



SLOVENSKI STANDARD
SIST EN 13770:2002

01-september-2002

Tekstilije - Ugotavljanje odpornosti proti odrgnjenju pletenih nogavic

Textiles - Determination of the abrasion resistance of knitted footwear garments

Textilien - Bestimmung der Scheuerbeständigkeit von gestrickter Fußbekleidung

Textiles - Détermination de la résistance à l'abrasion des articles chaussants tricotés

Ta slovenski standard je istoveten z: EN 13770:2002

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ICS:

61.020 Uà|æ ãæ Clothes

SIST EN 13770:2002 **en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13770

July 2002

ICS 61.020

English version

Textiles - Determination of the abrasion resistance of knitted footwear garments

Textiles - Détermination de la résistance à l'abrasion des articles chaussants tricotés

Textilien - Bestimmung der Scheuerbeständigkeit von gestrickter Fußbekleidung

This European Standard was approved by CEN on 11 April 2002.

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 Management Centre or to any CEN member.

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.

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document EN 13370:2002 has been prepared by Technical Committee CEN/TC 248 "Textiles and textile products", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by January 2003, and conflicting national standards shall be withdrawn at the latest by January 2003.

Annex A and annex D are normative.

Annex B, annex C, annex E and annex F are 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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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EN 13770:2002 (E)**Introduction**

This European Standard is composed of two tests.

The first test describes a method for the determination of the abrasion resistance of knitted footwear garments on samples stretched with a modified sample holder, on a Martindale abrasion machine.

The second test describes a testing device and a method for the determination of the abrasion resistance of knitted footwear garments in a stretched controlled state.

The test method is chosen before starting the test and recorded in the test report, since the results of the different methods cannot be compared with each other.

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1 Scope

This European Standard specifies two test methods for the determination of abrasion resistance of knitted footwear garments, e.g. ankle socks, socks, and heavy tights. The test methods apply to any of these articles, irrespective of size, composition and structure.

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 (including amendments).

EN 20139, *Textiles — Standard atmospheres for conditioning and testing (ISO 139:1973)*.

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)*.

3 Conditioning and testing atmosphere

The standard temperate atmosphere for conditioning and testing textiles as defined in EN 20139 shall be used.

4 Method 1 : Martindale abrasion machine method

4.1 Principle

Circular specimens of the hosiery are selected from the known wear areas of the socks, stretched over a flattened rubber surface and abraded against a reference abradant under a known pressure with a cyclic planar motion in the form of a Lissajous figure which is the resultant of two simple harmonic motions at right angles to each other. The resistance to abrasion is estimated by the number of cycles to either total breakdown or thinning of one component.

4.2 Apparatus and agents

4.2.1 Martindale abrasion machine as specified in EN ISO 12947–1.

4.2.2 Modified specimen holders for the evaluation of abrasion of knitted footwear garments (in accordance with annex A), consisting of a guide spindle, holder body, needle ring, holder nut and rubber sphere with flattened surfaces (20 mm being the test area).

4.2.3 Springloaded tightening block spanner which enables the tightening of the holder body and holder nut whilst ensuring the flat surface of the rubber sphere remains flat and horizontal.

4.2.4 Abradant and woven felt as specified in EN ISO 12947–1.

EN 13770:2002 (E)**4.3 Sampling and preparation of test specimens****4.3.1 General**

Ensure throughout sampling and specimen preparation that handling imposes the minimum possible tensile stress so as to prevent incorrect extension of the textile.

4.3.2 Sampling of the test specimens from the laboratory sample

Before sampling the test specimens from the laboratory samples, condition the laboratory samples, free from tension on a smooth horizontal surface with free access of air exposed to the standard atmosphere specified in clause 3.

Cut the knitted footwear garments so that the sole and heel are flat and free from tension (see Figure B.1).

Cut specimens 38 mm diameter from the required areas. A minimum of two specimens shall be taken from the heel and two from the sole, preferably with a cutting die. A greater number of specimens can be sampled from one sock style in order to evaluate variations or create a more accurate average value.

4.3.3 Dimensions of auxiliary materials**4.3.3.1 Dimensions of abradant**

The dimensions of the abradant shall be at least 140 mm in diameter or length and width.

4.3.3.2 Dimensions of abradant felt substrate

The dimensions of the woven wool felt shall be 140 mm \pm 0,5 / 0 mm.

4.3.4 Mounting the test specimens

Place a cut specimen face down onto a soft surface, e.g. light rubber board. Place the needle ring centrally over the specimen and push the needles through the specimen. Pull away from the board gathering the specimen on the needles.

Place the holder nut face down onto the springloaded tightening block.

Carefully place the needle ring with the specimen intact into the holder nut locating the needles in the holes of the holder nut.

Take the rubber sphere and place into the recess with the 20 mm diameter flat surface to the back of the specimen.

Ensure the specimen is flat by placing the holder body onto the holder nut and carefully screwing the holder body onto the holder nut, applying a downward force against the springloaded face of the tightening block spanner.

Repeat this process for all test specimens.

4.4 Test procedure

Select the standard Lissajous motion as specified in EN ISO 12947-1.

Move the specimen holder guide plate to ensure free access of the abrading tables.

Mount new abradant on each of the abrading tables over the woven wool felt and compress both the felt and abradant with a pressing weight having a mass of $(2,5 \pm 0,5)$ kg and a diameter of (120 ± 10) mm.

Fit the clamping ring and secure the felt and abradant firmly, ensuring it is free from tucks and ridges. Remove the pressing weight.

Replace the abradant at the start of each test or after 50 000 rubs. Change the felt when it is judged the level of soiling is heavy and/or could cause contamination to light coloured specimens.

Reposition the holder guide plate. Place the mounted specimens onto the abrading tables, locate the guide spindles and apply the 12 kPa loading piece to each.

Set the machine to the desired number of rubs (see annex B.1), zero the totalizing counter and switch on the machine.

4.5 Assessment intervals

4.5.1 After each pre-set cycle, inspect each specimen, without removing it from the holder, in order to determine if endpoint is reached.

NOTE The endpoint can be either:

- a hole which usually develops when one thread is broken causing a hole to appear.
- thinning when the knitted footwear garment is constructed of filament and spun staple yarns plated in knitting e.g. nylon / cotton, and the spun staple yarn wears away leaving a base of the filament yarn.

4.5.2 During inspection, remove any pills with sharp scissors with curved blades.

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4.5.3 Record the number of rubs to reach endpoint, which can be either a hole or thinning. If both endpoints, thinning and a hole are required to be determined, record clearly which number of rubs relates to which endpoint.

4.6 Test report

The test report shall include the following information:

- a) the reference to the method 1 of this European Standard;
- b) the sample reference;
- c) the area from which the test specimen has been sampled (sole, heel);
- d) the endpoint, thinning and/or a hole;
- e) the individual value of number of rubs for either thinning and/or a hole;
- f) others expressions of results, range or mean, if applicable and required;
- g) any deviation from this European Standard which can have affected the results.

EN 13770:2002 (E)**5 Method 2 : Abrasion on leg forms****5.1 Principle**

Knitted footwear garment is positioned on a volumetric leg form, in a stretched state, as in wear. A mechanical linear movement is produced with a specific sock abrasion tester. The resistance to abrasion is estimated by the number of cycles to either total breakdown or thinning of one component.

5.2 Apparatus**5.2.1 Abrasion tester (Figure C.1)**

The slipper (1) is positioned on a rail (2) between two lateral discs (3) which are secured onto the rail with screws (4). The discs are positioned so as to restrict the lateral movement, but not the vertical movement, of the slipper in slot.

This freedom of vertical movement ensures that the pressure on the test specimen is given by the mass of the slipper only. The mass of the rail has no effects because it lies on the roller bearing (6) which is fixed on the frame.

If required, additional loads can be positioned on the slipper using the support (7).

Interchangeable abradant shoes (8) are fitted to the sole of the slipper. The shoes are 10 mm wide, and their curvature is the same as that of the leg form used.

Rail (2) is driven by the motor to provide a reciprocating motion to the slipper along the axis of the leg form. The stroke of this motion is adjustable. The speed of the motor is $250 \text{ t}\cdot\text{min}^{-1}$.

The apparatus is fitted with pre-set and totalizing counters.

The apparatus has two separate test heads enabling two specimens to be tested at the same time.

5.2.2 Legs forms**5.2.2.1 Design of leg forms (Figure C.2)**

The leg forms are designed so as to present the sample for test in the stretched state, as in wear.

The leg forms consist of two cylinders (1 & 2) connected at right angles with one end (3) bevelled at 60° and the other end fixed to a sole plate (4).

To prevent movement of the garment during the test, the surface of the leg form is covered with cork.

Leg forms of various sizes are available to enable the full range of knitted footwear garments to be tested (see annex D).

5.2.2.2 Positioning of leg forms

The leg form can be positioned vertically as in Figure C.3a) or horizontally as in Figure C.3b).

With the leg form in the vertical position the sole and reinforcement of the toe or heel can be tested.

With the leg form in the horizontal position the back of the heel and leg can be tested.

5.2.3 Elastic retaining collars

5.2.4 Abradant paper, 734 silicon carbide P1000 (see annex E) or other abradant as agreed between the two parties.

5.2.5 Foam backing material (see annex F)

5.2.6 Soft brush

5.3 Sampling and number of tests

The test is normally carried out on two pairs of knitted footwear garments, in three different areas, two on the sole and one on the heel, totalling 12 test specimens (8 on the sole and 4 on the heel).

Additional tests can be made on other areas as required, e.g. leg, join of leg/heel, toe etc as agreed between the parties.

5.4 Test procedure

Put the specimen on the appropriately sized leg form, ensuring the heel and toe of the knitted footwear garment are well positioned on the heel and toe of the leg form, without tucks and ridges.

A knitted footwear garment is tested on the leg form of the same size. In the case of multisized knitted footwear garment, the test can be made on several leg form sizes.

Select the correct shoe for this leg form and attach it to the slipper.

Attach the leg form to the abrasion tester in the horizontal or vertical position required.

Cut a piece of the abradant and a piece of the foam backing to the size of the shoe. Fix the abradant to the foam backing using double-sided adhesive tape, and fix this assembly to the shoe with double-sided adhesive tape so that the foam is between the shoe and the abradant.

The test is normally carried out without any additional load on the slipper, but additional loads can be used as agreed between the parties.

Position the slipper at the appropriate test area. Adjust the stroke of the slipper to 10 mm. To prevent any movement of the test specimen on the leg form, place an elastic retaining collar around the specimen at each end of the slipper's traverse.

Pre-set the machine counter to 100 cycles, zero the totalizing counter and switch on the machine.

When the machine stops, lift up the slipper and brush the specimen surface with the brush before examining the wear on the specimen.

Continue to abrade the sample, examining it at intervals of 100 cycles or 500 cycles, until the endpoint (see clause 4.5.1) is reached. Note the number of cycles.

Change the abradant every 500 cycles.