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**Optični spojni elementi in pasivne komponente - Vmesniki optičnih konektorjev - 3-2. del: Parametri konektorjev za disperzijsko nespremenjena optična vlakna s kotnim fizičnim stikom 2,5 mm in cirkonijskimi cilindričnimi tulkami premera 1,25 mm**

Fibre optic interconnecting devices and passive components - Connector optical interfaces - Part 3-2: Connector parameters of dispersion unshifted single-mode physically contacting fibres - angled 2,5 mm and 1,25 mm diameter cylindrical full zirconia ferrules

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**Ta slovenski standard je istoveten z: prEN IEC 61755-3-2:2023**

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**ICS:**

33.180.20	Povezovalne naprave za optična vlakna	Fibre optic interconnecting devices
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# 86B/4770/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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IEC SC 86B : FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS	
SECRETARIAT: Japan	SECRETARY: Mr Shigeru Tomita
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	
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TITLE:

**Fibre optic interconnecting devices and passive components - Connector optical interfaces - Part 3-2: Connector parameters of dispersion unshifted single-mode physically contacting fibres - angled 2,5 mm and 1,25 mm diameter cylindrical full zirconia ferrules**

PROPOSED STABILITY DATE: 2031

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## 41 INTERNATIONAL ELECTROTECHNICAL COMMISSION

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44 **FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS –**  
45 **CONNECTOR OPTICAL INTERFACES –**

46

47 **Part 3-2: Connector parameters of dispersion unshifted single-mode physically**  
48 **contacting fibres – angled 2,5 mm and 1,25 mm diameter cylindrical full**  
49 **zirconia ferrules**

50

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82 International Standard IEC 61755-3-2 has been prepared by sub-committee 86B: Fibre optic  
83 interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

84 This second edition cancels and replaces the first edition published in 2006. It constitutes a  
85 technical revision. The changes with respect to the previous edition are:

86 a) to incorporate a previous corrigendum;

- 87 b) to add normative references;
- 88 c) to introduce an additional optical interface with a different fibre core eccentricity profile.  
89 The previous revision of optical interface standard is named "Variant 1: with fibre core  
90 axis oriented towards the connector guide key". The additional optical interface is named  
91 "Variant 2: with fibre core axis not oriented towards the connector guide key";
- 92 d) to provide statements related to interoperability, where both variants remain  
93 intermateable within a given performance grade, while only Variant 1 is backwards-  
94 compatible to IEC 61755-3-2:2006;
- 95 e) to add Grade B and Grade C interface requirements for both variants;
- 96 f) to add a descriptive statistic for the mean fibre core eccentricity (mean value) to further  
97 describe the distribution of fibre core eccentricity to ensure interoperability;
- 98 g) the addition of informative Annex B to give guidance on the expected attenuation when  
99 mated to a reference connector plug;
- 100 h) the addition of informative Annex C to give guidance related to the simulation of optical  
101 interface attenuation;
- 102 i) the addition of informative Annex D to give guidance related to estimation of mean fibre  
103 eccentricity limits for finite production batch sizes.

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

CDV	Report on voting
XXX	86B/4733/CC

105 Full information on the voting for the approval of this standard can be found in the report on  
106 voting indicated in the above table.  
107

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

109 A list of all parts of the IEC 61755 series, under the general title *Fibre optic interconnecting*  
110 *devices and passive components – Fibre optic connector optical interfaces*, can be found on  
111 the IEC website.

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

- 115 • reconfirmed,
- 116 • withdrawn,
- 117 • replaced by a revised edition, or
- 118 • amended.

119

120 The National Committees are requested to note that for this publication the stability date  
121 is 2018.

122 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED  
123 AT THE PUBLICATION STAGE.

124

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128 **FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS –**  
129 **FIBRE OPTIC CONNECTOR OPTICAL INTERFACES –**

130

131 **Part 3-2: Connector parameters of dispersion unshifted single-mode physically**  
132 **contacting fibres – angled 2,5 mm and 1,25 mm diameter cylindrical full**  
133 **zirconia ferrules**

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135

136 **1. Scope**

137 This part of IEC 61755 defines the dimensional limits of the optical interface that are necessary  
138 for single-mode fibre optic connectors with 2,5 mm or 1,25 mm diameter cylindrical zirconia  
139 (ZrO<sub>2</sub>) ferrules polished at an 8° angle to meet the specific requirements for fibre-to-fibre  
140 interconnection as defined in IEC 61755-2-2.

141 Ferrules made from the material specified in this standard are suitable for use in all the  
142 operating service environments defined in IEC 61753-1.

143 Ferrule dimensions and features are contained in the IEC 61754 series of fibre optic connector  
144 interface standards.

145 **2. Normative references**

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

150 IEC 61300-3-47, *Fibre optic interconnecting devices and passive components - Basic test and*  
151 *measurement procedures – Part 3-47: Examinations and measurements – End face geometry*  
152 *of PC/APC spherically polished ferrules using interferometry*

153 IEC 61755-1, *Fibre optic interconnecting devices and passive components – Fibre optic*  
154 *connector optical interfaces – Part 1: Optical interfaces for single-mode non-dispersion shifted*  
155 *fibres – General and guidance*

156 IEC 61755-2-2, *Fibre optic interconnecting devices and passive components – Fibre optic*  
157 *connector optical interfaces – Part 2-2: Connection parameters of dispersion unshifted single*  
158 *mode physically contacting fibres – angled*

159 IEC 61755-2-5, *Fibre optic interconnecting devices and passive components – Fibre optic*  
160 *connector optical interfaces – Part 2-5: Connection of non-dispersion shifted single-mode*  
161 *angled physically contacting fibres for reference connector applications*

162 **3. Terms and definitions**

163 For the purposes of this document, the terms and definitions given in IEC 61755-1 apply.

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

- 166
- IEC Electropedia: available at <http://www.electropedia.org/>



- 167 • ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 168 **4. Description**

169 The performance of an angled physical contact (APC) cylindrical ferrule optical interface is  
170 determined by the alignment of the optical datum targets of two mating ferrules. There are three  
171 conditions affecting the alignment of two optical datum targets: lateral offset, angular offset and  
172 longitudinal offset.

173 Parameters influencing the lateral and angular offset of the optical fibre axes include the  
174 following:

- 175 – ferrule outside diameter;
- 176 – ferrule bore concentricity relative to the ferrule outside diameter;
- 177 – ferrule bore angle relative to ferrule outside diameter axis;
- 178 – fibre cladding diameter relative to ferrule bore diameter;
- 179 – fibre core concentricity relative to the fibre cladding diameter;
- 180 – fibre core orientation relative to connector guide key;
- 181 – amount of angled PC polishing after tuning of the connector at PC condition;
- 182 – alignment sleeve inside diameter;
- 183 – force with which the alignment sleeve grips the ferrule.

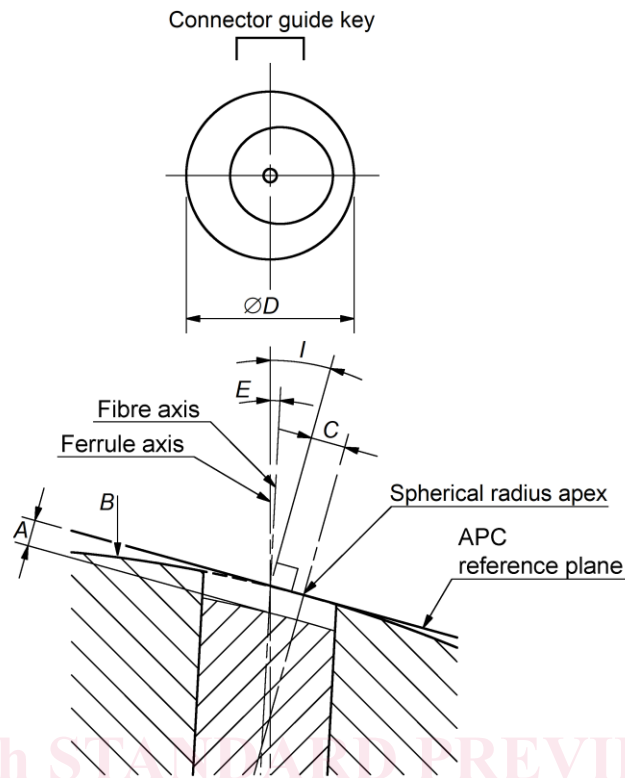
184 Parameters influencing the connector plug endface deformation requirements needed to  
185 maintain the physical contact of the ferrules within a mated connection are as follows:

- 186 – endface spherical radius;
- 187 – endface spherical radius apex offset of ferrule or angle relative to the APC reference plane;
- 188 – fibre undercut;
- 189 – ferrule rotational clearance relative to keying;
- 190 – axial force on ferrule endface;
- 191 – ferrule and fibre material physical constants;
- 192 – alignment sleeve frictional force;
- 193 – connector keying accuracy.

#### 194 **5. Interface parameters**

195 The endface dimensions of terminated connector plugs provided in Figure 1 and Figure 2 show  
196 the geometrical position of the fibre core for two alternative variants. These core location  
197 variants ensure full intermateability between Variant 1 and Variant 2 as defined in IEC 61755-  
198 1. In addition, both variants produced per this document are fully backwards compatible with  
199 Grade B in IEC 61755-3-2:2006.

200 The ferrule dimensions are defined in Figure 3. The parameter values are detailed in Tables 1,  
201 2 and 3.

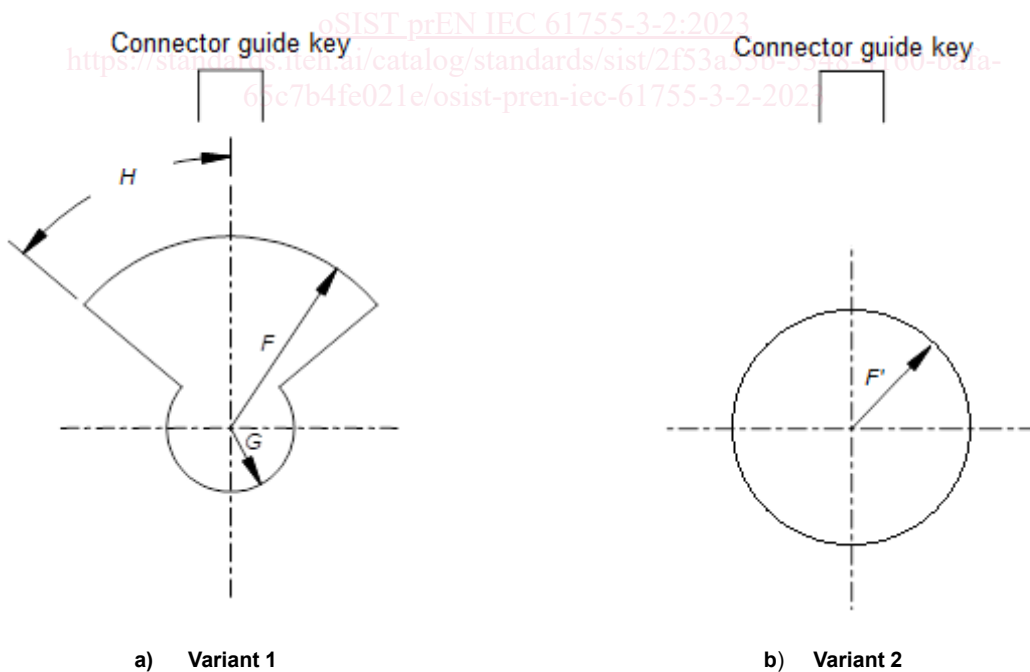


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203 NOTE B shows the polished spherical radius

204

**Figure 1 – Connector plug endface dimensions**



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207 NOTE  $F, F', G$  and  $H$  define the radial and angular polar coordinate limits of the optical fibre core axis relative to the optical  
208 datum target of the ferrule.

209

**Figure 2 – Geometric requirements for fibre core location after termination**

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211

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**Table 1 – Optical interface parameter values for 2,5 mm diameter ferrule**

Ref.	Parameter values								Units	Remarks
	Grade A		Grade B		Grade C		Grade D			
	Min	Max	Min	Max	Min	Max	Min	Max		
<i>A</i> <sup>b</sup>			–100	<i>a</i>	–100	<i>A</i>	–100	<i>a</i>	nm	Fibre undercut or protrusion
<i>B</i>			5	12	5	12	5	12	mm	Spherical radius
<i>C</i>			0	50	0	50	0	50	µm	Apex offset
<i>D</i>			2,498 5	2,499 5	2,498 5	2,499 5	2,498 5	2,499 5	mm	Outside diameter
<i>E</i>			0	0,2	0	0,3	0	0,6	°	Angle of fibre axis
<i>F</i>			0	1,0 <sup>c</sup>	0	1,4 <sup>d</sup>	Not Applicable		µm	Radius, See Figure 2 a)
<i>F'</i>			0	0,6 <sup>e</sup>	0	1,1 <sup>f</sup>	0	1,5 <sup>g</sup>	µm	Radius, See Figure 2 b)
<i>G</i>			0	0,3	0	0,3	Not Applicable		µm	Radius, See Figure 2 a)
<i>H</i>			0	50	0	50	Not Applicable		°	See Figure 2 a)
<i>I</i>			8		8		8		°	Basic dimension
<p>NOTE 1 The core location (<i>F</i>, <i>F'</i>, <i>G</i>, <i>H</i>) and tilt angle (<i>E</i>) values specified in this document have been calculated to ensure that the attenuation values specified in IEC 61755-2-1 are met under all circumstances (See Annex C). Guidance on expected attenuation values when mated to a reference connector plug can be found in Annex B.</p> <p>NOTE 2 <i>E</i>, <i>F</i>, <i>F'</i>, <i>G</i> and <i>H</i> are measured in the PC state before polishing APC angle.</p> <p>NOTE 3 Core eccentricity Variant 1 [Figure 2 a)] and Variant 2 [Figure 2 b)] are intended to be fully intermateable for a given performance grade as defined in IEC 61755-1.</p> <p>NOTE 4 Grade A is reserved for future application.</p> <p>NOTE 5 Attenuation performance grades are defined in IEC 61755-1.</p> <p>NOTE 6 See Annex D for information on estimation of average fibre core eccentricity limits as a function of batch size.</p> <p>NOTE 7 Refer to IEC 61300-3-47 for end face geometry measurement of PC spherically polished ferrules using interferometry.</p> <p>NOTE 8 To account for uncertainty in fibre core eccentricity measurements, the limits and mean values are to be rounded to one significant digit.</p>										
<p><sup>a</sup> Contact force 4,9 N nominal. Ferrule material: 3 mol % yttria stabilized zirconia, ZrO<sub>2</sub>. Nominal material physical constant values: Young's Modulus, 200 GPa ± 20 GPa, Poisson's Ratio, 0,30 to 0,31. See Annex A for details.</p> $A_{\text{maximum}} = 1\,988 \cdot B^{(-0,795)} - B \cdot 10^6 + \left( \sqrt{B^2 \cdot 10^6 - C^2} \right) \cdot 10^3 - 60$ <p><sup>b</sup> <i>A</i> as a negative value indicates fibre protrusion.</p> <p><sup>c</sup> Fibre core eccentricity distribution shall have a mean less than or equal to 0,4 µm. See Note 6.</p> <p><sup>d</sup> Fibre core eccentricity distribution shall have a mean less than or equal to 0,5 µm. See Note 6.</p> <p><sup>e</sup> Fibre core eccentricity distribution shall have a mean less than or equal to 0,2 µm. See Note 6.</p> <p><sup>f</sup> Fibre core eccentricity distribution shall have a mean less than or equal to 0,4 µm. See Note 6.</p> <p><sup>g</sup> Fibre core eccentricity distribution shall have a mean less than or equal to 0,6 µm. See Note 6.</p>										

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