

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Live working – Electrical insulating gloves

Travaux sous tension – Gants isolants électriques

[IEC 60903:2014](#)

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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	8
4 Requirements	11
4.1 General.....	11
4.2 Classification	11
4.3 Physical requirements.....	11
4.3.1 Composition	11
4.3.2 Dimensions.....	11
4.3.3 Thickness	13
4.3.4 Workmanship and finish.....	13
4.4 Mechanical, climatic and environmental requirements	14
4.5 Electrical requirements	14
4.6 Marking.....	14
4.7 Packaging	15
4.8 Instructions for use	16
5 Tests	16
5.1 General.....	16
5.2 Visual and dimensional inspection.....	16
5.2.1 General.....	16
5.2.2 Classification	16
5.2.3 Dimensions.....	16
5.2.4 Thickness	17
5.2.5 Workmanship and finish.....	17
5.3 Marking.....	17
5.3.1 Visual and dimensional inspection	17
5.3.2 Durability of marking.....	17
5.4 Packaging and instructions for use.....	17
5.5 Mechanical tests	18
5.5.1 General	18
5.5.2 Tensile strength and elongation at break	18
5.5.3 Resistance to mechanical puncture	20
5.5.4 Tension set.....	22
5.6 Dielectric tests	22
5.6.1 Type test	22
5.6.2 Alternative tests in case of gloves having completed the production phase	26
5.7 Ageing test	27
5.8 Thermal tests.....	27
5.8.1 Low temperature test.....	27
5.8.2 Flame retardancy test.....	29
5.9 Tests on gloves with special properties.....	30
5.9.1 Category A – Acid resistance.....	30
5.9.2 Category H – Oil resistance	30

5.9.3	Category Z – Ozone resistance	31
5.9.4	Category C – Extremely low temperature resistance	31
5.9.5	Category F – Leakage current resistance.....	31
5.10	Specific mechanical testing for composite gloves	33
5.10.1	Abrasion resistance	33
5.10.2	Cutting resistance.....	35
5.10.3	Tear resistance.....	38
6	Conformity assessment of gloves having completed the production phase.....	40
7	Modifications	40
Annex A (informative) In-service recommendations.....		41
A.1	General.....	41
A.2	Storage prior to issue and between use	41
A.3	Examination before use	41
A.4	Temperature	41
A.5	Precautions in use	41
A.6	Periodic inspection and electrical re-testing	42
Annex B (normative) Suitable for live working; double triangle (IEC 60417-5216:2002-10).....		44
Annex C (normative) Chronological order for type tests		45
C.1	General.....	45
C.2	Group size requirements.....	48
C.2.1	Group 1	48
C.2.2	Group 2	48
C.2.3	Group 3	48
C.2.4	Group 4 – Additional tests for composite gloves	48
C.2.5	Group 5 – Additional tests for gloves of category A.....	48
C.2.6	Group 6 – Additional tests for gloves of category H	49
C.2.7	Group 7 – Additional tests for gloves of category Z.....	49
C.2.8	Group 8 – Additional tests for gloves of category F.....	49
Annex D (informative) Guidelines for the selection of the class of glove in relation to a.c. nominal voltage of a system		50
Annex E (informative) Recommendations for d.c. electrical tests and voltage use		51
E.1	General.....	51
E.2	DC dielectric tests.....	51
E.2.1	General	51
E.2.2	Test equipment.....	51
E.2.3	Voltage dielectric test procedure.....	51
E.2.4	DC proof test	51
E.3	Recommended maximum use voltage in d.c. installations	52
Annex F (normative) Liquid for tests on gloves of category H – Oil resistance.....		53
F.1	Particularities of liquid 102.....	53
F.2	Characteristics of oil no. 1	53
Annex G (informative) Cotton canvas additional characteristics		54
Annex H (normative) Classification of defects and tests to be allocated		56
Annex I (informative) Rationale for the classification of defects.....		57
Bibliography.....		58
Figure 1 – Contour of glove		12

Figure 2 – Illustration of the working area	14
Figure 3 – Composite glove symbol – Hammer	15
Figure 4 – Dumb-bell test piece for mechanical tests (plan view)	19
Figure 5 – Test plates and needle for resistance to mechanical puncture	21
Figure 6 – Test set up for the dielectric test on glove	25
Figure 7 – Bend (fold) line for low and extremely low temperature test	28
Figure 8 – Set-up for low and extremely low temperature folding tests	28
Figure 9 – Set-up for the flame retardancy test	30
Figure 10 – Test arrangement for leakage current resistance	32
Figure 11 – Abrasion resistance tester	34
Figure 12 – Apparatus for testing cutting resistance	36
Figure 13 – Test piece direction and location for tear resistance	39
Figure 14 – Shape of test piece for tear resistance	39
Table 1 – Special properties	11
Table 2 – Standard lengths of gloves	12
Table 3 – Maximum thickness of the gloves	13
Table 4 – Sampling plan	19
Table 5 – Clearance from open part of the glove to water line	24
Table 6 – Proof test and withstand test	26
Table 7 – Clearance from open part of the gloves / long gloves to water line for alternative routine proof test	27
Table 8 – Test voltage for gloves of category F	33
Table 9 – Presentation of test results on glove test piece	38
Table A.1 – Distances between the cuff of the protector glove and the top of the cuff of the glove	42
Table C.1 – General type test procedure	46
Table D.1 – Designation of maximum use a.c. voltage	50
Table E.1 – Clearance from open part of the glove to water line	51
Table E.2 – Proof test voltage	52
Table E.3 – Designation of maximum use voltage	52
Table F.1 – Characteristics of oil no. 1	53
Table G.1 – Identification sheet – Reference test piece – Cotton weave fabric	55
Table H.1 – Classification of defects and associated requirements and tests	56
Table I.1 – Justification for the type of defect	57

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**LIVE WORKING –
ELECTRICAL INSULATING GLOVES****FOREWORD**

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International Standard IEC 60903 has been prepared by IEC technical committee 78: Live working.

This third edition cancels and replaces the second edition of IEC 60903, published in 2002. It constitutes a technical revision.

The major changes are:

- clarification of the requirements and tests for *long gloves*;
- introduction of a new special property for gloves resistant to leakage current;
- removal of the requirement for an area to mark the date of inspection;
- for the thickness measurement, no other instrument than the micrometer with specified parameters is allowed;
- the d.c. electric tests are no longer included in the normative part of the document but a proof test is suggested at the production level where a d.c. use of gloves 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 C on sampling plans and procedure has been deleted (not applicable according to IEC 61318:2007);
- in the new normative Annex F, updating of the characteristics of the liquid specified for tests on gloves of category H, according to the latest edition of ISO 1817;
- the informative Annex H on acceptance tests has been deleted (consideration now included in IEC 61318:2007);
- introduction of a new normative Annex H on classification of defects;
- introduction of a new informative Annex I on the rationale for the classification of defects;
- review of the annex on in-service recommendations.

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

FDIS	Report on voting
78/1043/FDIS	78/1056/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

In this document, the clauses on requirements and testing are reorganized in order to bring together the common requirements and tests, then to lay down separately those which are specific to insulating gloves for electrical protection normally worn under leather protector gloves as opposed to those specific to insulating gloves for combined electrical and mechanical protection. This arrangement meets the basic necessity that a same quality level of electrical insulation is achieved for all types of *electrical insulating gloves*.

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.

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LIVE WORKING – ELECTRICAL INSULATING GLOVES

1 Scope

This International Standard is applicable to *electrical insulating gloves* and *mitts* that provide protection of the worker against electric shock.

Unless otherwise stated, the use of the term “glove” includes both gloves and *mitts*.

This standard also covers *electrical insulating gloves* with additional integrated mechanical protection referred to in this document as “*composite gloves*”.

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.

NOTE Insulating gloves are normally to be used in conjunction with leather protector gloves to provide mechanical protection. *Composite insulating gloves* are normally used without over-gloves.

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*

ISO 23529, *Rubber – General procedures for preparing and conditioning test pieces for physical test methods*

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**bell cuff glove**

glove with an enlarged shape from the *wrist* to the *cuff* in such a way as to facilitate pull-on over a thick garment

3.2**composite glove**

electrical insulating glove made with additional integrated mechanical protection of the glove

[SOURCE: IEC 60050-651:2014, 651-23-03 and IEC 60743:2013, 8.2.1, modified – The definition clarifies that the mechanical protection is an additional one]

3.3**contour glove**

glove shaped at the upper part of the *gauntlet* in such a way as to facilitate the bending of the arm and intended for gloves that extend to or above the elbow

3.4**cuff**

open part of a glove

3.5**cuff roll**

roll or reinforced edge of a glove at the *cuff*

3.6**disruptive discharge**

passage of an arc following dielectric breakdown

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Note 1 to entry: The term “flashover” (in French “contournement”) is used when a *disruptive discharge* occurs at least partly along the surface of a solid dielectric surrounded by a gaseous or liquid medium.

Note 2 to entry: The term “puncture” (in French “perforation”) is used when a *disruptive discharge* occurs through a solid dielectric producing permanent damage.

[SOURCE: IEC 60050-604:1987, 604-03-38 modified – the content of the original note has been reduced, modified to suit the application and presented in the form of two notes to entry]

3.7**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]

3.8**electrical insulating glove**

glove made of *elastomer*, used for the protection of the worker against electric shock

[SOURCE: IEC 60050-651:2014, 651-23-02 and IEC 60743:2013, 8.1.3, modified – The definition is in line with the composition requirements of the standard for the type of insulating material. The note 1 to entry has been deleted]

3.9**fork**

part of glove at the junction of two fingers, or finger and thumb

3.10

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 glove* 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 glove*

3.11

gauntlet

part of a glove from the *wrist* to the open part of the glove

3.12

lined glove

glove with an inside lining of textile attached to the *elastomer*

3.13

long glove

electrical insulating glove used to extend the protection to the upper arm

Note 1 to entry: The length of the glove does not include protection up to the armpit.

[SOURCE: IEC 60743:2013, 8.1.5, modified – The whole document is about insulating glove protecting against electric shock so that does not need to be repeated in the term and its definition. The note 1 to entry has been added to clarify the type of protection offered]

3.14

mitt

glove with multiple fingers enclosed in one covering

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3.15

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]

3.16

palm

part of glove covering the face of the central inside hand

3.17

proof test voltage

specified voltage that is applied to a glove for the time defined under specified conditions to assure that the electrical strength of the insulation is above a specified value

3.18

withstand test voltage

voltage that the glove withstands without *disruptive discharge* when voltage is applied under specified conditions

3.19

wrist

narrowest part of the glove between the *cuff* and the hand

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 gloves covered by this standard shall be designated as follows:

- by class, as class 00, class 0, class 1, class 2, class 3 and class 4;
- by special properties, by the addition of a suffix to the class of the glove as shown in Table 1.

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

Table 1 – Special properties

Category	Resistant to
A	Acid
H	Oil
Z	Ozone
R	Acid, oil, ozone
C	Extremely low temperature
F	Leakage current
NOTE 1 Category R combines the characteristics of categories A, H and Z.	
NOTE 2 Category F is for long gloves only.	
NOTE 3 Any combination of categories may be used.	

4.3 Physical requirements

4.3.1 Composition

All gloves may be lined or unlined. They may have an exterior covering and may be specially compounded to reduce the effects of chemical attack. If gloves have an exterior covering, it shall be of a contrasting colour to assist in visual inspection.

Gloves are made of *elastomer*.

Gloves may be manufactured with or without *cuff roll*.

4.3.2 Dimensions

Gloves shall be of the length specified in Table 2.

Table 2 – Standard lengths of gloves

Class	Standard length mm ^b				
	00	280	360	–	–
0	280	360	410	460	800 ^a
1	–	360	410	460	800 ^a
2	–	360	410	460	800 ^a
3	–	360	410	460	800 ^a
4	–	–	410	460	800 ^a

^a Long gloves.

^b The tolerance in length shall be ± 15 mm for any class, except for long gloves where tolerance shall be ± 20 mm.

For contour-cuff gloves, the difference between the maximum and minimum lengths (see Figure 1) shall be $50 \text{ mm} \pm 6 \text{ mm}$ except for *long gloves* where this difference shall be $100 \text{ mm} \pm 12 \text{ mm}$.

NOTE 1 There are different shapes of gloves on the market including *bell cuff gloves*, *contour gloves* and *gauntlets*.

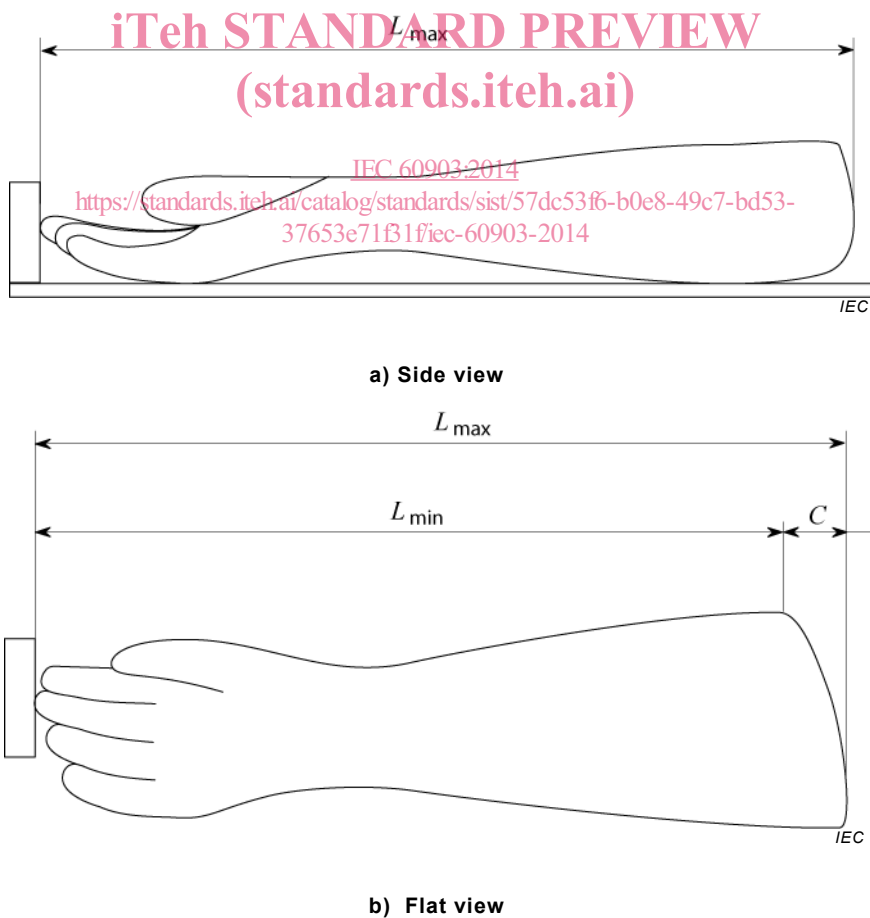


Figure 1 – Contour of glove

Palm circumferences shall be defined as follows:

178 mm (size 7), 191 mm (size 7.5), 203 mm (size 8), 216 mm (size 8.5), 229 mm (size 9), 241 mm (size 9.5), 254 mm (size 10), 267 mm (size 10.5), 279 mm (size 11), 292 mm (size 11.5) and 305 mm (size 12).

The tolerance in size shall be ± 13 mm.

NOTE 2 Additional sizes may be available following agreement between manufacturer and client.

4.3.3 Thickness

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

The maximum thickness on the flat surface of a glove (no ribbed area if present) shall be as given in Table 3 in order to obtain the appropriate flexibility.

Table 3 – Maximum thickness of the gloves

Class	Thickness mm	
	Gloves	Composite gloves
00	0,50	1,8
0	1,00	2,3
1	1,50	2,8
2	2,30	3,3
3	2,90	3,6
4	3,60	4,2

Long gloves may require additional thickness which shall not exceed 0,6 mm.

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

4.3.4 Workmanship and finish

Gloves 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 disrupts 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 glove due to imperfections on 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:

- the indentations, protuberance or mould marks tend to blend into a smooth slope upon stretching of the material;
- foreign material remains in place when the glove is folded and stretched with the material surrounding it;