



SLOVENSKI STANDARD
oSIST prEN IEC 61753-081-02:2022

01-oktober-2022

**Optični spojni elementi in pasivne komponente - Izvedbeni standard - 081-02. del:
Električno krmiljeni spremenljivi optični atenuator srednje obsežne naprave 1 x N
DWDM brez konektorjev za enorodovna vlakna kategorije C - Nadzorovana okolja**

Fibre optic interconnecting devices and passive components - Performance standard -
Part 081-02: Non-connectorized single-mode fibre optic middle-scale 1 x N DWDM
devices for category C - Controlled environments

PREVIEW
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Dispositifs d'interconnexion et composants passifs à fibres optiques - Norme de
performance - Partie 081-02: Dispositifs DWDM 1 × N de milieu d'échelle à fibres
optiques unimodales, non connectés, pour catégorie C - Environnements contrôlés

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Fibre optic interconnecting devices and passive components - Performance standard - Part 081-02: Non-connectorized single-mode fibre optic middle-scale 1 x N DWDM devices for category C - Controlled environments

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NOTE FROM TC/SC OFFICERS:

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**FIBRE OPTIC INTERCONNECTING DEVICES
AND PASSIVE COMPONENTS –
PERFORMANCE STANDARD –****Part 081-02: Non-connectorized single-mode fibre optic middle-scale
1 × N DWDM devices for category C – Controlled environments****FOREWORD**

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International Standard IEC 61753-081-02 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This first edition cancels and replaces the second edition of IEC 61753-081-2 published in 2014 and constitutes a technical revision. The specific technical changes from the previous edition are as follows:

- Change of test conditions harmonizing with IEC 61753-1, Edition 2:2018;
- Harmonization of the measurement uncertainties in Tables 2 to 4 with IEC 61753-081-03 and IEC 61753-081-06

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

FDIS	Report on voting
86B/xx/FDIS	86B/xxx/RVD

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

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

78 A list of all parts of IEC 61753 series, published under the general title *Fibre optic*
79 *interconnecting devices and passive components performance standard*, can be found on the
80 IEC website.

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

- 84 • reconfirmed,
- 85 • withdrawn,
- 86 • replaced by a revised edition, or
- 87 • amended.

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89 **FIBRE OPTIC INTERCONNECTING DEVICES**
90 **AND PASSIVE COMPONENTS –**
91 **PERFORMANCE STANDARD –**
92

93 **Part 081-02: Non-connectorized single-mode fibre optic middle-scale**
94 **1 × N DWDM devices for category C – controlled environment**
95

96 **1 Scope**

97 This part of IEC 61753 contains the minimum initial test and measurement requirements and
98 severities which a fibre optic middle-scale 1 × N ($16 \leq N \leq 64$) DWDM (dense wavelength
99 division multiplexing) arrayed waveguide grating device with channel spacing of 50 GHz, 100
100 GHz or 200 GHz needs to satisfy in order to be categorized as meeting the requirements of
101 category C (controlled environment). The requirements are given for the DWDM devices with
102 Gaussian passband profile and flat-top passband profile. The requirements exclude the
103 devices with dynamic electrical temperature control.

104 **2 Normative references**

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

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

111 IEC 60794-2-50, *Optical fibre cables – Part 2-50: Indoor cables – Family specification for*
112 *simplex and duplex cables for use in terminated cable assemblies*

113 IEC 61300 (all parts), *Fibre optic interconnecting devices and passive components - Basic*
114 *test and measurement procedures*

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

117 IEC 61300-2-1, *Fibre optic interconnecting devices and passive components – Basic test and*
118 *measurement procedures – Part 2-1: Tests – Vibration (sinusoidal)*

119 IEC 61300-2-4, *Fibre optic interconnecting devices and passive components – Basic test and*
120 *measurement procedures – Part 2-4: Tests – Fibre or cable retention*

121 IEC 61300-2-5, *Fibre optic interconnecting devices and passive components – Basic test and*
122 *measurement procedures – Part 2-5: Tests – Torsion*

123 IEC 61300-2-9, *Fibre optic interconnecting devices and passive components – Basic test and*
124 *measurement procedures – Part 2-9: Tests – Shock*

125 IEC 61300-2-14, *Fibre optic interconnecting devices and passive components – Basic test*
126 *and measurement procedures – Part 2-14: Tests – High optical power*

127 IEC 61300-2-17, *Fibre optic interconnecting devices and passive components – Basic test*
128 *and measurement procedures – Part 2-17: Tests – Cold*

- 129 IEC 61300-2-18, *Fibre optic interconnecting devices and passive components – Basic test*
130 *and measurement procedures – Part 2-18: Tests – Dry heat*
- 131 IEC 61300-2-19, *Fibre optic interconnecting devices and passive components – Basic test*
132 *and measurement procedures – Part 2-19: Tests – Damp heat (steady state)*
- 133 IEC 61300-2-22, *Fibre optic interconnecting devices and passive components – Basic test*
134 *and measurement procedures – Part 2-22: Tests – Change of temperature*
- 135 IEC 61300-2-42, *Fibre optic interconnecting devices and passive components – Basic test*
136 *and measurement procedures – Part 2-42: Tests – Static side load for connectors*
- 137 IEC 61300-2-44, *Fibre optic interconnecting devices and passive components - Basic test and*
138 *measurement procedures - Part 2-44: Tests – Flexing of the strain relief of fibre optic devices*
- 139 IEC 61300-3-2, *Fibre optic interconnecting devices and passive components – Basic test and*
140 *measurement procedures – Part 3-2: Examinations and measurements – Polarization*
141 *dependence of attenuation in a a single-mode fibre optic device*
- 142 IEC 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and*
143 *measurement procedures – Part 3-6: Examinations and measurements – Return loss*
- 144 IEC 61300-3-20, *Fibre optic interconnecting devices and passive components – Basic test*
145 *and measurement procedures – Part 3-20: Examinations and measurements – Directivity of*
146 *fibre optic branching devices*
- 147 IEC 61300-3-28, *Fibre optic interconnecting devices and passive components – Basic test*
148 *and measurement procedures – Part 3-28: Examinations and measurements – Transient loss*
- 149 IEC 61300-3-29, *Fibre optic interconnecting devices and passive components – Basic test*
150 *and measurement procedures – Part 3-29: Examinations and measurements – Measurement*
151 *techniques for characterizing the amplitude of the spectral transfer function of DWDM*
152 *components*
- 153 IEC 61300-3-32, *Fibre optic interconnecting devices and passive components – Basic test*
154 *and measurement procedures – Part 3-32: Examinations and measurements – Polarization*
155 *mode dispersion measurement for passive optical components*
- 156 IEC 61300-3-38, *Fibre optic interconnecting devices and passive components – Basic test*
157 *and measurement procedures – Part 3-38: Examinations and measurements – Group delay,*
158 *chromatic dispersion and phase ripple*
- 159 IEC 61753-1, *Fibre optic interconnecting devices and passive components – Performance*
160 *standard - Part 1: General and guidance*
- 161 IEC 62074-1, *Fibre optic WDM devices – Part 1: Generic specification*
- 162 IEC TS 62627-09, *Fibre optic interconnecting devices and passive components - Vocabulary*
163 *for passive optical devices*

164 **3 Terms and definitions**

165 For the purposes of this document, the following terms and definitions, as well as those given
166 in IEC 62074-1 and IEC TS 62627-09, apply.

167 ISO and IEC maintain terminological databases for use in standardization at the following
168 addresses:

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

171 3.1

172 middle-scale 1 × N DWDM device

173 wavelength-selective branching device which performs the function both of a wavelength
174 multiplexer and demultiplexer with DWDM channel spacing of 50 GHz, 100 GHz or 200 GHz
175 and a number of channels (*N*) equalling 16 to 64

176 3.2

177 type A (Gaussian passband profile)

178 middle-scale 1 × *N* DWDM device whose passband profile is Gaussian shape

179 3.3

180 type B (Flat-top passband profile)

181 middle-scale 1 × *N* DWDM device whose passband profile is flat-top shape

182 4 Test

183 Unless otherwise specified, all test methods shall be in accordance with the IEC 61300 series.
184 The samples shall be terminated onto single-mode fibres as per IEC 60793-2-50 category B-
185 652.B, B-652.D or B-657 in either coated fibres (primary and secondary) or reinforced cable
186 format as per IEC 60794-2-50. DWDM devices used for the test are intended to be previously
187 unstressed new samples but may also be selected from previously used samples, if desired.
188 All measurements shall be carried out at the standard atmospheric condition defined in IEC
189 61300-1, unless otherwise stated. If the device is provided with temperature control, this shall
190 be set at the set-point specified by the manufacturer.

191 The requirements apply to every combination of input and output port.

192 All tests shall be carried out to validate performance over the required operating wavelength
193 range. As a result, single or multiple spectral bands may be chosen for the qualification and
194 differing target specifications may be assigned to each spectral band.

195 The following Table 1 is intended to provide guidance on the wavelength ranges of the
196 various spectral bands. It is not intended for specification. Values of operating wavelength
197 used in performance verification shall be defined in the manufacturer's specification.

198 **Table 1 – Single-mode spectral bands**

Band	Descriptor	Range nm
O-band	Original	1 260 to 1 360
E-band	Extended	1 360 to 1 460
S-band	Short wavelength	1 460 to 1 530
C-band	Conventional	1 530 to 1 565
L-band	Long wavelength	1 565 to 1 625
U-band	Ultralong wavelength	1 625 to 1 675
SOURCE ITU-T G-series Recommendations – Supplement 39, Optical system design and engineering considerations		

199 **5 Test report**

200 Fully documented test reports and supporting evidence shall be prepared and be available for
201 inspection as evidence that the tests have been carried out and complied with.

202 **6 Performance requirements**203 **6.1 Reference components**

204 The testing for these devices does not require the use of reference components.

205 **6.2 Dimensions**

206 Dimensions shall comply with either an appropriate IEC interface standard or with those given
207 in appropriate manufacturers drawings, where the IEC interface standard does not exist or
208 cannot be used.

209 **6.3 Test details and requirements**

210 The requirements are given only for pigtailed DWDM devices. For connectorized components,
211 the connector performances shall be in compliance with IEC 61753-1.

212 The minimum length of fibre or cable of 1,0 m per port on each pigtailed side shall be used for
213 all tests.

214 Test details and minimum requirements for category C is shown in Table 2, Table 3 and Table
215 4.

216 **Table 2 – Test details and requirements for type A (Gaussian passband profile)**

No	Tests	Requirements	Details	
1A	Number of channels: N	$16 \leq N \leq 64$	Operating wavelength: NOTE	ITU-T grid (ITU-T Recommendation G.694.1) or custom design Design information (not test item)
2A	Channel frequency range	Channel central frequency $\pm 0,125 \times \Delta f$ where Δf is the channel spacing	Channel central frequency: NOTE	ITU-T grid (ITU-T Recommendation G.694.1) or custom design Design information (not test item)
3A	Attenuation (Insertion loss) IEC 61300-3-29	$\leq 6,0$ dB (channel spacing with 50 GHz) $\leq 4,5$ dB (channel spacing with 100 GHz, 200 GHz) Maximum allowable attenuation (Insertion loss) over the channel frequency range	Launch fibre length: Measurement uncertainty: NOTE	$\geq 2,0$ m 0,2 dB The attenuation (Insertion loss) is determined as the maximum value over all states of polarization
4A	Channel non-uniformity IEC 61300-3-29	$\leq 1,5$ dB Maximum allowable channel non-uniformity of attenuation (Insertion loss)	Launch fibre length: Measurement uncertainty: NOTE	$\geq 2,0$ m 0,2 dB The channel non-uniformity is determined as the maximum value over all states of polarization

Table 2 (continued)

No	Tests	Requirements	Details	
5A	1 dB passband width IEC 61300-3-29	$\geq 0,25 \times \Delta f$ where Δf is the channel spacing. Minimum allowable 1 dB passband width (centred at the channel frequency)	Launch fibre length: Measurement uncertainty: NOTE	$\geq 2,0$ m $0,01 \times \Delta f$ The 1 dB passband width is determined as the minimum value over all states of polarization
6A	3 dB passband width IEC 61300-3-29	$\geq 0,4 \times \Delta f$ where Δf is the channel spacing (channel spacing with 200 GHz) $\geq 0,5 \times \Delta f$ where Δf is the channel spacing (channel spacing with 50 GHz, 100 GHz) Minimum allowable 3 dB passband width (centred at the channel frequency)	Launch fibre length: Measurement uncertainty: NOTE	$\geq 2,0$ m $0,01 \times \Delta f$ The 3 dB passband width is determined as the minimum value over all states of polarization
7A	Passband ripple IEC 61300-3-29	$\leq 1,5$ dB Maximum attenuation (Insertion loss) variation within the channel frequency range	Launch fibre length: Measurement uncertainty: NOTE	$\geq 2,0$ m 0,2 dB The passband ripple is determined as the maximum value over all states of polarization.
8A	Adjacent channel crosstalk IEC 61300-3-29	≤ -25 dB Maximum allowable adjacent channel crosstalk over the channel frequency range	Launch fibre length: Measurement uncertainty: NOTE	$\geq 2,0$ m 1 dB The adjacent channel crosstalk is specified only for demultiplexer. The adjacent channel crosstalk is determined as the maximum value over all states of polarization
9A	Non-adjacent channel crosstalk IEC 61300-3-29	≤ -30 dB Maximum allowable non-adjacent channel crosstalk over the channel frequency range	Launch fibre length: Measurement uncertainty: NOTE	$\geq 2,0$ m 1 dB The non-adjacent channel crosstalk is specified only for demultiplexer. The non-adjacent channel crosstalk is determined as the maximum value over all states of polarization
10A	Total channel crosstalk IEC 61300-3-29	≤ -20 dB Maximum allowable total channel crosstalk value	Launch fibre length: Measurement uncertainty: NOTE	$\geq 2,0$ m 1 dB The total channel crosstalk is specified only for demultiplexer. The total channel crosstalk is determined as the maximum value over all states of polarization