

INTERNATIONAL STANDARD



**Tests for electric cables under fire conditions – Circuit integrity –
Part 4: Test method for fire with shock at a temperature of at least 830 °C for
cables of rated voltage higher than 1kV up to and including 30 kV**

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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	8
3 Terms and definitions	8
4 Test conditions	8
5 Test apparatus	9
5.1 Test equipment.....	9
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 Voltage supply arrangement	16
6 Test specimen	16
6.1 Test specimen preparation.....	16
6.2 Test specimen mounting	16
7 Test procedure	17
7.1 Test equipment and arrangement.....	17
7.2 Electrical connections and electrification.....	17
7.3 Flame, shock application and voltage supply.....	18
7.4 Optional water spray or water jet.....	18
8 Performance requirements.....	18
8.1 Flame application time	18
8.2 Acceptance criteria	18
9 Retest procedure	18
10 Test report.....	19
11 Cable marking	19
Annex A (normative) Verification procedure for the source of heat	20
A.1 Measuring equipment.....	20
A.2 Procedure	20
A.3 Evaluation.....	21
A.4 Further verification.....	21
A.5 Verification report	21
Annex B (informative) Guidance on the choice of recommended test apparatus	22
Annex C (informative) Guidance for using optional water spray or water jet protocol.....	23
C.1 General.....	23
C.2 Modifications for optional water spray or jet protocols	23
C.2.1 Water spay device – Option A.....	23
C.2.2 Water jet device – Option B	24
C.3 Additional inclusion for test report.....	27
C.4 Additional cable marking	27
Annex D (informative) Guidance for using 1 000 °C temperature testing	28

D.1 General..... 28

D.2 Test apparatus..... 28

D.3 Verification procedure for the source of heat..... 28

D.4 Additional marking 28

Bibliography..... 29

Figure 1 – Schematic diagram of test configuration (not to scale) 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 – Method of mounting test specimen 17

Figure A.1 – Temperature measuring arrangement 20

Figure C.1 – Water spray tube 24

Figure C.2 – Water spray application 24

Figure C.3 – Hose nozzle..... 25

Figure C.4 – Water jet application 26

Figure C.5 – End elevation of water jet application..... 26

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CIRCUIT INTEGRITY –**
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for cables of rated voltage higher than 1 kV up to and including 30 kV**

FOREWORD

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IEC 60331-4 has been prepared by IEC technical committee 20: Electric cables. It is an International Standard.

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

Draft	Report on voting
20/2194/FDIS	20/2215/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.

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

A list of all parts in the IEC 60331 series, published under the general 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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The IEC 60331 series consists of the following parts:

IEC 60331-1, *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*

IEC 60331-2, *Tests for electric cables under fire conditions – Circuit integrity – 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*

IEC 60331-3, *Tests for electric cables under fire conditions – Circuit integrity – 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*

IEC 60331-4, *Tests for electric cables under fire conditions – Circuit integrity – Part 4: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage higher than 1 kV up to and including 30 kV*

IEC 60331-11, *Tests for electric cables under fire conditions – Circuit integrity – Part 11: Apparatus – Fire alone at a flame temperature of at least 750 °C*

IEC 60331-21, *Tests for electric cables under fire conditions – Circuit integrity – Part 21: Procedures and requirements – Cables of rated voltage up to and including 0,6/1,0 kV*

IEC 60331-23, *Tests for electric cables under fire conditions – Circuit integrity – Part 23: Procedures and requirements – Electric data cables*

IEC 60331-25, *Tests for electric cables under fire conditions – Circuit integrity – Part 25: Procedures and requirements – Optical fibre cables*

NOTE 1 IEC 60331-21, IEC 60331-23 and IEC 60331-25 relate to fire-only conditions at a flame temperature of at least 750 °C.

NOTE 2 IEC 60331-11, IEC 60331-21, IEC 60331-23 and IEC 60331-25 are no longer subject to maintenance. The relevant test procedures are given in IEC 60331-1 and IEC 60331-2.

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

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

TESTS FOR ELECTRIC CABLES UNDER FIRE CONDITIONS – CIRCUIT INTEGRITY –

Part 4 – Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage higher than 1 kV up to and including 30 kV

1 Scope

This part of the IEC 60331 series specifies the test apparatus and procedure, and gives the performance requirements, including recommended flame application times and flame temperatures, for power cables of rated voltage higher than 0,6/1,0 kV up to and including 18/30 kV for maintaining circuit integrity when subject to fire and mechanical shock under specified conditions.

The test method in this document is restricted to conductor sizes up to and including 120 mm². The test results for 120 mm² size conductors constructions qualify larger cross-sections of the same cable construction.

In the case of preassembled three-core cables, then the complete cable is considered as tested when a complete single-core of the cable has been tested.

This document includes details for the specific point of failure, continuity checking arrangement, test sample, test procedure and test report relevant to electric power cables with a rated voltage higher than 0,6/1,0 kV up to and including 18/30 kV.

Annex A provides the method of verification of the burner and control system used for the test. Annex B provides a choice of the recommended test apparatus.

Annex C provides, as an option, guidance for using either water spray or water jet protocols.

Annex D provides, as an option, the flame temperature of 1 000 °C, which is applicable for special applications.

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

This group safety publication focusing on the test method for circuit integrity safety for power cables of rated voltage higher than 1 kV up to and including 30 kV under fire conditions, is primarily intended to be used as a product safety standard for the products mentioned in the scope, but is also intended to be used by TCs in the preparation of publications for products similar to those mentioned in the scope of this group safety publication, in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.

One of the responsibilities of a TC is, wherever applicable, to make use of either BSPs or GSPs, or both, in the preparation of its publications.

WARNING – The test given in this document can involve the use of dangerous voltages and temperatures. Suitable precautions should be taken against the risk of shock, burning, fire and explosion that can arise, and against any noxious fumes that can 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*