SLOVENSKI STANDARD
SIST EN 388:1996

01-februar-1996

Varovalne rokavice za zaščito pred mehanskimi nevarnostmi

Protective gloves against mechanical risks

Schutzhandschuhe gegen mechanische Risiken

Gants de protection contre les risques mécaniques

Ta slovenski standard je istoveten z: **EN 388:1994**

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13.340.40 Varovanje dlani in rok Hand and arm protection

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English version

Protective gloves against mechanical risks

Gants de protection contre les risques mécaniques

Schutzhandschuhe gegen mechanische Risiken

This European Standard was approved by CEN on 1994-03-16. CEN 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 CEN member.

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

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CEN

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

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 162 "Protective clothing including hand and arm protection and lifejackets", the secretariat of which is held by DIN.

It has been prepared under a mandate given to CEN by the Commission of the European Communities and the European Free Trade Association, and supports essential requirements of EC Directive(s).

This European Standard shall be given the status of a National Standard, either by publication of an identical text or by endorsement, at the latest by September 1994, and conflicting national standards shall be withdrawn at the latest by September 1994.

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given only for information. In this standard, annex A is normative.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

1 Scope

This European Standard is applicable to all kinds of protective gloves with regards to physical and mechanical aggressions caused by abrasion, blade cut, puncture, tear and impact cut. This standard is not applicable to antivibration gloves.

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.

EN 420 General requirements for gloves

3 Definitions

For the purposes of this standard the following definitions apply:

3.1 Equal protection

A glove that is constructed of the same uniform material or materials throughout, and is so constructed as to provide a uniform degree of protection over the whole hand area.

3.2 Specific protection

A glove that is constructed to provide an area of improved protection for a part of the hand.

3.3 Glove series

A single glove style or glove type with the same palm material up to the wrist line where the only variants are size, left/right hand, colour or sewing pattern.

A.2 KES F: KAWABATA Evaluation System for Fabrics

A.2.1 Tensile

(Tensile cycle, maximum tensile stress limit of which is - 1000 gf/cm)

LT: Linearity. (characterize the elasticity, 1 for a spring).
WT: Tensile energy in J/m
RT: Resiliency, i. e. percentage of recovered energy.

A.2.2 Bending

(Alternate bending cycle on a sample placed vertically.)

B: Bending stiffness
2HB: Bending hysteresis at 1 cm^{-1} of curvature

A.2.3 Shear

(Alternate deformation of a rectangular sample in a parallelogram, the angle of which is 8°)

G: Shear stiffness
2HG
et
2HG5: Shear hysteresis at 0,5 et 5 degrees of deformation.

A.2.4 Compression

(Compression cycle of the thickness, the maximum limit of which is 5,0 kPa)

LC: Linearity. (characterize the elasticity, 1 for a spring).
WC: Compression energy in J/m^2.
RC: Resiliency, i. e. the percentage of recovered energy.

A.2.5 Surface

(Characterization of a surface with sensors of 25 mm^2 (friction coef.) and 5 mm width (roughness))

MIU: Mean value of the friction coefficient
MMD: Mean deviation of the friction coefficient
SMD: Mean value of the surface roughness in µm

Table A1: Identification sheet;

Reference sample - Cotton weave fabric

KESF		Characteristic values			Settings for the tests		
Tests	Parameters	Units	Warp	Weft	Size	Stress	Speed
Tensile	LT WT RT	- J/m 96	0,98 to 1,04 15 to 25 49 to 50	0,98 to 1,04 7 to 8 52 to 53	200 mm x 50 mm	Maximum strain= 1000,00 gf/cm	0,02000 cm/s
Bending	B 2HB	µN.m mN	300 to 350 40 to 50	430 to 530 45 to 55	10 mm x 50 mm	Maximum curvature = ± 2,5 cm^{-1}	0,5 cm^{-1}/s
Shearing	G 2HG 2HG5	N/m-degree N/m N/M	20 to 30 45 to 60 45 to 55	20 to 30 45 to 60 45 to 55	200 mm x 50 mm	Tension = 1000 g Maximum angle = ± 8,0 degrees	0,478 degree/s
Compression	LC WC RC	- J/m² 96	0,43 to 0,49 0,21 to 0,25 32 to 35		2 cm²	Maximum pressure = 5,00 kPa	0,00200 cm/s
Surface	MIU MMD SMD	- - µm	0,200 to 0,210 0,035 to 0,050 160 to 200	0,200 to 0,210 0,035 to 0,050 80 to 100	5 mm x 20 mm 5 mm x 20 mm	Tension = 600 g P = 50 gf/25 mm² P = 10 gf/5 mm	1 mm/s
Thickness weight	To W	mm g/m²	1,2 to 1,35; 520 to 540		2 cm²	P = 0,05 kPa	0,00200 cm/s

Annex A (normative)

Additional specifications

A.1 General

The table A.1presents additional characteristics and specifications of the cotton canvas from which are cut the control specimens used in the blade cut resistance test as defined in 6.2.

These values are achieved with the method and the apparatus known world-wide as KESF (Kawabata Evaluation System for Fabrics).

The polymerization degree of the cotton used is 2000 ± 50.

8 Instructions for use

Instructions for use shall be in accordance with 7.3 of EN 420:1994.

Users should note that for gloves with two or more non bonded layers the overall classification does not necessarily reflect the performance of the outermost layer.

6.6.6 Calculation of results

Calculate the volume resistivity in ohms centimetres as follows:

$$\rho = \frac{\pi}{40}\left(\frac{D_1 + D_2}{2}\right)^2 \frac{R}{T} \qquad \ldots (4)$$

where

R is the volume resistance in ohms

D_1 is the diameter of the guarded electrode in millimetres

D_2 is the internal diameter of the guard electrode in millimetres

T is the thickness of the test piece in millimetres

ρ is the volume resistivity in ohms centimetres

6.6.7 Report

The report shall state :

a) the identification of the material being tested
b) the details of the conditioning of the material
c) the size and type of the electrodes
d) the nominal thickness of the test specimens
e) the volume resistivity of the material in ohms centimetres.

One specimen is to be taken from each of two different gloves of the same glove series. The value being recorded for each test and the maximum of the two is used for classification.

7 Marking

7.1 General

Marking of the protective glove shall be in accordance with 7.2 of EN 420:1994 together with the pictogram for mechanical risk.

7.2 Pictograms

The mechanical properties of the glove shall be shown by one pictogram followed by four numbers:

The first number identifies the performance level for Abrasion Resistance. The second, the Blade Cut: the third, the Tear and the fourth, the Puncture Resistance levels (as shown in Table 1).

If the performance level is below the minimum value shown in column 1, the number shown will be "0".

Two specific pictograms shall be used for:

Impact cut resistance
Anti-static properties

6.6.5 Measurements

a) check the effect of residual charges by noting the reading I' of the current measuring instrument with switches S1 open and S2 and S3 in the positions shown (see Figure 9);

b) after the residual charge check, close switch S1 , leaving switches S2 and S3 unaltered;

c) depending on the characteristics of the instrument and power supply, choose a safe range on the current measuring instrument;

d) operate switch S2 to connect the high voltage electrode to the high voltage supply;

e) after a few seconds, open switch S1;

f) select a suitable range on the current measuring instrument and note the current I after 1 min electrification;

g) if I' is not a significant proportion of I, proceed straight to the operation described in h). If I' is a significant proportion of I, the test is invalid; in this case carry out the operation described in j) and leave the test specimen between the electrodes. After a suitable time interval for I' to become negligible, (checked by carrying out the operations described in a) and b)), repeat the operations from the beginning;

h) after taking the last reading described in f) operate switch S3 to connect the guard ring to the low voltage supply;

i) note whether the operation described in h) causes a significant change in the measured current;

j) connect all electrodes to earth by operating switch S1 first, then by moving switches S2 and S3 to earth;

k) if the current changed significantly in the operation described in h) there is a serious leakage of current either from the lead from the guarded electrode or across the surface of the test specimen. To check leakage on the lead, disconnect that lead from the test specimen and leave it hanging free in the air. Set the current measuring instrument to the last range used in f) open switch S1 and switch S3 to the low voltage (the position of S2 during these operations is immaterial). Any serious leakage on the lead will then be indicated by a significant continuous reading. If the leakage on the lead is negligible, carefully clean the gap between the guard ring and the guarded electrode and repeat the operations a) to d). If the current still changes significantly in the operation described in h), the test is invalid and the surface resistivity is probably so low relative to the volume resistivity that the volume resistivity is of little practical significance.

Weight of the guarded electrode (to be determined for a pressure of 1,6 kPa)
Weight of the guard electrode (to be determined for a pressure of 1,6 kPa)

6.6.4 Measuring circuit

Resistance measuring device

Care shall be taken in its selection to ensure that:

a) It shall be capable of assessing the effects of residual charges on the specimen;

b) It shall be unaffected (or shall warn the operator) when a leakage resistance of, for instance, 10^{-2} times the measured resistance occurs between the guard and the guarded electrodes;

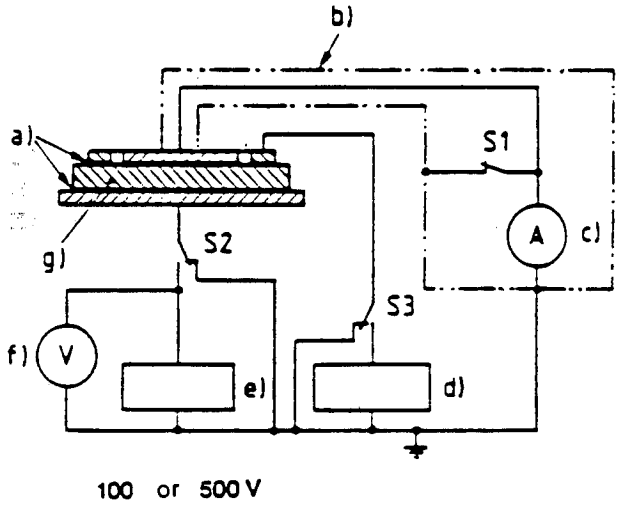
c) Its voltage supply shall be stable to the extent that capacitance currents through the test piece are negligible.

A suitable circuit consists of (see Figure 9):

1) a supply of (500 ± 50) V direct current or (100 ± 10) V direct current of adequate stability.

2) a suitable voltmeter

3) a means of measuring the very small currents involved, e. g. an adequate ammeter.



a) electrodes
b) screen
c) ammeter
d) low voltage supply
e) high voltage supply
f) voltmeter
g) test specimen

NOTE: It is possible to combine switches S1, S2 and S3 in one 5-position switch of very high leakage resistance. It is essential that each switch is of the make-before-break type and that suitable resistance are inserted in series with the two voltage supplies to protect them without dropping the test voltage. Care should be taken that there are no leakage paths over or through insulation between S1 and the other switches which are not intercepted by an earthed conductor.

Figure 9: Specific sample of a measuring circuit