SLOVENSKI STANDARD
SIST EN 381-4:2000

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Varovalna obleka za uporabnike ročnih verižnih žag – 4. del: Metode za preskušanje zaščitnih rokavic za uporabnike verižnih žag

Protective clothing for users of hand-held chainsaws - Part 4: Test methods for chainsaw protective gloves

Schutzkleidung für Benutzer von handgeführten Kettensägen - Teil 4: Prüfverfahren für Schutzhandschuhe für Kettensägen

Vetements de protection pour les utilisateurs de scies a chaîne tenues a la main - Partie 4: Méthodes d'essai pour les gants de protection contre les scies a chaîne

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English version

Protective clothing for users of hand-held chainsaws - Part 4: Test methods for chainsaw protective gloves

Vêtements de protection pour les utilisateurs de scies à chaîne tenues à la main - Partie 4: Méthodes d'essai pour les gants de protection contre les scies à chaîne

Schutzkleidung für Benutzer von handgeführten Kettensägen - Teil 4: Prüfverfahren für Schutzhandschuhe für Kettensägen

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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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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 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.

The European Standards for "Protective clothing for users of hand-held chainsaws" are the following:

EN 381-1	Protective clothing for users of hand-held chainsaws - Part 1: Test rig for testing resistance to cutting by a chainsaw
EN 381-2	... - Part 2: Test methods for leg protectors
EN 381-3	... - Part 3: Test methods for footwear
EN 381-4	... - Part 4: Test method for chainsaw protective gloves
EN 381-5	... - Part 5: Requirements for leg protectors
EN 381-7	... - Part 7: Requirements for chainsaw protective gloves
EN 381-8	... - Part 8: Test methods for chainsaw protective gaiters
EN 381-9	... - Part 9: Requirements for chainsaw protective gaiters

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 January 2000, and conflicting national standards shall be withdrawn at the latest by January 2000.

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

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

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard forms part of a series concerned with personal protective equipment designed to protect against the risks arising from the use of hand-held chainsaw. As far as is known all chainsaws are designed for right handed use and therefore all protective clothing designs and requirements have assumed right handed use. Protection can not be adequate for left handed use.

No protective equipment can ensure a 100% protection against cutting from a hand-held chainsaw.

Nevertheless, experience has shown that it is possible to design protective equipment which offers a certain degree of protection.

Different functional principles can be applied in order to give protection.

These include:

- chain slipping: on contact the chain does not cut the material;

- clogging: fibres are drawn with the chain into the drive sprocket and block chain movement;

- chain braking: fibres have a high resistance to cutting and absorb rotational energy, thereby reducing the chain speed.

Often more than one principle is applied.

1 Scope

This European Standard specifies the test specimens, pre-treatment and testing of gloves that are intended to provide protection against cuts by chainsaws. The method for measurement of protective coverage, the apparatus and the test method for assessing resistance to cutting, and the practical performance test for measuring the grip factor described in EN 381-7 are specified.

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 amendments or revision. For undated references the latest edition of the publication referred to applies.

EN 381-1:1993	Protective clothing for users of hand-held chainsaws - Part 1: Test rig for testing resistance to cutting by a chainsaw
EN 381-7:1999	Protective clothing for users of hand-held chainsaws - Part 7: Requirements for chainsaw protective gloves
EN 420:1994	General requirements for gloves
EN ISO 3175:1995	Textiles - Evaluation of stability to machine dry-cleaning (ISO 3175:1995)
ISO 6330:1984	Textiles - Domestic washing and drying procedures for textile testing

3 Definitions

For the purposes of this European Standard, the following definition shall apply :

3.1 line of longest length of a glove

the perpendicular line joining the seam of the cuff (or equivalent position if no seam is present) with the tip of the second finger (or equivalent position in a mitt or one-finger mitt).

4 Test specimens

All specimens shall be of size 9 as defined in EN 420:1994 when this size is available. If a different size has to be used, it shall be as close to size 9 as possible and the number of specimens required shall be as follows according to related mandatory and optional requirements of EN 381-7:

a) mandatory tests :
Four left-hand gloves for each pre-treatment applied.
b) optional test :
- Two left-hand gloves for each pre-treatment applied;
- Two right-hand gloves for each pre-treatment applied.

5 Pre-treatment

Except in the specific cases detailed below, all the test specimens shall be washed and dried five times before testing.

This washing shall be according to procedure 2A of ISO 6330 : 1984 and the drying by tumble drying at a temperature not exceeding 70°C (procedure E).

Exceptions to this treatment are permitted in the following cases :

a) Where the hand protectors are marked as unsuitable for washing or dry cleaning, the outside of the hand protectors shall be completely immersed in water (20°C) for 10 min and then allowed to line-dry with the opening downwards for at least 48 h at (20 ± 2)°C and (65 ± 5) % relative humidity;

b) Where the hand protectors are marked as unsuitable for washing but suitable for dry cleaning;

In such cases the test specimens shall be dry cleaned five times before testing. The dry-cleaning shall be performed principally in accordance with the conditions described in 9.1 of EN ISO 3175:1995. No restorative finishing procedure shall be used;

c) Where the hand protectors are marked as suitable for both washing and dry cleaning;

In such cases the test shall be carried out on both washed specimens and dry-cleaned specimens, (two sets of specimens) or, at the request of the manufacturer, first dry-cleaning and then washed on the same set of specimens;

d) Where the hand protectors are marked as unsuitable for tumble drying.

In such cases the specimens shall be washed by the method described above, then line-dried with the opening downwards for at least 48 h at (20 ± 2)°C and (65 ± 5)% relative humidity (procedure A of ISO 6330 : 1984).

6 Checking of protective coverage

The coverage is measured on one glove from each pre-treatment used.

Fit the glove onto an appropriately sized hand. Mark and measure the dimensions of the protective area, compare the results with the requirements in clause 4 of EN 381-7:1999.

a) For design A (see figure 1)

– the length of the protection area measured between the cuff and the crotch between digit 3 and 4;

– the width of the protection area at the mid-point of the line of the longest length axis of the glove.

b) For design B (see figure 2)

– the length of the protection area as measured along the line of the longest length axis of the glove;

– the width of the protection area at the mid-point of the line of the longest length axis of the glove.

Record the measurement and check that the requirements given in EN 381-7 are fulfilled.

7 Apparatus

7.1 Test rig

The test rig is as described in EN 381-1.

NOTE: For the purposes of testing gloves it is recommended that the test rig is fitted with some means of limiting the depth of cut into the artificial hand in cases where the glove fails to resist cut-through.

7.2 Chainsaw protective glove mounting device

7.2.1 Left and right artificial hands

These are moulded from a rigid polymer such as polyurethane.

Hardness = Between 90 Shore A and 98 Shore A.

Their shapes and dimensions are shown in figure 3 and table 1.

NOTE: The details given refer to a left hand. Right hands have the same shape and dimensions but are mirror images.

Table 1 : Dimensions of the artificial hand

Length	
l_1	190 mm
l_2	120 mm
l_3	116 mm
l_4	104 mm
l_5	60 mm
l_6	78 mm
l_7	65 mm
l_8	45 mm
l_9	135 mm
l_{10}	89 mm
Circumference	
a_1	197 mm
a_2	164 mm
a_3	60 mm
a_4	55 mm
a_5	69 mm
a_6	57 mm
a_7	60 mm
a_8	54 mm
a_9	51 mm
a_{10}	50 mm
a_{11}	70 mm
a_{12}	63 mm

7.2.2 Base

A means of mounting the artificial hand so that it is rigid and does not move when impacted by the chainsaw.

8 Test procedure

8.1 General

The chainsaw unit is arranged as in EN 381-1, with the exception that the horizontal distance from the centre of the sprocket to the point of contact with the test sample shall be 430 mm from the pivot (see figure 3 in EN 381-1:1993).

The downward force at the point of contact with the test specimen shall be (15 ± 0,5) N (see 5.3.5.1 in EN 381-1:1993).

Other calibration methods are performed as in EN 381-1.

8.2 Mounting of glove on artificial hand

The glove shall be fitted onto the appropriate (i.e. either left or right) artificial hand in the same manner as it would be in wear. Any fastening devices (e.g. straps, buckles etc.) shall also be fastened as in wear. The glove shall be fixed to the artificial hand by staples in the palm, so that the glove does not rotate during testing.

If any fixings used for this purpose pass through the protective material of the glove, this fact shall be recorded in the test report.

NOTE 1: In order to avoid the possibility that the fixings used might themselves interfere with the evaluation of the performance of the glove, it is desirable that staples or other fixing devices should be so positioned that they do not pass through the protective material (of the glove).

NOTE 2: Experience indicates that it is suitable to fix the glove with a line of staples (at least one staple every 30 mm) that pass through the unprotected part of the glove as close as possible to the edge of the glove as furthest from the pivot.

8.3 Cutting

8.3.1 General

Test cuts shall be performed on both design A and design B in the positions shown in figures 4, 5 and 6:

- mandatory cuts across back of metacarpus of left hand (position 1 and position 2 of figure 4);
- optional cut ;
- across back of fingers of left hand at position 3, figure 5;
- across back of metacarpus of right hand at position 4, figure 6);

Where possible avoid cutting into any fastenings which may be fitted to the glove, as this could lead to anomalous results.

Should this not be possible, however, then this fact should be recorded in the test report.

The total number of cuts required for a complete test is as follows :

- mandatory cuts : 2 cuts in position 1, and 2 cuts in position 2;
- optional cuts : 2 cuts in position 3, and 2 cuts in position 4.

No more than one cut may be made on any one glove.

8.3.2 Cuts across the back of metacarpus of left hand

The glove is first fitted onto the left artificial hand as in 7.2 and the combined assembly is then securely attached to the base.

The base is then orientated in such a manner that :

a) the back of the artificial hand is uppermost;
b) the thumb is nearest the pivot.

8.3.2.1 Cut at angle 45°

The test is then performed in the position shown in figure 4a, i.e. across the back of the hand at an angle of 45° to the line of the longest length of the glove and at a distance of (130 ± 10) mm from the tip of the second finger (or equivalent position).

8.3.2.2 Cut at angle 90°

This test is performed in position 2 shown in figure 4b i.e. across the back of the hand at an angle of 90° to the line of the longest length of the glove and at a distance of (130 ± 10) mm from the tip of the second finger (or equivalent position).

8.3.3 Optional cuts across the back of fingers of left hand (figure 5 : position 3)

The test cut is performed in position 3 shown in figure 5, i.e. across the back of the fingers at an angle of 90° to the line of the longest length of the glove and at a distance of (50 ± 10) mm from the tip of the second finger (or equivalent position).

8.3.4 Optional cuts across the back of the metacarpus of right hand (figure 6 : position 4)

The glove is first fitted onto the right artificial hand as in 7.2 and the combined assembly is then securely attached to the base. The base is then orientated in such a manner that:

a) the back of the artificial hand is uppermost;
b) the smallest finger (digit 5) is nearest the pivot.

The test is performed in position 4 shown in figure 6, i.e. across the back of the hand at an angle of 45° to the line of the longest length of the glove and at a distance of (130 ± 10) mm from the tip of the second finger (or equivalent position).

9 Ergonomic properties

9.1 General

The purpose of this grip test is to determine whether the wearing of a glove will significantly impair the grip.

The test is performed using human subjects who are required to grip a test bar both in their naked hand and while wearing a glove. The average compression force exerted by the wearers on the bar is measured under both conditions and any change caused by the wearing of the glove is noted. This is expressed as the grip factor.