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STANDARDS Australia

Australian/New Zealand Standard™

Tests on electric and optical fibre cables under fire conditions

Part 3.21: Test for vertical flame spread of vertically-mounted bunched wires or cables — Category A F/R

AS/NZS IEC 60332.3.21:2021

This joint Australian/New Zealand Standard™ was prepared by joint Technical Committee EL-003, Electric Cables and Wires. It was approved on behalf of the Council of Standards Australia on 12 October 2021 and by the New Zealand Standards Approval Board on 6 October 2021.

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The following are represented on Committee EL-003:

Australian Cablemakers Association
Australian Industry Group
Aviation and Marine Engineers Association, New Zealand
Electrical Compliance Testing Association of Australia
Electrical Regulatory Authorities Council, Australia
Engineers Australia
Institute of Electrical Inspectors, Australia
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Australian/New Zealand Standard™

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Part 3.21: Test for vertical flame spread of vertically-mounted bunched wires or cables — Category A F/R

Originated in Australia as SAA HT 88001—1988.
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AS/NZS 1660.5.1:2005 revised and redesignated, in part, as AS/NZS IEC 60332.3.21:2017.
Second edition 2021.

Preface

This Standard was prepared by the joint Standards Australia/Standards New Zealand Committee EL-003, Electric Cables and Wires, to supersede AS/NZS IEC 60332.3.21:2017.

The objective of this document is to cover category A F/R for methods of test for the assessment of vertical flame spread of vertically-mounted bunched wires or cables, under defined conditions.

This document relates only to power cables of conductor cross-sectional area greater than 35 mm^2 installed on the test ladder in a spaced configuration on the front and rear to achieve a nominal total volume of non-metallic material of 7 l/m of test sample. The flame application time is 40 min. This method of mounting is intended for special cable designs used in particular installations when required in the cable specification. Category A F/R is not intended for general use.

The test is intended for type approval testing. The requirements for the selection of cables for testing are given in Annex A. The flame spread is measured as the extent of damage of the cable sample. This procedure can be used to demonstrate the cable's ability to limit flame spread. A recommended performance requirement is given in Annex B.

This document is identical with, and has been reproduced from, IEC 60332-3-21:2018, *Tests on electric and optical fibre cables under fire conditions – Part 3-21: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A F/R*.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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TESTS ON ELECTRIC AND OPTICAL FIBRE CABLES UNDER FIRE CONDITIONS –

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FOREWORD

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International Standard IEC 60332-3-21 has been prepared by IEC technical committee 20: Electric cables.

This second edition cancels and replaces the first edition published in 2000. 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.

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
20/1798/FDIS	20/1815/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 publication 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.

INTRODUCTION

IEC 60332-3-21 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 cable or wire 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 the 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 mm^2 are tested in a spaced configuration, whereas cables of conductor cross-sectional area of 35 mm^2 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 3-21: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A F/R

1 Scope

This part of IEC 60332 covers category A F/R for methods of test for the assessment of vertical flame spread of vertically-mounted bunched wires or cables, under defined conditions.

This document relates only to power cables of conductor cross-sectional area greater than 35 mm^2 installed on the test ladder in a spaced configuration on the front and rear to achieve a nominal total volume of non-metallic material of 7 l/m of test sample. The flame application time is 40 min. This method of mounting is intended for special cable designs used in particular installations when required in the cable specification. Category A F/R is not intended for general use.

The test is intended for type approval testing. The requirements for the selection of cables for testing are given in Annex A. The flame spread is measured as the extent of damage of the cable sample. This procedure can be used to demonstrate the cable's ability to limit flame spread.

A recommended performance requirement is given in Annex B.

NOTE For the purposes 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

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 60332-3-10, *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 60811-605, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 605: Physical tests – Methods for determining the density*

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