

AS/NZS IEC 60331.1:2021
IEC 60331-1:2018



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Tests for electric cables under fire conditions — Circuit integrity

Method 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm



AS/NZS IEC 60331.1:2021

This Joint Australian/New Zealand Standard™ was prepared by Joint Technical Committee EL-003, Electric Wires And Cables. It was approved on behalf of the Council of Standards Australia on 4 January 2021 and by the New Zealand Standards Approval Board on 16 December 2020.

This Standard was published on 22 January 2021.

The following are represented on Committee EL-003:

- Australian Cablemakers Association
- Australian Industry Group
- Aviation and Marine Engineers Association
- Electrical Compliance Testing Association of Australia
- Electrical Regulatory Authorities Council
- Engineers Australia
- Institute of Electrical Inspectors
- Master Electricians NZ
- National Electrical and Communications Association
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This Standard was issued in draft form for comment as DR AS/NZS IEC 60331.1:2020.

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ISBN 978 1 76113 159 2

Australian/New Zealand Standard™

Tests for electric cables under fire conditions — Circuit integrity

Method 1: Test method for fire with shock at a temperature of at least 330 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm

Originated as part of AS/NZS 1660.5.5:1998.
Revised and redeveloped as AS/NZS IEC 60331.1:2017.
Fourth edition AS/NZS IEC 60331.1:2021.



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Preface

This Test Method was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-003, Electric Wires and Cables, to supersede AS/NZS IEC 60331.1:2017, *Tests for electric cables under fire conditions — Circuit integrity, Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm.*

The objective of this document is to specify the test method for cables which are required to maintain circuit integrity when subject to fire and mechanical shock under specified conditions.

This document is applicable to cables of rated voltage not exceeding 600 V/1 000 V, including those of rated voltage below 80 V, metallic data and telecom cables and optical fibre cables and testing cables of greater than 20 mm overall diameter.

This document is not applicable to cables of smaller diameter which are tested using the apparatus, procedure and requirements of AS/NZS IEC 60331.2.

This document is identical with, and has been reproduced from, IEC 60331-1:2018, *Tests for electric cables under fire conditions — Circuit integrity — Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm.*

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- (a) In the source text “this part of IEC 60331” should read “this document”.
- (b) A full point substitutes for a comma when referring to a decimal marker.

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The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

NOTES

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CONTENTS

CONTENTS	2
FOREWORD	4
INTRODUCTION	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	8
4 Test environment	8
5 Test apparatus	9
5.1 Test equipment	8
5.2 Test ladder and mounting	12
5.3 Source of heat	13
5.3.1 Burner	13
5.3.2 Flow meters and flow rates	14
5.3.3 Verification	15
5.4 Shock producing device	15
5.5 Positioning of source of heat	16
5.6 Continuity checking arrangements for electric power and control cables with rated voltage up to and including 600 V/1 000 V	16
5.7 Fuses	16
6 Test specimen (electric power and control cables with rated voltage up to and including 600 V/1 000 V)	16
6.1 Test specimen preparation	16
6.2 Test specimen mounting	17
6.2.1 Single core cables with concentric metal layer and multicore cables	17
6.2.2 Single core cables without concentric metal layer	19
7 Test procedure (electric power and control cables with rated voltage up to and including 600 V/1 000 V)	20
7.1 Test equipment and arrangement	20
7.2 Electrical connection	20
7.3 Flame and shock application	22
7.4 Electrification	22
8 Performance requirements (electric power and control cables with rated voltage up to and including 600/1 000 V)	23
8.1 Flame application time	23
8.2 Acceptance criteria	23
9 Test report	23
10 Test report (electric power and control cables with rated voltage up to and including 600 V/1 000 V)	23
11 Cable marking	23
Annex A (normative) Verification procedure for the source of heat	24
A.1 Measuring equipment	24
A.2 Procedure	24
A.3 Evaluation	25
A.4 Further verification	25
A.5 Verification report	25

Annex B (informative) Guidance on the choice of recommended test apparatus (burner and venturi)	26
Bibliography	27
Figure 1 – Schematic diagram of test configuration	10
Figure 2 – Plan view of fire test equipment	11
Figure 3 – End elevation of fire test equipment (not to scale)	12
Figure 4 – Typical rubber bush for supporting the test ladder	13
Figure 5 – Burner face	14
Figure 6 – Schematic diagram of an example of a burner control system	15
Figure 7 – Example of method of mounting a larger diameter test specimen for test (with a bending radius between approximately 200 and 400 mm)	17
Figure 8 – Detailed section of adjustable position of vertical ladder elements for mounting a smaller diameter test specimen for test (with a maximum bending radius of approximately 200 mm)	18
Figure 9 – Example of method of mounting test specimen with a bending radius in normal use larger than approximately 400 mm	19
Figure 10 – Method of mounting test specimen of a single core cable without concentric metal layer	20
Figure 11 – Basic circuit diagram – Electric power and control lines with rated voltage up to and including 600 V/1 000 V	22
Figure A.1 – Temperature measuring arrangement	24

INTERNATIONAL ELECTROTECHNICAL COMMISSION

TESTS FOR ELECTRIC CABLES UNDER FIRE CONDITIONS – CIRCUIT INTEGRITY –

Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60331-1 has been prepared by IEC technical committee 20: Electric cables.

This bilingual version (2018-11) corresponds to the monolingual English version, published in 2018-03.

This second edition cancels and replaces the first edition published in 2009. It constitutes a technical revision.

The significant technical changes with respect to the previous edition are as follows:

- extension of the scope to include metallic data and telecom cables and optical fibre cables, although details for the specific point of failure, continuity checking arrangement, test sample, test procedure and test report relevant to metallic data and telecom cables and optical fibre cables are not given by IEC 60331-1;
- improved description of the test environment;
- modified steel test ladder with two extra vertical elements to accommodate the modified testing of single core cables without concentric metal layer and the testing of cables with a bending radius in normal use larger than approximately 400 mm;
- mandatory use of mass flow meters/controllers as the means of controlling accurately the input flow rates of fuel and air to the burner;
- improved description of the information to be included in the test report.

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

FDIS	Report on voting
20/1781A/FDIS	20/1792/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.

The French version of this document has not been voted upon.

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

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

A list of all parts of the IEC 60331 series published under the title: *Tests for electric cables under fire conditions – Circuit integrity*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

IEC 60331 consists of the following parts under the general title: *Tests for electric cables under fire conditions – Circuit integrity*:

Part 1: *Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm*

Part 2: *Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter not exceeding 20 mm*

Part 3: *Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV tested in a metal enclosure*

Part 11: *Apparatus – Fire alone at a flame temperature of at least 750 °C*

Part 21: *Procedures and requirements – Cables of rated voltage up to and including 0,6/1,0 kV*

Part 23: *Procedures and requirements – Electric data cables*

Part 25: *Procedures and requirements – Optical fibre cables*

NOTE 1 Parts 21, 23 and 25 relate to fire-only conditions at a flame temperature of at least 750 °C.

NOTE 2 Parts 11, 21, 23 and 25 are no longer subject to maintenance. IEC 60331 Parts 1 and 2 are the recommended test procedures.

Since its first edition (1970), IEC 60331 has been extended and has introduced a range of test apparatus in order that a test may be carried out on large and small power, control, data and optical fibre cables.

Successful tests carried out in accordance with this standard will enable an identification to be marked on the product.

TESTS FOR ELECTRIC CABLES UNDER FIRE CONDITIONS – CIRCUIT INTEGRITY –

Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm

1 Scope

This part of IEC 60331 specifies the test method for cables which are required to maintain circuit integrity when subject to fire and mechanical shock under specified conditions.

This document is applicable to cables of rated voltage not exceeding 600 V/1 000 V, including those of rated voltage below 80 V, metallic data and telecom cables and optical fibre cables.

It is intended for use when testing cables of greater than 20 mm overall diameter.

Cables of smaller diameter are intended to be tested using the apparatus, procedure and requirements of IEC 60331-2.

This document includes details for the specific point of failure, continuity checking arrangement, test sample, test procedure and test report relevant to electric power and control cables with rated voltage up to and including 600 V/1 000 V. Details for the specific point of failure, continuity checking arrangement, test sample, test procedure and test report relevant to metallic data and telecom cables and optical fibre cables are not given by IEC 60331-1.

Although the scope is restricted to cables with rated voltage up to and including 0,6/1,0 kV, the procedure can be used, with the agreement of the manufacturer and the purchaser, for cables with rated voltage up to and including 1,8/3 (3,3) kV, provided that suitable fuses are used.

Annex A provides the method of verification of the burner and control system used for the test.

Requirements are stated for an identification that may optionally be marked on the cable to signify compliance with this document.

CAUTION – The test given in this standard may involve the use of dangerous voltages and temperatures. Suitable precautions should be taken against the risk of shock, burning, fire and explosion that may be involved, and against any noxious fumes that may be produced.

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 60584-1, *Thermocouples – Part 1: EMF specifications and tolerances*