



SLOVENSKI STANDARD
oSIST prEN IEC 61300-2-27:2023
01-maj-2023

Optični spojni elementi in pasivne komponente - Osnovni preskusni in merilni postopki - 2-27. del: Preskusi - Prah - Laminarni tok

Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-27: Tests - Dust - Laminar flow

Lichtwellenleiter - Verbindungselemente und passive Bauteile - Grundlegende Prüf- und Meßverfahren - Teil 2-27: Prüfungen: Staub - Laminare Strömung

Dispositifs d'interconnexion et composants passifs à fibres optiques - Méthodes fondamentales d'essais et de mesures - Partie 2-27: Essais - Poussière - Ecoulement laminaire

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IEC SC 86B : FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS	
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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.
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TITLE:

Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-27: Tests - Dust - Laminar flow

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NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING
DEVICES AND PASSIVE COMPONENTS –
BASIC TEST AND MEASUREMENT PROCEDURES –****Part 2-27: Tests – Dust – Laminar flow**

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International Standard IEC 61300-2-27 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 1995 and constitutes a technical revision. Specific technical changes from the previous edition are as follows:

- a) added normative references clause;
- b) added terms and definitions clause;
- c) changed relative humidity requirement during the test;
- d) the procedure description was modified;
- e) Figure 1 showing possible test configurations was added;
- f) the severity of the test was updated according to the component and performance category;
- g) added details to be specified and reported clause.

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

FDIS	Report on voting
86B/ XXXX/FDIS	86B/ XXXX/RVD

84
85 Full information on the voting for the approval of this standard can be found in the report on
86 voting indicated in the above table.

87 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
88 accordance with ISO/IEC Directives Part 1 and ISO/IEC Directives Supplement, available at
89 www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
90 described in greater detail at <https://www.iec.ch/standardsdev/publications/>.

91 A list of all parts of IEC 61300 series, published under the general title *Fibre optic*
92 *interconnecting devices and passive components – Basic test and measurement procedures*
93 can be found on the IEC website.

94 The committee has decided that the contents of this publication will remain unchanged until the
95 maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data
96 related to the specific publication. At this date, the publication will be

- 97 • reconfirmed,
- 98 • withdrawn,
- 99 • replaced by a revised edition, or
- 100 • amended.

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103 **FIBRE OPTIC INTERCONNECTING**
104 **DEVICES AND PASSIVE COMPONENTS –**
105 **BASIC TEST AND MEASUREMENT PROCEDURES –**

106
107 **Part 2-27: Tests – Dust – Laminar flow**
108

109 **1 Scope**

110 The purpose of this part of IEC 61300 is to determine the effects of dust on fibre optic
111 interconnecting devices or passive components.

112 **2 Normative references**

113 The following referenced documents are indispensable for the application of this document. For
114 dated references, only the edition cited applies. For undated references, the latest edition of
115 the referenced document (including any amendments) applies.

116 IEC 61300-1, *Fibre optic interconnecting devices and passive components – Basic test and*
117 *measurement procedures – Part 1: General and guidance*

118 IEC 61300-3-1, *Fibre optic interconnecting devices and passive components – Basic test and*
119 *measurement procedures – Part 3-1: Examinations and measurements – Visual examination*

120 IEC 61300-3-3, *Fibre optic interconnecting devices and passive components – Basic test and*
121 *measurement procedures – Part 3-3: Examinations and measurements – Active monitoring of*
122 *changes in attenuation and return loss*

123 IEC 61300-3-4, *Fibre optic interconnecting devices and passive components – Basic test and*
124 *measurement procedures – Part 3-4: Examinations and measurements – Attenuation*

125 IEC 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and*
126 *measurement procedures – Part 3-6: Examinations and measurements – Return loss*

127 IEC 61753-1, *Fibre optic interconnecting devices and passive components – Performance*
128 *standard – Part 1: General and guidance*

129 **3 Terms and definitions**

130 For the purposes of this document, the terms and definitions given in IEC 61300-1 apply.

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

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

135 **4 General description**

136 The device under test (DUT) is exposed to a specified dust concentration within a conditioning
137 chamber in which the air is circulated over a period of time. The effects of dust exposure on
138 optical performance and physical integrity of the DUT shall be determined.

139 5 Apparatus

140 5.1 Test chamber

141 The test chamber shall be capable of controlling the dust concentration, velocity, temperature,
142 and humidity of the dust-laden air. It shall be capable of being raised to and maintained at a
143 temperature of $63\text{ °C} \pm 2\text{ °C}$ with a relative humidity not exceeding 25 %. In order to provide
144 adequate circulation of the dust-laden air, no more than 50 % of the cross-sectional area
145 (normal to the air flow) and no more than 30 % of the volume of the chamber shall be occupied
146 by the DUT. The dust-laden air shall be introduced into the chamber in such a manner as to
147 allow it to become approximately laminar in the flow before striking DUT.

148 5.2 Dust

149 The dust shall be capable of passing through a sieve of 150 μm aperture. Dust type shall be
150 talc powder, unless otherwise specified in the relevant specification.

151 5.3 Optical measurement equipment

152 For optical performance measurement, the equipment and measurement methods shall be
153 according to IEC 61300-3-4 for attenuation and IEC 61300-3-6 for return loss. For changes in
154 attenuation and return loss, the equipment and measurement method shall be done according
155 to IEC 61300-3-3. The optical performance measurement shall be performed at the
156 wavelength(s) specified in the relevant specification.

157 6 Procedure

158 6.1 Preparation of DUT

159 Visually examine DUT according to IEC 61300-3-1. Prepare and clean the DUT according to
160 the manufacturer's instructions or as specified in the relevant specification. Unless otherwise
161 specified, the DUT shall be subjected to the test in optically functioning mode. If test
162 Configuration A is used, the DUT shall be terminated onto a sufficient length of fibre cables.
163 The loose ends of the cables may be terminated with an interconnecting device to facilitate
164 interfacing with the optical measurement equipment.

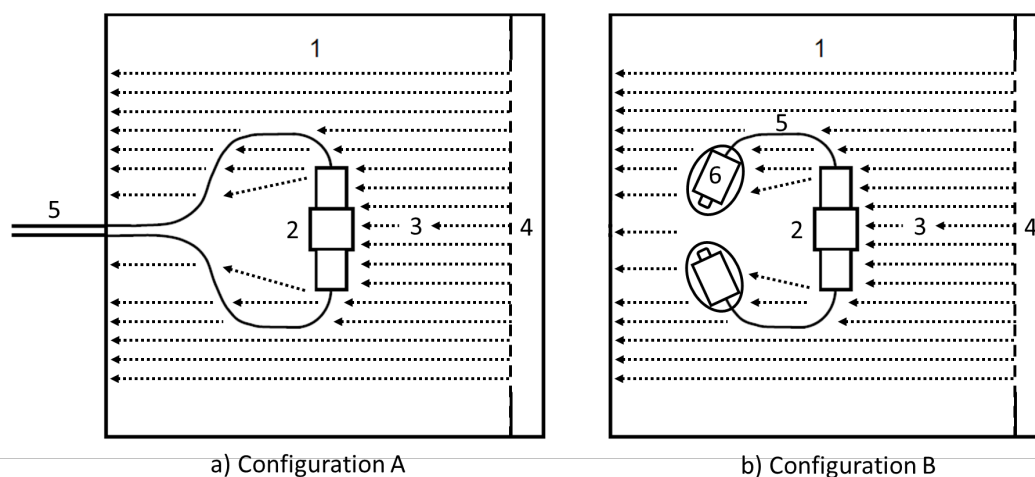
165 6.2 Preconditioning

166 Precondition the DUT for a minimum of 2 hours at the standard atmospheric conditions specified
167 in IEC 61300-1, unless otherwise specified in the relevant specification.

168 6.3 Mounting of DUT

169 The DUT shall be mounted and positioned as near to the centre of the test chamber as
170 practicable. If more than one DUT is being tested, there shall be a minimum clearance of 100
171 mm between surfaces of the specimens and any other object or material which would provide
172 protection. No surface of the DUT shall be any closer than 100 mm to any wall of the test
173 chamber. The DUT shall be orientated to expose the most critical or vulnerable parts to the dust
174 stream. Changes in DUT orientation during the test shall be specified in the relevant
175 specification.

176 Two possible test configurations are depicted in Figure 1. Configuration A with loose ends of
177 the termination cables located outside the test chamber. Configuration B with entire termination
178 cables put inside the chamber. When termination cables have interconnecting devices on the
179 loose ends, they shall be dust-protected and positioned so not to disturb laminar dust-laden air
180 flow. Configuration A shall be used for monitoring the optical performance during the test. For
181 optical measurements before/after the test either Configuration A or Configuration B can be
182 used, whichever more practicable.



183

184 Key:

185 1 : test chamber;

186 2 : DUT;

187 3 : laminar dust-laden air stream;

188 4 : dust feeder;

189 5 : termination fibre cable(s);

190 6 : dust-protected interconnecting device(s)

191

192

Figure 1 – Possible test configurations

193 6.4 Measure of initial optical properties

194 Measure the optical properties specified in the relevant specification, such as attenuation and
195 return loss. These values shall be recorded and used as a reference for the test evaluation.

196 For test Configuration B initial optical properties shall be recorded before mounting DUT inside the test
197 chamber.

198 6.5 Monitoring of optical properties

199 By default, monitoring of the optical performance during the test is not required. If monitoring
200 of optical performance during the test is required by the relevant specification, then the change
201 in optical properties, such as attenuation and return loss of the DUT shall be monitored during
202 the initial dust exposure and dust exposure periods, as described in IEC 61300-3-3. The optical
203 properties shall be measured at the interval specified in the relevant specification.

204 6.6 Initial dust exposure

205 Set the chamber controls to maintain an internal chamber temperature of $23\text{ °C} \pm 2\text{ °C}$ and a
206 relative humidity of less than 25 %. Adjust the air velocity to $530\text{ m/min} \pm 70\text{ m/min}$. Adjust the
207 dust feeder to control the dust concentration to the specified severity. Maintain these chamber
208 conditions for the specified duration.

209 6.7 Thermal conditioning

210 Upon completion of the initial dust exposure period, stop the dust feed and reduce the air
211 velocity to $90\text{ m/min} \pm 50\text{ m/min}$. Raise the internal chamber temperature to $63\text{ °C} \pm 2\text{ °C}$. The
212 rate of change of temperature shall be $2\text{ °C/min} \pm 1\text{ °C/min}$. Maintain a relative humidity of less
213 than 10 %. Maintain these chamber conditions for the specified duration.

214 6.8 Dust exposure

215 Upon completion of the thermal conditioning period, maintain the temperature at $63\text{ °C} \pm 2\text{ °C}$.
 216 Increase the air velocity to $530\text{ m/min} \pm 70\text{ m/min}$. Adjust the dust feeder to control the dust
 217 concentration to the specified severity. Maintain a relative humidity of less than 10 %. Maintain
 218 these chamber conditions for the specified duration.

219 6.9 Recovery

220 Upon completion of the test, turn off all chamber controls and allow the DUT to return to
 221 standard atmospheric conditions.

222 For Configuration A proceed with final measurements as described in section 6.10 and then
 223 continue with the rest of recovery procedures.

224 For Configuration B proceed with the rest of recovery procedures.

225 Remove the DUT from the chamber. Remove accumulated dust from the DUT by brushing,
 226 wiping, or shaking, exercising care to avoid introducing any additional dust into the DUT. Dust
 227 shall not be removed by either air blast or vacuum cleaning. DUT shall be kept for a minimum
 228 of 2 hours at standard atmospheric conditions before proceeding final measurements and
 229 examinations. Standard cleaning procedures of termination cables attached interconnecting
 230 devices might be used prior reconnecting with optical measurement equipment.

231 6.10 Final measurements and examinations

232 Measure final attenuation and return loss to ensure that there is no permanent optical
 233 degradation on the DUT. The results of the final measurements and the change in optical
 234 properties, compared with initial measurements at section 6.4 of this document shall be within
 235 the limits established in the relevant specification.

236 Visually examine DUT in accordance with IEC 61300-3-1. Check for evidence of any
 237 degradation. Examples of failures are as follow:

- 238 – broken or damaged seals, protective elements or other parts;
- 239 – contamination or scratching on fibre-to-fibre interface surfaces.

240 7 Severity

241 The severity consists of the dust concentration and duration of exposure. The table 1 shows
 242 the specified test severities in relation to the performance categories. It is recommended to
 243 verify the test severities with the relevant IEC 61753 performance standards and IEC 62005
 244 reliability documents for the normative values.

245 **Table 1 – Test severities**

246

Performance category	Component	Dust concentration (g/m ³)	Duration of exposure (min)	Dust type
OP OP ^{HD} OP+ OP+ ^{HD}	Connectors Field mountable connectors Passive components Splices	10,6 ± 7,1	10	talc
E	Connectors Passive components	10,6 ± 7,1	10	talc

NOTE Performance categories are defined in IEC 61753-1