



SLOVENSKI STANDARD
oSIST prEN IEC 60794-1-1:2022
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Optični kabli - 1-1. del: Splošna specifikacija - Splošno

Optical fibre cables - Part 1-1: Generic specification - General

Lichtwellenleiterkabel - Teil 1-1: Fachgrundspezifikation - Allgemeines

Câbles à fibres optiques - Partie 1-1: Spécification générique - Généralités

Ta slovenski standard je istoveten z: **prEN IEC 60794-1-1:2022**

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(Optična) vlakna in kabli

Fibres and cables

oSIST prEN IEC 60794-1-1:2022

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IEC SC 86A : FIBRES AND CABLES	
SECRETARIAT: France	SECRETARY: Mr Laurent Gasca
OF INTEREST TO THE FOLLOWING COMMITTEES:	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: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING	
<p>Attention IEC-CENELEC parallel voting</p> <p>The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.</p> <p>The CENELEC members are invited to vote through the CENELEC online voting system.</p>	

This document is still under study and subject to change. It should not be used for reference purposes.

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

TITLE:

Optical fibre cables - Part 1-1: Generic specification - General

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

Part 1-1: Generic specification – General

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.
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 - 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.
- IEC 60794-1-1 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics. It is an International Standard.
- This fifth edition cancels and replaces the fourth edition published in 2015. This edition constitutes a technical revision.
- This edition includes the following significant technical changes with respect to the previous edition:
- a) the reorganization of the document to a more logical flow making it easier for the reader
 - b) expansion of the tables to include names and definitions of all standards in the IEC 60794-x series
 - c) the expansion of the definitions, graphical symbols, terminology and abbreviations content, with the aim of making this standard the default and reference for all others in the IEC 60794-x series.

137 d) the inclusion of updated, reorganized and expanded optical fibre, attenuation and bandwidth
 138 sections, with the aim of making this standard the default and reference for all others in the
 139 IEC 60794-x series.

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

Draft	Report on voting
86A/XX/FDIS	86A/XX/RVD

141
 142 Full information on the voting for its approval can be found in the report on voting indicated in
 143 the above table.

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

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

149 The committee has decided that the contents of this document will remain unchanged until the
 150 stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to
 151 the specific document. At this date, the document will be

- 152 • reconfirmed,
- 153 • withdrawn,
- 154 • replaced by a revised edition, or
- 155 • amended.

156 <https://standards.iteh.ai/catalog/standards/sist/704f8762-7139-4084-97fa-f610336330e0/osist-pren-iec-60794-1-1-2022>
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

Part 1-1: Generic specification – General

1 Scope

This part of IEC 60794 applies to optical fibre cables for use with communication equipment and devices employing similar techniques. Electrical properties are specified for OPGW and OPPC cables. Hybrid communication cables are specified in IEC 62807 series..

The object of this standard is to establish uniform generic requirements for the geometrical, transmission, material, mechanical, ageing (environmental exposure), climatic and electrical properties of optical fibre cables and cable elements, where appropriate.

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 60189-1, *Low-frequency cables and wires with PVC insulation and PVC sheath – Part 1: General test and measuring methods*

IEC 60304, *Standard colours for insulation for low-frequency cables and wires*

IEC 60793-1-21, *Optical fibres Part 1-21: Measurement methods and test procedures – Coating geometry*

IEC 60793-1-22, *Optical fibres - Part 1-22: Measurement methods and test procedures – Length measurement*

IEC 60793-1-40, *Optical fibres – Part 1-40: Attenuation measurement methods*

IEC 60793-1-44, *Optical fibres – Part 1-44: Measurement methods and test procedures – Cut-off wavelength*

IEC 60793-1-46, *Optical fibres – Part 1-46: Measurement methods and test procedures – Monitoring of changes in optical transmittance*

IEC 60793-1-48, *Optical fibres – Part 1-48: Measurement methods and test procedures – Polarization mode dispersion*

IEC 60793-2, *Optical fibres – Part 2: Product specifications – General*

IEC 60793-2-10, *Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres*

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- 194 IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for*
195 *class B single-mode fibres*
- 196 IEC 60794-1-21, *Optical fibre cables – Part 1-21: Generic specification – Basic optical cable*
197 *test procedures – Mechanical tests methods*
- 198 IEC 60794-1-22, *Optical fibre cables – Part 1-22: Generic specification – Basic optical cable*
199 *test procedures – Environmental tests methods*
- 200 IEC 60794-2-23 *Detailed specification for multi-fibre cables for use in MPO connector*
201 *terminated cable assemblies*
- 202 IEC 60794-2-24 *Detailed specification for multiple multi-fibre unit cables for use in MPO*
203 *connector terminated breakout cable assemblies*
- 204 IEC 60811-201, *Electric and optical fibre cables – Test methods for non-metallic materials –*
205 *Part 201: General tests – Measurement of insulation thickness*
- 206 IEC 60811-202, *Electric and optical fibre cables – Test methods for non-metallic materials –*
207 *Part 202: General tests – Measurement of thickness of non-metallic sheath*
- 208 IEC 60811-203, *Electric and optical fibre cables – Test methods for non-metallic materials –*
209 *Part 203: General tests – Measurement of overall dimensions*
- 210 IEC TR 61282-3, *Fibre optic communication system design guides - Part 3: Calculation of link*
211 *polarization mode dispersion*
- 212 ISO 14001, *Environmental management systems – Requirements with guidance for use*
oSIST prEN IEC 60794-1-1:2022
- 213 ISO 14064-1, *Greenhouse gases – Part 1: Specification with guidance at the organization level*
214 *for quantification and reporting of greenhouse gas emissions and removals*
1-2022

215 3 Terms and definitions

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

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

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

221 3.1

222 no change in attenuation

223 acceptance criterion for attenuation measurement that includes an allowance for measurement
224 uncertainty arising from measurement errors or calibration errors due to a lack of suitable
225 reference standards

226 Note 1 to entry: For a practical interpretation, the following values shall be used:

- 227 a) no change in attenuation, single-mode (Class B): the total uncertainty of measurement shall be $\leq \pm 0,05$
228 dB for attenuation or $\leq \pm 0,05$ dB/km for attenuation coefficient. Any measured value within this range shall
229 be considered as “no change in attenuation”

230 The requirement for these parameters is indicated as “No change ($\leq \pm 0,05$ dB or $\leq \pm 0,05$ dB/km)”.

231 By agreement between customer and supplier, minor deviation from this limit may be accepted at some low
232 frequency, e.g. less than 10%. However, for mechanical tests no deviation in excess of 0,15 dB shall be
233 accepted. For environmental tests no deviation in excess of 0,10 dB/km shall be accepted.

234 b) no change in attenuation, multimode (Category A1): the total uncertainty of measurement shall be $\leq \pm 0,2$
235 dB for attenuation or $\leq \pm 0,2$ dB/km for attenuation coefficient

236 Any measured value within this range shall be considered as “no change in attenuation”.

237 The requirement for these parameters is indicated as “No change ($\leq \pm 0,2$ dB or $\leq \pm 0,2$ dB/km)”.

238 By agreement between customer and supplier, minor deviation from this limit may be accepted at some low
239 frequency, e.g. less than 10%. However, for mechanical tests no deviation in excess of 0,5 dB shall be
240 accepted. For environmental tests no deviation in excess of 0,5 dB/km shall be accepted.

241 c) no change in attenuation, plastic optical fibre (Category A4): the total uncertainty of measurement for this
242 standard shall be ≤ 2 % of maximum specified attenuation in IEC 60793-2-40 Annex A to I

243 Any measured value within this range shall be considered as “no change in attenuation”.

244 3.2

245 allowable change in attenuation

246 <during mechanical and environmental tests> change in attenuation that may be a value larger
247 than the no change limits, depending on fibre category, single-mode or multimode, cable design
248 and application

249 3.3

250 link design attenuation

251 LDA

252 statistical average attenuation value for a link of concatenated cables

253 3.4

254 no change in fibre strain

255 acceptance criterion for fibre strain measurement that includes an allowance for measurement
256 uncertainty arising from measurement errors or calibration errors due to a lack of suitable
257 reference standards

258 Note 1 to entry: For a practical interpretation, the total uncertainty of measurement shall be $\pm 0,05$ % strain. Any
259 measured value within this range shall be considered as “no change in strain”.

260 3.5

261 allowable change in fibre strain

262 <during mechanical and environmental tests> level of strain that will not compromise fibre
263 mechanical reliability for some of the parameters specified

264 3.6

265 cable load definitions (non-aerial applications)

266 3.6.1

267 long-term load

268 T_L

269 acceptable amount of long-term load which the cable may experience during operation (i.e.
270 after installation is completed)

271 Note 1 to entry: Long-term load may be due to residual loading from the installation process and/or environmental
272 effect. This is the rated maximum load for which a cable is subject to in long term tests.

273 Note 2 to entry: For 1 % proof-tested fibres, the fibre strain under long term tensile load (T_L) shall not exceed 20 %
274 of this fibre proof strain (equal to absolute 0,2 % strain) and there shall be no change in attenuation during the test

275 Note 3 to entry: For fibres proof tested at higher levels the safe long-term load will not scale linearly with proof strain,
276 so a lower percentage of the proof strain is applicable. For greater than 1 % up to 2 % proof-tested fibres, the strain
277 at T_L shall be limited to 17 % of the proof-test strain (equal to absolute 0,34 % strain for 2 % proof tested fibres).

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279 **3.6.2**280 **short-term load**281 **T_S**

282 acceptable amount of short-term load that can be applied to a cable without permanent
283 degradation of the characteristics of the fibres, cable elements or sheath

284 Note 1 to entry: Short-term load is often called rated installation load.

285 Note 2 to entry: Under short term tensile load (T_S) the fibre strain shall not exceed 60 % of the fibre proof strain and
286 the attenuation change during test shall be measured and recorded.

287 **3.7**288 **cable load definitions and tensile testing terminology**
289 **(self-supporting aerial applications)**290 **3.7.1**291 **maximum allowable tension**292 **MAT**

293 maximum tensile load that may be applied to the cable without detriment to the performance
294 requirements (e.g. attenuation, fibre reliability) due to fibre strain

295 Note 1 to entry: Due to installation codes the MAT value is sometimes restricted to be less than 60 % of the breaking
296 tension of the cable.

297 Note 2 to entry: This is also called UOS, Ultimate Operational Strength, 60% of RTS (and fibre strain < 0.35%, 1/3
298 of proof test). MAT < 60% UOS.

299 Note 3 to entry: This is also called EDS, Every Day Stress, defined as 25% of RTS and no fibre strain (<0.05%)

300 **3.7.2**301 **strain margin**

302 value of cable elongation at the onset of fibre strain

303 Note 1 to entry: Strain margin may also be expressed as cable load (N) at the onset of fibre strain.

304 **3.7.3**305 **breaking tension**

306 tensile load that will produce physical rupture of the cable

307 Note 1 to entry: The breaking tension may be calculated, provided that the design model has been validated.

308 **3.7.4**309 **maximum installation tension**310 **MIT**

311 maximum recommended stringing tension during installation

312 **3.7.5**313 **rated tensile strength**314 **RTS**

315 summation of the product of nominal cross-sectional area, nominal tensile strength, and
316 stranding factor for each load bearing material in the cable construction

317 **3.7.6**318 **creep**

319 tendency of a solid material to slowly move or deform permanently under the influence of stress

320 Note 1 to entry: The information derived from creep testing may be used in the sag-tension calculations during the
321 design layout of aerial optical cables used along electrical power lines.

- 322 **3.8**
323 **cable section**
324 individual reel of cable, as produced
- 325 **3.9**
326 **fittings**
327 hardware used for stringing and clipping of aerial cables to the structures (e.g. towers, poles)
328 at the end of the installation procedure
- 329 Note 1 to entry: Suspension, dead end, vibration damper and bonding clamps hardware are designed for a specific
330 size and/or type of aerial cable.
- 331 **3.10**
332 **cable element**
333 component of a cable designed to house and protect the optical fibres
- 334 Note 1 to entry: Changed from “fibre optic unit” in IEC 60794-4-10 to “cable element” to be consistent with IEC 60794-
335 1-23 and also to avoid confusion with IEC 60794-5-20.
- 336 **3.11**
337 **polarization mode dispersion (PMD) terms**
- 338 **3.11.1**
339 **differential group delay**
340 **DGD**
341 relative time delay between the two fundamental polarization modes (principal states of
342 polarization) at the end of an optical fibre cable, at a particular time and wavelength
- 343 Note 1 to entry: Differential group delay is expressed in ps.
- 344 **3.11.2**
345 **polarization mode dispersion (PMD) value**
346 average of DGD values across wavelengths
- 347 Note 1 to entry: The polarization mode dispersion value is expressed in ps.
- 348 **3.11.3**
349 **polarization mode dispersion (PMD) coefficient**
350 PMD value of an optical fibre cable divided by the square root sum of its length (km)
- 351 Note 1 to entry: The polarization mode dispersion coefficient is expressed in ps/ $\sqrt{\text{km}}$.
- 352 **3.11.4**
353 **link**
354 length of cable composed of a number of individual cable sections
- 355 Note 1 to entry: Link PMD values are generally calculated according to the formulae given in IEC TR 61282-3:2006
356 but may be measured.
- 357 **3.12**
358 **recovery time**
359 time allowed for any of the tests before performing the after-test measurement
- 360 Note 1 to entry: For a practical interpretation, this is typically 5 minutes minimum.
- 361 **3.13**
362 **ruggedized cable**
363 cable having enhanced mechanical performances