IEC 60984

Edition 2.0 2014-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Live working – Electrical insulating sleeves

Travaux sous tension – Protège-bras isolants électriques

IEC 60984:2014-07(en-fr)

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIVE WORKING – ELECTRICAL INSULATING SLEEVES

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.
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International Standard IEC 60984 has been prepared by IEC technical committee 78: Live working.

This second edition cancels and replaces the first edition, published in 1990 and its Amendment 1 published in 2002. It constitutes a technical revision.

The major changes are:

– removal of the requirement for an area to mark the date of inspection;
– only the straight mounting method with water electrodes is specified for the dielectric type test;
– the d.c. electric tests are no longer included in the normative part of the document, but a d.c. test is suggested at the production level where a d.c. use of sleeves is expected, as presented in a new informative Annex E;
– preparation of the elements of evaluation of defects, and general application of IEC 61318:2007;

– the normative Annex E on sampling procedure has been deleted (not applicable according to IEC 61318:2007);
– the informative Annex F on acceptance and complementary tests has been deleted (consideration now included in IEC 61318:2007);
– in the new normative Annex F, updating of the characteristics of the liquid specified for tests on sleeves of category H, according to the latest edition of ISO 1817;
– introduction of a new normative Annex G on classification of defects;
– introduction of a new informative Annex H on the rationale for the classification of defects;
– review of the annex on in-service recommendations;
– for periodic electrical retesting, recommended voltage limit of the dielectric test methods to 10 kV except in case of the test method with water electrodes and straight mounting;

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

FDIS	Report on voting
78/1042/FDIS	78/1055/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.

Terms defined in Clause 3 are given in italic print throughout this standard.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

INTRODUCTION

This document has been prepared according to the requirements of IEC 61477 where applicable.

The product covered by this standard may have an impact on the environment during some or all stages of its life cycle. These impacts can range from slight to significant, be of short-term or long-term, and occur at the global, regional or local level.

Except for a disposal statement in the Instructions for use, this standard does not include requirements and test provisions for the manufacturers of the product, or recommendations to the users of the product for environmental improvement. However, all parties intervening in its design, manufacture, packaging, distribution, use, maintenance, repair, reuse, recovery and disposal are invited to take account of environmental considerations.

LIVE WORKING – ELECTRICAL INSULATING SLEEVES

1 Scope

This International Standard is applicable to *electrical insulating sleeves* for the protection of workers from accidental contact with live electrical conductors, apparatus or circuits.

The products designed and manufactured according to this standard contribute to the safety of the users provided they are used by skilled persons, in accordance with safe methods of work and the instructions for use.

Unless otherwise stated, in this standard the term “sleeve” is used for “*electrical insulating sleeve*”.

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

IEC 60060-2, *High-voltage test techniques – Part 2: Measuring systems*

IEC 60212, *Standard conditions for use prior to and during the testing of solid electrical insulating materials*

IEC 60417, *Graphical symbols for use on equipment*

IEC 61318:2007, *Live working – Conformity assessment applicable to tools, devices and equipment*

IEC 61477, *Live working – Minimum requirements for the utilization of tools, devices and equipment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61318 as well as the following apply.

3.1
elastomer
macromolecular material which returns rapidly to its initial dimensions and shape after substantial deformation by a weak stress and release of the stress

Note 1 to entry: The definition applies under room temperature test conditions.

[SOURCE: ISO 472: 2013, 2.327]

3.2
electrical insulating sleeve
sleeve made of *elastomer* used in conjunction with an electrical insulating glove to extend protection against electric shock to the upper arm

Note 1 to entry: *Electrical insulating sleeves* are designed to protect the worker against inadvertent contacts with live parts.

Note 2 to entry: The length of the sleeve does not provide protection up to the armpit

[SOURCE: IEC 60743:2013, 8.1.4, modified – The definition is in line with the composition requirements of the standard for the type of insulating material. The note 2 to entry has been added to clarify the type of protection offered.]

3.3
formally trained and qualified person
competent person possessing the appropriate practical and theoretical knowledge and having adequate skill and experience to enable the person to perform the required periodic testing, interpret the resultant information and from that information determine that the *electrical insulating sleeve* is safe to use, and report the importance of any defect found or suspected in relation to the safety and continued use of the *electrical insulating sleeve*

3.4
nominal voltage of a system
suitable approximate value of voltage used to designate or identify a system

[SOURCE: IEC 60050-601:1985, 601-01-21]

4 Requirements

4.1 General

The following requirements have been prepared in order that the products covered by this standard are designed and manufactured to contribute to the safety of the users, provided they are used by persons skilled for live working, in accordance with safe method of work and the instructions for use.

4.2 Classification

The sleeves covered by this standard shall be designated as follows:

– by class as class 0, class 1, class 2, class 3 and class 4;
– by style as style A (Straight taper) and style B (Curved elbow);
– by special properties, by the addition of a suffix to the class of the sleeve as shown in Table 1:

Table 1 – Special properties

Category	Resistant to
A	Acid
H	Oil
Z	Ozone
S[a]	Oil and ozone
C	Extremely low temperature
[a] Category S combines the characteristics of Categories H and Z.	

Guidance as to temperature range at which sleeves can be used is given in Annex A.

4.3 Physical requirements

4.3.1 Composition

The sleeves shall be manufactured of *elastomer* and produced by a seamless process. The holes provided in sleeves, for the purposes of strap or harness attachments, shall have non-metallic reinforcement. The holes shall fit the fixing device of the sleeve harness and should be nominally 8 mm in diameter.

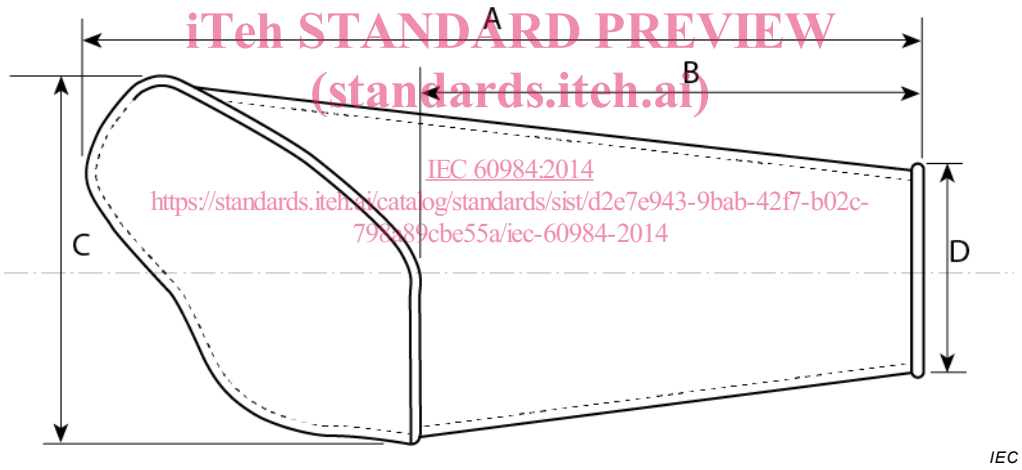
The cuff and the large opening shall have reinforced edges.

4.3.2 Shape

The shape of the straight taper sleeve (style A) is indicated in Figure 1.

The shape of the curved elbow sleeve (style B) is indicated in Figure 2.

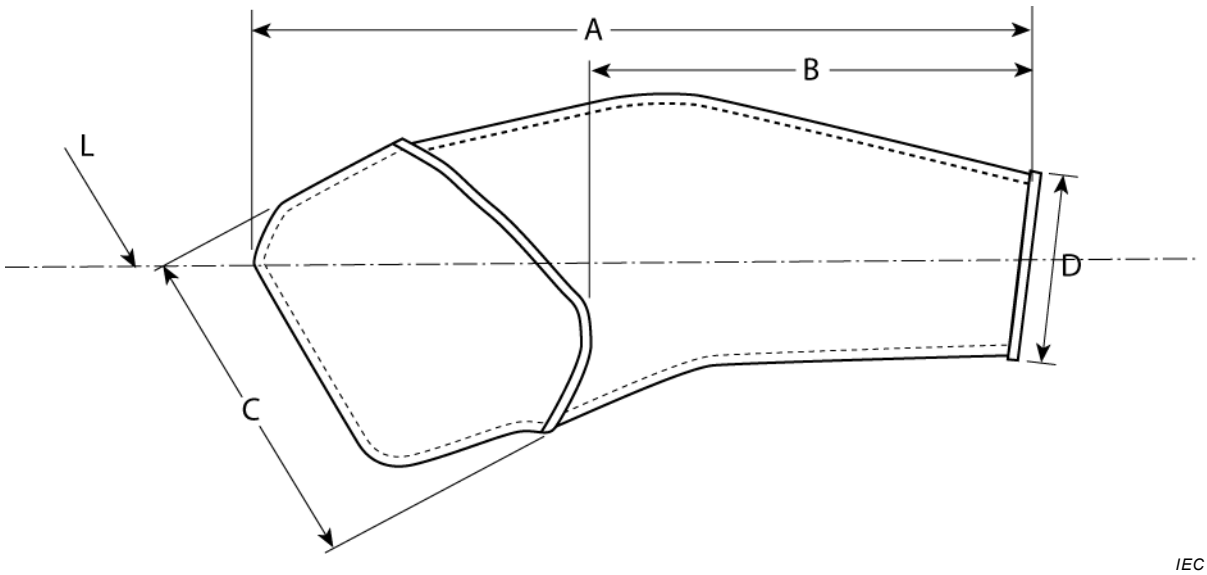
The taper of sleeves should be uniform.



Key

A overall length
B underarm length
C opening width
D cuff width

Figure 1 – Style A: straight taper sleeve



Key

A	overall length	L	orientation line
B	underarm length		
C	opening width		
D	cuff width		

Figure 2 – Style B, curved elbow sleeve

4.3.3 Dimensions

Table 2 gives the standard dimensions and tolerances of sleeves. The dimensions are also shown in Figures 1 and 2.

NOTE Additional dimensions may be available following agreement between manufacturer and client.

Table 2 – Dimensions*

Style	Size	Dimensions mm			
		A	B	C	D
Style A (Figure 1) (straight taper)	Small	630	370	270	140
	Medium	670	410	290	140
	Large	720	450	330	175
	Extra large	760	500	340	175
Style B (Figure 2) (curved elbow)	Small	630	370	290	145
	Medium	670	410	310	145
	Large	710	420	330	175
	Extra large	750	460	330	180
Tolerances shall be as follows: Dimension A: ±15 mm; Dimension B: ±15 mm; Dimension C: ±15 mm; Dimension D: ± 5 mm.					

4.3.4 Thickness

The minimum thickness shall be determined only by the ability to pass the dielectric tests defined in 5.6.

The maximum thickness of the sleeve on the flat surface (not ribbed area, if present) of a sleeve shall be as given in Table 3 in order to obtain appropriate flexibility.

Table 3 – Maximum sleeve thickness

Class	Thickness mm
0	1,00
1	1,50
2	2,50
3	2,90
4	3,60

Sleeves of categories A, H, and Z may require additional thickness which shall not exceed 0,6 mm.

4.3.5 Workmanship and finish

Sleeves shall be free on both inner and outer surfaces from harmful physical irregularities that can be detected by thorough test and inspection.

Harmful physical irregularities shall be defined as any feature that disrupt the uniform, smooth surface contour, such as pinholes, cracks, blisters, cuts, conductive embedded foreign matter, creases, pinch marks, voids (entrapped air), prominent ripples and prominent mould marks.

Non-harmful physical irregularities shall be defined as surface irregularities present on the inner and outer surfaces of the sleeve due to imperfections on forms or molds and inherent difficulties in the manufacturing process. These irregularities may appear as mould marks that look like cuts even though they are actually a raised ridge of material, indentations, protuberances, embedded foreign matter, or colour splashes that are acceptable provided that:

a) the depression is not larger than 1,6 mm in diameter, has rounded edges and no visible break in the surface, and cannot be seen on the opposite side when stretched over the thumb;

b) there are not more than five depressions as described in a) anywhere on the sleeve and any two are separated by at least 15 mm;

c) the indentations, protuberance or mould marks tend to blend into a smooth slope upon stretching of the material;

d) the small projections or protuberances represent only a small amount of excess material that cannot be readily removed with the finger and these projections do not appreciably affect the stretching of the material.

4.4 Mechanical, climatic and environmental requirements

Sleeves shall withstand the mechanical, climatic and environmental stresses specified in this standard.

Sleeves with one or more special categories (see Table 1) shall support any related stresses.

4.5 Electrical requirements

Sleeves shall be capable of withstanding the corresponding electrical stresses according to its electrical class.

4.6 Marking

Each sleeve which is claimed to comply with the requirements of this standard shall bear a label and/or marking giving the following information:

– symbol IEC 60417-5216:2002-10 – Suitable for live working; double triangle (see Annex B);

NOTE The exact ratio of the height of the figure to the base of the triangle is 1,43. For the purpose of convenience, this ratio can be between the values of 1,4 and 1,5.

– number of the relevant IEC standard immediately adjacent to the symbol (IEC 60984);

– name, trade mark, or identification of the manufacturer;

– category if applicable;

– size;

– class;

– "right" or "left";

– month and year of manufacture.

To minimize problems of marking and identification, the following standard abbreviations may be used:

small (S), medium (M), large (LG), extra large (XLG).

Class 0, Class 1, Class 2, Class 3 and Class 4, right or left shall not be abbreviated.

Marking shall be clearly visible and legible to a person with normal or corrected vision without additional magnification.

The marking or label shall not impair the quality of the sleeve. It shall be durable and shall remain visible after being subjected to a durability test (see 5.3.2).

Any additional marking or label shall be subject to agreement between the manufacturer and the customer.

When a colour code is used for the symbol (double triangle), it shall correspond to the following:

class 0 – red;

class 1 – white;

class 2 – yellow;

class 3 – green;

class 4 – orange.

4.7 Packaging

Each pair of sleeves shall be packaged in an individual container or package of sufficient strength to so far as is reasonably practicable, properly protect the sleeves from damage when transported, handled and stored in accordance with the manufacturers instructions.

The outside of the container or package shall be marked with the name of the manufacturer or supplier, classification, category, size, length, and style.