

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

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**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**

**Essais pour câbles électriques soumis au feu – intégrité des circuits –  
Partie 1: Méthode d'essai au feu avec chocs pour les câbles de tension assignée  
au plus égale à 0,6/1,0 kV et de diamètre externe supérieur à 20 mm, à une  
température d'au moins 830 °C**



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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 .....	8
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 connections .....	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 Retest procedure .....	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 cables with rated voltage up to and including 600 V/1 000 V .....	22
Figure A.1 – Temperature measuring arrangement .....	24

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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## 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

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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*