

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Power cables with extruded insulation and their accessories for rated voltages above 30 kV ( $U_m = 36$  kV) up to 150 kV ( $U_m = 170$  kV) – Test methods and requirements**

**Câbles d'énergie à isolation extrudée et leurs accessoires pour des tensions assignées supérieures à 30 kV ( $U_m = 36$  kV) et jusqu'à 150 kV ( $U_m = 170$  kV) – Méthodes et exigences d'essai**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2004 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [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.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

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 It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

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

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

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

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)

Tel.: +41 22 919 02 11

Fax: +41 22 919 03 00

### A propos de la CEI

La Commission Electrotechnique internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: [www.iec.ch/searchpub/cur\\_fut-f.htm](http://www.iec.ch/searchpub/cur_fut-f.htm)

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

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

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: [www.iec.ch/webstore/custserv/custserv\\_entry-f.htm](http://www.iec.ch/webstore/custserv/custserv_entry-f.htm)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: [csc@iec.ch](mailto:csc@iec.ch)

Tél.: +41 22 919 02 11

Fax: +41 22 919 03 00

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**Power cables with extruded insulation and their accessories for rated voltages above 30 kV ( $U_m = 36$  kV) up to 150 kV ( $U_m = 170$  kV) – Test methods and requirements**

**Câbles d'énergie à isolation extrudée et leurs accessoires pour des tensions assignées supérieures à 30 kV ( $U_m = 36$  kV) et jusqu'à 150 kV ( $U_m = 170$  kV) – Méthodes et exigences d'essai**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

**XA**

## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references.....	8
3 Definitions.....	9
3.1 Definitions of dimensional values (thicknesses, cross-sections, etc.).....	9
3.2 Definitions concerning the tests.....	9
4 Voltage designations and materials.....	10
4.1 Rated voltages.....	10
4.2 Cable insulating materials.....	10
4.3 Cable oversheathing materials.....	10
5 Precautions against water penetration in cables.....	11
6 Cable characteristics.....	11
7 Accessory characteristics.....	11
8 Test conditions.....	12
8.1 Ambient temperature.....	12
8.2 Frequency and waveform of power frequency test voltages.....	12
8.3 Waveform of lightning impulse test voltages.....	12
8.4 Relationship of test voltages to rated voltages.....	12
8.5 Determination of the cable conductor temperature.....	12
9 Routine tests on cables and on the main insulation of prefabricated accessories.....	13
9.1 General.....	13
9.2 Partial discharge test.....	13
9.3 Voltage test.....	13
9.4 Electrical test on oversheath of the cable.....	14
10 Sample tests on cables.....	14
10.1 General.....	14
10.2 Frequency of tests.....	14
10.3 Repetition of tests.....	14
10.4 Conductor examination.....	14
10.5 Measurement of electrical resistance of conductor and metallic screen.....	14
10.6 Measurement of thickness of cable insulation and oversheath.....	15
10.7 Measurement of thickness of metallic sheath.....	16
10.8 Measurement of diameter.....	17
10.9 Hot set test for XLPE, EPR and HEPR insulations.....	17
10.10 Measurement of capacitance.....	17
10.11 Measurement of density of HDPE insulation.....	17
11 Sample tests on accessories.....	17
11.1 Tests on components.....	17
11.2 Tests on complete accessory.....	17
12 Type tests on cable systems.....	18
12.1 Range of type approval.....	18
12.2 Summary of type tests.....	19
12.3 Electrical type tests on complete cable systems.....	19
12.4 Non-electrical type tests on cable components and on completed cable.....	23

13	Type tests on cables .....	28
13.1	Range of type approval .....	28
13.2	Summary of type tests .....	29
13.3	Electrical type tests on completed cables .....	29
14	Type tests on accessories .....	30
14.1	Range of type approval .....	30
14.2	Summary of type tests .....	30
14.3	Electrical type tests on accessories .....	31
15	Electrical tests after installation .....	32
15.1	DC voltage test of the oversheath .....	32
15.2	AC voltage test of the insulation .....	32
	Annex A (informative) Determination of the cable conductor temperature .....	39
	Annex B (normative) Rounding of numbers .....	43
	Annex C (informative) Summary of type tests of cable systems, of cables and of accessories .....	44
	Annex D (normative) Method of measuring resistivity of semi-conducting screens .....	45
	Annex E (normative) Determination of hardness of HEPR insulations .....	47
	Annex F (normative) Water penetration test .....	49
	Annex G (normative) Tests on components of cables with a longitudinally applied metal foil .....	51
	Annex H (normative) Tests of outer protection for buried joints .....	54
	Bibliography .....	56
	Figure A.1 – Typical test set-up for the reference loop and the main test loop .....	40
	Figure A.2 – Arrangement of the thermocouples on the conductor of the reference loop .....	40
	Figure D.1 – Preparation of samples for measurement of resistivity of conductor and insulation screens .....	46
	Figure E.1 – Test on surfaces of large radius of curvature .....	48
	Figure E.2 – Test on surfaces of small radius of curvature .....	48
	Figure F.1 – Schematic diagram of apparatus for water penetration test .....	50
	Figure G.1 – Adhesion of metal foil .....	51
	Figure G.2 – Example of overlapped metal foil .....	52
	Figure G.3 – Peel strength of overlapped metal foil .....	52
	Table 1 – Insulating compounds for cables .....	32
	Table 2 – Oversheathing compounds for cables .....	33
	Table 3 – $\tan \delta$ requirements for insulating compounds for cables .....	33
	Table 4 – Test voltages .....	33
	Table 5 – Non-electrical type tests for insulating and oversheathing compounds for cables .....	34
	Table 6 – Test requirements for mechanical characteristics of insulating compounds for cables (before and after ageing) .....	35

Table 7 – Test requirements for mechanical characteristics of oversheathing compounds for cables (before and after ageing) ..... 36

Table 8 – Test requirements for particular characteristics of insulating compounds for cables ..... 37

Table 9 – Test requirements for particular characteristics of PVC oversheathing compounds for cables ..... 38

Table C.1 – Type tests on cable systems, on cables and on accessories ..... 44

Table H.1 – Impulse voltage tests ..... 55

Withstand

iTech Standards  
(<https://standards.iteh.ai>)  
Document Preview

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**POWER CABLES WITH EXTRUDED INSULATION AND THEIR ACCESSORIES  
FOR RATED VOLTAGES ABOVE 30 kV ( $U_m = 36$  kV)  
UP TO 150 kV ( $U_m = 170$  kV) –  
TEST METHODS 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 60840 has been prepared by IEC technical committee 20: Electric cables.

This third edition cancels and replaces the second edition published in 1999 and constitutes a technical revision.

The significant technical changes with respect to the previous edition are described in the introduction of this edition.

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

FDIS	Report on voting
20/684/FDIS	20/692/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.

The committee has decided that the content of this publication will remain unchanged until 2008. At this date, the publication will be

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

Withdawn

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

IEC 60840:2004

<https://standards.iteh.ai/catalog/standards/iec/08088b41-a4f3-4770-a3b7-6e64cca3184f/iec-60840-2004>



## INTRODUCTION

This document is a major revision of IEC 60840, second edition, published in February 1999.

During the preparation of the second edition, a number of comments of principle were made on the CD and CDV and, at its meeting in February 1998, the former SC20A of TC20 agreed that these comments should be the basis of a major revision of IEC 60840 under the maintenance cycle. In addition, during the preparation of the new IEC 62067 covering cable systems above 150 kV up to 500 kV, it appeared that a number of comments were also applicable to IEC 60840. Therefore, all these comments were considered in the preparation of this third edition.

In addition, the following other aspects have been considered.

The first edition of IEC 60840, published in 1988, dealt only with cables. Accessories were added to the second edition, published in February 1999, which separately covered test methods and test requirements for

- a) cables alone;
- b) cables together with accessories (a cable system).

Some countries have suggested that a better discrimination be made between systems, cables and accessories, particularly for the lower voltages of the scope, e.g. 45 kV. This has been taken into account in this revision, which gives the type approval requirements and the range of approvals for

- a) cable systems;
- b) cables alone;
- c) accessories alone.

Manufacturers and users may choose the most appropriate option for type approval.

During the meeting of TC20 held in Stockholm in September 2000, it was agreed that WG16 consider the guidelines made by CIGRE for cables having a longitudinally applied metal foil, published in Electra n°141 in April 1992. WG16 carried out this task and, further to a survey on the experience with such cables, have concluded that only a part of these guidelines should be introduced in this standard as a normative annex.

Consideration has also been given to the recent work carried out by CIGRE on tests after installation on high voltage extruded insulation cables, the recommendations of which were published in Electra n°173 in August 1997. These recommendations state, among others, that d.c. tests should be avoided on the main insulation, as they are both ineffective and dangerous. On the other hand, d.c. tests are recommended on the oversheath.

A list of relevant CIGRE references is given in the bibliography.

# POWER CABLES WITH EXTRUDED INSULATION AND THEIR ACCESSORIES FOR RATED VOLTAGES ABOVE 30 kV ( $U_m = 36$ kV) UP TO 150 kV ( $U_m = 170$ kV) – TEST METHODS AND REQUIREMENTS

## 1 Scope

This International Standard specifies test methods and requirements for power cable systems for fixed installations, for rated voltages above 30 kV ( $U_m = 36$  kV) up to and including 150 kV ( $U_m = 170$  kV). It also separately covers cables and accessories.

The requirements apply to single-core cables and to individually screened three-core cables and to their accessories for usual conditions of installation and operation, but not to special cables and their accessories, such as submarine cables, for which modifications to the standard tests may be necessary or special test conditions may need to be devised.

This standard does not cover transition joints between cables with extruded insulation and paper insulated cables.

## 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 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60183:1984, *Guide to the selection of high-voltage cables*

IEC 60228:1978, *Conductors of insulated cables*

IEC 60229:1982, *Tests on cable oversheaths which have a special protective function and are applied by extrusion*

IEC 60230:1966, *Impulse tests on cables and their accessories*

IEC 60287-1-1:1994, *Electric cables – Calculation of the current rating – Part 1: Current rating equations (100 % load factor) and calculation of losses – Section 1: General*

IEC 60332-1:1993, *Tests on electric cables under fire conditions – Part 1: Test on a single vertical insulated wire or cable*

IEC 60811-1-1:1993, *Common test methods for insulating and sheathing materials of electric cables – Part 1: Methods for general application – Section 1: Measurement of thickness and overall dimensions – Tests for determining the mechanical properties*

IEC 60811-1-2:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 1: Methods for general application – Section Two: Thermal ageing methods*

IEC 60811-1-3:1993, *Insulating and sheathing materials of electric cables – Common test methods – Part 1: General application – Section 3: Methods for determining the density – Water absorption tests – Shrinkage test*

IEC 60811-1-4:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 1: Methods for general application – Section Four: Tests at low temperature*

IEC 60811-2-1:1998, *Insulating and sheathing materials of electric and optical cables – Common test methods – Part 2-1: Methods specific to elastomeric compounds – Ozone resistance, hot set and mineral oil immersion tests*

IEC 60811-3-1:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 3: Methods specific to PVC compounds – Section One: Pressure test at high temperature – Tests for resistance to cracking*

IEC 60811-3-2:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 3: Methods specific to PVC compounds – Section Two: Loss of mass test – Thermal stability test*

IEC 60811-4-1:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 4: Methods specific to polyethylene and polypropylene compounds – Section One: Resistance to environmental stress cracking – Wrapping test after thermal ageing in air – Measurement of the melt flow index – Carbon black and/or mineral content measurement in PE*

IEC 60885-3:1988, *Electrical test methods for electric cables – Part 3: Test methods for partial discharge measurements on lengths of extruded power cables*

ISO 48:1994, *Rubber, vulcanized or thermoplastic – Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

### 3 Definitions

For the purposes of this document, the following definitions apply.

#### 3.1 Definitions of dimensional values (thicknesses, cross-sections, etc.)

##### 3.1.1

##### **nominal value**

value by which a quantity is designated and which is often used in tables

NOTE Usually, in this standard, nominal values give rise to values to be checked by measurements taking into account specified tolerances.

##### 3.1.2

##### **median value**

when several test results have been obtained and ordered in an increasing (or decreasing) succession, middle value if the number of available values is odd, and mean of the two middle values if the number is even

#### 3.2 Definitions concerning the tests

##### 3.2.1

##### **routine tests**

tests made by the manufacturer on each manufactured component (length of cable or accessory) to check that the component meets the specified requirements

### 3.2.2

#### **sample tests**

tests made by the manufacturer on samples of completed cable or components taken from a completed cable or accessory, at a specified frequency, so as to verify that the finished product meets the specified requirements

### 3.2.3

#### **type tests**

tests made before supplying on a general commercial basis a type of cable system or cable or accessory covered by this standard, in order to demonstrate satisfactory performance characteristics to meet the intended application. Once successfully completed, these tests need not be repeated, unless changes are made in the cable or accessory materials, or design or manufacturing process which might change the performance characteristics

### 3.2.4

#### **electrical tests after installation**

tests made to demonstrate the integrity of the cable system as installed

### 3.3

#### **cable system**

cable with installed accessories

### 3.4

#### **nominal electrical stress**

electrical stress calculated at  $U_0$  using nominal dimensions

## 4 Voltage designations and materials

### 4.1 Rated voltages

In this standard, the symbols  $U_0$ ,  $U$  and  $U_m$  are used to designate the rated voltages of cables and accessories where these symbols have the meanings given in IEC 60183.

### 4.2 Cable insulating materials

This standard applies to cables insulated with one of the materials listed in Table 1. It also specifies for each type of insulating compound the maximum operating conductor temperatures on which the specified test conditions are based.

### 4.3 Cable oversheathing materials

Tests are specified for four types of oversheath, as follows:

- $ST_1$  and  $ST_2$  based on polyvinyl chloride;
- $ST_3$  and  $ST_7$  based on polyethylene.

The choice of the type of oversheath depends on the design of the cable and the mechanical and thermal constraints during installation and operation.

The maximum conductor temperatures in normal operation for the different types of oversheathing materials covered by this standard are given in Table 2.

## 5 Precautions against water penetration in cables

When cable systems are installed in ground, easily flooded galleries or water, a radial water impermeable barrier around the cable is recommended.

NOTE A test for radial water penetration is not currently available.

Longitudinal water barriers may also be applied to avoid the need to replace long sections of cable in case of damage in the presence of water.

A test for longitudinal water penetration is given in 12.4.18.

## 6 Cable characteristics

For the purpose of carrying out the cable system or cable tests described in this standard and recording the results, the cable shall be identified. The following characteristics shall be known or declared.

- a) Name of manufacturer, type, designation and manufacturing date or date code.
- b) Rated voltage: values shall be given for  $U_0$ ,  $U$ ,  $U_m$  (see 4.1 and 8.4).
- c) Type of conductor, its material and nominal cross-sectional area, in square millimetres. If the nominal cross-sectional area is not in accordance with IEC 60228, the d.c. conductor resistance and the conductor construction shall be declared. Presence, if any, and nature of measures taken to achieve longitudinal watertightness.
- d) Material and nominal thickness of insulation (see 4.2). If the insulation is XLPE, special additives shall be declared if the higher value of  $\tan \delta$  according to Table 3 is applicable.
- e) Type of manufacturing process for insulation system.
- f) Presence, if any, and nature of watertightness measures in the screening area.
- g) Material and construction of metallic screen, e.g. number and diameter of wires. The d.c. resistance of the metallic screen shall be declared. Material, construction and nominal thickness of metallic sheath, or longitudinally applied metal foil, if any.
- h) Material and nominal thickness of oversheath.
- i) Nominal diameter of the conductor ( $d$ ).
- j) Nominal overall diameter of the cable ( $D$ ).
- k) Inner and outer nominal diameters of the insulation.
- l) Nominal capacitance between conductor and metallic screen/sheath.

## 7 Accessory characteristics

For the purpose of carrying out the cable system or accessory tests described in this standard and recording the results, the accessory shall be identified. The following characteristics shall be known or declared.

- a) Cables used for testing accessories shall be correctly identified as in Clause 6.
- b) Conductor connections used within the accessories shall be correctly identified, where applicable, with respect to
  - assembly technique;
  - tooling, dies and necessary setting;
  - preparation of contact surfaces;

- type, reference number and any other identification of the connector;
  - details of the type test approval of the connector.
- c) Accessories to be tested shall be correctly identified with respect to
- name of manufacturer;
  - type, designation and manufacturing date or date code;
  - rated voltage (see 6 b) above);
  - installation instructions (reference and date).

## 8 Test conditions

### 8.1 Ambient temperature

Unless otherwise specified in the details for the particular test, tests shall be carried out at an ambient temperature of  $(20 \pm 15) ^\circ\text{C}$ .

### 8.2 Frequency and waveform of power frequency test voltages

Unless otherwise indicated in this standard, the frequency of the alternating test voltages shall be in the range 49 Hz to 61 Hz. The waveform shall be substantially sinusoidal. The values quoted are r.m.s. values.

### 8.3 Waveform of lightning impulse test voltages

In accordance with IEC 60230, the front time of the standard lightning impulse voltage shall be between  $1 \mu\text{s}$  and  $5 \mu\text{s}$ . The time to half value shall be  $50 \mu\text{s} \pm 10 \mu\text{s}$  as specified in IEC 60060-1.

### 8.4 Relationship of test voltages to rated voltages

Where test voltages are specified in this standard as multiples of the rated voltage  $U_0$ , the value of  $U_0$  for the determination of the test voltages shall be as specified in Table 4.

For cables and accessories of rated voltages not shown in the table, the value of  $U_0$  for determination of test voltages may be the same as for the nearest rated voltage which is given, provided that the value of  $U_m$  for the cable and accessory is not higher than the corresponding value in the table. Otherwise, and particularly if the rated voltage is not close to one of the values in the table, the value of  $U_0$  on which the test voltages are based shall be the rated value, i.e.  $U$  divided by  $\sqrt{3}$ .

The test voltages in this standard are based on the assumption that the cables and accessories are used on systems of category A or B, as defined in IEC 60183.

### 8.5 Determination of the cable conductor temperature

It is recommended that one of the test methods described in Annex A is used to determine the actual conductor temperature.