



BSI Standards Publication

Measurement of smoke density of cables burning under defined conditions

Part 2: Test procedure and requirements

National foreword

This British Standard is the UK implementation of EN 61034-2:2005+A2:2020. It is identical to IEC 61034-2:2005, incorporating amendment 1:2013 and amendment 2:2019. It supersedes BS EN 61034-2:2005+A1:2013, which will be withdrawn on 27 December 2022.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee GEL/20/18, Electric Cables - Fire testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2020
Published by BSI Standards Limited 2020

ISBN 978 0 539 00988 0

ICS 13.220.40; 29.020; 29.060.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 21 October 2005.

Amendments/corrigenda issued since publication

Date	Text affected
31 October 2013	Implementation of IEC amendment 1:2013 with CENELEC endorsement A1:2013. Annex ZA updated
31 March 2020	Implementation of IEC amendment 2:2019 with CENELEC endorsement A2:2020

EUROPEAN STANDARD

EN 61034-2+A2

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2020

ICS 13.220.40; 29.020; 29.060.20

Supersedes EN 50268-2:1999

English version

**Measurement of smoke density of cables
burning under defined conditions
Part 2: Test procedure and requirements
(IEC 61034-2:2005)**

Mesure de la densité de fumées
dégagées par des câbles brûlant
dans des conditions définies
Partie 2: Procédure d'essai et exigences
(CEI 61034-2:2005)

Messung der Rauchdichte von Kabeln
und isolierten Leitungen beim Brennen
unter definierten Bedingungen
Teil 2: Prüfverfahren und Anforderungen
(IEC 61034-2:2005)

This European Standard was approved by CENELEC on 2005-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

European Foreword

The text of document 20/755/FDIS, future edition 3 of IEC 61034-2, prepared by IEC TC 20, Electric cables, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61034-2 on 2005-06-01.

The principal changes with respect to EN 50268-2 are as follows:

- a) inclusion of non-circular cables;
- b) addition of guidance on testing cables above 80 mm diameter;
- c) delineation of elements of the test report;
- d) addition of guidance on the calculation for other parameters for fire safety engineering purposes.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2006-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2008-06-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61034-2:2005 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60695-6-1 NOTE Harmonized as EN 60695-6-1:2005 (not modified).

European foreword to amendment A1

The text of document 20/1429/FDIS, future edition 3 of IEC 61034-2:2005/A1, prepared by IEC TC 20, "Electric cables" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61034-2:2005/A1:2013.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-03-25
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-06-25

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 61034-2:2005/A1:2013 was approved by CENELEC as a European Standard without any modification.

European foreword to amendment A2

The text of document 20/1886/FDIS, future IEC 61034-2/A2, prepared by IEC/TC 20 "Electric cables" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61034-2:2005/A2:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2020-09-27
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-12-27

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61034-2:2005/A2:2019 was approved by CENELEC as a European Standard without any modification.

CONTENTS

FOREWORD	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 Test apparatus	6
5 Test assembly	6
5.1 Test sample	6
5.2 Cable test piece selection and test sample assembly	7
5.2.1 Selection of number of test pieces	7
5.2.2 Mounting of test sample.....	8
5.3 Positioning of test sample	8
6 Test procedure	8
7 Evaluation of test results	9
8 Retest procedure.....	9
9 Test report.....	10
Annex A (informative) Guidance on the principles and use of smoke measurements	13
Annex B (informative) Recommended performance requirement	16
Bibliography.....	17
Figure 1 – Method of binding for bundles of test pieces	10
Figure 2 – Method of support of test sample	11
Figure 3 – Method of assembly of flat horizontal unit of non-circular cables	12
Table 1 – Number of test pieces	7

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MEASUREMENT OF SMOKE DENSITY OF CABLES
BURNING UNDER DEFINED CONDITIONS –**

Part 2: Test procedure and requirements

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61034-2 has been prepared by IEC technical committee 20: Electric cables.

This third edition cancels and replaces the second edition published in 1997. It constitutes a technical revision.

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

- a) inclusion of cables down to 1 mm diameter;
- b) inclusion of non-circular cables;
- c) addition of guidance on testing cables above 80 mm diameter;
- d) delineation of elements of the test report;

- e) addition of guidance on the calculation for other parameters for fire safety engineering purposes;
- f) removal of minor differences with equivalent CENELEC work to allow parallel voting with that body.

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

The text of this standard is based on the following documents:

FDIS	Report on voting
20/755/FDIS	20/767/RVD

Full information on the voting for the approval of this 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.

IEC 61034 consists of the following parts, under the general title *Measurement of smoke density of cables burning under defined conditions*,

Part 1 : Test apparatus

Part 2 : Test procedure and requirements

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.

The contents of the corrigendum of September 2006 have been included in this copy.

INTRODUCTION

The measurement of smoke density is an important aspect in the evaluation of the burning performance of cables as it is related to the evacuation of persons and accessibility for firefighting.

IEC 61034 is published in two parts, which together specify a method of test for measurement of smoke density of cables burning under defined conditions. Users of this test are reminded that the configurations of cable in the test (i.e. as test pieces or bundles of test pieces) may not represent actual installation conditions.

Part 1 gives details of the test apparatus and verification procedure to be used for the measurement of smoke density of the products of combustion of cables burnt under defined conditions. It includes details of a test enclosure of 27m³ volume, a photometric system for light measurement, the fire source, smoke mixing method and a qualification procedure.

This Part 2 gives the test procedure, together with an informative annex giving recommended requirements for compliance where no specified requirement is given in the particular cable standard or specification. The measurement of smoke density is expressed in terms of minimum levels of light transmittance, and Annex A explains possibilities for using these values for fire safety engineering calculations.

MEASUREMENT OF SMOKE DENSITY OF CABLES BURNING UNDER DEFINED CONDITIONS –

Part 2: Test procedure and requirements

1 Scope

This part of IEC 61034 provides details of the test procedure to be employed for the measurement of the density of smoke emitted from cables burning under defined conditions. It describes the means of preparing and assembling cables for test, the method of burning the cables, and gives recommended requirements for evaluating test results.

2 Normative references

The following referenced documents are indispensable for the application 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 60695-4, *Fire hazard testing – Part 4: Terminology concerning fire tests*

Ⓐ₁ IEC 60811-203, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 203: General tests – Measurement of overall dimensions* Ⓐ₁

IEC 61034-1, *Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus*

Ⓐ₂ IEC Guide 104 Ⓐ₂, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO/IEC 13943:2000, *Fire safety – Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions in IEC 60695-4 apply, or if a term is not defined in IEC 60695-4 then the definition in ISO/IEC 13943 applies.

4 Test apparatus

The test procedure defined in this Part 2 of IEC 61034 shall be carried out using the test apparatus, i.e. test enclosure, photometric system and standard fire source, given in IEC 61034-1.

5 Test assembly

5.1 Test sample

The test sample shall consist of one or more test pieces of cable, each 1,00 m ± 0,05 m long, which shall be carefully straightened and then conditioned for at least 16 h at 23 °C ± 5 °C.