

INTERNATIONAL STANDARD



**Fibre optic interconnecting devices and passive components – Basic test and measurement procedures –
Part 2-11: Tests – Axial compression**

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INTERNATIONAL STANDARD



**Fibre optic interconnecting devices and passive components – Basic test and measurement procedures –
Part 2-11: Tests – Axial compression**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING
DEVICES AND PASSIVE COMPONENTS –
BASIC TEST AND MEASUREMENT PROCEDURES –****Part 2-11: Tests – Axial compression****FOREWORD**

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IEC 61300-2-11 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics. It is an International Standard.

This third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

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

- a) added Terms and definitions clause;
- b) removed severity table for closures;
- c) added recommended severity for tubes and cables without strength member attachment.

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

Draft	Report on voting
86B/4807/FDIS	86B/4824/RVD

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.

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – BASIC TEST AND MEASUREMENT PROCEDURES –

Part 2-11: Tests – Axial compression

1 Scope

The purpose of this part of IEC 61300 is to ensure that the captivation or the attachment of the cable to the fibre optic devices or components, for example fibre optic closures, will withstand compressive axial loads likely to be applied during normal service.

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

IEC 61300-3-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-1: Examinations and measurements – Visual examination*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

3.2 Abbreviated terms

DUT device under test

4 General description

The ~~specimen~~ DUT is rigidly clamped and an axial compressive load is applied to the cable.

5 Apparatus

5.1 General

The test apparatus shall be capable of applying an axial compression load between a clamped ~~specimen~~ device or component and a fixed cable. The apparatus consists of the elements described in 5.2 to 5.5.

5.2 Moveable clamping device

A ~~suitable~~ clamping device which grips a length of fibre optic cable over a distance equivalent to at least three times the cable diameter (see Figure 1, dimension A), and which is capable of providing an axial load without slipping, causing damage to the cable or increasing attenuation.

5.3 Fixed clamping device

A fixed clamping device capable of gripping the ~~specimen~~ device or component without altering any of its mechanical properties.

5.4 Force generator

A force generator may be any device or apparatus capable of smoothly applying the specified force at the specified rate.

5.5 Force gauge

A ~~suitable~~ instrument for measuring the applied force being exerted between the ~~specimen~~ device or component and the fibre optic cable.

6 Procedure

6.1 Preparation of ~~specimens~~ DUT

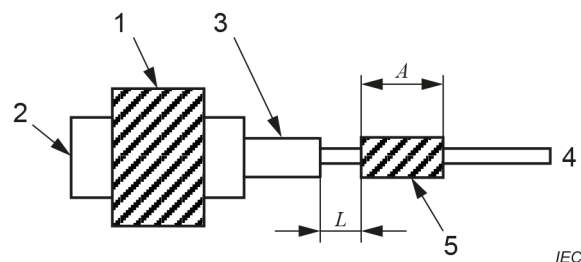
The ~~specimen~~ DUT shall consist of a fully assembled optical device or component, ~~prepared in accordance with the relevant specification~~ where one or more cables are fixed and prepared in accordance with the manufacturer's instructions. ~~Unless otherwise specified,~~ The ~~specimen~~ DUT shall be subjected to the following test procedure in non-operational mode.

6.2 Preconditioning

~~Unless otherwise specified,~~ Precondition each prepared ~~specimen~~ DUT for at least 2 h at the standard ~~test~~ atmospheric conditions specified in IEC 61300-1.

6.3 Mounting of the DUT

Securely fix the device ~~under test~~ or component to the fixed clamping device. See Figure 1 for an example of the test set-up. Clamp the cable at the point of application using a ~~movable~~ clamping device such that the distance, L , between the rear of the strain relief and the front of the ~~cable~~ ~~moveable~~ clamping device is ~~twice the cable diameter~~. ~~The length, L , shall be~~ at maximum twice the cable diameter to prevent cable buckling.



Key

- 1 fixed clamping device
- 2 device-under-test or component
- 3 strain relief
- 4 fibre optic cable
- 5 movable clamping device
- A cable clamp length (at least three times the cable diameter)
- L length between rear of strain relief and cable clamp (maximum two times the cable diameter)

Figure 1 – Example of test apparatus set-up

6.4 Initial examination

The DUT shall be visually inspected according to IEC 61300-3-1.

6.5 Application of load

Smoothly apply the axial compressive load to the cable, as recommended in Table 1. ~~Unless otherwise specified,~~ Maintain the load for a minimum of 2 min. The position of the point of application shall be such that the load is axially transmitted.

6.6 Recovery

Allow DUT to recover for at least 4 h at standard atmospheric conditions specified in IEC 61300-1.

6.7 ~~Post-test~~ Final examination

Remove the axial compressive load from the ~~specimen~~ DUT and the ~~specimen~~ DUT from the test mounting. ~~Unless otherwise specified,~~ Visually examine the ~~specimen~~ DUT and its component parts in accordance with IEC 61300-3-1. Check for evidence of cracking, loose parts, chipped parts, scratches, permanent deformation, displacement, excessive movements or other damage to cable jacket, seals, strain relief or fibres which might impair its function, and against any other pass/fail criteria specified in the relevant IEC 61753 performance standard or IEC 62005 reliability specification. Careful attention shall be given to degradation of the optical signal, fibre breakage and excessive movement of the cable relative to the ~~specimen~~ DUT.

7 Severity

~~The severity consists of the magnitude of the axial compressive force. The severity shall be specified in the relevant specification. Recommended values of the test parameters are given in Table 1 and Table 2.~~

Table 1 shows the specified test severities in relation to the performance categories. It is recommended to verify the test severities with the relevant IEC 61753 performance standards and IEC 62005 reliability specifications for the normative values.

Table 1 – Recommended severity levels

Cable diameter mm	Load N
<3	10
3 to 6	20
6 to 10	50
10 to 20	100
>20	200

Category	Cable diameter mm	Load N
C, A, G, S	< 3	10
	≥ 3 to < 6	20
	≥ 6 to < 10	50
	≥ 10 to < 20	100
	≥ 20	200
	For tubes and cables without strength member attachment	10

Table 2 – Recommended severity levels for closures

Target	Load N	Duration min
Central strength member	450	30

8 Details to be specified and reported

The following details, as applicable, shall be specified in the relevant specification and shall be reported in the test report:

- magnitude of the load;
- duration of the axial compression load if other than 2 min;
- cable type, diameter;
- ~~— Length L~~
- ~~— Rate of load application~~
- ~~— Specimen mated or unmated~~
- ~~— Specimen optically functioning or non-functioning~~
- type of load application;
- description of DUT;
- pre-conditioning procedure;
- ~~— Post-conditioning procedure~~
- initial examinations and measurements and performance requirements;
- examinations and measurements during test and performance requirements, if required;
- final examinations and measurements and performance requirements;
- optical measurement method, if necessary;
- deviations from test procedure;

- additional pass/fail criteria.

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Bibliography

IEC 61753 (all parts), *Fibre optic interconnecting devices and passive components – Performance standard*

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**Fibre optic interconnecting devices and passive components – Basic test and measurement procedures –
Part 2-11: Tests – Axial compression**

**Dispositifs d'interconnexion et composants passifs fibroniques – Procédures fondamentales d'essais et de mesures –
Partie 2-11: Essais – Compression axiale**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – BASIC TEST AND MEASUREMENT PROCEDURES –

Part 2-11: Tests – Axial compression

1 Scope

The purpose of this part of IEC 61300 is to ensure that the captivation or the attachment of the cable to the fibre optic devices or components, for example fibre optic closures, will withstand compressive axial loads likely to be applied during normal service.

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

3.2 Abbreviated terms

DUT device under test

4 General description

The DUT is rigidly clamped and an axial compressive load is applied to the cable.

5 Apparatus

5.1 General

The test apparatus shall be capable of applying an axial compression load between a clamped device or component and a fixed cable. The apparatus consists of the elements described in 5.2 to 5.5.

5.2 Moveable clamping device

A clamping device which grips a length of fibre optic cable over a distance equivalent to at least three times the cable diameter (see Figure 1, dimension A), and which is capable of providing an axial load without slipping, causing damage to the cable or increasing attenuation.

5.3 Fixed clamping device

A fixed clamping device capable of gripping the device or component without altering any of its mechanical properties.

5.4 Force generator

A force generator may be any device or apparatus capable of smoothly applying the specified force at the specified rate.

5.5 Force gauge

An instrument for measuring the applied force being exerted between the device or component and the fibre optic cable.

6 Procedure

6.1 Preparation of DUT

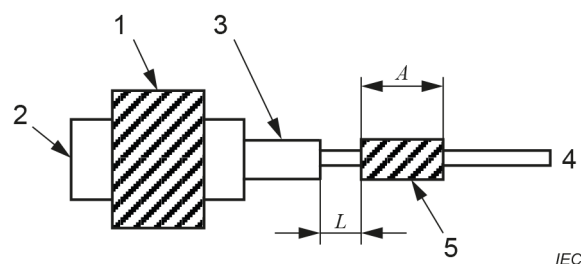
The DUT shall consist of a fully assembled optical device or component where one or more cables are fixed and prepared in accordance with the manufacturer's instructions. The DUT shall be subjected to the following test procedure in non-operational mode.

6.2 Preconditioning

Precondition each prepared DUT for at least 2 h at the standard atmospheric conditions specified in IEC 61300-1.

6.3 Mounting of the DUT

Securely fix the device or component to the fixed clamping device. See Figure 1 for an example of the test set-up. Clamp the cable at the point of application using a moveable clamping device such that the distance, L , between the rear of the strain relief and the front of the moveable clamping device is at maximum twice the cable diameter to prevent cable buckling.

**Key**

- 1 fixed clamping device
- 2 device or component
- 3 strain relief
- 4 fibre optic cable
- 5 movable clamping device
- A cable clamp length (at least three times the cable diameter)
- L length between rear of strain relief and cable clamp (maximum two times the cable diameter)

Figure 1 – Example of test set-up**6.4 Initial examination**

The DUT shall be visually inspected according to IEC 61300-3-1.

6.5 Application of load

Smoothly apply the axial compressive load to the cable, as recommended in Table 1. Maintain the load for a minimum of 2 min. The position of the point of application shall be such that the load is axially transmitted.

6.6 Recovery

Allow DUT to recover for at least 4 h at standard atmospheric conditions specified in IEC 61300-1.

6.7 Final examination

Remove the axial compressive load from the DUT and the DUT from the test mounting. Visually examine the DUT and its component parts in accordance with IEC 61300-3-1. Check for evidence of cracking, loose parts, chipped parts, scratches, permanent deformation, displacement, excessive movements or other damage to cable jacket, seals, strain relief or fibres which might impair its function, and against any other pass/fail criteria specified in the relevant IEC 61753 performance standard or IEC 62005 reliability specification. Careful attention shall be given to degradation of the optical signal, fibre breakage and excessive movement of the cable relative to the DUT.

7 Severity

Table 1 shows the specified test severities in relation to the performance categories. It is recommended to verify the test severities with the relevant IEC 61753 performance standards and IEC 62005 reliability specifications for the normative values.

Table 1 – Recommended severity levels

Category	Cable diameter mm	Load N
C, A, G, S	< 3	10
	≥ 3 to < 6	20
	≥ 6 to < 10	50
	≥ 10 to < 20	100
	≥ 20	200
	For tubes and cables without strength member attachment	10

8 Details to be specified and reported

The following details, as applicable, shall be specified in the relevant specification and shall be reported in the test report:

- magnitude of the load;
- duration of the axial compression load if other than 2 min;
- cable type, diameter;
- type of load application;
- description of DUT;
- pre-conditioning procedure;
- initial examinations and measurements and performance requirements;
- examinations and measurements during test and performance requirements, if required;
- final examinations and measurements and performance requirements;
- optical measurement method, if necessary;
- deviations from test procedure;
- additional pass/fail criteria.

Bibliography

IEC 61753 (all parts), *Fibre optic interconnecting devices and passive components – Performance standard*

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**DISPOSITIFS D'INTERCONNEXION ET COMPOSANTS PASSIFS
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L'IEC 61300-2-11 a été établie par le sous-comité 86B: Dispositifs d'interconnexion et composants passifs 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 2012. Cette édition constitue une révision technique.

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

- a) ajout d'un article "Termes et définitions";
- b) suppression du tableau des sévérités pour les boîtiers;
- c) ajout d'une recommandation de sévérité pour les tubes et les câbles sans fixation d'éléments de renfort.

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

Projet	Rapport de vote
86B/4807/FDIS	86B/4824/RVD

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.

Le présent 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 61300, publiées sous le titre général *Dispositifs d'interconnexion et composants passifs fibroniques – Procédures fondamentales d'essais et de mesures*, se trouve sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

- reconduit,
- supprimé, ou
- révisé.

DISPOSITIFS D'INTERCONNEXION ET COMPOSANTS PASSIFS FIBRONIQUES – PROCÉDURES FONDAMENTALES D'ESSAIS ET DE MESURES –

Partie 2-11: Essais – Compression axiale

1 Domaine d'application

La présente partie de l'IEC 61300 vise à vérifier que la rétention ou la fixation du câble à des dispositifs ou des composants fibroniques, par exemple boîtiers fibroniques, résistera aux forces de compression axiale susceptibles d'être appliquées dans des conditions normales de fonctionnement.

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 61300-1, *Dispositifs d'interconnexion et composants passifs fibroniques – Procédures fondamentales d'essais et de mesures – Partie 1: Généralités et recommandations*

IEC 61300-3-1, *Dispositifs d'interconnexion et composants passifs à fibres optiques – Méthodes fondamentales d'essais et de mesures – Partie 3-1: Examens et mesures – Examen visuel*

3 Termes, définitions, et abréviations

3.1 Termes et définitions

Aucun terme n'est défini dans le présent document.

L'ISO et l'IEC tiennent à jour des bases de données terminologiques destinées à être utilisées en normalisation, consultables aux adresses suivantes:

- IEC Electropedia: disponible à l'adresse <https://www.electropedia.org/>
- ISO Online browsing platform: disponible à l'adresse <https://www.iso.org/obp>

3.2 Abréviations

DUT dispositif en essai

4 Description générale

Le DUT est maintenu de manière rigide et une force de compression axiale est appliquée au câble.