

SLOVENSKI STANDARD

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Tests on electric and optical fibre cables under fire conditions - Part 3-10: Test for vertical flame spread of vertically-mounted bunched wires or cables - Apparatus (IEC 60332-3-10:2018)

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Prüfungen an Kabeln, isolierten Leitungen und Glasfaserkabeln im Brandfall - Teil 3-10: Prüfung der vertikalen Flammenausbreitung von vertikal angeordneten Bündeln von Kabeln und isolierten Leitungen - Prüfvorrichtung (IEC 60332-3-10:2018)

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Essais des câbles électriques et des câbles à fibres optiques soumis au feu - Partie 3-10: Essai de propagation verticale de la flamme des fils ou câbles montés en nappes en position verticale - Appareillage (IEC 60332-3-10:2018)

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EUROPEAN STANDARD

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**Tests on electric and optical fibre cables under fire conditions -
Part 3-10: Test for vertical flame spread of vertically-mounted
bunched wires or cables - Apparatus
(IEC 60332-3-10:2018)**

Essais des câbles électriques et des câbles à fibres
optiques soumis au feu - Partie 3-10: Essai de propagation
verticale de la flamme des fils ou câbles montés en nappes
en position verticale - Appareillage
(IEC 60332-3-10:2018)

Prüfungen an Kabeln, isolierten Leitungen und
Glasfaserkabeln im Brandfall - Teil 3-10: Prüfung der
vertikalen Flammenausbreitung von vertikal angeordneten
Bündeln von Kabeln und isolierten Leitungen -
Prüfvorrichtung
(IEC 60332-3-10:2018)

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EN IEC 60332-3-10:2018 (E)**European foreword**

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**Tests on electric and optical fibre cables under fire conditions –
Part 3-10: Test for vertical flame spread of vertically-mounted bunched wires or
cables – Apparatus**

**Essais des câbles électriques et des câbles à fibres optiques soumis au feu –
Partie 3-10: Essai de propagation verticale de la flamme des fils ou câbles
montés en nappes en position verticale – Appareillage**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**TESTS ON ELECTRIC AND OPTICAL FIBRE CABLES
UNDER FIRE CONDITIONS –****Part 3-10: Test for vertical flame spread of
vertically-mounted bunched wires or cables – Apparatus**

FOREWORD

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International Standard IEC 60332-3-10 has been prepared by IEC technical committee 20: Electric cables.

This second edition cancels and replaces the first edition published in 2000 and Amendment 1:2008. This edition constitutes a technical revision.

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

- a) adjustments have been made to the title, and elsewhere, to emphasise the standard is applicable to optical fibre cables as well as metallic conductor types;
- b) details of the way in which cables are mounted on the ladder have been better defined in order to improve repeatability and reproducibility;

c) the connection of the venturi mixer to the burner is better defined.

It has the status of a group safety publication in accordance with IEC Guide 104.

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

FDIS	Report on voting
20/1797/FDIS	20/1814/RVD

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

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

A list of all parts in the IEC 60332 series, published under the general title *Tests on electric and optical fibre cables under fire conditions*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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. <https://standards.iteh.ai/catalog/standards/sist/e556e479-34e9-4ab0-a231-9044f5056a32/sist-en-iec-60332-3-10-2018>

The contents of the corrigendum of October 2018 have been included in this copy.

INTRODUCTION

IEC 60332-3-10 is part of a series of publications dealing with tests on electric and optical fibre cables under fire conditions.

The IEC 60332-1 and IEC 60332-2 series specify methods of test for flame spread characteristics for a single vertical insulated wire or cable. It cannot be assumed that, because a wire or cable meets the requirements of the IEC 60332-1 and IEC 60332-2 series, a vertical bunch of similar cables or wires will behave in a similar manner. This is because flame spread along a vertical bunch of cables depends on a number of features, such as

- a) the volume of combustible material exposed to the fire and to any flame which may be produced by the combustion of the cables;
- b) the geometrical configuration of the cables and their relationship to an enclosure;
- c) the temperature at which it is possible to ignite the gases emitted from the cables;
- d) the quantity of combustible gas released from the cables for a given temperature rise;
- e) the volume of air passing through the cable installation;
- f) the construction of the cable, for example armoured or unarmoured, multi- or single-core.

All of the foregoing assume that the cables are able to be ignited when involved in an external fire.

The IEC 60332-3 series gives details of a test where a number of cables are bunched together to form various test sample installations. For easier use and differentiation of various test categories, the parts are designated as follows:

Part 3-10: Apparatus

Part 3-21: Category A F/R

Part 3-22: Category A

Part 3-23: Category B

Part 3-24: Category C

Part 3-25: Category D

Parts from 3-21 onwards define the various categories and the relevant procedures. The categories are distinguished by test duration, the volume of non-metallic material of the test sample and the method of mounting the sample for the test. In all categories, cables having at least one conductor of cross-sectional area greater than 35 mm² are tested in a spaced configuration, whereas cables of conductor cross-sectional area of 35 mm² or smaller and optical fibre cables are tested in a touching configuration.

The categories are not necessarily related to different safety levels in actual cable installations. The actual installed configuration of the cables may be a major determinant in the level of flame spread occurring in an actual fire.

The method of mounting described as category A F/R (Part 3-21) is intended for special cable designs used in particular installations.

Categories A, B, C and D (Part 3-22 to Part 3-25 respectively) are for general use where different non-metallic volumes are applicable.

TESTS ON ELECTRIC AND OPTICAL FIBRE CABLES UNDER FIRE CONDITIONS –

Part 3-10: Test for vertical flame spread of vertically-mounted bunched wires or cables – Apparatus

1 Scope

This part of IEC 60332 details the apparatus and its arrangement and calibration for methods of test for the assessment of vertical flame spread of vertically-mounted bunched wires or cables, electrical or optical, under defined conditions.

NOTE For the purpose of this document the term “electric wire or cable” covers all insulated metallic conductor cables used for the conveyance of energy or signals.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

3.1

ignition source

source of energy that initiates combustion

[SOURCE: ISO 13943:2017, 3.219]

4 Test environment

The test shall not be carried out if the external wind speed, measured by an anemometer fitted on the top of the test rig, is greater than 8 m/s and shall not be carried out if the temperature of the inside walls is below 5 °C or above 40 °C measured at a point approximately 1 500 mm above floor level, 50 mm from a side wall, and 1 000 mm from the door. The enclosure door shall be closed throughout the test.

5 Test apparatus

The test apparatus consists of the following.

5.1 Test chamber

The test rig (see Figures 1a) and 1b)) shall comprise a vertical test chamber having a width of $(1\ 000 \pm 100)$ mm, a depth of $(2\ 000 \pm 100)$ mm and a height of $(4\ 000 \pm 100)$ mm; the floor of the chamber shall be raised above ground level. The test chamber shall be nominally airtight along its sides, air being admitted at the base of the test chamber through an aperture of (800 ± 20) mm \times (400 ± 10) mm situated (150 ± 10) mm from the front wall of the test chamber (see Figure 1).

An outlet (300 ± 30) mm \times $(1\ 000 \pm 100)$ mm shall be made at the rear edge of the top of the test chamber. The back and sides of the test chamber shall be thermally insulated to give a coefficient of heat transfer of approximately $0,7\ \text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$. For example, a steel plate 1,5 mm to 2,0 mm thick covered with 65 mm of mineral wool with a suitable external cladding is satisfactory (see Figure 2). The distance between the ladder and the rear wall of the chamber is (150 ± 10) mm, and between the bottom rung of the ladder and the floor (400 ± 5) mm. The clearance between the lowest point of the test piece and the floor is approximately 100 mm (see Figure 3).

5.2 Air supply

A means of supplying a controlled air flow through the chamber shall be fitted.

Air shall be introduced into the test chamber through a box fitted directly underneath, and of approximately the same dimensions as the air inlet aperture. Air shall be blown into the box from a suitable fan through a straight section of duct which shall enter from the rear of the test chamber and be parallel to the floor and along the burner centre line as shown in Figure 1b). The duct shall be arranged to allow air into the box through an opening in the longest side.

A grille may be placed over the air inlet aperture to facilitate accessing the test chamber but should neither restrict the airflow nor modify its direction.

A duct of constant cross-section of approximately $240\ \text{cm}^2$ and minimum length of 60 cm is recommended.

Prior to burner ignition, the air flow shall be adjusted to a rate of $(5\ 000 \pm 500)$ l/min at a constant controlled temperature of (20 ± 10) °C and at atmospheric pressure and measured at the inlet side before the test commences. This air flow rate shall be maintained throughout the test until cable burning or glowing has ceased or for a maximum time of 1 h from completion of the test flame application period, after which period the flame or glowing shall be extinguished.

In order to remove noxious gases, it is recommended to maintain the air flow for some minutes after the end of the test, before entering the test chamber.

5.3 Ladder types

There are two types of tubular steel ladder: a standard ladder of (500 ± 5) mm width and a wide ladder of (800 ± 10) mm width. Details of the types of ladder are given in Figures 4a) and 4b).

5.4 Effluent cleaning attachment

Legal requirements may make it necessary for equipment for collecting and washing the effluent to be fitted to the test chamber. This equipment shall not cause a change in the air flow rate through the test chamber.