
**Delo pod napetostjo – Rokavice iz izolacijskega materiala (IEC 60903:2002
(Spremenjen))**

Live working - Gloves of insulating material

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60903:2004](https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ae8d-865c5832aa2b/sist-en-60903-2004)

<https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ae8d-865c5832aa2b/sist-en-60903-2004>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 60903:2004

<https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ae8d-865c5832aa2b/sist-en-60903-2004>

EUROPEAN STANDARD

EN 60903

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2003

ICS 13.260; 29.240.20; 29.260.99

Supersedes EN 60903:1992 + A11:1997 & EN 50237:1997

English version

**Live working -
Gloves of insulating material**
(IEC 60903:2002 + corrigendum 2003, modified)

Travaux sous tension -
Gants en matériau isolant
(CEI 60903:2002 + corrigendum 2003,
modifiée)

Arbeiten unter Spannung -
Handschuhe aus isolierendem Material
(IEC 60903:2002 + Corrigendum 2003,
modifiziert)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This European Standard was approved by CENELEC on 2003-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 78/462A/FDIS, future edition 2 of IEC 60903, prepared by IEC TC 78, Live working, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60903 on 2003-07-01.

A draft amendment, prepared by the Technical Committee CENELEC TC 78, Equipment and tools for live working, was submitted to the formal vote and was approved by CENELEC for inclusion into EN 60903 on 2003-07-01.

This European Standard

- supersedes EN 60903:1992 + A11:1997, covering insulating gloves (and mitts) which would normally be used in conjunction with leather protector gloves worn over the insulating gloves (and mitts) to provide mechanical protection,
- supersedes EN 50237:1997, covering gloves (and mitts) which combine in one unique glove the insulating properties of elastomer gloves and the mechanical properties of leather gloves. The result of the combination is defined as a composite glove;
- includes requirements and testing for a "long composite glove" which extends protection to most of the upper arm.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement [SIST EN 60903:2004](https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ac8d-60903-2004) (dop) 2004-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-07-01

This European Standard was prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and supports the essential requirements of Directive 89/686/EEC.

NOTE Subclauses which are additional to those in IEC 60903 are prefixed "Z".

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A, B, C and ZA are normative and annexes D, E, F, G, H and I are informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60903:2002 and its corrigendum February 2003 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

5.7 Marking

Modify the second indent as follows:

- number of the relevant European Standard immediately adjacent to the symbol with year of publication (EN 60903:2003)

Add the following item after the sixth indent (class):

- serial number or batch number;

5.8 Packaging

Delete the last sentence.

Add a new Subclause 5.Z1 as follows:

5.Z1 Manufacturer's instructions

Each pair of gloves shall come with the manufacturer's instructions for use and care.

These instructions shall include, as a minimum, the following information:

- the significance of any marking (see 5.7);
- the type of packaging suitable for transport (see 5.8);
- the classes and categories appropriate to different levels of risks and the corresponding limit of use (see Annex D);
- performance as recorded during the technical tests to check the levels or classes of protection (see Clauses 8, 9 and 10);
- the end of life deadline or period to end of life of the product; alternatively, the conditions of periodic inspection and electrical re-testing ensuring a safe use until the end of life of the product (see E.5);
- storage, use, cleaning, maintenance, servicing and disinfection. Cleaning, maintenance or disinfectant products recommended by the manufacturer and the relevant instructions;
- these gloves are intended to be used exclusively for electrical purpose.

Bibliography

Add the following references:

EN 388, *Protective gloves against mechanical risks*

EN 420, *Protective gloves - General requirements*

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-151	2001	International Electrotechnical Vocabulary (IEV) Part 151: Electrical and magnetic devices	-	-
IEC 60050-601	1985	Chapter 601: Generation, transmission and distribution of electricity - General	-	-
IEC 60050-651	1999	Part 651: Live working	-	-
IEC 60060-1 + corr. March	1989 1990	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 60060-2	1994	Part 2: Measuring systems	EN 60060-2 A11	1994 1998
IEC 60212	1971	Standard conditions for use prior to and during the testing of solid electrical insulating materials	HD 437 S1	1984
IEC 60417	database	Graphical symbols for use on equipment	-	-
IEC 60743	2001	Live working - Terminology for tools, equipment and devices	EN 60743	2001
IEC 61318	1994	Live working - Guidelines for quality assurance plans	-	-
IEC 61477	2001	Live working - Minimum requirements for the utilization of tools, devices and equipment	EN 61477	2002
ISO 37	1994	Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties	-	-
ISO 472	1999	Plastics - Vocabulary	EN ISO 472	2001

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 2592	2000	Determination of flash and fire points - Cleveland open cup method	EN ISO 2592	2001
ISO 2859-1	1999	Sampling procedures for inspection by attributes Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection	-	-
ISO 2977	1997	Petroleum products and hydrocarbon solvents - Determination of aniline point and mixed aniline point	-	-
ISO 3104	1994	Petroleum products - Transparent and opaque liquids - Determination of kinematic viscosity and calculation of dynamic viscosity	EN ISO 3104	1996
ISO 9000	2000	Quality management systems - Fundamentals and vocabulary	EN ISO 9000	2000
ISO 9001	2000	Quality management systems - Requirements	EN ISO 9001	2000
ISO 9004	2000	Quality management systems - Guidelines for performance improvements	EN ISO 9004	2000

iTeh STANDARD PREVIEW
 (standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ac8d-865c5832aa2b/sist-en-60903-2004>
SIST EN 60903:2004

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 60903:2004

<https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ae8d-865c5832aa2b/sist-en-60903-2004>

INTERNATIONAL STANDARD

IEC 60903

Second edition
2002-08

Live working – Gloves of insulating material

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60903:2004](https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ac8d-865c5832aa2b/sist-en-60903-2004)

<https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ac8d-865c5832aa2b/sist-en-60903-2004>

© IEC 2002 Copyright - all rights reserved

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 the publisher.

International Electrotechnical Commission, 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE **XB**

For price, see current catalogue

CONTENTS

FOREWORD	9
INTRODUCTION	13
1 Scope	15
2 Normative references.....	15
3 Definitions	17
4 Classification	21
5 General requirements	23
5.1 Physical requirements	23
5.1.1 Composition.....	23
5.1.2 Shape	23
5.1.3 Dimensions	23
5.1.4 Thickness	25
5.1.5 Workmanship and finish	27
5.2 Mechanical requirements	27
5.2.1 Tensile strength and elongation at break	27
5.2.2 Tension set	27
5.3 Electrical requirements	27
5.4 Ageing requirements	29
5.5 Thermal requirements	29
5.5.1 Low temperature resistance	29
5.5.2 Flame retardancy	31
5.6 Gloves with special properties	31
5.6.1 Acid resistance	31
5.6.2 Oil resistance.....	31
5.6.3 Ozone resistance	31
5.6.4 Acid, oil and ozone resistance	31
5.6.5 Extremely low temperature resistance.....	31
5.7 Marking	33
5.8 Packaging.....	35
6 Specific mechanical requirements.....	35
6.1 Insulating gloves – Resistance to mechanical puncture.....	35
6.2 Composite gloves	35
6.2.1 Resistance to mechanical puncture.....	35
6.2.2 Abrasion resistance	35
6.2.3 Cutting resistance	35
6.2.4 Tear resistance	35
7 Electrical requirements for long composite gloves.....	35
8 General testing	37
8.1 General	37
8.2 Visual inspection and measurements	37
8.2.1 Shape	37
8.2.2 Dimensions	37
8.2.3 Thickness	39
8.2.4 Workmanship and finish.....	39

8.3	Mechanical tests.....	39
8.3.1	Tensile strength and elongation at break	39
8.3.2	Resistance to mechanical puncture.....	41
8.3.3	Tension set.....	41
8.4	Dielectric tests.....	43
8.4.1	General.....	43
8.4.2	AC test procedure.....	45
8.4.3	DC test procedure.....	47
8.5	Ageing test	49
8.6	Thermal tests.....	49
8.6.1	Low temperature test	49
8.6.2	Flame retardancy test	49
8.7	Tests on gloves with special properties.....	51
8.7.1	Category A – Acid resistance	51
8.7.2	Category H – Oil resistance	51
8.7.3	Category Z – Ozone resistance.....	53
8.7.4	Category C – Extremely low temperature resistance	53
8.8	Marking	53
8.9	Packaging.....	53
9	Specific mechanical testing.....	53
9.1	Abrasion resistance.....	53
9.2	Cutting resistance.....	55
9.2.1	Test on reference test piece.....	57
9.2.2	Test on glove test piece.....	57
9.3	Tear resistance.....	59
10	Leakage current test.....	61
10.1	General test conditions	61
10.2	Test arrangement	61
10.3	Test procedure	63
11	Quality assurance plan and acceptance tests	63
11.1	General	63
11.2	Categories of tests.....	63
11.3	Sampling procedure.....	63
11.4	Acceptance tests	63
	Annex A (normative) List and classification of tests.....	95
	Annex B (normative) Liquid for tests on gloves of category H – Oil resistance.....	101
	Annex C (normative) Sampling procedure	103
	Annex D (informative) Guidelines for the selection of the class of glove in relation to nominal voltage of a system.....	107
	Annex E (informative) In-service recommendations	109
	Annex F (informative) Typical glove dimensions.....	113
	Annex G (informative) Cotton canvas additional characteristics.....	115
	Annex H (informative) Acceptance tests	119
	Annex I (informative) Electrical limits for the use of gloves of insulating material.....	121
	Bibliography.....	125

Figure 1 – Examples of typical shapes of gloves	65
Figure 2 – Shape of mitts	67
Figure 3 – Contour of glove (see 8.2.2)	69
Figure 4 – Example of area usually in contact with energized equipment.....	71
Figure 5 – Marking symbols (see 5.7).....	73
Figure 6 – Dumb-bell test piece for mechanical tests (see 8.3.1 and 8.3.3)	75
Figure 7 – Test plates and needle for resistance to mechanical puncture (see 8.3.2)	77
Figure 8 – Distance D from open part of glove to water line (see 8.4.1.1).....	79
Figure 9 – Bend (fold) line for low and extremely low temperature test (see 8.6.1 and 8.7.4).....	81
Figure 10 – Polyethylene plates for low and extremely low temperature test (see 8.6.1 and 8.7.4).....	83
Figure 11 – Set-up for the flame retardancy test (see 8.6.2).....	85
Figure 12 – Abrasion resistance tester (see 9.1)	87
Figure 13 – Apparatus for testing cutting resistance (see 9.2)	89
Figure 14 – Test piece direction and location for tear resistance (see 9.3)	91
Figure 15 – Shape of test piece for tear resistance (see 9.3).....	91
Figure 16 – Set-up for the leakage current test (see 10.2).....	93
Table 1 – Special properties..... (standards.iteh.ai).....	23
Table 2 – Standard lengths of gloves	25
Table 3 – Maximum thickness of the gloves.....	25
Table 4 – Proof test and withstand test.....	29
Table 5 – Surface leakage current test for long composite gloves	37
Table 6 – Clearance from open part of the glove to water line	45
Table 7 – Presentation of test results on glove test piece.....	59
Table A.1 – General test procedure.....	95
Table B.1 – Characteristics of oil no. 1.....	101
Table C.1 – Classification of defects	103
Table C.2 – Sampling plan for minor defects	105
Table C.3 – Sampling plan for major defects	105
Table D.1 – Designation of maximum use voltage	107
Table E.1 – Distances between the cuff of the protector glove and the top of the cuff of the insulating glove	109
Table F.1 – Details and dimensions (see Figures 1 and 2)	113
Table G.1 – Identification sheet.....	117
Table I.1 – Electrical limits	123

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**LIVE WORKING–
GLOVES OF INSULATING MATERIAL**
FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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

This second edition:

- cancels and replaces the first edition of IEC 60903, published in 1988, covering insulating gloves (and mitts) which would normally be used in conjunction with leather protector gloves worn over the insulating gloves (and mitts) to provide mechanical protection;
- includes and cancels IEC 61942, first edition, published in 1997, covering gloves (and mitts) which combine in one unique glove the insulating properties of elastomer gloves and the mechanical properties of leather gloves. The result of the combination is defined as a composite glove;
- includes requirements and testing for a “long composite glove” which extends protection to most of the upper arm.

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

FDIS	Report on voting
78/462A/FDIS	78/479/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 contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

The contents of the corrigenda of February 2003 and January 2005 have been included in this copy.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 60903:2004

<https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ae8d-865c5832aa2b/sist-en-60903-2004>

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 insulating gloves.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 60903:2004](https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ac8d-865c5832aa2b/sist-en-60903-2004)

<https://standards.iteh.ai/catalog/standards/sist/01589a41-a0f4-4135-ac8d-865c5832aa2b/sist-en-60903-2004>