SLOVENSKI STANDARD
SIST EN 511:1996

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Rokavice za zaščito pred mrazom

Protective gloves against cold

Schutzhandschuhe gegen Kälte

Gants de protection contre le froid

Ta slovenski standard je istoveten z: **EN 511:1994**

ICS:

13.340.40 Varovanje dlani in rok Hand and arm protection

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English version

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This European Standard was approved by CEN on 1994-09-09. 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

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Foreword

This European Standard was prepared by CEN/TC 162 "Protective clothing including hand and armprotection and lifejackets" of which the secretariat 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of an identical text or by endorsement, at the latest by March 1995, and conflicting national standards shall be withdrawn at the latest bv March 1995.

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.

In accordance with 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 standard defines the requirements and test methods for gloves which protect against convective or conductive cold down -50°C. This cold can be linked to the climatic conditions or an industrial activity. The specific values of the different performance levels are decided by the special requirements for each class of risk or the special areas of application. Product tests can only be carried out for performance levels and not for levels of protection.

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 admendments 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 344:1992	Requirements and test methods for safety, protective and occupational footwear for professional use
EN 388:1994	Protective gloves against mechanical risks
EN 420:1994	General requirements for gloves
ISO 4675:1990	Fabrics coated with rubber or plastics - Low temperature bend test
ISO 5085-1:1989	Textiles; determination of thermal resistance part 1 - Low thermal resistance
ISO 7854:1984	Rubber or plastics-coated-fabrics - Determination of resistance to damage by flexing (dynamic method)

3 General requirements

These gloves shall meet the requirements of EN 420:1994, clause 5.1 sizes and clause 4.4.2 determination of pH value.

4 Performance requirements

The gloves shall at least comply with performance level 1 of EN 388:1994, clause 6.1 abrasion resistance and clause 6.3 tear resistance.

4.1 Flexibility behaviour

When tested in accordance with 5.1 there shall not be any cracks. This test is not necessary for uncoated materials.

4.2 Water impermeability

Provided it is additionally requested, when tested in accordance with 5.2 water penetration shall not appear earlier than 30 min after the start.

4.3 Cold resistance

When tested in accordance with 5.3 no crack shall appear at the fold. This test is not necessary for uncoated material.

4.4 Convective cold

When tested in accordance with 5.4, the thermal insulation properties of the glove material shall comply with the values given in table 1.

Table 1: Thermal insulation values

Performance level	Thermal insulation I_{TR} in m^2 °C/W
1	$0,10 \leq I_{TR} < 0,15$
2	$0,15 \leq I_{TR} < 0,22$
3	$0,22 \leq I_{TR} < 0,30$
4	$0,30 \leq I_{TR}$

4.5 Contact cold

When tested in accordance with 5.5, the thermal resistance properties of the material shall comply with the values given in table 2.

Table 2: Thermal resistance values

Performance level	Thermal resistance R in m^2 °C/W
1	$0,025 \leq R < 0,050$
2	$0,050 \leq R < 0,100$
3	$0,100 \leq R < 0,150$
4	$0,150 \leq R$

5 Test methods

Before testing, the samples shall be stored for a minimum of 7 days in the following standard atmosphere:

Temperature (20 ± 2) °C
Relative humidity (65 ± 5) %

The test shall be preferably carried out in this atmosphere. If the test is carried out under different climatic conditions then it should be started within 3 minutes of the time the samples were removed from the standard atmosphere.

For protective gloves with a multilayer construction the test shall be carried out on all layers simultaneously, even if these, when removed, are not connected to one another (see 5.2 and 5.5).

5.1 Flexibility behaviour

The test shall be carried out in accordance with Method A of ISO 7854:1984 at a test temperature of -20 °C.

- The number of cycles shall be 10 000;

- From each palm of a pair of protective gloves two samples shall be taken (four samples in total);

- If the direction of manufacture of the material is recognizable then one sample shall be so taken that the longitudinal axis lies in the direction of the manufacture and one in the direction at right angles to it;

- If the direction of manufacture is not given and one cannot be established then the two samples are taken in two directions at right angles to one another;

- The samples are taken without seams. If this is not possible then the sample is taken in such a way that the seams lie, during the test, in the area of the clip and do not influence the bending.

5.2 Water impermeability

The test shall be carried out in accordance of EN 344:1992, clause 5.12 with the following requirements:

- A sample is taken from the palm and the back of one pair of gloves (four samples in total);

- The samples shall not be buffed;

- The amplitude of compression shall be 15 %.

5.3 Cold resistance

The test shall be carried out in accordance with ISO 4675:1990 with a test temperature of -50 °C.

- From each palm and back of a pair of gloves a sample will be taken (four samples in total);

- If the direction of manufacture of the material is recognizable then one sample shall be taken so that the longitudinal axis lies in the direction of manufacture and one in the direction at right angles to it;

- If the direction of manufacture is not given and one cannot be established then the two samples are taken in two directions at right angles to one another.

5.4 Convective cold

5.4.1 Principle

The thermal insulation is measured with a heated full scale model of a hand.
Design and construction of the hand shall achieve the same constant temperature over the whole hand surface.

The heat imput to the hand shall be sufficient to maintain a mean hand temperature in each zone in the range 30 °C to 35 °C at an ambient temperature, which ist at least 20 °C lower.

5.4.2 Apparatus

The test apparatus consists of:

- Hand model
- Climatic room
- Measuring equipment

See annex A

5.4.3 Test sample

The test sample must be of size 9.

5.4.4. Procedure

The hand is dressed with the test glove and placed vertically in the test zone of the climatic room.

The ambient temperature (T_A) is set sufficiently low to meet the requirements of the annex A. The air velocity is kept at (4 ± 0,3) m/s and relative humidity 40 % to 60%.

When the temperature of the hand (T_{Hand}) and power consumption (Q_{Hand}) have reached a steady state, the measurements are taken of their average values for a period of 10 min.

The resultant thermal insulation is calculated by

$$I_{TR} = \frac{T_{Hand} - T_A}{Q_{Hand}}$$

T_{Hand} is the surface temperature of the hand, in °C
T_A is the ambient temperature of the climate, in °C
Q_{Hand} is the power consumption of the hand, in W/m²

The average of two independent measurements is used as the main value for the test glove.

5.5 Contact cold

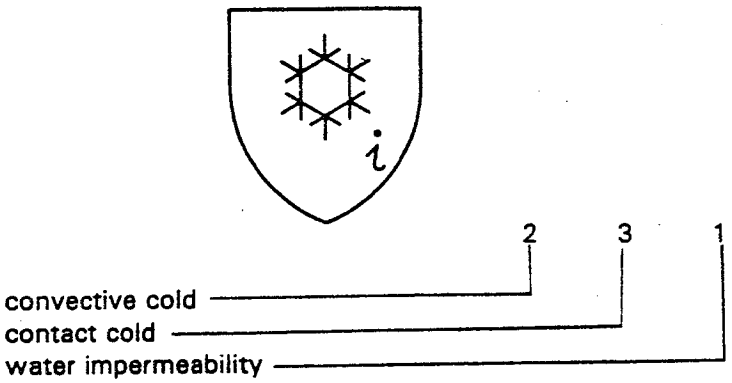
The test shall be carried out in accordance of ISO 5085-1:1989 using a pressure of 6,9 kPa, expressing the results in m²· °C/W.

Samples shall be taken from the palm of the hand of one pair of gloves (two samples in total).

6 Marking

The marking shall comply with EN 420:1994, clause 7.2.

In addition, the pictogram for the cold protective gloves shall be included with the performance levels indicated as shown in the example hereunder:



Levels of performance "1" for water impermeability, shall only be included when the test according to clause 4.2 is fulfilled.

7 Instructions for use

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