 – not suitable for making and breaking an electrical circuit under load for 32 A or 63 A
319 configuration type 4;
- 320 – not suitable for making and breaking an electrical circuit under load for 33 A or 63 A but
321 suitable for breaking all ratings up to 16 A for configuration 4.

322 NOTE Communication circuits according to this document are deemed not to make or break load as a result of this
323 Subclause 7.4.

324 **7.5 According to interface**

325 *Replacement:*

326 *Replace the existing text of IEC 62196-1:202X, 7.5 with the following:*

327 Interface is specified in Clause 6:

- 328 – basic type.

329 *Addition:*

330 *Add the following new subclause:*

331 **7.201 According to the standard sheet used**

- 332 – configuration type 1;
- 333 – configuration type 2;
- 334 – configuration type 3;
- 335 – configuration type 4.

336 **8 Marking**

337 Clause 8 of IEC 62196-1:202X applies.

338 **9 Dimensions**

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339 Clause 9 of IEC 62196-1:202X applies, except as follows:

340 *Addition:*

341 *Add the following new subclause:*

342 **9.201 Standard sheets**

343 Accessories shall comply with the relevant standard sheets as specified below and in Table 203:

- 344 – Configuration type 1
 - 345 • 32 A, 250 V single-phase vehicle couplers: Standard Sheet 2-I.
 - 346 • Optional latching system: Standard Sheet 2-Ia.

347 NOTE In the following countries, Standard Sheets 2-I and 2-Ia may be applied to vehicle couplers with rated current
348 up to 80 A: US, KR, JP.

- 349 – Configuration type 2

- 350 • 63 A, 480 V three-phase or 250 V, 70 A single-phase accessories: Standard Sheets 2-
351 II, IIa, IIb, IIc, IId, IIe, IIf, IIg and IIh, as specified in Table 204.

- 352 – Configuration type 3

- 353 • 16 A, 250 V single-phase accessories with one pilot: Standard Sheet 2-IIIa;

- 354 • 32 A, 250 V single-phase accessories with two pilots: Standard Sheet 2-IIIb;
 355 • 63 A, 480 V three-phase accessories with two pilots: Standard Sheet 2-IIIc;
 356 • Latching means and maximum dimensions of vehicle connector body outline: Standard
 357 Sheet 2-IIId.
 358 – Configuration type 4
 359 • 10 A, 16 A. or 32 A, 250 V single-phase accessories: Standard Sheet 2-IV;
 360 • 16A, 32 A, or 63 A, 480 V three-phase accessories: Standard Sheet 2-IV.
 361
 362

Table 203 – Configuration types and standard sheets

Configuration type	Standard sheet	Applicable accessories	Rated voltage V	Rated current A	Phase
1	2-I	Vehicle couplers	250	32	Single phase
2	2-II	Accessories	250	70	Single phase
			480	63	Three phase
3	2-III	Accessories	250	16	Single phase
			250	32	Single phase
			480	63	Three phase
4	2-IV	Accessories			
			250	32	Single phase
			480	63	Three phase

363

10 Protection against electric shock

365 Clause 10 of IEC 62196-1:202X applies.

11 Size and colour of protective earthing and neutral conductors

367 *Replacement:*

368 *Replace the existing text of IEC 62196-1:202X, Clause 11 with the following:*

369 The core connected to the earthing terminal shall be identified by the colour combination green-
 370 and-yellow. The nominal cross-sectional area of the earthing conductor and of the neutral
 371 conductor, if any, shall be at least equal to that of the phase conductors.

372 NOTE In the following countries, the colour green may be used to identify the earthing conductor: JP, US, CA, KR,
 373 BR.

12 Provisions for earthing

375 Clause 12 of IEC 62196-1:202X applies.

13 Terminals

377 Clause 13 of IEC 62196-1:202X applies, except as follows.

378 *Addition:*