



SLOVENSKI STANDARD
oSIST prEN IEC 60794-2-50:2022
01-september-2022

Optični kabli - 2-50. del: Notranji optični kabli - Skupinska specifikacija za simpleksne in dupleksne kable za zaključene kableske sestave

Optical fibre cables - Part 2-50: Indoor cables - Family specification for simplex and duplex cables for use in terminated cable assemblies

Lichtwellenleiterkabel - Teil 2-50: LWL-Innenkabel - Familienspezifikation für Simplex- und Duplexkabel für den Einsatz in konfektionierten Kabeln

Câbles à fibres optiques - Partie 2-50: Câbles intérieurs - Spécification de famille pour les câbles simplex et duplex utilisés dans les câbles assemblés équipés

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TITLE:

Optical fibre cables - Part 2-50: Indoor cables - Family specification for simplex and duplex cables for use in terminated cable assemblies

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NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL FIBRE CABLES –

Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies

FOREWORD

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International Standard IEC 60794-2-50 has been prepared by subcommittee 86A: Fibres and cables, of IEC technical committee 86: Fibre optics.

This document includes test methods according to IEC 60794-1-21, IEC 60794-1-22 and IEC 60794-1-23 that will be split into single documents and individually renumbered in the IEC 60794-1-1xx series, IEC 60794-1-2xx series and IEC 60794-1-3xx series. Full cross-reference details are given in IEC 60794-1-2.

This third edition cancels and replaces the second edition published in 2020. This edition constitutes a technical revision.

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

- a) added IEC 60793-1-46 and IEC 60794-1-211 to the normative references;
- b) changed the load duration for the tensile test from 5 to 10 min;

- 108 c) clarified the distance between the clamps for torsion test to 125 times cable diameter, but
109 not less than 0,3 m;
- 110 d) recommended the temperatures -10 °C and +60 °C for indoor simplex and duplex cables and
111 included the low and high temperatures for category C, C^{HD}, OP and OP^{HD} according to the
112 operating service environments in IEC 61753-1 for temperature cycling and shrinkage
113 testing;
- 114 e) updated the shrinkage test standard to IEC 60794-1-211, F11A, and changed the
115 requirement to maximum 20 mm;
- 116 f) replaced the text for the fire performance with an improved description.

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

FDIS	Report on voting
86A/1972/FDIS	86A/1978/RVD

118
119 Full information on the voting for the approval of this International Standard can be found in the
120 report on voting indicated in the above table.

121 This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

122 A list of all the parts in the IEC 61340 series, published under the general title *Optical fibre*
123 *cables*, can be found on the IEC website.

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

- 127 • reconfirmed,
- 128 • withdrawn,
- 129 • replaced by a revised edition, or
- 130 • amended.

131

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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OPTICAL FIBRE CABLES –

Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies

142 **1 Scope**

143 This part of IEC 60794 is a family specification that specifies requirements for simplex and
144 duplex optical fibre cables for use in terminated cable assemblies or as used for termination of
145 passive components.

146 **2 Normative references**

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

151 IEC 60793-1-20, *Optical fibres – Part 1-20: Measurement methods and test procedures – Fibre
152 geometry*

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

155 IEC 60793-1-32, *Optical fibres – Part 1-32: Measurement methods and test procedures –
156 Coating strippability*

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

158 IEC 60793-1-46, *Optical fibres – Part 1-46: Monitoring of changes in optical transmittance*

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

161 IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for
162 class B single-mode fibres*

163 IEC 60794-1-1, *Optical fibre cables – Part 1-1: Generic specification – General*

164 IEC 60794-1-2, *Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test
165 procedures – General guidance*

166 IEC 60794-1-211, *Optical fibre cables - Part 1-211: Generic specification - Basic optical cable
167 test procedures - Environmental test methods - Sheath shrinkage, Method F11*

168 IEC 60794-1-21, *Optical fibre cables – Part 1-21: Generic specification – Basic optical cable
169 test procedures – Mechanical tests methods*

170 IEC 60794-1-22, *Optical fibre cables – Part 1-22: Generic specification – Basic optical cable*
171 *test procedures – Environmental tests methods*

172 IEC 60794-1-23, *Optical fibre cables – Part 1-23: Generic specification – Basic optical cable*
173 *test procedures – Cable element test methods*

174 IEC 60794-2, *Optical fibre cables – Part 2: Indoor cables – Sectional specification*

175 IEC 60811-202, *Electric and optical fibre cables – Test methods for non-metallic materials –*
176 *Part 202: General tests – Measurement of thickness of non-metallic sheath*

177 IEC 60811-203, *Electric and optical fibre cables – Test methods for non-metallic materials –*
178 *Part 203: General tests – Measurement of overall dimensions*

179 **3 Terms and definitions**

180 For the purposes of this document, the terms and definitions given in IEC 60794-1-1 and the
181 following apply.

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

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

186 **3.1** 187 **terminated cable assembly** 188 a cable terminated with connectors

189 Note 1 to entry: Examples from ISO/IEC 11801 (all parts) are optical fibre cords used to establish connections on
190 patch panels, equipment and at work areas or to connect outlets to the terminal equipment.

191 Note 2 to entry: A so called patch cord or jumper is one type of a terminated cable assembly.

192 **4 Construction**

193 **4.1 General**

194 In addition to the constructional requirements in IEC 60794-2, the following considerations
195 apply to simplex and duplex indoor cables for use in terminated cable assemblies.

196 It is not the intention of this document to specify the finished terminated cable assembly
197 complete with terminations.

198 There shall be no fibre splice in a delivery length. It shall be possible to identify each individual
199 fibre throughout the length of the cable.

200 **4.2 Optical fibres and primary coating**

201 Multimode or single-mode optical fibres meeting the requirements of IEC 60793-2-10
202 sub-categories A1-OM1 or A1-OM2 to A1-OM5 or IEC 60793-2-50 class B shall be used.

203 4.3 Buffer

204 If a tight or semi-tight (loosely applied) buffer is required, it shall consist of one or more layers
 205 of inert material. Unless otherwise specified, the tight buffer shall be removed in one operation
 206 together with fibre coating over the specified length. Semi-tight tubes may be filled. For semi-
 207 tight and loose buffer, the buffer material is removed for a specified length leaving the primary
 208 coating of the fibre intact.

209 Specified buffer strippability minimum lengths:

- 210 – tight: 15 mm;
- 211 – semi tight: 300 mm;
- 212 – loose: 1,0 m.

213 Strip force shall comply to the values stated in the relevant specification and the evaluation
 214 shall be carried out according to IEC 60793-1-32.

215 Buffer dimensions are shown in Table 1.

216 **Table 1 – Outer dimensions of buffered fibres**

Nominal outer diameter	Tolerance
mm	mm
0,3 to 0,9	± 0,05

217

218 Lower tolerance levels can be a requirement for buffered fibres having a low nominal diameter
 219 within the specified range. In such cases, tolerance values shall be agreed between supplier
 220 and customer.

221 4.4 Tube

222 One or two primary coated or buffered fibres are packaged in a tube construction which may be
 223 filled. A tube is a cable element that is not covered in 4.3 and typically has a larger outer
 224 diameter than what is specified in 4.3. The tube may be reinforced with a composite wall.

225 If required, the suitability of the tube shall be determined by an evaluation of its kink resistance
 226 in accordance with IEC 60794-1-23, method G7.

227 4.5 Strength and anti-buckling members

228 The cable shall be designed with sufficient strength members to meet the requirements of this
 229 document.

230 The strength and/or anti-buckling member may be either metallic or non-metallic and may be
 231 located in the cable core and/or under the sheath and/or in the sheath.

232 4.6 Sheath

233 The cable shall have a uniform overall protective sheath. The cable diameter shall be specified
 234 in the relevant specification. Sheath removal is an important feature of these cables. Sheath
 235 pull-off force shall be determined in accordance with IEC 60794-1-21, method E21.

236 4.7 Sheath marking

237 If required, the cable shall be marked as agreed between the customer and supplier.

238 4.8 Examples of cable constructions

239 Examples of cable constructions are shown in Annex A.

240 Other configurations are not excluded if they meet the mechanical, environmental, transmission
241 and termination requirements given in this document.

242 5 Tests

243 5.1 General

244 Compliance with the specification requirements shall be verified by carrying out tests selected
245 from Clause 5. It is not intended that all tests be carried out in all cases, and Annex B provides
246 guidance on the selection of applicable tests. The tests to be applied and the frequency of
247 testing need to be agreed between the customer and supplier.

248 Some of the following tests can be performed on a short sample length of cable which is still an
249 integral part of a longer length, thus making it possible to detect permanent changes in
250 attenuation. As a general requirement for the tests specified in this document, the spirit is to
251 keep "no change in attenuation" criteria at the end of each evaluation, although the parameters
252 specified in this document may be affected by measurement uncertainty arising either from
253 measurement errors or calibration errors. The optical total uncertainty of measurement for this
254 document shall be $\pm 0,05$ dB for single-mode fibres and $\pm 0,2$ dB for multimode fibres. Any
255 measured value within this range shall be considered as "no change in attenuation".

256 Single-mode fibre cables are measured at 1 550 nm or 1 625 nm and the measuring wavelength
257 shall be agreed between the customer and supplier. Multimode fibre cables are measured at
258 850 nm or 1 300 nm and the measuring wavelength shall be agreed between the customer and
259 supplier. Measurements of attenuation shall be carried out according to IEC 60793-1-40.
260 Change in attenuation measurements shall be carried out according to IEC 60793-1-46.

261 NOTE The optimized wavelength for multimode fibres A1-OM3 and A1-OM4 is 850 nm and for A1-OM5 fibre, the
262 targeted operational wavelength range is in the vicinity of 850 nm to 950 nm.

263 If loops are used within a test to fix the ends of a cable, the loop diameter shall be equal or
264 greater than the specified minimum cable bend diameter to avoid cable damage and excessive
265 mode filtering in multimode fibre.

266 Unless otherwise specified, all tests shall be carried out at expanded test conditions as
267 specified in IEC 60794-1-2.

268 5.2 Dimensions

269 The fibre dimensions and tolerances shall be checked in accordance with test method
270 IEC 60793-1-20 or IEC 60793-1-21. The diameter of the buffer and of the cable, as well as the
271 thickness of the sheath, shall be measured in accordance with the methods of IEC 60811-202
272 and IEC 60811-203.

273 The nominal outer cable diameter is abbreviated as "*d*" in this document. "*d*" for the different
274 cable constructions is defined as follows:

- 275 – For simplex cable, "*d*" is the outer diameter;
- 276 – For zip cord cable, "*d*" is the outer diameter of the simplex cable which is used to be
277 combined with another simplex cable to form a zip cord;