

---

**Oplaščeni vodniki za nadzemne vode in ustrezen pribor za naznačene izmenične napetosti nad 1 kV, ki ne presegajo 36 kV - 2. del: Pribor za oplaščene vodnike - Preskusi in prevzemni pogoji**

Covered conductors for overhead lines and the related accessories for rated voltages above 1 kV a.c. and not exceeding 36 kV a.c. - Part 2: Accessories for covered conductors - Tests and acceptance criteria

Kunststoffumhüllte Leiter und zugehörige Armaturen für Freileitungen mit Nennspannungen über 1 kV und nicht mehr als 36 kV Wechselspannung - Teil 2: Armaturen für kunststoffumhüllte Freileitungsseile - Prüfungen und Anforderungen

<https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8eb9/osist-pr-en-50397-2-2021>

Conducteurs gainés pour lignes aériennes et accessoires associés pour des tensions assignées supérieures à 1 kV en courant alternatif et ne dépassant pas 36 kV en courant alternatif - Partie 2: Accessoires pour conducteurs gainés - Exigences et essais

**Ta slovenski standard je istoveten z: prEN 50397-2**

**ICS:**

29.060.20	Kabli	Cables
29.240.20	Daljnovodi	Power transmission and distribution lines

**oSIST prEN 50397-2:2021 en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[oSIST prEN 50397-2:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8e69/osist-pren-50397-2-2021>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 50397-2**

August 2021

ICS 29.240.20

Will supersede EN 50397-2:2009 and all of its amendments and corrigenda (if any)

English Version

## Covered conductors for overhead lines and the related accessories for rated voltages above 1 kV a.c. and not exceeding 36 kV a.c. - Part 2: Accessories for covered conductors - Tests and acceptance criteria

Conducteurs gainés pour lignes aériennes et accessoires associés pour des tensions assignées supérieures à 1 kV en courant alternatif et ne dépassant pas 36 kV en courant alternatif - Partie 2: Accessoires pour conducteurs gainés - Exigences et essais

Kunststoffumhüllte Leiter und zugehörige Armaturen für Freileitungen mit Nennspannungen über 1 kV und nicht mehr als 36 kV Wechselspannung - Teil 2: Armaturen für kunststoffumhüllte Freileitungsseile - Prüfungen und Anforderungen

This draft European Standard is submitted to CENELEC members for enquiry.  
Deadline for CENELEC: 2021-11-05.

It has been drawn up by CLC/TC 20.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CENELEC in three official versions (English, French, German).  
A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

1	<b>Contents</b>	Page
2	<b>European foreword</b> .....	4
3	<b>Introduction</b> .....	5
4	<b>1 Scope</b> .....	6
5	<b>2 Normative references</b> .....	6
6	<b>3 Terms and definitions</b> .....	6
7	<b>4 Requirements</b> .....	8
8	<b>4.1 General requirements</b> .....	8
9	<b>4.2 Specific requirements for fittings used on covered conductor</b> .....	9
10	<b>4.3 Marking</b> .....	10
11	<b>5 Quality assurance</b> .....	10
12	<b>6 Classification of tests – Type tests, sample tests, routine tests</b> .....	10
13	<b>6.1 Type tests</b> .....	10
14	<b>6.2 Sample tests</b> .....	11
15	<b>6.3 Routine tests</b> .....	11
16	<b>7 Tests</b> .....	11
17	<b>7.1 General</b> .....	11
18	<b>7.2 Visual examination</b> .....	12
19	<b>7.3 Dimensional and material verification</b> .....	12
20	<b>7.4 Test for permanent marking</b> .....	12
21	<b>7.5 Mechanical tests</b> .....	12
22	<b>7.6 Hot dip galvanizing test</b> .....	29
23	<b>7.7 Water tightness test</b> .....	29
24	<b>7.8 Electrical ageing test for connectors and Joints</b> .....	30
25	<b>7.9 Short-circuit test on APD or EPD</b> .....	30
26	<b>7.10 Power arc test</b> .....	31
27	<b>7.11 Environmental test for suspension and tension clamps</b> .....	32
28	<b>7.12 Environmental tests for connectors and joints</b> .....	35
29	<b>7.13 Endurance test for joints (optional)</b> .....	36
30	<b>Annex A (normative) Type tests, sample tests and routine tests</b> .....	37
31	<b>Annex B (informative) Example of sampling with inspection by attributes</b> .....	39
32	<b>Annex C (informative) Example of sampling with inspection by variable</b> .....	40
33	<b>Annex D (normative) Special national conditions</b> .....	41
34	<b>Bibliography</b> .....	42

iTech STANDARD PREVIEW

(standards.iteh.ai)

oSIST prEN 50397-2:2021

<https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846ec8ef9/osist-pren-50397-2-2021>

f76846ec8ef9/osist-pren-50397-2-2021

35	<b>Figures</b>	
36	Figure 1 — Test arrangement for damage and failure load test .....	14
37	Figure 2 — Test arrangement of slip test at ambient temperature .....	14
38	Figure 3 — Slip test arrangement at low temperature.....	16
39	Figure 4 — Lift and side load test .....	18
40	Figure 5 — Tensile test arrangement .....	20
41	Figure 6 — Arrangement for the low temperature zone .....	21
42	Figure 7 — Test arrangement .....	26
43	Figure 8 — Mechanical stresses on earth parking device .....	28
44	Figure 9 — Test arrangement for water tightness test .....	30
45	Figure 10 — Resistance measurement.....	31
46	Figure 11 — Example of power arc test arrangement for arc protection system.....	32
47	<b>Tables</b>	
48	Table 1 — Specified minimum loads .....	18
49	Table A.1 .....	37

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 50397-2:2021](https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8e69/osist-pren-50397-2-2021)  
<https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8e69/osist-pren-50397-2-2021>

prEN 50397-2:2021 (E)

50 **European foreword**

51 This document (prEN 50397-2:2021) has been prepared by CLC/TC 20 “Electric cables”.

52 This document is currently submitted to the Enquiry.

53 The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

54 This document will supersede EN 50397-2:2009 and all of its amendments and corrigenda (if any).

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[oSIST prEN 50397-2:2021](https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8e69/osist-pren-50397-2-2021)

<https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8e69/osist-pren-50397-2-2021>

## 55 Introduction

56 Covered conductors consist of a conductor surrounded by a covering made of insulating material as protection  
57 against accidental contacts with other covered conductors and with grounded parts such as tree branches, etc.  
58 In comparison with insulated conductors, this covering has reduced properties, but is able to withstand the  
59 phase-to-earth voltage temporarily.

60 Since covered conductors are unscreened, they are not touch-proof, i.e. they must be treated as bare  
61 conductors with respect to electric shock.

62 This document does not cover aspects related to the installation of overhead lines such as determination of  
63 clearances, spans, sags, etc.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 50397-2:2021](https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8e69/osist-pren-50397-2-2021)

<https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8e69/osist-pren-50397-2-2021>

## prEN 50397-2:2021 (E)

64 **1 Scope**

65 This Part 2 of EN 50397 contains the requirements for accessories that are for use with the covered conductors  
66 in accordance with EN 50397-1. They are for applications in overhead lines with rated voltages  $U$  above  
67 1 kV a.c. and not exceeding 36 kV a.c.

68 NOTE This document describes the requirements and tests only for the accessories installed on the covered conductor  
69 itself.

70 **2 Normative references**

71 The following documents are referred to in the text in such a way that some or all of their content constitutes  
72 requirements of this document. For dated references, only the edition cited applies. For undated references, the  
73 latest edition of the referenced document (including any amendments) applies.

74 EN 50397-1:2020, *Covered conductors for overhead lines and the related accessories for rated voltages above  
75 1 kV a.c. and not exceeding 36 kV a.c. - Part 1: Covered conductors*

76 EN 50483-5, *Test requirements for low voltage aerial bundled cable accessories - Part 5: Electrical ageing test*

77 EN 50483-6:2009, *Test requirements for low voltage aerial bundled cable accessories - Part 6: Environmental  
78 testing*

79 EN 61284:1997, *Overhead lines - Requirements and tests for fittings (IEC 61284:1997)*

80 EN 61467, *Insulators for overhead lines - Insulator strings and sets for lines with a nominal voltage greater than  
81 1 000 V - AC power arc tests (IEC 61467)*

82 EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods  
83 (ISO 1461)*

84 ISO 2859-1, *Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by  
85 acceptance quality limit (AQL) for lot-by-lot inspection*

86 ISO 2859-2, *Sampling procedures for inspection by attributes - Part 2: Sampling plans indexed by limiting quality  
87 (LQ) for isolated lot inspection*

88 ISO 3951 (series), *Sampling procedures for inspection by variables*

89 **3 Terms and definitions**

90 For the purposes of this document, the following terms and definitions apply.

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

92 — ISO Online browsing platform: available at <https://www.iso.org/obp>

93 — IEC Electropedia: available at <http://www.electropedia.org/>

94 **3.1**95 **type test**

96 test required to be made before supplying a type of product covered by this document on a general commercial  
97 basis in order to demonstrate satisfactory performance characteristics to meet the intended application

98 Note 1 to entry: Symbol T.

99 Note 2 to entry: These tests are of such nature that, after they have been made, they need not be repeated unless changes  
100 are made in the material, design or manufacturing process, which might change the performance characteristics.



- 101 **3.2**  
 102 **sample test**  
 103 test made on samples of completed product or components taken from the completed product adequate to  
 104 verify, that the finished product meets the design specifications
- 105 Note 1 to entry: Symbol S.
- 106 **3.3**  
 107 **routine test**  
 108 test intended to prove conformance of fittings to specific requirements and made on every fitting
- 109 Note 1 to entry: Symbol R.
- 110 **3.4**  
 111 **rated voltage**  
 112 reference voltage ( $U$ ), for which it is designed and which serves to define the electrical tests
- 113 Note 1 to entry: The rated voltage is expressed by the value  $U$  expressed in kV, where  $U$  is the r.m.s. value between any  
 114 two phase conductors.
- 115 **3.5**  
 116 **ambient temperature**  
 117 temperature from 15 °C to 30 °C
- 118 **3.6**  
 119 **factory-formed helical conductor fitting**  
 120 fitting consisting of helically formed wires which provide the force necessary to grip the conductor by self-  
 121 tightening
- 122 **3.7**  
 123 **tension clamp**  
 124 device which firmly attaches a covered conductor to a support and is designed to transmit the specified  
 125 mechanical tension in the conductor to the supporting structure
- 126 [SOURCE: IEC 461-18-01, modified]
- 127 **3.8**  
 128 **tension joint**  
 129 mid-span sleeve designed to joint two lengths of tensioned conductor
- 130 **3.9**  
 131 **non-tension joint**  
 132 sleeve designed to joint two lengths of non tensioned conductor
- 133 **3.10**  
 134 **suspension clamp**  
 135 device which attaches a covered conductor to a support in order to carry its weight and any specified load
- 136 [SOURCE: IEC 461-18-02 modified]
- 137 **3.11**  
 138 **top clamp**  
 139 device to clamp the covered conductor on the top of a pin or line post insulator in order to carry its weight and  
 140 any specified load

## prEN 50397-2:2021 (E)

- 141 **3.12**  
 142 **branch connector**  
 143 metallic device for connecting a branch conductor to a main conductor at an intermediate point on the latter
- 144 [SOURCE: IEC 461-17-05]
- 145 **3.13**  
 146 **arc protection device**  
 147 **APD**  
 148 metallic device installed on the conductor or on accessories to protect the conductor against the possible arcs
- 149 **3.14**  
 150 **arc protection system**  
 151 assembly of arc protection devices, insulators and conductor, including all needed accessories
- 152 **3.15**  
 153 **earth parking device**  
 154 **EPD**  
 155 device installed on the conductor to allow temporary earthing
- 156 **3.16**  
 157 **specified minimum slip load**  
 158 **SMSL**  
 159 minimum load specified by the purchaser or declared by the supplier at which slippage will not take place
- 160 **3.17**  
 161 **specified minimum failure load**  
 162 **SMFL**  
 163 minimum load specified by the purchaser or declared by the supplier at which mechanical failure will not take  
 164 place
- iTech STANDARD PREVIEW  
 (standards.iteh.ai)
- <https://standards.iteh.ai/catalog/standards/sist/03805875-a477-4a8d-ba7c-f76846cc8e69/osist-pr-en-50397-2-2021>
- 165 Note 1 to entry: From the probabilistic point of view, the specified minimum failure load corresponds to the value having  
 166 the probability of e % in the distribution function of the strength of the fitting. The exclusion limit e % is usually taken within  
 167 2 % to 5 % with 10 % being the upper limit (see IEC 60826).
- 168 **3.18**  
 169 **minimum breaking load**  
 170 **MBL**  
 171 minimum breaking load of the conductor given by the manufacturer if not defined in EN 50397-1
- 172 **4 Requirements**
- 173 **4.1 General requirements**
- 174 **4.1.1 General**
- 175 General requirements shall be according to EN 61284:1997, 4.1.
- 176 Other accessories should be resistant against corrosion and environmental ageing.
- 177 **4.1.2 Speed of load application**
- 178 For all mechanical tests, the load increase shall be carried out smoothly with a tension machine and the rate of  
 179 the load increase shall be between 5 000 N/min and 7 500 N/min for mechanical accessories and 1 000 N/min  
 180 to 5 000 N/min for connectors.

## 181 4.2 Specific requirements for fittings used on covered conductor

### 182 4.2.1 General

183 The piercing part or element of any accessories shall not decrease the mechanical strength of the conductor  
184 below than 90 % of the Minimum breaking load (MBL) of the conductor. All accessories are watertight, they  
185 shall prevent moisture ingress in the conductor. The water tightness shall be tested according to 7.7.

186 The intended piercing of the cover is not considered as a damage caused by the fitting.

### 187 4.2.2 Tension clamps

188 For the purpose of terminating covered conductors over the covering fitting shall include, but are not limited to,  
189 the following:

190 — cone, bolted or wedge type clamp;

191 — preformed helical fittings.

192 The fittings shall be able to withstand the specific minimum failure load (SMFL) and shall not damage the  
193 covering and shall be designed to prevent the ingress of moisture during service.

194 “shall not damage the covering” means no damage shall occur which could affect the correct function of the  
195 covering.

### 196 4.2.3 Suspension and top clamps

197 Fittings for the purpose of suspension over the covering include, but are not limited to the following:

198 — top-clamps;

199 — pre-formed helical fittings;

200 — suspension clamp according to EN 61284:1997, 11.4.

201 The fittings shall not damage the covering and shall be designed to prevent the ingress of moisture during  
202 service.

203 “shall not damage the covering” means no damage shall occur which could affect the correct function of the  
204 covering.

205 The suspension clamps shall be so designed that the effects of vibration, both on the covered conductor and  
206 on the clamps themselves, are minimized. The clamps shall be designed to avoid localized pressure or damage  
207 to the covered conductor.

208 If needed the suspension clamps shall have sufficient current carrying capability to avoid damage by fault  
209 currents.

210 The wear resistance of the articulation assembly shall be sufficient to prevent deterioration in service.

### 211 4.2.4 Connectors for piercing the covering

212 Connectors shall be capable of carrying the load current, and fault current if any.

### 213 4.2.5 Arc protection devices

214 These protection devices are designed to protect insulator sets and covered conductors against damage caused  
215 by power arcs (arcing horns, arcing rings).

216 The maximum short-circuit current shall be 10 kA for 1 s.

217 This device shall be delivered with an installation instruction. It shall include the description of the conditions for  
218 installation of arc protection system in order this whole installation withstands the arc power test at 1 kA and  
219 10 kA.

**prEN 50397-2:2021 (E)**

220 The arc protective devices shall withstand a mechanical load in order to support the installation strengths.

221 **4.2.6 Earth parking devices**

222 The earth parking device shall be capable of carrying the short circuit current. The maximum short circuit current  
223 shall be 10 kA for 1 s.

224 These fittings shall withstand a mechanical load in order to support the installation strengths.

225 **4.2.7 Joint**

226 The joint shall be suitable for the covered conductor for which they are designed.

227 The joint shall have the same basic insulation properties as the conductor covering. In this case, the test shall  
228 be carried out according to EN 50397-1:2020, Table 2, ref. 1.2 "High voltage test". The conductor shall have a  
229 sufficient length so that the joint is immersed and the test duration shall be same as for sample test.

230 **4.3 Marking**

231 All products mentioned above shall permanently bear:

232 — manufacturer's trade mark or logo;

233 — product code or reference;

234 — traceability code / batch number;

235 — the minimum and maximum cross section for which the unit is suitable;

236 — tightening torque or die reference, if applicable;

237 — recycling code, if any.

238 Other specific markings should be agreed between customer and manufacturer.

239 A test for marking is provided in 7.4.

240 **5 Quality assurance**

241 A quality assurance programme taking into account the requirements of this document can be used by  
242 agreement between the purchaser and the supplier to verify the quality of the fittings during the manufacturing  
243 process.

244 NOTE Detailed information on the use of quality assurance is given in EN ISO 9000, and other standards in the same  
245 series.

246 **6 Classification of tests – Type tests, sample tests, routine tests**

247 **6.1 Type tests**

248 **6.1.1 General**

249 Type tests are intended to establish design characteristics. They are normally only made once and repeated  
250 only when the design or the material of the fitting is changed. The results of type tests are recorded as evidence  
251 of compliance with design requirements.

252 **6.1.2 Application**

253 Fittings shall be subject to type tests in accordance with Table A.1.

## 254 6.2 Sample tests

### 255 6.2.1 General

256 Sample tests are intended to verify the quality of materials and workmanship.

### 257 6.2.2 Application

258 Overhead line fittings shall be subjected to sample tests as listed in Table A.1. The samples to be tested shall  
259 be selected at random from the lot offered for acceptance. The purchaser has the right to make the selection.

### 260 6.2.3 Sampling and acceptance criteria

261 Unless otherwise agreed between purchaser and supplier, the sampling plan procedures according to  
262 ISO 2859-1, ISO 2859-2 (inspection by attributes) and to the ISO 3951 series (inspection by variables) shall be  
263 applied.

264 For each sample test, the type of inspection (by attributes or by variables) and the detailed procedures  
265 (inspection level, acceptable quality level, single, double or multiple sampling, etc.) shall be agreed between  
266 purchaser and supplier (see example in Annex B for inspection by attributes, and Annex C for inspection by  
267 variables).

268 NOTE Sampling inspection by variables is an acceptance sampling procedure to be used in place of inspection by  
269 attributes when it is more appropriate to measure on some continuous scale the characteristic(s) under consideration. In the  
270 case of failure load tests and similar expensive tests, better discrimination between acceptable quality and objective quality  
271 is available with acceptance sampling by variables than by attributes for the same sample size.

272 The purpose of the sampling process may also be important in the choice between a variables or attributes  
273 plan.

274 For example, a purchaser may choose to use an attributes acceptance sampling plan to ensure that parts in a  
275 shipment lot are within a required dimensional tolerance; the manufacturer may make measurements under a  
276 variables sampling plan of the same dimensions because he is concerned with gradual trends or changes which  
277 may affect his ability to provide shipment lots which meet the AQL.

## 278 6.3 Routine tests

### 279 6.3.1 General

280 Routine tests are intended to prove conformance of fittings to specific requirements and are made on every  
281 fitting. The tests shall not damage the fitting.

### 282 6.3.2 Application and acceptance criteria

283 The compliance with the requirements according to Clause 4 shall be established by the tests listed in Table A.1.  
284 The tests are only for fittings which are clamping the conductor over the covering.

## 285 7 Tests

### 286 7.1 General

287 Three samples of fittings or clamps shall be tested, except when the specific subclause requires another  
288 number.

289 Annex A provides a table of the general tests required for each product.

290 NOTE This clause defines only the tests for fittings used over the covering.

291 For fittings directly used on conductor itself, see EN 61284.