

# INTERNATIONAL STANDARD

**Halogen-free thermoplastic insulated and sheathed flexible cables of rated voltages up to and including 300/300 V –  
Part 1: General requirements and cables**





**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2017 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

**About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

**About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

**IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)**

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

**IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)**

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)**

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

**Electropedia - [www.electropedia.org](http://www.electropedia.org)**

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

**IEC Glossary - [www.iec.ch/glossary](http://www.iec.ch/glossary)**

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

**IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)**

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).

# INTERNATIONAL STANDARD

---

**Halogen-free thermoplastic insulated and sheathed flexible cables of rated voltages up to and including 300/300 V –  
Part 1: General requirements and cables**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 29.060.20

ISBN 978-2-8322-5074-7

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references .....	6
3 Terms and definitions .....	7
3.1 Definitions relating to insulating and sheathing materials .....	7
3.2 Definitions relating to the tests.....	7
4 Code designation.....	8
5 Rated voltage .....	8
6 Marking .....	8
6.1 Indication of origin and cable identification and cable type .....	8
6.2 Continuity of marks.....	9
6.3 Durability .....	9
6.4 Legibility .....	9
7 Core identification .....	9
7.1 General requirements .....	9
7.2 Colour scheme.....	9
7.3 Colour combination green-and-yellow .....	9
8 General requirements for the construction of cables .....	10
8.1 Conductors .....	10
8.1.1 Material .....	10
8.1.2 Construction .....	10
8.1.3 Check on construction .....	10
8.1.4 Electrical resistance .....	10
8.1.5 Sizes of cable .....	10
8.2 Insulation.....	10
8.2.1 Material .....	10
8.2.2 Application to the conductor .....	10
8.2.3 Thickness .....	11
8.2.4 Mechanical properties.....	11
8.3 Filler (optional) .....	13
8.3.1 Material .....	13
8.3.2 Application.....	13
8.4 Assembly .....	13
8.5 Sheath .....	13
8.5.1 Material .....	13
8.5.2 Application.....	14
8.5.3 Thickness .....	14
8.5.4 Mechanical properties.....	14
8.6 Tests on completed cables.....	16
8.6.1 Electrical properties .....	16
8.6.2 Overall dimensions .....	18
8.6.3 Mechanical strength of flexible cables .....	19
8.6.4 Tests under fire conditions.....	19
8.6.5 Compatibility of materials .....	19

Annex A (normative) Assessment of halogens .....	20
A.1 Requirements for extruded material .....	20
A.1.1 Type test .....	20
A.1.2 Sample test .....	20
A.2 Requirements for non-extruded materials.....	21
Annex B (normative) Tables for cable dimension and insulation resistance .....	22
Annex C (normative) Requirements for compatibility test .....	23
C.1 Test conditions .....	23
C.2 Requirements .....	23
Table 1 – Examples of maximum permitted voltages against rated voltage of cable .....	10
Table 2 – Requirements for halogen-free thermoplastic insulating compound .....	12
Table 3 – Requirements for halogen-free thermoplastic sheathing compounds .....	15
Table 4 – Tests for cable types 111 and 111f.....	17
Table A.1 – Type test for extruded material for the assessment of halogens .....	20
Table A.2 – Sample test for extruded material for the assessment of halogens .....	20
Table B.1 – General data for cable types 111 and 111f.....	22
Table C.1 – Requirements for compatibility test .....	23

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HALOGEN-FREE THERMOPLASTIC  
INSULATED AND SHEATHED FLEXIBLE CABLES  
OF RATED VOLTAGES UP TO AND INCLUDING 300/300 V –**

**Part 1: General requirements and cables**

**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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 63010-1 has been prepared by IEC technical committee 20: Electrical cables.

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

FDIS	Report on voting
20/1760/FDIS	20/1773/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 document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 63010 series, published under the general title *Halogen-free thermoplastic insulated and sheathed flexible cables of rated voltages up to and including 300/300 V*, 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 "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

Currently in preview, click buy full version

# HALOGEN-FREE THERMOPLASTIC INSULATED AND SHEATHED FLEXIBLE CABLES OF RATED VOLTAGES UP TO AND INCLUDING 300/300 V –

## Part 1: General requirements and cables

### 1 Scope

This part of IEC 63010 applies to cables with insulation and sheaths based on halogen-free thermoplastic compounds for use with small devices and for short connections to desktop electrical appliances where flexibility is of prime importance. These cables have a voltage rating  $U_0/U$  up to and including 300/300 V. Maximum operating temperature for the cables in this document is 70 °C.

NOTE 1 For these types of flexible cables the term cord is also used.

NOTE 2 Unlike other cables that are described as “halogen-free” as part of an overall fire performance capability, cables conforming to IEC 63010 have no requirements relating to evolution of smoke.

NOTE 3 Not to be used for fixed installation, extension leads or completed cordsets longer than four meters.

### 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 60227-2:1997, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 2: Test methods*  
IEC 60227-2:1997/AMD1:2003

IEC 60228:2004, *Conductors of insulated cables*

IEC 60332-1-2:2004, *Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame*

IEC 60684-2, *Flexible insulating sleeving - Part 2: Methods of test*

IEC 60754-1, *Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content*

IEC 60754-2, *Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity*

IEC 60811-401, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 401: Miscellaneous tests - Thermal ageing methods - Ageing in an air oven*

IEC 60811-501, *Electric and optical fibre cables - Test methods for non-metallic materials - Part 501: Mechanical tests - Tests for determining the mechanical properties of insulating and sheathing compounds*