



SLOVENSKI STANDARD SIST EN 420:1996

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Splošne zahteve za rokavice

General requirements for gloves

Allgemeine Anforderungen für Handschuhe

Exigences générales pour les gants

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EUROPEAN STANDARD

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English version

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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.

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CEN

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

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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of an identical text or by endorsement, at the latest by September 1994, and conflicting national standards shall be withdrawn at the latest by September 1994.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 and annexes B and C are informative.

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.

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0 Introduction

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This European Standard is a reference standard to be called up as appropriate by the specific European Standards relevant or applicable to protective gloves.

A non exhaustive list of these standards is given in annex C.

This European Standard includes test methods and specifications already used and validated in several national standards.

They will be reviewed by CEN/TC 162/WG8 and further developed so as to provide more data and expand their scope to all types of protective gloves. This applies in particular to hand and glove dimensions, determination of pH value, water vapour transmission and absorption.

1 Scope

This standard defines the general requirements for ergonomics, glove construction, high visibility, innocuousness, cleaning, comfort and efficiency, marking and information applicable to all protective gloves.

It is also applicable to gloves permanently incorporated in containment enclosures.

It is not applicable to the following glove types :

- a) Electrician's gloves (see EN 60903)
- b) Medical gloves (see EN 455)

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 340	General requirements for protective clothing
EN 407	Protective gloves against thermal hazards (heat and/or fire)
EN 455	Medical gloves for single use
EN 471	High visibility warning clothing
EN 60903	Specification for gloves and mitts of insulating material for live working
ISO 3758:1991	Textiles care labelling code using symbols
ISO 4044:1977	Leather - Preparation of chemical test samples
ISO 4045:1977	Leather - Determination of pH
IUP 15	Measurement of water vapour permeability ¹⁾

3 Definitions

For the purposes of this standard, the following definitions apply (see figure 1)

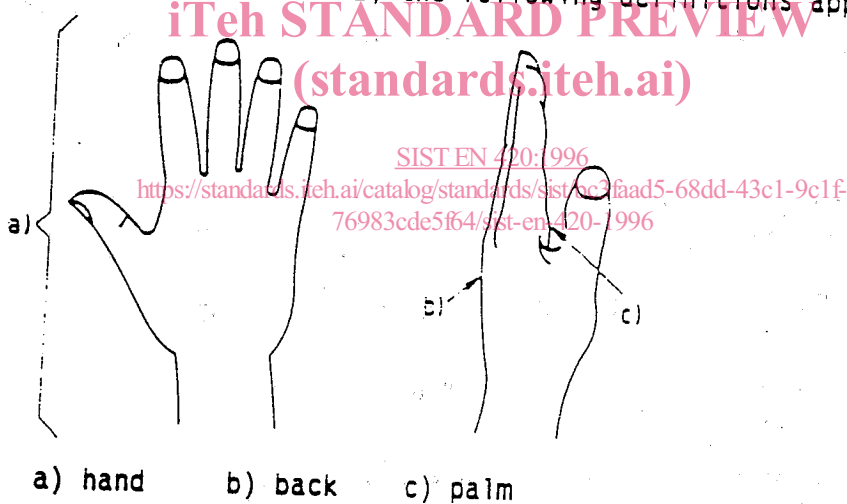


Figure 1: Definitions of hand, palm and back

- 3.1 **Hand:** Part of the body from the tip of the middle finger to the wrist.
- 3.2 **Glove:** Personal protective equipment (PPE) which protects the hand or part of the hand against hazards. It can additionally cover part of the forearm and arm.
- 3.3 **Glove palm:** Part of the glove which covers the palm of the hand.
- 3.4 **Glove back:** Part of the glove which covers the back of the hand.
- 3.5 **Dexterity:** Manipulative ability to perform a task.

NOTE: Dexterity is related to the thickness of glove material, its elasticity and its deformability.

¹⁾ can be obtained from International Union of Leather Technologists and Chemists Societies IULTCS, Leather Trade House, Kingspark Road, Moultonpark, Northampton NN3JD, England.

3.6 Hazard: Situation which can be the cause of any harm or damage to the health of the human body.

NOTE: Various categories of hazards are to be considered:

- mechanical hazards and static electricity (see EN 388) and vibration (see prEN 30819)
- chemical hazards and microbiological hazards (see EN 374)
- heat and fire (see EN 407)
- cold (see EN 511)
- ionizing radiation (see EN 421)

There are other special applications for which particular gloves are designed, for example gloves for butchers (see prEN 1082) or gloves designed for high visibility (materials see EN 471).

Each category of hazard or special application may be further sub-divided into specific hazards or criteria.

There are multi-hazard situations where there are several potentially simultaneous hazards.

The test methods included in the specific standards listed in the introduction determine the levels of performance against individual hazards.

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3.7 Level of performance: Number that designates a particular category or range of performance by which the results of testing can be graded.

NOTE 1: The level of performance is determined by the result of the corresponding test as described in the specific standards referred to in the introduction.

In most cases, such results are graded into a set of up to 5 levels of performance, whereby a high level number corresponds to a high level of performance.

Level 0 indicates that either the glove is untested or falls below the minimum performance level for the given individual hazard.

NOTE 2: Since levels of performance are based upon the results of laboratory tests, they do not necessarily relate to actual conditions in the work-place. Thus, the selection of the protective glove should be carried out with the knowledge of the tasks and process to be performed by the worker, taking into account the working conditions, the risks involved and the data supplied by the glove's manufacturer in relation to the performance of the protective glove against the hazard or hazards in question.

4 General requirements

4.1 Design principles - General

The protective glove shall be designed and manufactured so that in the foreseeable conditions of use for which it is intended, the user can perform the hazard related activity normally whilst enjoying appropriate protection at the highest possible level.

4.2 Glove construction

When the glove construction includes seams, the material and strength of the seams shall be such that the overall performance of the glove is not significantly decreased. Where relevant, test methods and requirements are specified in the specific standards listed in the introduction.

4.3 High visibility gloves

High visibility gloves shall use retroreflective material as defined in EN 471. More than 50 % of that part of the glove surface required to provide high visibility shall be of retroreflective material.

4.4 Innocuousness of protective gloves

4.4.1 General

Protective gloves shall be designed and manufactured to provide protection when used to the manufacturer's instructions, without harm to the user when so used. Glove materials, degradation products, incorporated substances, seams and edges and particularly those parts of the glove in close contact with the user shall not harm the user's health and hygiene.

The manufacturer or his authorized representative shall name all the substances contained in the glove which are known to cause allergies (see 7.3.6).

4.4.2 Determination of pH value

The pH value for all gloves shall be as close as possible to neutrality.

The pH value for leather gloves shall be greater than 3,5 and less than 9,5.

Determination of pH for leather gloves shall be according to ISO 4045:1977 with following amendments:

- the pH value shall be measured at (23 ± 2) °C
- the determination of difference figure is not applicable.

4.4.3 Determination of chromium (VI) content

Chromium (VI) content in leather gloves shall be less than 2 mg/kg.

Test method: see 6.1

4.5 Cleaning

All tests required in this standard as well as in the standards for protective gloves listed in the introduction shall be performed on unused gloves unless otherwise specified. If care instructions are provided (see 7.3.8), the relevant tests of the specific standards (see the introduction) shall be performed on the gloves, before and after they have been subjected to the maximum recommended number of cleaning cycles.

The corresponding levels of performance shall remain unchanged.

5 Comfort and efficiency

5.1 Sizing

5.1.1 Sizes and measurement of hands

Two primary measurements are taken:

- Hand circumference (see 6.2)
- Length (distance between the wrist and the tip of the middle finger).

Six sizes of hands are defined in table 1, according to anthropomorphic surveys conducted in different countries. Half sizes can be derived by interpolation between full sizes.

Table 1 : Sizes of hands

Hand size 1)	hand circumference mm	Length mm
6	152	160
7	178	171
8	203	182
9	229	192
10	254	204
11	279	215

1) This code is a conventional specification of hand size corresponding to the hand circumference expressed in inches.

5.1.2 Sizes and measurements of gloves

Sizes of gloves are defined with respect to the sizes of the hands they are to fit.

Six sizes are defined in table 2.

Table 2 : Sizes of gloves

Glove size	Fit	Minimum length of glove (in accordance with 6.2.3) mm
6	hands size 6	220
7	hands size 7	230
8	hands size 8	240
9	hands size 9	250
10	hands size 10	260
11	hands size 11	270

NOTE: Actual measurements of gloves shall be determined by the manufacturer taking into account the behaviour of the glove material and the intended use.

5.1.3 Gloves for special applications

It is possible that the length of gloves designed for special applications may not conform to the values of table 2.

For such gloves, the manufacturer shall demonstrate that they are "fit for special purpose" by clearly stating in the instructions for use (7.3.3) the intended application(s) and the reason why the gloves do not conform to table 2.

5.2 Dexterity

A glove should allow as much dexterity as possible given its purpose.

If required, finger dexterity shall be tested according to the test method in 6.3.

The performances shall be graded according to table 3 hereafter.

Table 3: Levels of performance - Finger dexterity test

Level of performance	Smallest diameter of pin fulfilling test conditions mm
1	11
2	9,5
3	8,5
4	6,5
5	5

5.3 Water vapour transmission and absorption

5.3.1 Where practicable, protective gloves shall allow water vapour transmission.

If required, leather gloves shall have a water vapour transmission of at least $2 \text{ mg}/(\text{cm}^2 \cdot \text{h})$ when tested according to 6.4.

5.3.2 Where the protection level of the glove inhibits or excludes water vapour transmission, then the glove shall be designed to reduce the effect of perspiration as much as possible.

If required, leather gloves shall have a water vapour absorption of at least $8 \text{ mg}/\text{cm}^2$ for 8 h when tested according to 6.5.

6 Test Methods

6.1 Methods for detection of soluble chromate and determination of chromium (VI)

6.1.1 Method for detection of soluble chromate

6.1.1.1 Principle

The aqueous extract prepared for checking compliance with 4.4.2 (determination of pH value) is tested for the presence of soluble chromate.

6.1.1.2 Reagents

6.1.1.2.1 Diphenylcarbazide

A 0,25 % solution of 1,5-diphenylcarbazide (1,5-diphenylcarbonohydrazide) in 50 % aqueous acetone.

6.1.1.2.2 Sulphuric acid. Aqueous solution $c(\text{H}_2\text{SO}_4) = 3 \text{ mol/l}$

6.1.1.3 Procedure

1 ml of sulphuric acid according to 6.1.1.2.2 and 1 ml of freshly prepared diphenylcarbazide reagent according to 6.1.1.2.1 is added to 10 ml of the aqueous extract. The production of a violet colour indicates that soluble chromate is present.

6.1.1.4 Result

If soluble chromate is present, the quantitative method described in 6.1.2 shall be performed.

6.1.2 Photometric determination of chromium (VI) using 1,5-Diphenylcarbazide

6.1.2.1 Reagents

6.1.2.1.1 Phosphate buffer solution: 2 mol/l dipotassium hydrogenphosphate

6.1.2.1.2 Phosphoric acid solution: 500 ml orthophosphoric acid diluted in 300 ml distilled water

6.1.2.1.3 Diphenylcarbazide solution: 1 g (1,5-diphenylcarbazide) dissolved in 100 ml acetone and made acidic with one drop of glacial acetic acid. The solution should be kept in a brown bottle. Shelf life is 14 days at 4 °C.

6.1.2.1.4 Chromium (VI) stock solution: 2,829 g potassium dichromate is dissolved and made up to 1000 ml in distilled water. 1 ml of this solution contains 1 mg chromium.

6.1.2.1.5 Chromium (VI) standard solution: 5 ml chromium (VI) stock solution made up to 1000 ml in distilled water. 1 ml of this solution thus contains 5 µg chromium(VI).

6.1.2.2 Preparation of aqueous extract for the determination of chromium (VI)

10 g of the cut-up glove specimen pieces (ground up as per ISO 4044, if required) are extracted with 99 ml of distilled water and 1 ml of phosphate buffer solution according to 6.1.2.1.1 for two hours and then filtered. The pH value of the filtrate should be between 7,5 and 8,0. 25 ml of this solution is used for the determination.