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colour inside

Dynamic modules – ~~General and guidance~~ Generic specification

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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DYNAMIC MODULES – ~~GENERAL AND GUIDANCE~~ GENERIC SPECIFICATION

FOREWORD

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

This third edition cancels and replaces the second edition published in 2017. This edition constitutes a technical revision.

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

a) addition of terms and definitions for optical multicast switches (3.8);
b) revision of Clause 4, listing the requirements for standards in the IEC 62343 series;
c) addition of Clause 6 (Safety requirements).

The text of this International Standard is based on the following documents:

Draft	Report on voting
86C/1803/CDV	86C/1827/RVC

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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

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- replaced by a revised edition, or
- amended.

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INTRODUCTION

This document applies to dynamic devices as defined in IEC TS 62538. This document contains general guidance for the IEC 62343 series related to dynamic devices and definitions which apply to dynamic devices. The dynamic module (DM), or device, has two distinguishing characteristics: dynamic and module.

"Dynamic" highlights the functions of the products to include "tuning, varying, switching, configuring, and other continuous optimization," often accomplished by electronics, firmware, software or their combinations. The dynamic device usually has a certain level of intelligence to monitor or measure ~~the situation~~ its configuration or settings and make decisions for necessary (optimization) actions. The behaviour of dynamic modules ~~may~~ can be characterized by transient characteristics as the dynamic module undergoes tuning, switching, configuring, and other continuous optimization. Characterization of transient characteristics will be considered in individual dynamic module standards.

"Module" defines that products covered by this document are the integration of active and passive components (either or both), through interconnecting materials or devices. The controlling electronics can be inside or outside the optical package that contains all or most of the optical components and interconnection. The product can be a small printed wiring board (PWB) or child-board with mounted optical module, or it can be a small box (e.g., housing) with optical components and electronics enclosed. In the former case, it is more like an assembly (i.e., generally not packaged in a box or housing) than a module (i.e., generally packaged in a box or housing).

For historical reasons and convenience, a dynamic module or device is referred to as a dynamic module in the IEC 62343 series.

The number of dynamic modules and devices is rapidly growing as optical communications networks evolve. The following list provides some examples of the products covered by the IEC 62343 series. It should be noted that the list is not exhaustive and the products to be covered are not limited by the listed examples:

- channel gain equalizer;
- dynamic channel equalizer;
- dynamic gain tilt equalizer;
- dynamic slope equalizer;
- tuneable chromatic dispersion compensator;
- polarization mode dispersion compensator;
- reconfigurable optical add-drop multiplexer;
- switch with monitoring and controls;
- variable optical attenuator with monitoring and controls;
- optical channel monitor;
- wavelength selective switch;
- optical multicast ~~optical~~ switch.

The IEC 62343 series covers performance templates, performance standards, reliability qualification requirements, hardware and software interfaces, and related testing methods.

The structure of the IEC 62343 series, under the general title *Dynamic modules,* is as follows:

- IEC 62343-1 series Part 1: Performance standards
- IEC 62343-2 series Part 2: Reliability qualification
- IEC 62343-3 series Part 3: Performance specification templates
- IEC 62343-4 series Part 4: Software and hardware interface
- IEC 62343-5 series Part 5: Test methods
- IEC 62343-6 series Part 6: Design ~~guides~~ guidelines

A complete set of standards related to a dynamic module or device should include the following:

- optical performance standards;
- reliability qualification standards;
- optical performance specification templates;
- hardware and software interface standards;
- test methods;
- technical reports.

The safety standards related to dynamic modules are mostly optical power considerations, which are covered by ~~IEC TC 76: Optical radiation safety and laser equipment~~ the IEC 60825 series.

Only those dynamic modules for which standards are complete or in preparation are included in Clause 3. To reflect the rapidly growing market for dynamic modules, additional terms and definitions will be added in subsequent revisions as the series expands.

It should be noted that optical amplifiers could be regarded as dynamic modules. They are not included in the IEC 62343 series but are covered in their own series of IEC standards.

DYNAMIC MODULES – ~~GENERAL AND GUIDANCE~~ GENERIC SPECIFICATION

1 Scope

This document applies to all commercially available optical dynamic modules and devices. It describes the products covered by the IEC 62343 series, defines terminology, fundamental considerations and basic approaches.

The object of this document is to

- establish uniform requirements for operation, reliability and environmental properties of dynamic modules (DMs) to be implemented in the appropriate DM standard, and
- provide assistance to the purchaser in the selection of consistently high-quality DM products for their particular applications, as well as in the consultation of the appropriate specific DM standard(s).

This document covers performance templates, performance standards, reliability qualification requirements, hardware and software interfaces and related testing methods.

Since a dynamic module integrates an optical module/device, printed wiring board, and software/firmware, the standards developed in the series will mimic appropriate existing standards. On the other hand, since "dynamic module" is a relatively new product category, the dynamic module standards series will not be bound by the existing practices where requirements differ.

The safety standards as related to dynamic modules are mostly optical power considerations, which is covered by ~~IEC TC 76: Optical radiation safety and laser equipment~~ the IEC 60825 series (see Clause 6).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050-731, *International Electrotechnical Vocabulary – Chapter 731: Optical fibre communication* (available at www.electropedia.org)

IEC TR 61931, *Fibre optic – Terminology*

~~IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications*~~

IEC 62343

Edition 3.0 2023-01

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Dynamic modules – Generic specification

Modules dynamiques – Spécification générique

IEC 62343:2023-01(en-fr)

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MODULES DYNAMIQUES – SPÉCIFICATION GÉNÉRIQUE

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L'IEC 62343 a été établie par le sous-comité 86C: Systèmes et dispositifs actifs à fibres optiques, du comité d'études 86 de l'IEC: Fibres optiques. Il s'agit d'une Norme internationale.

Cette troisième édition annule et remplace la deuxième édition parue en 2017. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) ajout de termes et de définitions relatifs aux commutateurs optiques multidiffusions (3.8);
b) révision de l'Article 4 énumérant les exigences relatives aux normes de la série IEC 62343;
c) ajout de l'Article 6 (Exigences de sécurité).

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
86C/1803/CDV	86C/1827/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Une liste de toutes les parties de la série IEC 62343, publiées sous le titre général *Modules dynamiques*, se trouve sur le site web de l'IEC.

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INTRODUCTION

Le présent docoument s’applique aux dispositifs dynamiques tels que définis dans l’IEC TS 62538. Le présent document contient les lignes directrices générales pour la série IEC 62343 portant sur les dispositifs dynamiques, et les définitions qui s’y appliquent. Un dispositif ou un module dynamique (DM) a deux caractéristiques distinctives: dynamique et module.

"Dynamique" indique que les fonctions des produits incluent "le réglage, la variation, la commutation, la configuration et d’autres optimisations continues", souvent réalisés par des circuits électroniques, des logiciels ou des microprogrammes, ou une combinaison des deux. Un dispositif dynamique a généralement un certain niveau d’intelligence pour contrôler ou mesurer sa configuration ou ses réglages et prendre des décisions sur les actions nécessaires (optimisation). Le comportement des modules dynamiques peut être caractérisé par des caractéristiques transitoires lorsque le module dynamique fait l’objet d’un réglage, d’une commutation, d’une configuration et d’autres optimisations continues. La caractérisation des caractéristiques transitoires est prise en considération dans chaque norme sur les modules dynamiques.

"Module" définit que les produits couverts par le présent document sont l’intégration de composants actifs et passifs (l’un ou l’autre ou les deux), en interconnectant des matériaux ou des dispositifs. L’électronique de commande peut être à l’intérieur ou à l’extérieur du boîtier optique qui contient la totalité ou la majeure partie des interconnexions et des composants optiques. Le produit peut être une petite carte imprimée ou une carte fille sur laquelle est monté un module optique, ou un petit boîtier enfermant les composants optiques et les composants électroniques. Dans le premier cas, il s’agit plutôt d’un ensemble (c’est-à-dire généralement non placé dans un boîtier) que d’un module (c’est-à-dire généralement placé dans un boîtier).

Pour des raisons historiques et par commodité, les dispositifs ou modules dynamiques sont appelés modules dynamiques dans la série IEC 62343.

Le nombre de modules et de dispositifs dynamiques augmente rapidement à mesure que les réseaux de communications optiques évoluent. La liste suivante présente des exemples de produits couverts par la série IEC 62343. Il convient de noter que la liste n’est pas exhaustive et que les produits à couvrir ne sont pas limités par les exemples donnés:

- égaliseur de gain de canal de transmission;
- égaliseur de canal de transmission dynamique;
- égaliseur dynamique de basculement de gain;
- égaliseur dynamique de pente;
- compensateur de dispersion chromatique réglable;
- compensateur de dispersion de mode de polarisation;
- multiplexeur optique d’insertion-extraction reconfigurable;
- commutateur avec contrôle et commande;
- affaiblisseur optique variable avec contrôle et commande;
- contrôleur de canal de transmission optique;
- commutateur sélectif en longueur d’onde;
- commutateur optique multidiffusion.

La série IEC 62343 couvre des modèles de performance, des normes de performance, des exigences relatives à la qualification de la fiabilité, des interfaces matérielles et logicielles et des méthodes d’essais associées.

La structure de la série IEC 62343, sous le titre général *Modules dynamiques,* est la suivante:

- Série IEC 62343-1 Partie 1: Normes de performance
- Série IEC 62343-2 Partie 2: Qualification de fiabilité
- Série IEC 62343-3 Partie 3: Modèles de spécification de performance
- Série IEC 62343-4 Partie 4: Interface logicielle et matérielle
- Série IEC 62343-5 Partie 5: Méthodes d'essai
- Série IEC 62343-6 Partie 6: Lignes directrices de conception

Il convient qu'un ensemble complet de normes relatif à un dispositif ou un module dynamique inclue les éléments suivants:

- normes de performance optique;
- normes de qualification de fiabilité;
- modèles de spécification de performance optique;
- normes d'interfaces matérielles et logicielles;
- méthodes d'essai;
- rapports techniques.

Les normes de sécurité se rapportant aux modules dynamiques sont principalement des considérations sur la puissance optique, traitées par la série IEC 60825.

Seuls les modules dynamiques pour lesquels des normes existent ou sont en cours d'établissement sont inclus dans l'Article 3. Pour refléter le marché des modules dynamiques se développant rapidement, d'autres termes et définitions sont amenés à être ajoutés dans des révisions suivantes à mesure que la série se développe.

Il convient de noter que les amplificateurs optiques peuvent être considérés comme des modules dynamiques. Ils ne sont pas inclus dans la série IEC 62343, mais ils sont couverts dans leur propre série de normes IEC.

MODULES DYNAMIQUES – SPÉCIFICATION GÉNÉRIQUE

1 Domaine d'application

Le présent document s'applique à tous les dispositifs et modules dynamiques optiques disponibles dans le commerce. Elle décrit les produits couverts par la série IEC 62343, définit la terminologie, les considérations fondamentales et les approches de base.

Le présent document a pour objets:

- d'établir des exigences uniformes pour le fonctionnement, la fiabilité et les propriétés environnementales des modules dynamiques (DM) à intégrer dans la norme appropriée sur les modules dynamiques, et
- d'aider l'acheteur à choisir des produits à modules dynamiques de haute qualité dans le cadre de ses applications particulières et à consulter les normes appropriées sur les modules dynamiques spécifiques.

Le présent document couvre les modèles de performance, les normes de performance, les exigences sur la qualification de la fiabilité, les interfaces matérielles et logicielles et les méthodes d'essais associées.

Puisqu'un module dynamique intègre un module ou un dispositif optique, une carte imprimée et un logiciel ou un microprogramme, les normes développées dans la série calquent des normes existantes appropriées. D'autre part, un "module dynamique" étant une catégorie de produit relativement nouvelle, la série de normes sur les modules dynamiques n'est pas limitée par les pratiques existantes dans lesquelles les exigences diffèrent.

Les normes de sécurité se rapportant aux modules dynamiques sont principalement des considérations sur la puissance optique, qui sont traitées par la série IEC 60825 (voir l'Article 6).

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60050-731, *Vocabulaire Electrotechnique International – Chapitre 731: Télécommunications par fibres optiques* (disponible sous www.electropedia.org)

IEC TR 61931, *Fibres optiques – Terminologie*