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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Dynamic modules –
Part 3-1: Performance specification templates – Dynamic channel equalizers

Modules dynamiques –
Partie 3-1: Modèles de spécification de performance – Egaliseurs de canaux de transmission dynamiques

IEC 62343-3-1:2010

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FOREWORD

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International Standard IEC 62343-3-1 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

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

CDV	Report on voting
86C/901/CDV	86C/951/RVC

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 2.

A list of all parts of IEC 62343 series, under the general title *Dynamic modules*, can be found on the IEC website.

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

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- withdrawn,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

INTRODUCTION

A dynamic channel equaliser (DCE) is used to compensate and equalize the variations in channel power spectrum as the optical channels propagate through DWDM networks. A typical DCE module is an electrically controlled two port device, which controls the time varying power levels of multichannel input signals such that at the output channel powers are nominally equalised.

DYNAMIC MODULES –

Part 3-1: Performance specification templates – Dynamic channel equalizers

1 Scope

This part of IEC 62343 provides a performance specification template for the dynamic channel equaliser (DCE). The object of this performance specification template is to provide a frame for the preparation of detail specifications on the performances of dynamic channel equalisers.

Additional specification parameters may be included for detailed product specifications or performance specifications. However, specification parameters specified in this standard should not be removed from the detail product specifications or performance specifications.

The technical information regarding dynamic channel equalisers, and their applications in DWDM systems are described in future IEC/TR 62343-6-1[1].

2 Normative references

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

IEC 61300-3-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-2: Examinations and measurements – Polarization dependent loss in a single-mode fibre optic device*

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

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

IEC 61300-3-32, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-32: Examinations and measurements – Polarization mode dispersion measurement for passive optical components*

IEC 61753-021-2: *Fibre optic interconnecting devices and passive components performance standard – Part 021-2: Grade C/3 single-mode fibre optic connectors for category C – Controlled environment*

ITU-T Recommendation G.694.1: *Spectral grids for WDM applications: DWDM frequency grid*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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1 Under consideration.

3.1
channel frequency range
frequency range within which a device is expected to operate with a specified performance. For a particular nominal channel central frequency, f_{nomi}, this frequency range is from f_{imin} = (f_{nomi} - Δf_{max}) to f_{imax} = (f_{nomi} + Δf_{max}), where Δf_{max} is the maximum channel central frequency deviation

3.2
channel non-uniformity
difference (in dB) between the powers of the channel with the most power (in dBm) and the channel with the least power (in dBm). This applies to a multichannel signal across the operating wavelength range

3.3
channel response time
elapsed time it takes a device to transform a channel from a specified initial power level to a specified final power level desired state, when the resulting output channel non-uniformity tolerance is met, measured from the time the actuation energy is applied or removed

3.4
channel spacing
centre-to-centre difference in frequency (or wavelength) between adjacent channels in a device

3.5
dynamic channel equalizer
DCE
device that is capable of transforming, by internal or external automatic control, a multichannel input signal with time-varying averaged powers into an output signal in which all working channel powers are nominally equal or are set for a required level of pre-emphasis

NOTE This device may also provide the extinction of one or more of the input channels.

3.6
in-band extinction ratio
within the operating wavelength range, the difference (in dB) between the minimum power of the non-extinguished channels (in dBm) and the maximum power of the extinguished channels (in dBm)

3.7
operating wavelength range
specified interval of wavelengths around the operating wavelength within which an optical component is designed to operate with the specified performance

3.8
out-of-band attenuation
attenuation (in dB) of channels that fall outside of the operating wavelength range

3.9
ripple
peak-to-peak difference in insertion loss within a channel frequency (or wavelength) range

4 Test report

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

5 Reference components

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

6 Performance requirements

6.1 Dimensions

Dimensions shall comply with either an appropriate IEC interface standard or with those given in the manufacturer's drawings, where the IEC interface standard does not exist or cannot be used.

6.2 Sample size

The test sample size and sequencing requirements for the module components shall be defined in the relevant specification.

6.3 Test details and requirements

The requirements are given only for non-connectorized DCE devices. For connectorized components, the connector performances shall be in compliance with IEC 61753-021-2.

A minimum length of fibre or cable of 1,5 m per port shall be included in all climatic and environmental tests.

The channel spacings, unless otherwise specified, shall be in accordance with ITU-T Recommendation G.694-1. Environmental test shall be measured for a single input/output port combination.

The test details and requirements for performance standard category C are shown in Table 1.

Table 1 – Tests and requirements

No.	Test parameters	Unit	Details
1	Insertion loss	dB Over the operating wavelength range	IEC 61300-3-4 Source: The source shall be tuneable over the operating wavelength range and shall have a spectral width of ≤1 GHz The source stability shall be ≤0,25 GHz The source output shall be unpolarised Detector: The linearity of the detector shall be within ± 0,05 dB The spectral response shall be matched to the source The dynamic range shall be consistent with the attenuation values to be measured The maximum attenuation value specified applies to any combination of input/output ports
2	In band extinction ratio	dB	Method under consideration
3	Out of band attenuation	dB	Method under consideration

No.	Test parameters	Unit	Details
4	Return loss (branching device method)	dB Class W	IEC 61300-3-6 Branching device: The nominal splitting ratio shall be 50/50 The directivity shall be ≥60 d B Source: The central wavelength shall be 1 550 nm ± 20 nm The power stability of the light source shall be better than ± 0,05 dB over the measuring period Detector: The linearity of the detector shall be within ± 0,05 dB The detector sensitivity shall be <-80 dBm All ports not under test shall be terminated to avoid unwanted back reflections contributing to the measurement
5	Polarization dependent loss	dB	IEC 61300-3-2, Method 1 Other details shall be the same as in test no. 1 The polarization dependant loss shall be measured between any input/output port combination
6	Polarization mode dispersion	ps	IEC 61300-3-32 Other details shall be the same as in test no. 1 The polarization mode dispersion shall be measured between any input/output port combination
7	Output channel non-uniformity	dB	Method under consideration
8	Input channel non-uniformity	dB	Method under consideration
9	Ripple	dB	Method under consideration
10	Channel frequency range	GHz	Method under consideration
11	Channel response time	s	Method under consideration
12	Channel spacing	GHz	Method under consideration
13	Chromatic dispersion	ps/nm	Method under consideration
14	Channel crosstalk	dB	Method under consideration
15	Adjacent channel attenuation crosstalk	dB	Method under consideration
16	Maximum input power	dBm	Method under consideration