PD IEC/TR 61916:2014

BSI Standards Publication

Electrical accessories — Harmonization of general rules

bsi.

...making excellence a habit.™

Document Sharing Hub

National foreword

This Published Document is the UK implementation of IEC/TR 61916:2014. It supersedes PD IEC/TR 61916:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/23, Electrical accessories.

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 2014.

Published by BSI Standards Limited 2014

ISBN 978 0 580 77519 2

ICS 29.120

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

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 December 2014.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: PD IEC/TR 61916:2014

IEC TR 61916

Edition 3.0 2014-11

RAPPORT TECHNIQUE

Electrical accessories – Harmonization of general rules

Petit appareillage – Harmonisation des règles générales

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX V

ICS 29.120

ISBN 978-2-8322-1938-6

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

Documents
Document Sharing Hub

Full document details: PD IEC/TR 61916:2014

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms and definitions 8
4 General requirements 8
4.1 General 8
4.2 Standard conditions for operation in service 9
4.2.1 Ambient temperature 9
4.2.2 Altitude 9
4.2.3 Maximum relative humidity at 40 °C 9
4.2.4 External magnetic field 9
4.2.5 Accessory orientation 10
4.3 Ambient air temperature range for testing 10
5 Resistance to heat 10
5.1 General 10
5.2 Requirements 10
5.3 Tests 10
6 Screws, current-carrying parts and connections (electrical and mechanical) 11
6.1 General 11
6.2 Types of screw 12
6.2.1 Thread-forming screw 12
6.2.2 Thread-cutting screw 12
6.3 Requirements 12
6.4 Tests 14
7 Resistance to abnormal heat and to fire 15
7.1 General 15
7.2 Requirements 16
7.3 Glow-wire flammability test for end-products, IEC 60695-2-11 16
7.3.1 Purpose and principle 16
7.3.2 Test specimens 16
7.3.3 Test method 16
7.3.4 Relevance of test data 16
8 Resistance of insulating materials to tracking 17
8.1 General 17
8.2 Requirements 17
8.3 Tracking index test, IEC 60112 17
8.3.1 Purpose and principle 17
8.3.2 Test method 17
8.3.3 Relevance of test data 18
9 Resistance to rusting 18
9.1 General 18
9.2 Requirements 18
9.3 Test 18
10 Legibility, durability and indelibility of marking 19

AVA Documents
Document Sharing Hub
Full document details: PD IEC/TR 61916:2014

10.1 General ... 19
10.2 Requirements ... 19
10.3 Test ... 19
11 Screw-type terminals for connecting conductors ... 19
12 Criteria for tests in accessory standards ... 19
13 Tolerances ... 20
14 Mechanical strength ... 20
14.1 Impact ... 20
14.2 Free fall ... 20
15 Appropriate dimensioning of insulation distances ... 20
15.1 General ... 20
15.2 General information ... 21
15.3 Dimensioning of clearances ... 21
15.4 Dimensioning of creepage distances ... 22
15.5 Dimensioning of solid insulation ... 23
15.6 Dimensioning of functional insulation ... 23
15.7 Practical application of IEC 60664 series with regards to particular questions ... 23
15.8 Other information useful for TC 23 ... 24
16 Resistance to UV ... 25
16.1 General ... 25
16.2 Basic principles ... 25
16.3 Tests ... 26
16.3.1 General ... 26
16.3.2 UV Test ... 26
16.3.3 Mechanical test ... 26
Annex A (informative) Material selection process ... 27
A.1 General ... 27
A.2 Terms and definitions ... 27
A.3 Requirements for material selection process ... 27
A.4 Material selection process ... 28
A.4.1 Material selection based on flammability classifications ... 28
A.4.2 Arc ignition test ... 28
Bibliography ... 30

Figure 1 – Thread-forming screw ... 12
Figure 2 – Thread-cutting screw ... 12

Table 1 – Torque per thread diameter ... 15
Table A.1 – Minimum glow wire ignition temperature (GWIT) of insulating materials required for the flammability classification of the selected material ... 28
Table A.2 – Minimum glow wire ignition temperature (GWIT) of insulating materials required for the GWFI classification of the selected material ... 28
Table A.3 – Minimum number of arcs required for the flammability classification of the selected material ... 28
Table A.4 – Minimum number of arcs required for the GWFI classification of the selected material ... 29

Documents
Document Sharing Hub
Full document details: PD IEC/TR 61916:2014

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL ACCESSORIES – HARMONIZATION OF GENERAL RULES

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.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 61916, which is a technical report, has been prepared by IEC technical committee 23: Electrical accessories.

This third edition cancels and replaces the second edition published in 2009 and constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

a) Modification of "General requirements" to include standard conditions for operation in service and information on ambient temperature range for testing;
b) Replacement of Clause 14;
c) Addition of a Clause 15 in UV resistance;
d) Addition of Annex A on Material selection process.

Documents
Document Sharing Hub

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
23/639/DTR	23/667A/RVC

Full information on the voting for the approval of this technical report 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.

In this technical report, the following print types are used:

– requirements proper: in roman type;
– *test specifications: in italic type*;
– Explanatory matter: in smaller roman type.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

Documents
Document Sharing Hub
Full document details: PD IEC/TR 61916:2014

INTRODUCTION

The purpose of this Technical Report is to have harmonized rules on the same subjects in all the Standards published by TC 23 and its subcommittees, in order to give coordinated indications to subcommittees when making their standards.

These recommendations are meant as a guide. Consequently, subcommittees, according to their own particularities, may use whole or part of the document which is not meant to be compulsory.

In publishing these recommendations, TC 23 wishes to spread the information so that other committees of the IEC may use these recommendations, if necessary.

Documents
Document Sharing Hub
Full document details: PD IEC/TR 61916:2014

ELECTRICAL ACCESSORIES – HARMONIZATION OF GENERAL RULES

1 Scope

This Technical Report provides guidance on requirements and tests for subjects common to TC 23 and its subcommittees by providing recommendations applicable to electrical accessories that are within the scope of TC 23 and its subcommittees.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60112, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60228, *Conductors of insulated cables*

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC TR 60664-2-1:2011, *Insulation coordination for equipment within low-voltage systems – Part 2-1: Application guide – Explanation of the application of the IEC 60664 series, dimensioning examples and dielectric testing*

IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60664-4, *Insulation coordination for equipment within low-voltage systems – Part 4: Consideration of high-frequency voltage stress*

IEC 60664-5:2007, *Insulation coordination for equipment within low-voltage systems – Part 5: Comprehensive method for determining clearances and creepage distances equal to or less than 2 mm*

IEC 60695-2-10, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2014, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-10-2:2014, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

IEC 60998-1:2002, *Connecting devices for low-voltage circuits for household and similar purposes – Part 1: General requirements*

IEC 60998-2-1:2002, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

AVA Documents
Document Sharing Hub

IEC 60999 (all parts), *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units*

ISO 4892-2: 2013, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

3 Terms and definitions

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

NOTE The terms defined hereafter concern Clause 8 Resistance of insulation materials to tracking.

3.1
tracking
progressive formation of conducting paths, which are produced on the surface of a solid insulating material, due to the combined effects of electric stress and electrolytic contamination on this surface

[SOURCE: IEC 60050-212:2010, 212-11-56, modified – The note has been deleted.]

3.2
electrical erosion
wearing away of insulating material by action of electrical discharges

[SOURCE: IEC 60050-212:2010, 212-11-55]

3.3
comparative tracking index
CTI
numerical value of the maximum voltage in volts at which a material withstands 50 drops without tracking

Note 1 to entry: The value of each test voltage and the CTI should be divisible by 25.

[SOURCE: IEC 60050-212:2010, 212-11-59, modified – The text "and without a persistent flame occurring under specified test conditions" has been removed at the end of the definition and Note 1 to entry has been added.]

3.4
proof tracking index
PTI
numerical value of the proof voltage in volts at which a material withstands 50 drops without tracking

[SOURCE: IEC 60050-212:2010, 212-11-60, modified – Number of drops specified.]

4 General requirements

4.1 General

This guidance is applicable to the relevant clause(s) of TC 23 standards and of its subcommittees covering general requirements and/or scope.

Before tests, the specimen is stored for at least 24 h in an atmosphere having a temperature between 15 °C and 35 °C and relative humidity between 45 % and 75 %, except for the test of Clause 7 where IEC 60112 applies.

Documents
Document Sharing Hub
Full document details: PD IEC/TR 61916:2014

Accessories within the scope of TC 23 standards, and those of its subcommittees, shall be designed and constructed so that, in normal use, their performance is reliable and safe for the user and the surroundings.

Standard conditions for operation in service for electrical accessories complying with the existing standards should be suitable for use at ambient temperatures not normally exceeding 40 °C, but their average over a period of 24 h does not exceed 35 °C, with a lower limit of the ambient air temperature of –5 °C.

4.2 Standard conditions for operation in service

4.2.1 Ambient temperature

4.2.1.1 General

Unless covered by a temperature classification, accessories within the scope of TC 23 standards should be at least capable of operating under the following standard conditions.

4.2.1.2 Ambient air temperature range in normal use

Electrical accessories complying with the existing standards are suitable for normal use at ambient temperatures not normally exceeding 40 °C, but their average over a period of 24 h does not exceed 35 °C, with a lower limit of the ambient air temperature of –5 °C.

NOTE This temperature range corresponds to AA4 of IEC 60364-5-51:2005, Table 51A. Part of the temperature range of IEC 60721-3-3, class 3K5, with the high air temperature restricted to 40 °C.

Accessories intended to be used in ambient air temperatures outside the above mentioned conditions permanently or during a long period shall be covered by special requirements or tests, if necessary, to be decided by each product committee.

4.2.1.3 Ambient air temperature range in cold climate

In areas where electrical accessories are to be used in cold or arctic climate, any tests may need to be performed in a suitable cold ambient temperature.

Product committees have the responsibility to evaluate if the accessories intended to be used in ambient air temperatures in cold climate permanently or during a long period shall be tested in a temperature corresponding to the climate area, for example AA3 or AA2 of IEC 60364-5-51:2005, Table 51A.

4.2.2 Altitude

Unless otherwise specified, the accessories are intended to be installed at an altitude not higher than 2 000 m.

4.2.3 Maximum relative humidity at 40 °C

Unless otherwise specified, the maximum relative humidity at the temperature of 40 °C is 50 %.

Higher relative humidity values are admitted at lower temperature (for example 90 % at 20 °C).

4.2.4 External magnetic field

Unless otherwise specified, the external magnetic field is considered not exceeding 5 times the earth's magnetic field in any direction.

Documents
Document Sharing Hub
Full document details: PD IEC/TR 61916:2014