SLOVENSKI STANDARD
SIST EN 50237:2000

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Rokavice in brezprstne rokavice z mehansko zaščito za delo z elektriko

Gloves and mitts with mechanical protection for electrical purposes

Handschuhe für mechanische Beanspruchung für Arbeiten unter Spannung

Gants et moufles avec protection mécanique pour travaux électriques

Ta slovenski standard je istoveten z: **EN 50237:1997**

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13.260	Varstvo pred električnim udarom. Delo pod napetostjo	Protection against electric shock. Live working
13.340.40	Varovanje dlani in rok	Hand and arm protection

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English version

Gloves and mitts with mechanical protection for electrical purposes

Gants et moufles avec protection mécanique pour travaux électriques

Handschuhe für mechanische Beanspruchung für Arbeiten unter Spannung

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CENELEC

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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 78, Tools and equipment for live working.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50237 on 1997-03-11.

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 (dop) 1997-12-01
- latest date by which national standards conflicting with the EN have to be withdrawn (dow) 1997-12-01

Mechanical requirements derived from those of protective gloves against mechanical risks are given in EN 388:1994.

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

Contents

Introduction

This draft standard was established on the basis of EN 60903 on insulating gloves. The same quality level of insulation was required as basic principle.

The purpose thereof was to combine in one unique glove the insulating properties of elastomer gloves and the mechanical properties of leather gloves which are commonly used to protect mechanically the insulating gloves.

For the time being, only three classes of gloves are covered due to the lack of data and practice for high voltages. Some difficulties were observed when combining electrical and mechanical properties. It seems to be difficult to obtain flexible gloves providing adequate mechanical protection.

1 Scope

This Standard is applicable to insulating gloves and mitts made of plastic or elastomer for use without over-gloves for mechanical protection. Unless otherwise stated the use of the term "glove" includes both gloves and mitts.

The gloves are intended to be used for working live or close to live parts at a nominal voltages up to 7 500 V a.c. (or 11 250 V d.c.)

For other voltages detailed information is not yet available.

1.1 Classes of gloves

Three classes of gloves, differing in electrical characteristics, are provided and are designated class 00, class 0, class 1.

For other classes such as class 2, class 3 and class 4 additional data will be necessary.

1.2 Categories of gloves

Five categories of gloves, differing in properties related to acid, oil, ozone and a combination of all are provided and designated, Categories A, H, Z and P respectively and also extreme low temperature designated Category C.

2 Normative references

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).

EN 388	1994	Protective gloves against mechanical risks
EN 60903	1992	Specification for gloves and mitts of insulating material for live working (IEC 903:1988, modified)
ENV 50196	1995	Live working - Required insulation level and related air distances Calculation method
IEC 50(121)	1978	International Electrotechnical Vocabulary (IEV) Chapter 121: Electromagnetism
IEC 50(151)	1978	Chapter 151: Electrical and magnetic devices
IEC 50(601)	1985	Chapter 601: Generation, transmission and distribution of electricity - General

IEC 60-1	1989	High voltage test techniques - Part 1: General definitions and test requirements (harmonized as HD 588.1 S1:1991)
IEC 160	1963	Standard atmospheric conditions for test purposes
IEC 212	1971	Standard conditions for use prior to and during the testing of solid electrical insulating materials (harmonized as HD 437 S1:1984)
IEC 410	1973	Sampling plans and procedures for inspection by attributes
IEC 1318	1994	Live working - Guidelines for quality assurance plans
ISO 472	1988	Plastics - Vocabulary
ISO 9000	1987	Quality management and quality assurance standards - Guidelines for selection and use

3 Definitions

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

3.1 palm: Part of glove covering the face of the central inside hand.

3.2 wrist: The narrowest part of the glove above the cuff.

3.3 contour glove: A glove shaped at the upper part of the cuff in such a way as to facilitate the bending of the arm.

3.4 fork: Part of glove at the junction of two fingers, or finger and thumb.

3.5 curved glove: A glove on which the fingers are slightly bent in a position corresponding to the position the hand forms while holding an object.

3.6 lined glove: A glove with an inside lining of textile attached to the plastic or to the elastomer.

3.7 composite glove: A glove composed of several attached or superimposed layers of different colours.

3.8 mitt: A glove which has less than four fingers individually enclosed.

3.9 cuff: Part of a glove from the wrist to the open part of the glove.

3.10 cuff roll: The roll or reinforced edge of a glove at the cuff.

3.11 electrical puncture: A disruptive breakdown through a solid insulant [IEV 121-03-13].

3.12 flashover: An arc by-passing an insulating body [IEV 121-03-14] and occurring between electrodes and over or around, but not through, the equipment being tested

3.13 nominal voltage: A suitable approximate value of voltage used to identify a system [IEV 601-01-21].

3.14 plastic: A material which contains as an essential ingredient a high polymer and which at some stage in its processing into finished products can be shaped by flow [ISO 472-1.2.22].

3.15 elastomer: A generic term that includes rubbers, latex and elastomeric compounds that may be natural or synthetic or a mixture or a combination of both.

3.16 proof voltage: The specified voltage that is applied to a device for the time defined under specified conditions to assure that the electrical strength of the insulation is above a specified value.

3.17 withstand voltage: The voltage that the device must withstand without flashover, disruptive discharge, puncture or other electric failure when voltage is applied under specified conditions.

3.18 type test: A test performed on one or more devices made to a certain design to show that the design meets certain specifications [IEV 151-04-15].

3.19 routine test: A test to which each device is subjected during or after manufacture to ascertain whether it complies with certain criteria. [IEV 151-04-16].

3.20 sampling test: A test performed on a number of devices taken at random from a batch. [IEV 151-04-17].

3.21 acceptance test: A contractual test to prove to the customer that the device meets certain conditions of its specification. [IEV 151-04-20].

4 Composition

The gloves shall be manufactured of plastic or elastomer. They may be lined or unlined, uncovered or have an exterior covering for protection against mechanical wear, chemical attack, and the effects of ozone.

In case of wear on the exterior of a composite glove made up of layers of different colours, the different colour layer underneath will appear.

The gloves shall be provided with a cuff.

5 Classification

The gloves covered under this standard shall be designated as follows :

- by class as class 00, class 0, class 1;

- by special properties by the addition of a suffix as shown in table 1.

Guidance as to use in relation to nominal voltage of a system is given in annex D.

Guidance as to temperature range at which gloves can be used is given in annex E.

Table 1 - Special properties

Category	Resistant to
A	Acid
H	Oil
Z	Ozone
P	Acid, oil, ozone
C	Extreme low temperature

NOTES:
1 - Category P combines the characteristics of categories A, H and Z.
2 - Any combination of categories may be used.

6 Physical requirements

6.1 Shape

6.1.1 The shape of a glove is indicated in figure 1. The letter "h" in figure 1 represents the curve of the finger in curved gloves. The shape of a mitt is indicated in figure 2.

6.1.2 Gloves may be manufactured with or without cuff roll.

6.2 Dimensions

6.2.1 Length

Class 00 - standard lengths are 270 and 360 mm.

Class 0 - standard lengths are 270, 360, 410 and 460 mm.

Class 1 - standard lengths are 360, 410 and 460 mm.

The permissible variation in length shall be ± 15 mm for any class.

NOTE - If other classes are required, length should be those of EN 60903.

6.2.2 For contour cuff gloves the difference between the maximum and minimum lengths shall be 50 mm ± 6 mm (see figure 3).

6.2.3 It is not practicable to specify other dimensions but typical glove dimensions are suggested in annex F.

6.3 Thickness

6.3.1 The maximum thickness on the flat surface (not ribbed area if present) of a glove shall be as given in table 2 in order to obtain appropriate flexibility.

Table 2 - Maximum thickness

Class	Thickness mm
00	1,80
0	2,30
1	(a)
(a) under consideration These thicknesses are based on available technology.	

6.3.2 The minimum thickness shall be determined only by the ability to pass the tests defined in 7.

6.4 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.

The working area is defined as all finger and thumb forks, the palm and the palm side of the fingers and thumb (see figure 4).

Palm and finger surfaces designed to improve the grip shall not be considered as irregularities.

6.5 Mechanical requirements

6.5.1 Abrasive resistance

The abrasive resistance shall be at least equal to level 2 according to EN 388, table 1.

NOTE - The value of 0,05 mg/revolution given in 7.3.2 is considered as equivalent to 500 cycles required in EN 388 for level 2.

6.5.2 Cutting resistance

The cutting resistance shall be at least equal to level 2 according to EN 388, table 1. Level 2 is obtained when the calculated index is at least 2,5.

6.5.3 Tear resistance

The tear resistance shall be at least equal to level 2 according to EN 388, table 1. Level 2 is obtained when the force value is greater than 25 newtons.

6.5.4 Resistance to mechanical puncture

The resistance to mechanical puncture shall be at least equal to level 2 according to EN 388, table 1. Level 2 is obtained when the force value is greater than 60 newtons.

6.5.5 Tensile strength and elongation at break

This requirement does not apply to gloves with attached fabric.

The tensile strength shall not be less than 14 MPa.

The elongation at break shall not be less than 600%.

6.6 Electrical requirements

6.6.1 Proof resistance

Gloves shall withstand the appropriate test for the voltage rating of the glove.

6.6.2 Withstand resistance

Gloves shall withstand the appropriate overvoltage for the a. c. installations on which they are to be used.

6.7 Thermal requirements

6.7.1 Ageing; high temperature resistance

Sample pieces from gloves shall be submitted to high temperature test to simulate the effects of ageing. The lowest characteristic value recorded shall be a value of not less than 80 % of the unaged value.

6.7.2 Low temperature resistance

Sample pieces from gloves submitted to the low temperature test shall maintain their flexibility and their unaged characteristics.

6.7.3 Flame retardancy

Sample pieces from gloves shall be flame retardant. The flame shall not reach the reference line located on the test piece at 55 mm from its end within 55 s after withdrawal of the flame.

6.8 Gloves with special properties

6.8.1 Acid resistance

Gloves of category A shall be acid resistant. Values shall not be less than 75% of the values obtained on non conditioned gloves.

6.8.2 Oil resistance

Gloves of category H shall be oil resistant. Values shall not be less than 50% of the values obtained on non conditioned gloves.

6.8.3 Ozone resistance

Gloves of category Z shall be ozone resistant. The gloves shall exhibit no cracks under visual inspection.

6.8.4 Acid, oil and ozone resistance

Gloves of category P shall be acid, oil and ozone resistant. Specifications according to 6.8.1, 6.8.2 and 6.8.3.

6.8.5 Extreme low temperature resistance

Gloves of category C shall be extreme low temperature resistant. The glove shall exhibit no tear, break or crack under visual inspection.

6.9 Marking

6.9.1 Each glove which is claimed to comply with the requirements of this standard shall be marked with the following (see figure 5):

- symbol (double triangle);
- mechanical protection mark (hammer);
- name, trademark, or identification of the manufacturer;
- category if applicable;
- size;
- class;
- serial number or batch number;
- month and year of manufacture.

In addition each glove shall provide for either:

a) a rectangular band permitting the marking of the date the glove is put into service and the dates of periodic inspection and test. The dimensions and position of this rectangular band are given in figure 5;

b) an additional coloured band in which holes can be punched, the glove cuff shall not be punched. This band shall be affixed to the edge of the cuff and the date the glove is put into service and the dates of periodic inspection and test shall be shown by punched holes which shall be located not more than 20 mm apart around of the periphery of the cuff;

c) any other suitable means to identify the date the glove is put into service and the dates of periodic inspection and test.

6.9.2 The marking shall be durable and shall not impair the quality of the glove.

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

6 9.4 When a colour code for symbols is used, it shall correspond to the following:

Class 00 - beige
Class 0 - red
Class 1 - white

6.10 Packaging

Each pair of gloves shall be packaged in an individual container or package of sufficient strength to properly protect the gloves from damage. The outside of the container or package shall be marked with the name of the manufacturer or supplier, classification, category, size, length and cuff design.

The type of packaging suitable for transport shall be defined by the manufacturer.

At the request of the customer, (see annex H) any additional or amended instructions shall be included in the package.

7 Tests on gloves

7.1 General

Each of the following clauses defines whether type, routine or sampling tests are required.

In order to carry out the type tests, it is necessary to have:

- thirty gloves to cover all tests common to all categories of gloves;
- seven gloves of category A;
- seven gloves of category H;
- three gloves of category Z;
- seventeen gloves of category P.

The allotment of these gloves in various testing lots and the order in which these tests are carried out are given in annex A.

The test location conditions shall be in accordance with IEC 160 clause 4.

7.2 Visual inspection and measurements

Visual inspection shall be carried out by a person with normal or corrected vision without additional magnification.

7.2.1 Shape

Type test and sampling test, - (see 6.1 and figures 1 and 2).

The shape of the glove shall be verified by visual inspection.

7.2.2 Dimensions

Type test and sampling test - (see 6.2, figures 1 and 2 and annex F).

The length of the glove shall be measured from the tip of the second finger to the outer edge of the cuff. The measurement is made with the glove in a relaxed position and the edge of the cuff perpendicular to the line of measurement.

The difference in length for contour cuff gloves shall be measured with the glove in the relaxed position, along a line parallel to the length dimension, as shown in figure 3.

7.2.3 Thickness

Type test and Sampling test - (see 6.3)

Thickness measurements shall be made on one complete glove as follows:

- at four or more points on the palm of the glove;

- at four or more points on the back of the glove but not on the cuff;

- at one or more points on the thumb and on the index finger in the "finger print" area.

Such points shall be distributed over the surface and not concentrated.

Measurements shall be made with a micrometer or any alternative instrument giving substantially the same results. The micrometer shall be graduated to within 0,02 mm, have an anvil about 6 mm in diameter and a flat presser foot 3,17 mm ± 0,25 mm in diameter. The presser foot shall exert a total force of 0,83 N ± 0,03 N. Sufficient support shall be given the glove so that it will present an unstressed, flat surface between the anvil faces of the micrometer.

In case of dispute, the micrometer method described above shall be used.

NOTE - A method for measuring ribbed gloves is under consideration.

7.2.4 Workmanship and finish

Type test and Sampling test - (see 6.4).

The workmanship and finish shall be verified by visual inspection.

7.3 Mechanical tests

7.3.1 General

All mechanical tests shall be performed on samples which have been conditioned by storing each glove separately in a horizontal position for a period of 24 h ± 2 h at a temperature of 23 °C ± 2 °C and 50 % ± 5 % relative humidity (see IEC 212:1971 standard atmosphere B).

7.3.2 Abrasive resistance

Type test and Sampling test

The abrasive tester see figure 6 consists of a test piece holder which rotates around a central axis at a speed of 60 rev/min ± 5 rev/min. The test piece is secured onto the disk by means of a fixing ring.

Two abrasive rings made of tungsten carbide are placed onto two wheels 13 mm wide : 52 mm in diameter, the inner sides of whose are 52 mm ± 1 mm far one from the other. A brush eliminates the particles coming from the test piece being tested and it is vacuum inspired.