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Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-38: Tests - Sealing for fibre optic sealed closures and hardened connectors using air pressure

Lichtwellenleiter - Verbindungselemente und passive Bauteile - Grundlegende Prüf- und Messverfahren - Teil 2-38: Prüfungen - Dichtheit druckfester Muffen für Lichtwellenleiterbauteile

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Dispositifs d'interconnexion et composants passifs à fibres optiques - Méthodes fondamentales d'essais et de mesures - Partie 2-38: Essais - Etanchéité pour les boîtiers à fibres optiques à surpression interne

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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.
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TITLE:

Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-38: Tests – Sealing for fibre optic sealed closures and hardened connectors using air pressure

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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 2-38: Tests – Sealing for fibre optic sealed closures and hardened
connectors using air pressure**

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International Standard IEC 61300-2-38 has been prepared by sub-committee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This third edition cancels and replaces the second edition published in 2006. It constitutes a technical revision.

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

- a) addition of sealed hardened connectors;
- b) recommended test severities from IEC 61753-1;
- c) test configurations for hardened connectors and adaptors.

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

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

81

82 Full information on the voting for the approval of this standard can be found in the report on
83 voting indicated in the above table.

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

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

- 90 • reconfirmed;
- 91 • withdrawn;
- 92 • replaced by a revised edition, or
- 93 • amended.

94

95

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96 **FIBRE OPTIC INTERCONNECTING DEVICES**
97 **AND PASSIVE COMPONENTS –**
98 **BASIC TEST AND MEASUREMENT PROCEDURES –**
99

100 **Part 2-38: Tests – Sealing for fibre optic sealed closures and hardened**
101 **connectors using air pressure**
102

103 **1 Scope**

104 This part of IEC 61300 presents two methods for testing the sealing performance of a fibre
105 optic sealed closure and hardened connector using air pressure.

106 **2 Normative references**

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

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

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

114 **3 Terms and definitions**

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

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

- 119 - IEC Electropedia: available at <https://www.electropedia.org/>
- 120 - ISO Online browsing platform: available at <https://www.iso.org/obp>

121 **3.1**
122 **hardened fibre optic connector**
123 water and dust tight connector

124 Note 1 to entry: Typically used for a connection in outside plant

125 [SOURCE: IEC 61753-1:2018, 3.8]

126 **3.2**
127 **sealed closure**

128 watertight and dust-tight housing that can hold a varying overpressure or underpressure
129 caused by temperature changes or atmospheric pressure changes

130 Note 1 to entry: There is no exchange of air with the outside environment when exposed to temperatures over the
131 specified operating temperature range.

132 Note 2 to entry: Although often referred to as hermetic sealed closures, humidity can enter the inner closure by
133 diffusion.

134 Note 3 to entry: Sealed boxes or sealed wall outlets shall be treated as sealed closures.

135 [SOURCE: IEC 61753-1:2018, 3.17, modified –Note 4 to entry has been deleted.]

136 4 Test methods

137 A number of sealed closures or hardened connectors are assembled following the
138 manufacturer's instructions.

139 The tests shall be carried out according at standard atmospheric conditions as defined in
140 IEC 61300-1, unless otherwise specified in the relevant performance specification. The test
141 samples are then sealed, pressurized and tested for leaks by using the method A or method B.

142 Method A is a performance criterion test for leaks when the test sample is pressurized with air
143 and submerged in a water bath. This method is generally used to check the sealing of the
144 closure or hardened connector after installation of the test sample or after a performance test.
145 In the field the test is usually done with soap water to check for leaks.

146 Method B is a performance criterion test for leaks when the test sample is pressurized with air
147 and the pressure loss is monitored by using a gauge. This test method is generally used to
148 check the sealing of the closure or hardened connector during mechanical tests at a specified
149 test temperature, by measuring the pressure before and after the test. Since atmospheric
150 pressure can change over time, this test should not exceed the duration of 2 hours between
151 the first and the last measurement of the overpressure inside the closure, unless the change
152 in overpressure is compensated by the change in atmospheric pressure over the
153 measurement period.

154 5 Apparatus

155 5.1 Elements of apparatus

156 The apparatus consists of the following elements:

- 157 – pressurizer;
- 158 – capillary gas connection;
- 159 – pressure gauge;
- 160 – water bath.

161 5.2 Pressurizer

162 The test samples shall be pressurized with a pressurizer. A pressurizer provides means of
163 pressurizing the test samples.

164 5.3 Capillary gas connection

165 A suitable capillary gas connection shall fit into the test sample or cable to allow the test
166 sample to be pressurized.

167 5.4 Pressure gauge

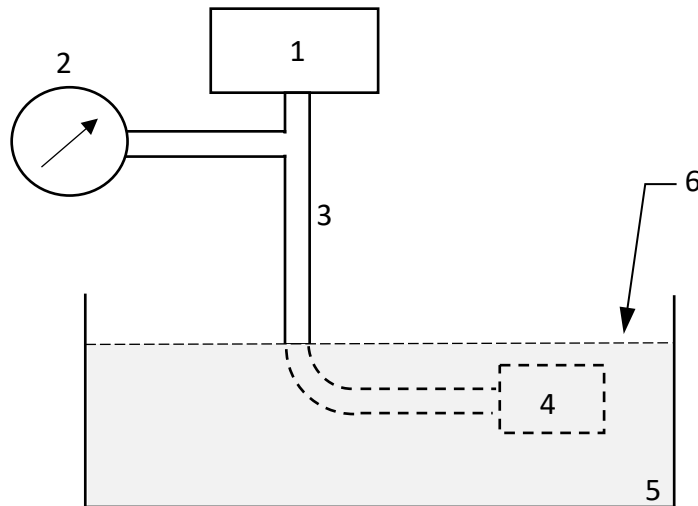
168 A pressure gauge is a gauge to measure the pressure inside the test sample. Gauges with a
169 suitable range and a resolution of at least 0,1 kPa to determine a 2 kPa drop in pressure shall
170 be used.

171 5.5 Water bath

172 A water bath filled with fresh water is used for method A. The water bath shall be deep
173 enough to fully immerse the test samples.

174 **6 Procedure**175 **6.1 Method A**

176 A test configuration for method A is shown in Figure 1.



177

178

Key:

179

1 regulated pressurizer;

180

2 pressure gauge, utilized for monitoring the overpressure;

181

3 pressure air tube, utilized for transferring pressurized air;

182

4 sealed closure;

183

5 water bath, utilized for immersing the test sample;

184

6 water surface.

185

Figure 1 – Configuration for method A

186

a) Prepare the test samples using the smallest and the largest cable diameter for which the test samples are designed.

187

188

b) Install the pressure gauge into the test sample or cable. Make sure that the cable can transfer the overpressure into the test sample.

189

190

c) Seal the open cable ends at their extremities with a cap.

191

d) Hardened connectors shall be installed on a sealed closure or pressure vessel and equipped with one or more adaptors or sockets for making a connection with the hardened connector. See Annex A for the test configuration for hardened connectors.

192

193

194

e) Submerge the test sample and cables in a water bath. Remove the trapped air on the outside of the test sample. Place test sample and cable just below the water surface.

195

196

Note: Immersion of the test sample deep under the water surface could create a higher compression force onto the sealing material and mask potential leak paths.

197

198

f) Pressurize the test sample with the pressurizer. The pressurizer shall remain switched on during the test to provide a constant overpressure in the test sample.

199

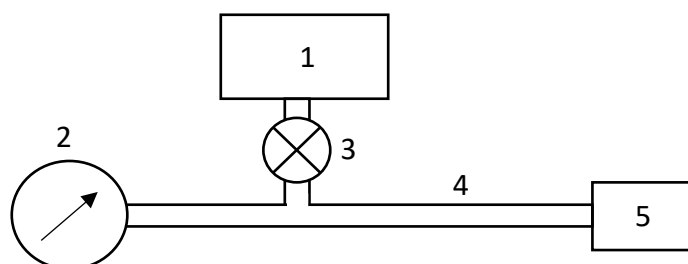
200

g) No escape of air bubbles, indicating a leakage, shall be observed for at least 15 minutes.

201

202 6.2 Method B

203 A test configuration for method B is shown in Figure 2.



204 Key:

205 1 regulated pressurizer;

206 2 pressure gauge, utilized for monitoring the overpressure;

207 3 valve to shut of pressurizer once test pressure is stable;

208 4 pressure air tube, utilized for transferring pressurized air;

209 5 sealed closure.

210
211 **Figure 2 – Configuration for method B**

- 212 a) Prepare the test samples using the smallest and the largest cable diameter for which the
213 test samples are designed.
- 214 b) Install the pressure gauge into the test sample or cable. Only if the air pressure is put into
215 the cable requires that the cable can transfer the overpressure into the test sample.
- 216 c) Seal the open cable ends at their extremities with a cap.
- 217 d) Connect the test sample with the capillary gas connection to the pressurizer. Pressurize
218 the test sample at specified temperature.
- 219 e) Hardened connectors shall be installed on a sealed closure or pressure vessel with an
220 inner volume between 1 dm³ and 5 dm³ and equipped with one or more adaptors or
221 sockets for making a connection with the hardened connector. See Annex A for the test
222 configuration for hardened connectors.
- 223 f) After the test sample is conditioned at the test pressure and test temperature, the
224 pressurizer shall be isolated from the test sample circuit by closing the valve of the
225 pressurizer output. The air pressure inside the test sample shall be monitored using the
226 installed gauge. Measure and record the pressure before and after the mechanical test at
227 the same test temperature. The pressure in the test sample shall not decay more than the
228 specified amount.

229 7 Severity

230 The severity is determined by the initial overpressure, the time duration for the test and the
231 allowable leakage or pressure loss during the test.

232 The recommended severities for the overpressure are defined in IEC 61753-1 and are listed
233 in Table 1.

234