SLOVENSKI PREDSTANDARD

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Optični vmesniki konektorja optičnih vlaken – 2-1. del: Standard optičnega vmesnika enorodnih vlaken, ki se fizično stikajo pod pravim kotom

(istoveten prEN 61755-2-1:2005)

Fibre optic connector optical interfaces – Part 2-1: Optical interface standard single mode non-angled physically contacting fibres

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86B/2139/CDV

COMMITTEE DRAFT FOR VOTE (CDV)
PROJET DE COMITÉ POUR VOTE (CDV)

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Secretary: Etsuji SUGITA (Japan) Secrétaire:		
Also of interest to the following committees Intéresse également les comités suivants	Supersedes document Remplace le document 86B/1931/CD and 86B/1984A/CC	
Functions concerned Fonctions concernées ☐ Safety / Sécurité ☐ EMC / CEM ☐ Environment / Environnement ☐ Quality assurance / Assurance qualité		

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Titre :

Title : IEC 61755-2-1 Ed 1.0: Fibre optic connector optical interfaces - Part 2-1: Optical interface standard single mode non-angled physically contacting fibres

Note d'introduction

Introductory note

This CDV has been prepared in accordance with the decisions taken during last WG6 meeting.

The French version will be circulated at FDIS stage.

ATTENTION	ATTENTION
CDV soumis en parallèle au vote (CEI) et à l'enquête (CENELEC)	**Parallel IEC CDV/CENELEC Enquiry**

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS

61755-2-1: Fibre optic connector optical interfaces – Part 2-1: Optical interface standard single mode non-angled physically contacting fibres

FOREWORD

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International Standard IEC 61755-2-1 has been prepared by sub-committee 86B. Fibre optic interconnecting devices and passive components of IEC technical committee 86: Fibre optics.

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

FDIS	Report on Voting

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3

Annex A forms an integral part of this standard.

The committee has decided that the contents of this publication will remain unchanged until 200x. At this date the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS

61755-2-1: Fibre optic connector optical interfaces – Part 2-1: Optical interface standard single mode non-angled physically contacting fibres

1 Scope

The document defines a set of prescribed conditions that must be maintained in order to satisfy the requirements of attenuation and return loss performance in a randomly mated pair of fibres considering a beam with a Gaussian distribution of light intensity over the considered MFD. Performance grades are classified into four categories for attenuation and return loss measurements.

2 Performance grades

Proposed performance grades for PC polished connectors are given in tables 1 and 2. The performance grades based on return loss are for non-angled connectors only. Performance grades for APC connectors are defined separately in IEC 61755-2-2.

Table1 - Singlemode attenuation grades at 1310nm and 1550nm (dB)

Attenuation grade	Attenuation (≥97%)[1]	Mean	Notes
A			Reserved for future application
B	≤0,25	≤0,12	
C	≤0,50	≤0,25	
D	≤1,0	≤0,50	

1. The probability of a random mated connector set of meeting or exceeding the specified level of attenuation will be ≥ 97%

Table 2 - Singlemode return loss grades at 1310nm and 1550nm (dB)

Return loss grade	Return Loss (mated)	Notes
1	> 60	> 55dB in unmated condition (APC only)
2	≥ 45	
3	≥ 35	
4	≥ 26	

3 Criteria for a fit within performance grades

The following figures and tables give the criteria for meeting the performance grades listed above. The parameters chosen for the criteria definition are based on the degree of significance in affecting the performance under test. The criteria selected are based on the theoretical model presented in the paragraphs 3.1 and 3.2 of this documents.

3.1 Attenuation grades and criteria

Considering a beam with a Gaussian distribution, the coupling efficiency, η, of two single mode fibres is given by Equation (1). The mode field diameters and the nominal index of refraction of the fibre core are given in table 3.

Table 3 - Mode field diameter and fibre core nominal index of refraction as a function of the nominal wavelength of the light used

Fibre Type	Nominal wavelength (nm)	MFD (μm)		n_0 (core)
		Min.	Max	
Dispersion Unshifted	1310	8,8	9,6	1,4520
Fibre	1550	9,6	11,2	1,4493

The attenuation (also referred to as Insertion Loss, IL, or coupling efficiency) of the fibres equals η combined. The definition of performance grades is based on a statistical approach defining parameter values to reach the given random attenuation in 97% of the connections. This performance is reached considering following assumptions: normal distribution of MFD within the range defined in table 3 nominal value for wavelength.

Lateral and angular misalignment of the two randomly mated connectors are assumed to be statistically distributed within the specific ranges of parameter values E and F.

The design curves given in figure 1 each represents maximum allowable combinations of a given specific lateral offset and an accordant angular misalignment to not exceed the specified attenuation of any single considered connection. The shown design curves represent the determination of the parameters under a worst case mismatch of the mode field diameter of the selected fibres as given in table 3 i.e. 8,8/9,6 _m and a wavelength of 1310 nm. These mode field diameter ranges are selected within the IEC 60793-2-50 family specification for single mode non-dispersion shifted fibres as given in table 3. The equation is also applicable to 1550 nm, using the parameters in table 3, but the design curves are not shown in figure 1.

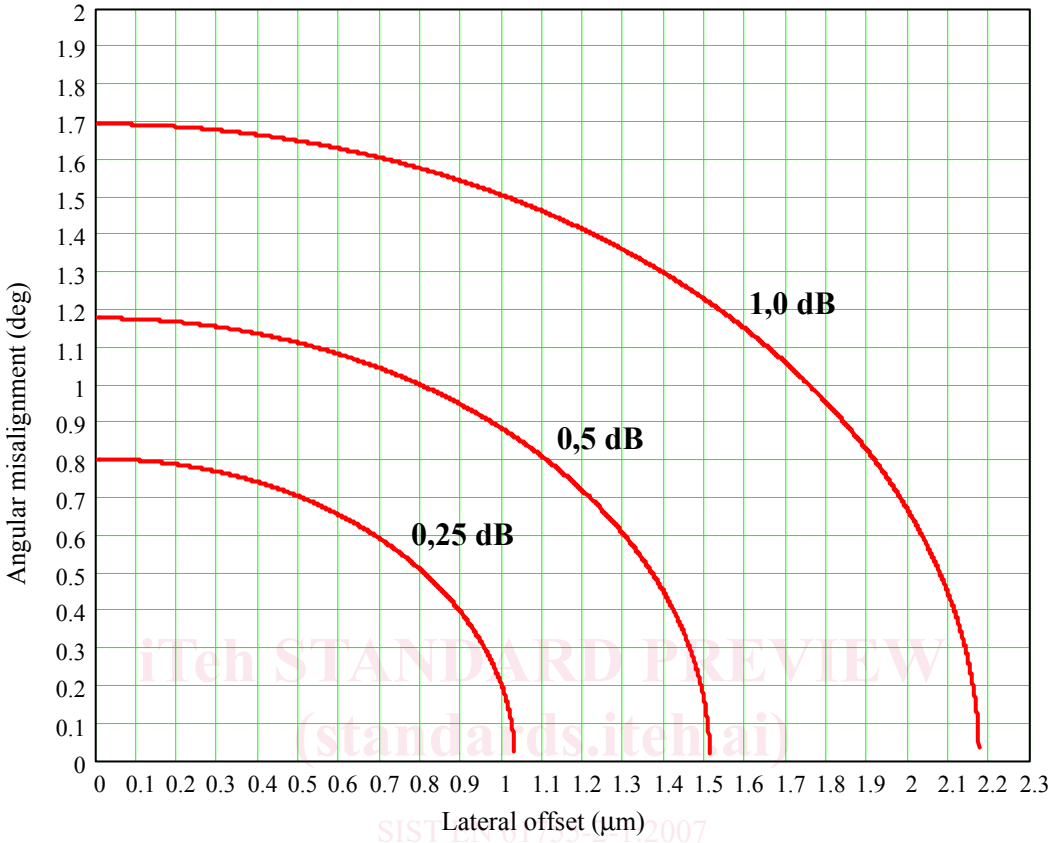

Figure 1 - Lateral offset and angular misalignment versus attenuation for a typical non-dispersion shifted single mode fibre

Equation 1: Attenuation $\eta_{combined}$

$$\eta_{combined} = -10\log\left[\frac{(2\omega_2\omega_1)^2}{\left(\omega_2^{\,2}+\omega_1^{\,2}\right)^2}\exp\left[\frac{-2\cdot d^2}{\omega_2^{\,2}+\omega_1^{\,2}} - 2\pi^2\frac{n_0^{\,2}}{\lambda^2}\frac{\left(\omega_2^{\,2}\omega_1^{\,2}\right)}{\left(\omega_2^{\,2}+\omega_1^{\,2}\right)}\sin(\theta)^2\right]\right] \quad (1)$$

d = Total lateral offset
θ = Angular misalignment between fibre cores
λ = Wavelength of transmitted light in vacuum
n_0 = Index of refraction of the fibre core
ω_1 = Transmit fibre mode field radius
ω_2 = Receive fibre mode field radius