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Varovalne rokavice za zaġļito pred mehanskimi nevarnostmi

Protective gloves against mechanical risks

Schutzhandschuhe gegen mechanische Risiken

Gants de protection contre les risques mécaniques

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13.340.40 Varovanje dlani in rok Hand and arm protection

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Protective gloves against mechanical risks

Gants de protection contre les risques mécaniques

Schutzhandschuhe gegen mechanische Risiken

This European Standard was approved by CEN on 2 July 2003.

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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 CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword

This document (EN 388:2003) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand and arm protection and lifejackets”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by March 2004, and conflicting national standards shall be withdrawn at the latest by March 2004.

This document supersedes EN 388:1994.

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

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

The Annex A is normative and the Annex B is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies requirements, test methods, marking and information to be supplied, for protective gloves against the mechanical risks of abrasion, blade cut, tear and puncture.

This standard is only applicable in conjunction with EN 420.

The test methods developed in this standard can also be applicable to arm protectors which are protective devices separate from the glove or the clothing.

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 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 420, *General requirements for gloves*

EN ISO 12947-1, *Textiles - Determination of the abrasion resistance of fabrics by the Martindale method - Part 1: Martindale abrasion testing apparatus (ISO 12947-1:1998)*

EN ISO 13997, *Protective clothing — Mechanical properties — Determination of resistance to cutting by sharp objects (ISO 13997:1999).*

3 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply:

3.1
protective glove against mechanical risks
glove that provides protection against at least one of the following mechanical risks: abrasion, blade cut and puncture

NOTE Tear resistance provides information on the mechanical resistance of the glove, but is not indicative of protection against a specific risk. Whilst a high value is normally considered as better, a low value is required in case of possible entanglement with moving machinery.

3.2
glove providing a specific protection
glove that is designed to provide an area of improved protection for the whole hand or part of it

3.3
glove series
single glove style or glove type with the same palm material up to the wrist line where the only variants are size**,** length, left/right hand and colour

3.4
arm
part of the body between the wrist and the shoulder

4 Requirements

The protective gloves according to this standard shall first meet all the applicable requirements of EN 420.

A protective glove against mechanical risks shall have a performance level of 1 or above for at least one of the properties (abrasion, blade cut, tear and puncture) classified according to the minimum requirements for each level shown in table 1.

NOTE Gloves meeting the requirements for resistance to puncture may not be suitable for protection against sharply pointed objects such as hypodermic needles.

Table 1 — Levels of performance

Test	Level 1	Level 2	Level 3	Level 4	Level 5
6.1 Abrasion resistance (number of cycles)	100	500	2000	8000	-
6.2 Blade cut resistance (index)	1,2	2,5	5,0	10,0	20,0
6.3 Tear resistance (N)	10	25	50	75	-
6.4 Puncture resistance (N)	20	60	100	150	-

5 Sampling and conditioning

5.1 Unless otherwise stated all specimens shall be taken from the palm of different gloves for classification purposes.

5.2 If relevant, additional areas of the protective glove shall be tested, e. g. for specific protection.

5.3 Conditioning of samples is as follows:

— Temperature (23 ± 2) °C;

— Relative Humidity (50 ± 5) %.

The period of conditioning is 24 h. Tests shall preferably be performed in the above mentioned environment.

5.4 If the test is performed in a different environment, it shall be started within 5 min after removal from the conditioning.

5.5 If special applications require testing in a different environment, it is the responsibility of the manufacturer or his authorized representative to arrange for additional tests and to present the results including a full description of the testing environment in the information supplied by the manufacturer (clause 8).

6 Test methods

6.1 Abrasion resistance

6.1.1 Principle

Circular specimens of material are abraded under known pressure with a cyclic planar motion in the form of a Lissajous figure, which is the result of the simple harmonic motions at right angles to each other.

The resistance to abrasion is measured by the number of cycles required for breakthrough to occur. Breakthrough is understood to mean when a hole is worn through the test specimen.

6.1.2 Abradant

The abradant shall meet the following specifications:

a) Backing: The backing shall be of a suitable quality paper with a minimum weight of 125 g/m² ± 5 %;

b) Adhesive: The adhesive shall be water soluble, of good quality and suitable for purpose;

c) Abrasive: The glass used shall be of good quality, suitable for purpose and shall meet the sieve analysis requirements given in table 2.

Table 2 — Sieve analysis for the abrasive

Requirement	Sieve aperture μm
All to pass	212
No more than 25 % to be retained on	180
At least 50 % to be retained on	125
Not more than 5 % to pass	106

The finished glass paper shall have the following characteristics:

1) The breaking strength shall not be less than:

— Machine direction: 392 N/50 mm;

— Cross direction: 215 N/50 mm;

2) The weight of the glass paper shall be 300 g/m² ± 10 %.

6.1.3 Apparatus

An abrasion testing machine of the type described in EN ISO 12947-1 as a Martindale Wear and Abrasion machine is required. It shall fulfil the following requirement:

Pressure on specimen (9 ± 0,2) kPa

NOTE More detailed specifications relative to the apparatus can be found in EN ISO 12947-1. The model number 103 (four places) is appropriate.

6.1.4 Test specimens

Four test specimens shall be taken from four individual gloves of the same glove series.

Where the test specimen is made of several unbonded layers, the test is performed on each layer, and the classification is based on the sum of the number of cycles.

6.1.5 Test procedure

Setting up the machine.

A. General

Check that the top plate and abrading tables are parallel. Insert a dial gauge through the spindle bearing and move the top plate by turning the drive shaft by hand. The needle movement of the dial gauge shall be within ± 0,05 mm over the whole surface of an abrading table.

If machines are being used in which the specimen holders are connected to the weights by spindles, assemble each empty specimen holder and place each one in position on the appropriate abrading table and insert the spindles. Use a feeler gauge to check for any gap between the face of the specimen holder insert and the table. The gap shall not be greater than 0,05 mm. Rock the spindle from side to side and re-check with the feeler gauge. To avoid damaging abrading tables and metal inserts, do not run the testing apparatus with metal inserts in contact with the uncovered abrading table.

B. Mounting test specimens

Place the ring of the specimen holder in position on the mounting plate provided on the base of the testing apparatus. Secure without tension carefully and centrally the test specimen on the metal insert by means of double-sided adhesive tape under a weight of 10 kg applied during 5 min. Good adhesion can be achieved through the use of double-sided tape which prevents loosening of the test specimen and the inclusion of air bubbles.

While ensuring that the ring containing the specimen and metal insert is held firmly in the mounting plate, start to screw the top of the specimen holder on to the ring, taking care that the screw threads are not crossed. Having started the screwing down operation, use both hands to maintain a continuous downward pressure on the assembly against the mounting plate.

This procedure will normally ensure that the specimen is securely retained in the holder in a wrinkle-free condition and that it is ready for testing.

NOTE An example of appropriate double-sided adhesive tape is product ref. 465 from 3M. This information is given for the convenience of users of this standard and does not constitute an endorsement by CEN/TC 162 of the product named. Equivalent products may be used if they can be shown to lead to the same results.

C. Mounting abradant[1])

Secure carefully the abradant [1)] by means of double-sided adhesive tape. Ensure the abradant is flat by placing the weight supplied with the testing machine for this purpose on its surface, and then position and tighten up the retaining frame evenly using diagonally opposite screws in sequence. Make sure that the abradant is held in place firmly and that there are no tucks or ridges.

D. Mounting specimen holders

Mount the test specimen holders on the top plate under a pressure of (9 ± 0,2) kPa and switch on the testing machine.

Every time a specimen holder is taken from the machine to check the end point of the specimen for breakthrough, retighten the specimen holder before it is replaced on the machine.

If it is necessary to interrupt the test for an appreciable length of time (e. g. overnight or at the weekend) remove the specimens in their holders and store them face upwards. Protect the specimens by covering them with a clean card or piece of fabric.

E. Method of assessment

Each test shall be performed with a new abradant. Begin the test and check the test specimens after 100 cycles. If there is no breakthrough continue the test until reaching 500 cycles (performance level 2). If there is no breakthrough,

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[1)] An example of suitable abradant is OAKEY Glass Quality Cabinet Paper Grade F2, Grit 100 – Self-adhesive abradant is acceptable.
This information is given for the convenience of users of this standard and does not constitute an endorsement by CEN/TC 162 of the product named. Equivalent products may be used if they can be shown to lead to the same results.

continue the test until the next performance level in table 1 is reached. Examine the test specimens at the required cycle number for each performance level.

At each examination of a specimen at a specified performance level, both the test specimens and the abradant shall be cleaned (e. g.) by clean compressed air and the specimen holder tightened before it is replaced on the machine.

If a breakthrough is found when examining the test specimens at a given performance level, the classification shall be at the preceding inferior performance level.

When breakthrough occurs at less than 2 mm of the edge of one test specimen or when tearing occurs, this test specimen has to be discarded and the entire test has to be repeated. If in the second test, at least one test specimen fails, the lowest value of the test specimens that have not been discarded in both tests shall be recorded.

6.2 Blade cut resistance

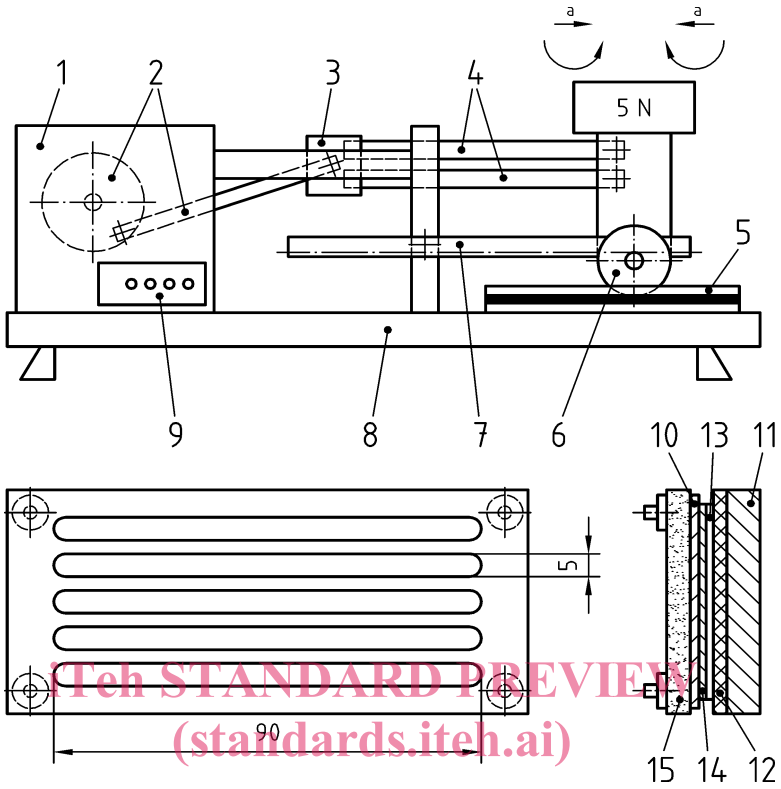
NOTE This test is not applicable to gloves made from very hard materials such as chain mail materials.

6.2.1 Principle

Specimens are cut by a counter-rotating circular blade, which moves with an alternating motion under a specified load.

6.2.2 Equipment

Dimensions in millimetres



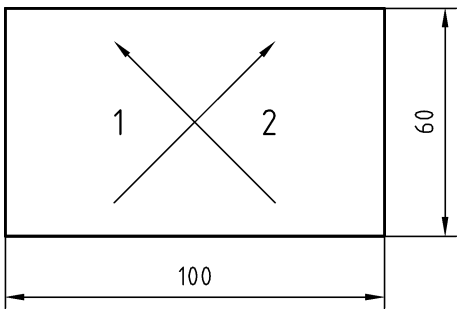
Key

1 Compartment of motor and electronic detection
2 Wheel and driving rod
3 Sliding system
4 Rods
5 Test piece device
6 Circular blade
7 Toothed rack
8 Support plate
9 Counter
10 Specimen
11 Insulated support
12 Conductive rubber
13 Aluminium foil
14 Filter paper
15 Upper part

a Alternating motion of the blade

Figure 1 — Apparatus for testing blade cut resistance of protective gloves

Dimensions in millimetres



Key

1 Warp or longitudinal direction
2 Weft or transversal direction

Figure 2 — Control specimen dimensions