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EUROPEAN STANDARD

EN 13516

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS 61.060

English version

## Footwear - Test methods for uppers, lining and insoles - Colour fastness to rubbing

Chaussures - Méthodes d'essai des tiges, de la doublure et des garnitures intérieures - Stabilité de la couleur au frottement

Schuhe - Prüfverfahren für Schäfte, Futter und Deckbrandsohlen - Farbechtheit bei Abrieb

This European Standard was approved by CEN on 16 November 2001.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 309 "Footwear", the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by June 2002, and conflicting national standards shall be withdrawn at the latest by June 2002.

Method A of this draft European Standard is based on the IULTCS/IUF 450 method (ISO 11640:1993 "Leather; tests for colour fastness; colour fastness to cycles of to-and-fro rubbing"), and method C is based on the IULTCS/IUF 426 method (ISO 11641:1993 "Leather; tests for colour fastness; colour fastness to perspiration").

Annex A is informative.

This standard includes a Bibliography.

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.

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**EN 13516:2001 (E)****1 Scope**

**1.1** This standard specifies two test methods (method A and method B) for assessing the degree of damage (marring) and transfer of a material's surface colour during mild dry or wet abrasion. The methods are applicable to all footwear upper, lining and insock irrespective of the material, in order to assess the suitability for the end use.

**1.2** This standard also specifies a method (method C) for determining the likelihood of colour bleeding from materials and components such as sewing threads and shoe laces due to the action of water and artificial perspiration solutions, in order to assess the suitability for the end use.

**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 12222, *Footwear - Standard atmospheres for conditioning and testing of footwear and components for footwear.*

EN ISO 105-A01, *Textiles - Tests for colour fastness - Part A01: General principles of testing (ISO 105-A01:1994).*

EN 20105-A02, *Textiles - Tests for colour fastness - Part A02: Grey scale for assessing change in colour (ISO 105-A02:1993).*

EN 20105-A03, *Textiles - Tests for colour fastness - Part A03: Grey scale for assessing staining (ISO 105-A03:1993).*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696:1987).*

ISO 105-F10, *Textiles - Tests for colour fastness - Part F10: Specification for adjacent fabric: Multifibre.*

**3 Terms and definitions**

For the purposes of this European Standard, the following terms and definitions apply.

**3.1****colour fastness to rubbing**

resistance of a material to damage (marring) and transfer of the materials surface colour during mild dry or wet abrasion

**3.2****perspiration fastness**

resistance of a material to colour bleed when exposed to an artificial perspiration solution

**3.3****thick leather**

leather with a thickness greater than 2 mm

## 4 Apparatus and material

The following apparatus and material shall be used:

### 4.1 Method A

4.1.1 Test machine with the following:

4.1.1.1 Flat horizontal metal platform of minimum dimensions 80 mm × 25 mm.

4.1.1.2 Means of moving the platform in a direction parallel to its 80 mm edges through distance of 35 mm ± 2 mm and back again at a rate of 40 cycles/min ± 2 cycles/min.

4.1.1.3 Pair of clamps positioned at the ends of the platform at 90° to the 80 mm edges and which are designed to clamp the test specimen against the platform. The clamp faces shall be a minimum distance of 80 mm apart.

4.1.1.4 Means of moving the clamps apart so that the test specimen is extended linearly by an amount adjustable up to 20 %.

4.1.1.5 Rubbing finger with a flat horizontal lower surface capable of holding a square felt pad (4.1.2). For machines with a platform wider than 25 mm the relative position of the rubbing finger shall be adjustable across the width of the platform.

4.1.1.6 Means of holding a square felt pad (4.1.2) on the lower surface of the finger.

4.1.1.7 Means of applying a downward force of 4,9 N ± 0,1 N and 9,8 N ± 0,2 N to the rubbing finger.

4.1.1.8 Means of counting the number of cycles traversed by the platform.

4.1.2 Square pads of scoured pure wool felt with the following requirements.

4.1.2.1 Sides of length 15 mm ± 1 mm.

4.1.2.2 Mass per unit area of 1750 g/m<sup>2</sup> ± 100 g/m<sup>2</sup> and thickness 5,5 mm ± 0,5 mm when measured using a dial gauge exerting a downward pressure of 49 kPa ± 5 kPa on a measuring foot diameter of 10 mm ± 1 mm.

4.1.2.3 The pH of an aqueous extract, made by shaking 5 g of ground felt in 100 ml of distilled or deionized water complying with EN ISO 3696 in a polyethylene bottle and leaving for 2 h, between 6 and 7.

4.1.3 Grey scales for assessing change in colour and staining with half step ratings conforming to EN 20105-A02 and EN 20105-A03

4.1.4 Assessment cabinet with artificial lighting as specified in EN ISO 105-A01. Alternatively, the assessment can be carried out in daylight from the north, when the test is carried out in the northern hemisphere, or daylight from the south when testing in the southern hemisphere.

4.1.5 Distilled or de-mineralized water complying with grade 3 of EN ISO 3696.

4.1.6 Synthetic perspiration solution containing per litre of solution;

- Sodium chloride, 5,0 g per litre of solution, g/cm<sup>3</sup>.

- Ammonia solution, density 0,880 g/cm<sup>3</sup>, 6,0 cm<sup>3</sup>.

4.1.7 White spirit, general purpose reagent grade.

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## 4.2 Method B

4.2.1 Test machine with the following:

4.2.1.1 Rigid horizontal platform (preferably metal) capable of clamping the test specimen.

4.2.1.2 Vertical rotating spindle capable of holding the circular felt pad.

4.2.1.3 Means of rotating the felt pad at a speed of  $15,6 \text{ rad/s} \pm 0,5 \text{ rad/s}^1$ .

4.2.1.4 Means of loading the rotating felt pad with a force of either  $24,5 \text{ N} \pm 0,5 \text{ N}$  and  $7,1 \text{ N} \pm 0,2 \text{ N}$ .

4.2.1.5 Means of counting the number of revolutions of the felt pad.

4.2.2 Circular pads of scoured pure wool felt with central holes, with the following requirements:

a) Outside diameter  $25 \text{ mm} \pm 1 \text{ mm}$ , bore diameter  $3 \text{ mm} \pm 0,5 \text{ mm}$ .

b) Thickness, to be measured by one of the following methods:

Thickness	Downward pressure/presser foot size	Specimen
$6,5 \pm 0,5$	$49 \text{ kPa} \pm 5 \text{ kPa}/10 \text{ mm} \pm 1 \text{ mm}$	Cut pads or uncut sheet material
$5,0 \pm 0,5$	$2,0 \text{ kPa} \pm 0,2 \text{ kPa}/19 \text{ mm} \pm 10 \text{ mm}$	Cut pads

c) Density  $190 \text{ kg/m}^3 \pm 20 \text{ kg/m}^3$ .

4.2.3 Grey scales for assessing the change in colour and degree of staining complying with EN 20105-A02 and EN 20105-A03 respectively.

4.2.4 Metal plate approximately  $75 \text{ mm} \times 65 \text{ mm}$  and thickness  $5 \text{ mm}$  with a hole diameter  $25 \text{ mm}$  through its centre for use in the wetting from the back with organic solvents test described in 6.2.2.6.

4.2.5 Polished aluminium disc (diameter approximately  $50 \text{ mm}$  and thickness approximately  $12 \text{ mm}$ ) to help cool the test specimen in dry rub tests.

4.2.6 Balance, capable of weighing masses up to  $5 \text{ g}$  to an accuracy of  $10 \text{ mg}$ .

4.2.7 Assessment cabinet with artificial lighting as specified in EN ISO 105-A01. Alternatively, the assessment can be carried out in daylight from the north, when the test is carried out in the northern hemisphere, or daylight from the south when testing in the southern hemisphere.

4.2.8 Distilled or deionised water complying with grade 3 of EN ISO 3696 for the wet rub test described in 6.2.2.3.

4.2.9 Synthetic perspiration solution, for the perspiration rub test described in 6.2.2.4, consisting of:

- Sodium chloride,  $5 \text{ g}$  per litre of solution,  $\text{g/cm}^3$ .

- Ammonia solution, density  $0,880 \text{ g/cm}^3$ ,  $6,0 \text{ cm}^3$ .

4.2.10 White spirit for the spirit rub test described in 6.2.2.5.

4.2.11 Organic solvents (as used for solvent activated stiffeners) for the wetting from the back with organic solvents test described in 6.2.2.6.

1)  $1 \text{ rad} \approx 0,16 \text{ rev}$ .



### 4.3 Method C

- 4.3.1** Petri dish large enough to accommodate a glass plate (4.3.2) for each test specimen assembly.
- 4.3.2** Glass plate of length at least 110 mm and width at least 55 mm with a mass of  $100 \text{ g} \pm 2 \text{ g}$  for each test specimen assembly.
- 4.3.3** Rectangular pieces of multifibre fabric type DW as specified in ISO 105-F10 of dimensions  $100 \text{ mm} \pm 5 \text{ mm} \times 50 \text{ mm} \pm 2 \text{ mm}$ .
- 4.3.4** Oven maintained at a temperature of  $37 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$ .
- 4.3.5** Grey scales for assessing change in colour and staining with half steps as described in EN 20105-A02 and EN 20105-A03.
- 4.3.6** Assessment cabinet with artificial lighting as specified in EN ISO 105-A01. Alternatively, the assessment can be carried out in daylight from the north, when the test is carried out in the northern hemisphere, or daylight from the south when testing in the southern hemisphere.
- 4.3.7** Balance capable of measuring mass up to 100 g to the nearest 0,1 g for testing yarns or loose fibres.
- 4.3.8** Distilled or de-mineralized water complying with grade 3 of EN ISO 3696.
- 4.3.9** Alkaline perspiration solution containing, per litre of solution;
- l-histidine monohydrochloride monohydrate: 5,00 g.
  - Sodium chloride: 5,00 g.
  - Disodium hydrogen orthophosphate dihydrate: 2,50 g.

After preparation, the solution is brought to pH 8 with 0,1 M sodium hydroxide solution.

Store the solution at  $4 \text{ }^\circ\text{C} \pm 1 \text{ }^\circ\text{C}$ . If the solution is more than one week old check its pH and adjust as necessary before use. Discard the solution if precipitated solids develop.

**4.3.10** Acid perspiration solution containing, per litre of solution;

- l-histidine monohydrochloride monohydrate: 5,00 g.
- Sodium chloride: 5,00 g.
- Sodium dihydrogen orthophosphate dihydrate: 2,20 g.

After preparation, the solution is brought to pH 5,5 with 0,1 M sodium hydroxide solution.

Store the solution at  $4 \text{ }^\circ\text{C} \pm 1 \text{ }^\circ\text{C}$ . If the solution is more than one week old, check its pH and adjust as necessary before use. Discard the solution if precipitated solids develop.

## 5 Sampling and conditioning

### 5.1 Method A

**5.1.1** Rectangular test specimens of sufficient size to be clamped firmly on the test platform (4.1.1.1) are required. The test specimens can be cut from the material in any direction. Typically test specimens shall be of minimum dimensions  $100 \text{ mm} \times 25 \text{ mm}$ .

For test machines that have test platforms of width 25 mm, separate test specimens are required for each number of rubs or test condition to be used.