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Footwear — Test methods for accessories: shoe laces — Abrasion resistance

Chaussures — Méthodes d'essai pour accessoires: lacets et œillets — Résistance à l'abrasion

Reference number
ISO 22774:2004(E)

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22774 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 216, *Footwear*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

Annex ZA provides a list of corresponding International and European Standards for which equivalents are not given in the text.

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Foreword

This document (EN ISO 22774:2004) has been prepared by CEN/TC 309, "Footwear", the secretariat of which is held by AENOR, in collaboration with Technical Committee ISO/TC 216 "Footwear".

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of an identical text or by endorsement, at the latest by June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This document specifies three test methods for determining the abrasion resistance of a shoe lace to repeated rubbing:

— Method 1: lace to lace abrasion;

— Method 2: lace to standard eyelet abrasion;

— Method 3: lace to eyelet (from footwear) abrasion.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12222, *Footwear — Standard atmospheres for conditioning and testing of footwear and components for footwear*

3 Terms and definitions

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

3.1
abrasion resistance of shoe laces
ability of the shoe lace to resist to repeated rubbing against either a similar shoe lace or a lace carrier

3.2
number of cycles to failure
arithmetic mean of the number of cycles to failure for the test specimens submitted to test

3.3
type of failure
expressed as failure of the shorter lace or failure of the longer lace, together with a description of the respective amount of wear in the covering and core of each lace

4 Principle

A shoe lace is threaded through a loop formed by:

- a piece of similar lace held open by a spacer (Method 1);

- a lace carrier (Methods 2 and 3).

The shoe lace is bent through a fixed acute angle at the point of contact with the loop. It is then held under a standard tension while it is repeatedly drawn back and forth through the loop until it fails.

5 Apparatus and materials

5.1 General

5.1.1 A test machine with one or more test stations, see Figure 1, each having:

NOTE Test machines with less than six stations are also acceptable to conduct this test. In which case the test should be repeated until six test specimens have been tested (see 8.1.6).

5.1.2 A moveable clamp which has a means of firmly holding:

- both ends of a piece of shoe lace (Method 1);
- one end of the metal strip (see 5.1.8) (Methods 2 and 3).

5.1.3 A stationary clamp which is mounted in the same horizontal plane as the moveable clamp (5.1.1) and is capable of holding one end of a shoe lace. The stationary clamp should be 280 mm ± 50 mm from the moveable clamp (5.1.2) when the clamps are at their minimum separation, this distance will subsequently be referred to as D.

5.1.4 A tensioning device with a method of holding the end of a piece of shoe lace at a point 35 mm ± 5 mm to one side of, and in the same horizontal plane as, the stationary clamp (5.1.3) and applying a tensioning force of 2,45 N ± 0,03 N, see Figure 1. This can be achieved by passing the shoe lace over a pulley and suspending a mass of 250 g ± 3 g from the lower end of the vertical portion of the lace.

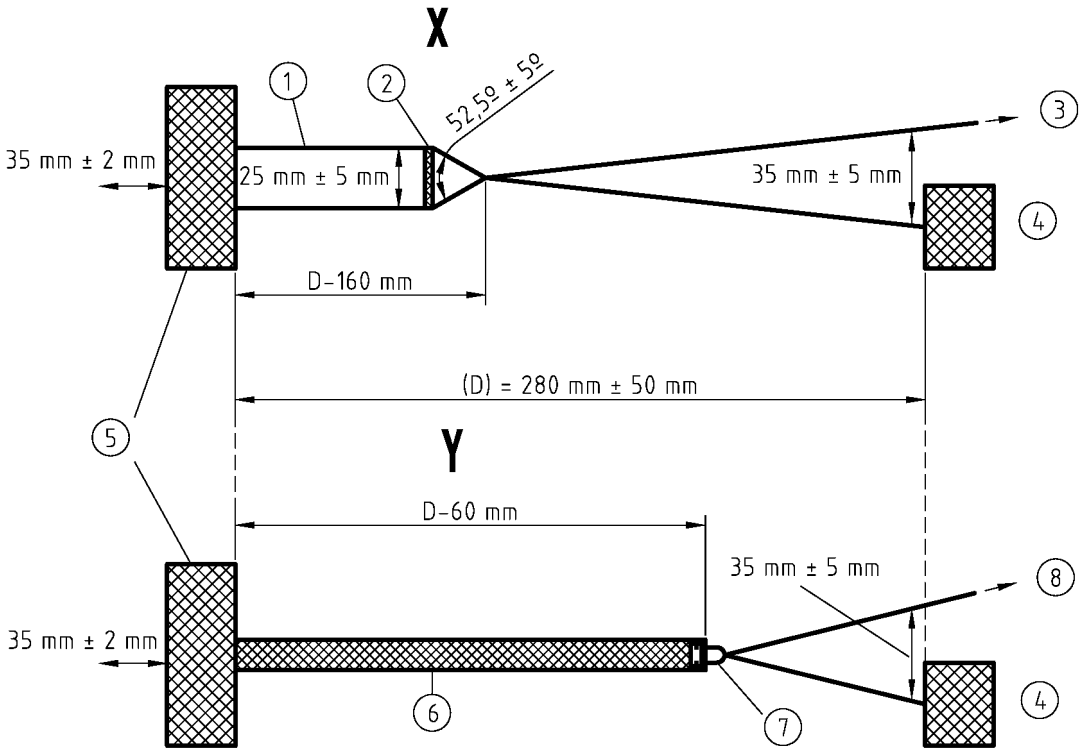
5.1.5 A means of moving the moveable clamp (5.1.2) with a simple harmonic reciprocating motion through a distance of 35 mm ± 2 mm and back to the original starting position at a rate of 60 cycles per minute ± 6 cycles per minute.

5.1.6 A means of counting the number of abrasion cycles up to failure of the lace or lace carrier.

5.1.7 For Method 1:

- a rigid spacer device of width 25 mm ± 5 mm. This is used to hold the two legs of the loop of lace which is clamped in the moveable clamp (5.1.2) apart (see Figure 1), so that when it is under tension the end of the loop forms an isosceles triangle with the spacer as its base and the two parts of the lace are at an angle of 52,5° ± 5,0°;
- a template with an angle of 52,5° marked on it, for setting the position of the spacer device.

5.1.8 For Method 2, a metal strip of width approximately 25 mm, thickness approximately 1 mm and length approximately *D* – 60 mm. One end of the strip should fit into the moveable clamp (5.1.2) and the other end should be capable of holding the test lace carrier.



X = Method 1: Lace – lace abrasion
Y = Methods 2 and 3: Lace – carrier abrasion
1 Lace loop
2 Spacer
3 Force (2,45 N ± 0,03 N)
4 Stationary clamp
5 Moveable clamp
6 Metal strip
7 Lace carrier
8 Force (2,45 N ± 0,03 N)

Figure 1 — Plan view of abrasion geometry

5.2 Standard eyelets, with the following characteristics (method 2):

— Construction: Visible (standard/flat) type;

— Material type: brass;

— Nominal internal barrel diameter: 4,5 mm;

— Nominal overall length: 5,5 mm;

5.3 Six test lace carriers (for methods 2 and 3)

5.3.1 Method 2

Mounting board: rigid fibreboard 3,0 mm ± 0,5 mm thick. Eyelet is clenched in drilled hole 5,0 mm ± 0,2 mm diameter (board with eyelet cut to size to fit mounting in machine) and fixed to the metal strip (see Figure 1).

5.3.2 Method 3

Cut from the footwear a sample including the eyelet and fix it to the metal strip (see Figure 1).

6 Test specimens

6.1 Method 1

6.1.1 Cut six pieces of shoe lace each of minimum length 2 x (*D* – 160) mm.

If sufficient made shoe laces are available, cut each test specimen from a separate lace.

6.1.2 Cut six pieces of shoe lace each of length 500 mm ± 10 mm.

If sufficient made shoe laces are available, cut each test specimen from a separate lace.

For some equipment it is possible to use pieces of lace as short as 100 mm by tying string to each end to lengthen them, provided only the lace test specimen (6.1.1) rubs against the lace test specimen (6.1.2).

6.2 Methods 2 and 3

Cut six pieces of shoe lace each of length 300 mm ± 10 mm.

If sufficient made shoe laces are available, cut each test specimen from a separate lace.

For some equipment it is possible to use pieces of lace as short as 100 mm by tying string to each end to lengthen them, provided only the lace test specimen rubs against the test lace carrier (5.3).

7 Conditioning

Store the shoe laces and the test lace carriers in a standard atmosphere in accordance with EN 12222 for at least 48 h before testing and carry out the test in this atmosphere.

8 Procedure

8.1 Method 1

8.1.1 Secure both ends of one of the pieces of lace (6.1.1) in a moveable clamp (5.1.2) so that it forms a loop of length approximately 2 x (*D* – 160) mm.

8.1.2 Secure one end of a piece of the lace (6.1.2) in the corresponding stationary clamp (5.1.3).

8.1.3 Thread the free end of the piece of lace (6.1.2) through the loop formed by the piece of lace (6.1.1) in subclause 8.1.1.

8.1.4 Apply a tensioning force of 2,45 N ± 0,03 N to the free end of the piece of lace (6.1.2).

8.1.5 Fit a spacer (5.1.7) into the loop formed by the piece of lace (6.1.1) and slide it towards the point of contact with the piece of lace (6.1.2) until the template (5.1.7) indicates that the tip of the loop of lace (6.1.1) forms an angle of 52,5° ± 5,0° (see Figure 1).

8.1.6 Repeat the procedure in 8.1.1 to 8.1.5 for the other 5 pairs of test laces (6.1.1 and 6.1.2). For equipment with less than six test stations this will require steps 8.1.1 to 8.1.4 to be repeated until all six pieces have been tested.

8.1.7 Reset the counter(s) (5.1.6) and start the test machine (5.1).

8.1.8 Stop the test when all the lace test specimens (8.1.6) have failed.

8.1.9 For each lace test specimen record the number of cycles to failure and the type of failure (3.3).

8.2 Method 2

8.2.1 Fix a test lace carrier (5.3.2) (including the standard eyelet) to one end of each of the metal strips (5.1.8) so that the relative orientation between the carrier and the metal strip is the same as the orientation between the carrier and the facing in the completed shoe.

8.2.2 Clamp the other end of a metal strip into each of the moveable clamps (5.1.2) so that the lace carrier is approximately D – 60 mm from the moveable clamp.

8.2.3 Follow the procedure in 8.1.2 to 8.1.4 for each of the six pieces of lace (6.2) but thread them through the lace carriers (5.3) instead of the pieces of lace. For machines with less than six test stations, see 8.1.6.

8.2.4 Follow the procedure in 8.1.7 to 8.1.8.

8.2.5 For each lace test specimen record the number of cycles to failure, the type of failure (3.3) and any damage to the test lace carriers.

8.3 Method 3

8.3.1 Fix a test lace carrier (5.3.3) (including the sample cut from the footwear) to one end of each of the metal strips (5.1.8) so that the relative orientation between the carrier and the metal strip is the same as the orientation between the carrier and the facing in the completed shoe.

8.3.2 Clamp the other end of a metal strip into each of the moveable clamps (5.1.2) so that the lace carrier is approximately D – 60 mm from the moveable clamp.

8.3.3 Follow the procedure in 8.1.2 to 8.1.4 for each of the six pieces of lace (6.2) but thread them through the lace carriers (5.3) instead of the pieces of lace. For machines with less than six test stations, see 8.1.6.

8.3.4 Follow the procedure in 8.1.7 to 8.1.8.

8.3.5 For each lace test specimen record the number of cycles to failure, the type of failure (3.3) and any damage to the test lace carriers.

9 Calculation and expression of results

Calculate the arithmetic mean of the rubbing cycles (recorded in 8.1.9, 8.2.5 and 8.3.5) required to abrade through each of the six test specimens.

10 Test report

The test report shall include the following information:

a) reference to this document, EN ISO 22774;

b) test method [Method 1: lace to lace abrasion or Method 2: lace to standard eyelet abrasion or Method 3: lace to eyelet (from footwear) abrasion] used;

c) full description of:

- the shoe laces (Method 1);
- the shoe laces and standard eyelets (Method 2);
- the shoe laces and eyelets from footwear (Method 3);

d) arithmetic mean of the number of abrasion cycles to failure (see clause 9);

e) range of abrasion cycles to failure;

f) type(s) of failure;

g) any deviation from this test method and any incident which could affect the result;

h) date of testing.

Annex ZA
(normative)

Normative references to International publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Publication	Year	Title	EN	Year
ISO 18454	2001	Footwear — Standard atmospheres for conditioning and testing of footwear and components for footwear	EN 12222	1997

ICS 61.060

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