SLOVENSKI STANDARD
SIST EN 381-2:1996

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Varovalna obleka za uporabnike ročnih verižnih žag - 2. del: Preskusne metode za ščitnike nog

Protective clothing for users of hand-held chain saws - Part 2: Test methods for leg protectors

Schutzkleidung für die Benutzer von handgeführten Kettensägen - Teil 2: Prüfverfahren für Beinschutz

Vetements de protection pour utilisateurs de scies a chaîne tenues a la main - Partie 2: Méthodes d'essai pour protege-jambes

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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" of which the secretariat is held by DIN.

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 EC Directive 89/686/EEC.

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

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of an identical text or by endorsement, at the latest by October 1995, and conflicting national standards shall be withdrawn at the latest by October 1995.

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 and the United Kingdom.

0 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 chain saws.

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

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

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

These include:

a) chain slipping: on contact the chain does not cut the material

b) clogging: fibres are drawn with the chain into the drive sprocket and block chain movement

c) 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 Part 2 specifies the test methods to be used to assess the resistance of leg protectors to cutting by hand-held chain saws and other properties.

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.

ISO 3175: 1979	Textiles - Determination of dimensional change on dry cleaning in perchloroethylene - Machine method
ISO 3759:1984	Textiles - Preparation, marking and measuring of fabric specimens and garments in tests for determination of dimensional change
ISO 5077: 1984	Textiles - Determination of dimensional change in washing and drying
ISO 5082:1982	Textiles - Woven fabrics - Determination of breaking strength - Grab method
ISO 6330:1984	Textiles - Domestic washing and drying procedures for textile testing
EN 340:1993	Protective clothing - General requirements
EN 381-1:1993	Test rig for testing resistance to cutting by a chain saw - Part 1: Test rig for testing resistance to cutting by a chain saw
EN 381-5:1995	Protective clothing for users of hand-held chain saws. Part 5: Requirements for leg protectors

3 Definitions

For the purpose of this standard the following definitions apply:

3.1 Front (of a leg protector)

The forward 50 % of the leg circumference.

3.2. Rear (of a leg protector)

The backwards 50 % of the leg circumference.

NOTE: Depending upon design and construction, and due to many layers of clogging material, it may be difficult to establish the front and the rear of a leg protector. It is nevertheless of great importance to establish the front and the rear before pretreatment and testing.

4 Test specimens

4.1 Number of test specimens

For the design of EN 381-5 in normal cases the total number of test specimens for testing are as follows:

Design A and B :

a) If only cleaned by washing: four pairs of complete leg protectors.

b) If only cleaned by dry-cleaning: four pairs of complete leg protectors.

c) If cleaned both by washing and dry-cleaning: eight pairs of complete leg protectors.

Depending on construction and pretreatment more test specimens may be needed.

Design C:

a) If only cleaned by washing: five pairs of complete leg protectors.

b) If only cleaned by dry-cleaning: five pairs of complete leg protectors.

c) If cleaned both by washing and dry-cleaning: ten pairs of complete leg protectors.

Depending on construction and pretreatment more test specimens may be needed.
It is allowable to use the same test specimens for cutting as were used for testing dimensional change.

4.2 Size designation of test specimens

For trousers the size designation according to table 1 of EN 340:1993 shall be: waist girth 92 to 96.

For other leg protectors a size designation comparable to waist girth 93 shall be chosen.

5 Pretreatment

Except in the specific cases detailed below, all the test specimens are washed and dried 5 times before testing.

This washing shall be according to procedure 2 A of ISO 6330 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 leg 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. In principle the dry cleaning shall be performed in accordance with the conditions described in 9.1 "Process for normal materials" of ISO 3175:1979 i.e. using conditioned test specimens, perchlorethylene with surfactant, addition of emulsified water, cleaning for 15 minutes at (30 ± 3) °C , draining and extracting, rinsing for 5 minutes with pure solvent, and draining and final extraction. Tumble dry with an outlet temperature not exceeding 60 °C. No restorative finishing procedure.

b) Where the test specimens are marked as suitable for both washing and dry-cleaning.

In such cases, the test shall be carried out on both washed test specimens and dry-cleaned test specimens, (2 sets of test specimens).

c) Where the test specimens are marked as unsuitable for tumble-drying.

In such cases, the test specimens shall be washed by the method described above, then line-dried (procedure A of ISO 3175).

6 Testing for dimensional change

Number of test specimens: One test specimen for each pretreatment.

Test procedure:
The test procedure for determination of dimensional stability in washing and drying as stated in ISO 6330 and following the manufacturers care labelling regarding cleaning information.

One test specimen shall be subjected to five washing processes, or the alternative processes mentioned under 5a, 5b or 5c.

After each washing the leg protectors shall be reshaped by hand, but not reshaped by ironing.

Dimensional change is assessed in accordance with ISO 3759 for measuring, ISO 5077 for washing and ISO 3175 for dry-cleaning, where it is noted that complete garments are used as test specimens. Figure 2 in ISO 3759 is representative for the measurements with the addition that the measurements shall be made at a place with protective material.

During measurement of L and W, distances representing length and width, the leg protectors shall be stretched with a force of 20 N. This can be done with a line load for L and a width-stretcher for W. L and W shall be measured with an uncertainty of measurement of ± 5 mm. The line load of 20 N shall be applied between the waist and bottom of the leg protector leg, and it shall be applied through at least 3 clamps in each end, whereby the load is distributed. The clamps shall in the bottom fix to protective padding.

The width-stretcher shall stretch the leg protector leg over a distance of 500 mm with a force of 20 N.

7 Checking of protective coverage

The coverage is measured on the pretreated test specimen used for testing of dimensional change.

For trousers the following procedure is recommended:

Establish the front and the rear of the leg protector. It is suggested to "throw" the trousers on a table, getting them stretched out with fly and crotch centrally on top and bottom, and each time mark inner and outer lines along the leg. Also mark the front line being the line in the middle of the front and the rear line being the line in the middle of the rear.

Take the garment and turn it inside out.

Record the area that is covered with protective material and check that the requirements given in EN 381-5 are fulfilled.

NOTE: The process of placing the trousers in a position making measurements possible was discussed carefully when the standard was developed. The method described will make it possible to check the coverage. If the design of the clothing makes it easier to check the coverage by placing the trousers in a different position, then this can be done, but it has to be mentioned in the test report.

For other types of leg protectors, for instance such that cannot be turned inside out, the test house will have to check that the requirements are fulfilled using a method suitable for the particular product.

8 Testing of resistance to cutting

8.1 Purpose of testing

The purpose of this test is to assess the resistance of the leg protector to cutting by a chain saw under such conditions that the garment leg is restrained from twisting when contacted by the moving chain.

8.2 Test specimens

The number of test specimens required for each design as defined in EN 381-5 are as follows:

For design A and design B, three pairs of protective garment and for design C, four pairs of protective garment.

All pairs of protective garment shall be pretreated according to clause 5.

In the case that both washing and dry-cleaning is performed the number of test specimens is doubled.

8.3 Apparatus

The test rig described in EN 381-1 shall be used. For variable properties use the arrangement and dimensions of the figure given in 5.3.5.1 of EN 381-1:1993.

The calibration pad mount and calibration pad fixture device described in 5.5 of EN 381-1:1993 are used.

8.4 Mounting of test specimens

The test specimen is mounted on the calibration pad mount in such a way that the contact point with the saw chain shall be on the middle line of the front or the middle line of the rear.

It is fixed using the calibration pad fixture device. Ensure that the spikes penetrate the protective material, except approximately 60 mm on each side of the contact point, where the spikes are omitted.

A gravitational line loading of 50 N/m is applied inside the garment under test.

8.5 Test procedure

8.5.1 Positions

The test cuts are performed either on the front of the leg or on the rear of the leg.
All cuts are made at an angle of 45° to the sample mount, and at a distance of between 250 mm to 500 mm from the crotch. The direction of cut is as shown in figure 1.

No cutting shall be made at positions where the protective material is folded.

If there are joins in a design C protective leg protectors, the following will apply:

a) if the join is within the protective area for design B or interferes with the normal testing positions for design B, there is cut testing across such a join. In such cases more test specimens may be needed.

b) if the join is outside the protective area for design B and clear of the normal testing point for design C, there is no cut testing over the joins.

Only one cut shall be performed on any one leg of each test specimen.

8.5.2 Number of cuts

8.5.2.1 Design A and design B

For each pretreatment six cuts are made, all on the front.

8.5.2.2 Design C

For each pretreatment eight cuts are made, four on the front and four on the rear.

8.5.3 Chain speed

The chain speed shall be one of the speeds specified in 6.3.1 of EN 381-5:1995 as required by the client. If no information is available 20 m/s is used.

9 Testing of attachment.

9.1 General

The purpose of this test is to ensure that the protective material is adequately fixed to the garment.

This test is only applied to trousers or similar leg protectors where outer material is provided with protective material giving the chain saw protective properties.

The grab test is carried out according to ISO 5082 with trouser legs in full length as test specimens.

9.2 Test specimens

One pair of trousers for each pretreatment applied.

The leg protectors are cut open in leg length direction at a distance of at least 100 mm from the seam to be tested. Leg protectors earlier tested according to clause 8 can be used provided the attachment has not been affected.

9.3 Apparatus

Tensile testing machine and grab equipment (see figure 2) according to ISO 5082.

9.4 Test procedure

Fix the free end of the protective padding and the opposite free end of the garment to each of the two grabs. The distance from the seam to each grab shall be (25 ± 1) mm and no grab shall be closer to an end or corner of the protective padding than 100 mm. Mount the grabs with the test specimen in a tensile testing machine and pull with a speed of (1,5 ± 1) mm/s. Measure the force needed to break the test specimen. The test can be stopped if the force is above 500 N.

NOTE: If no tensile testing machine is available, the test can be performed by applying lots of 1 kg mass every 5 s to the lower grab until breaking occurs.

10 Test report

The report shall include:

a) identification of the test specimens, e.g. manufacturer, style, design, size

b) pretreatment, dimensional change, test results for attachment test

c) protective coverage

d) chain speed

e) test results for resistance to cutting, evaluation of damage and chain stopping mechanism

f) the information required in EN 381-5.