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Footwear — Test methods for accessories: Touch and close fasteners — Peel strength before and after repeated closing

Chaussures — Méthodes d'essai pour accessoires: fermetures auto-agrippantes — Résistance au pelage avant et après un usage répété

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Foreword

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ISO 22777 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.

Contents

Foreword

This document (EN ISO 22777:2004) has been prepared by Technical Committee 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of an identical text or by endorsement, at the latest by June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.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 a test method for determining the peel strength of touch and close fasteners before and after repeated use.

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*

EN 12240, *Touch and close fasteners — Determination of the overall and effective widths of tapes and the effective width of a closure*

EN ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1:2004)*

3 Terms and definitions

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

3.1
peel strength
force per unit effective width required to separate the two tapes forming the specified closure from an open edge under the specified conditions of test

3.2
effective width
width of the pile at 90° to the length of the tape and which does not include the selvedge

4 Principle

4.1 Peel strength

Both parts of a touch and close fastener are pressed together under controlled conditions, and the average force required to peel them apart along their length from either end is measured with a tensile testing machine. This procedure is then repeated with one of the parts of the fastener turned through 180°.

4.2 Peel strength after repeated opening and closing

A touch and close fastener is repeatedly opened and closed a standard number of times by a machine. The peel strength is then measured by repeating the test described in 4.1.

5 Apparatus

5.1 A **tensile testing machine** complying with the requirements of EN ISO 7500-1 to an accuracy corresponding to class 2, and with the following:

5.1.1 A jaw separation rate of 100 mm/min ± 10 mm/min.

5.1.2 The means of producing a continuous record of force throughout the test.

5.2 A **roller device** with a roller (see Figure 1) of diameter 100 mm ± 5 mm capable of applying a force of 1,0 N ± 0,1 N per millimetre width of the test specimen. This is to close the fastener under a standard pressure.

5.3 **Fork** with a handle (see Figure 2) which engages the roller (5.2) and allows it to be moved without any extra down force being applied (see Figure 3).

Dimensions in mm

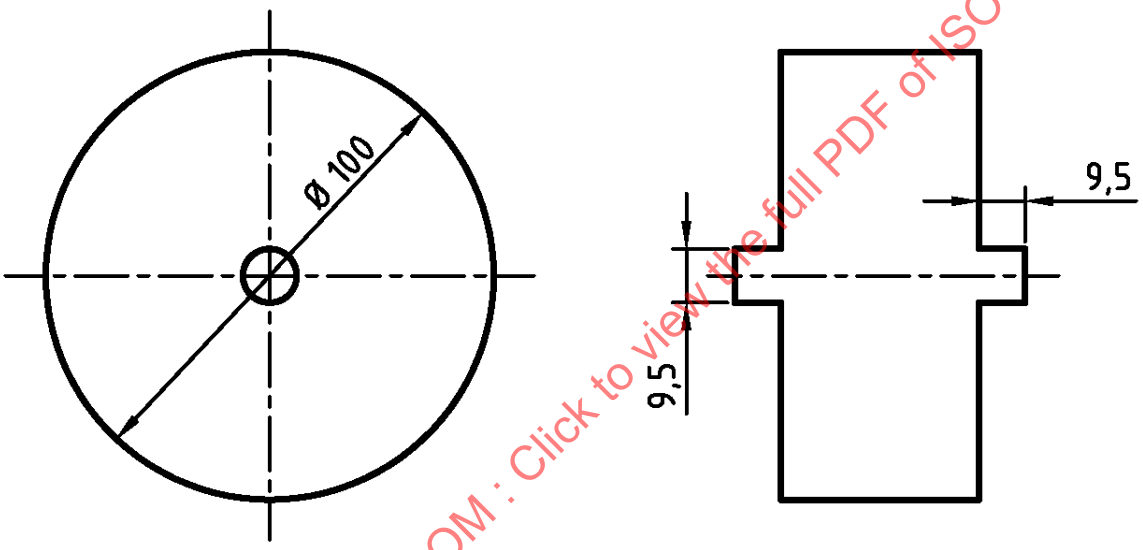
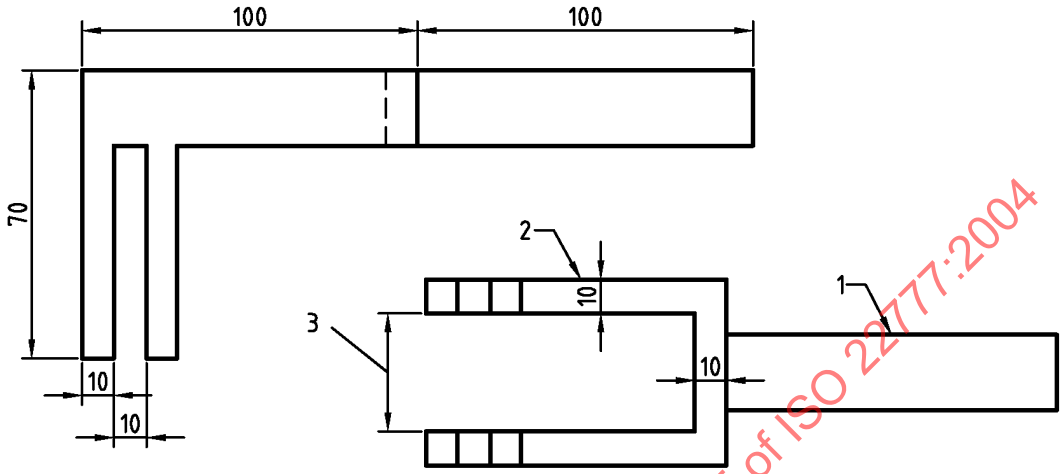


Figure 1 — Roller

Dimensions in mm



Key

1 Handle
2 Forks
3 Space between the forks to be 2 mm greater than the roller width

Figure 2 — Fork with a handle

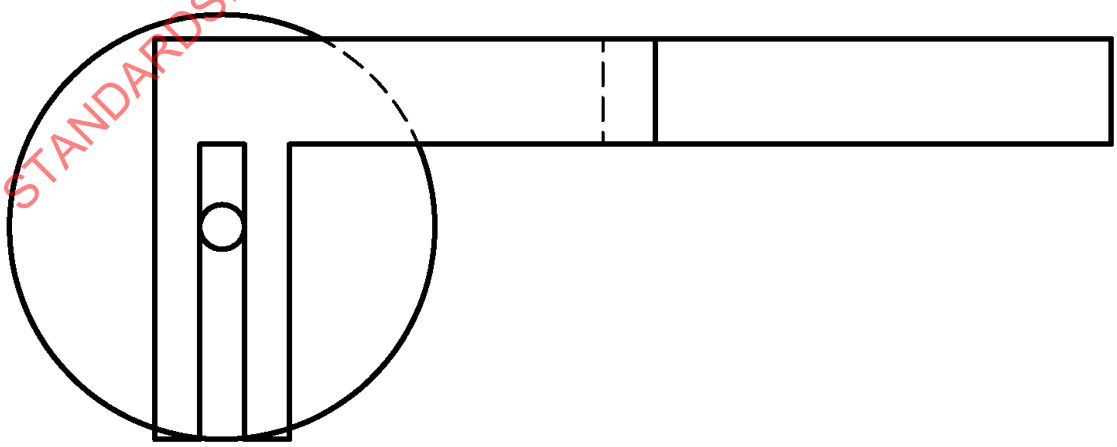


Figure 3 — Rolling mechanism for touch and close fasteners

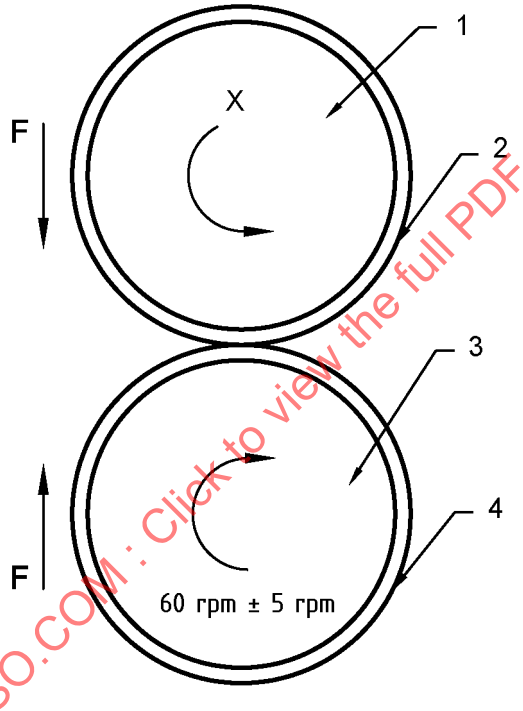
5.4 A **touch and close cycling machine** (see Figure 4) with:

5.4.1 Two circular drums of minimum width 70 mm, one of diameter 160,0 mm ± 0,5 mm and the other diameter 162,5 mm ± 0,5 mm. Each drum has a single slot of length 55 mm ± 2 mm across its width to hold the free ends of the specimen fastener. The drums are mounted next to each other with their axes parallel.

5.4.2 A means of rotating the smaller of the two drums at a rate of 60 rev/min ± 5 rev/min with the direction of rotation being reversed every 30 s ± 5 s. The larger of the two drums rotates freely and is driven by physical contact with the smaller drum via the test specimen.

5.4.3 A means of applying a force of 1,0 N ± 0,1 N between the two drums for every 1 mm width of the test specimen.

5.4.4 A method of counting the total number of rotations of the smaller of the two drums regardless of the direction of rotation.



Key

1 Idling drum (diameter 162,5 mm ± 0,5 mm)
2 Hook tape
3 Driven drum (diameter 160 mm ± 0,5 mm)
4 Loop tape
F Force between drums = 1 N × for every millimetre of effective width of fastener
X Drum

Figure 4 — Touch and close fastener cycling machine

6 Test specimens

6.1 Peel strength

6.1.1 Cut one piece of minimum length 420 mm from both the hook and loop tapes.

6.1.2 Mark on the reverse side of each piece of tape four lines at 100 mm ± 5mm intervals from one end, as shown in Figure 5, to define the four test specimens.

6.1.3 Mark one end of each test specimen with a “1” and the other end with a “2” as shown in Figure 5.

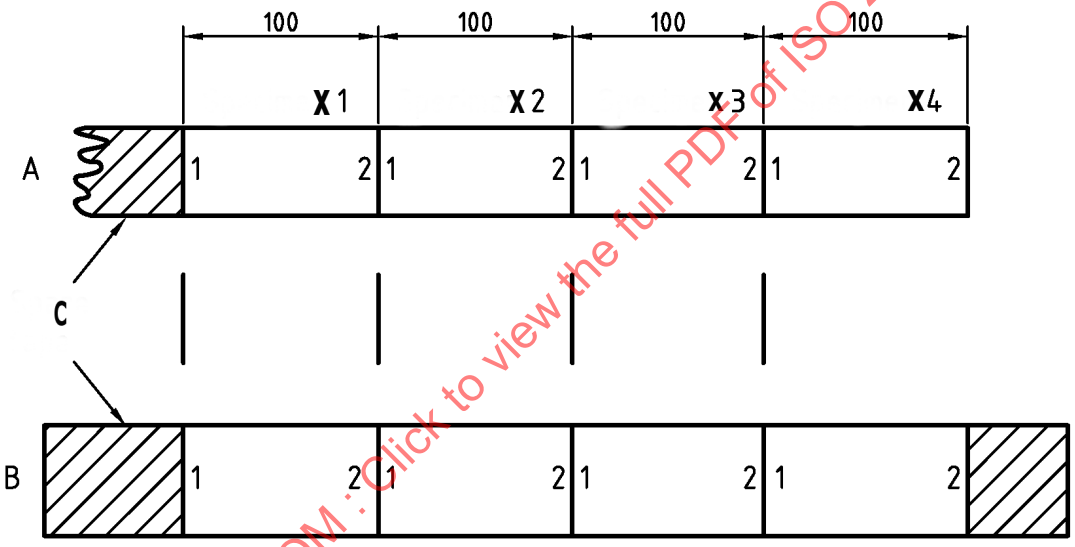
6.1.4 Separate the four test specimens by cutting along the lines drawn in 6.1.2.

6.2 Peel strength after repeated opening and closing

6.2.1 Cut one piece of length 540 mm ± 10 mm from both the hook and loop tapes.

6.2.2 Mark four test specimens, each of length 100 mm ± 5 mm on the central portion of both tapes.

6.2.3 Mark each 100 mm test specimen section with a “1” at one end and a “2” at the other (see Figure 5). Do not cut the test specimens out at this stage.



Key

A Hook tape
B Loop tape
C Spare tape
X Specimen

Figure 5 — Marking and cutting of test specimens

7 Conditioning

The test specimens shall be conditioned in accordance with the standard atmosphere specified in EN 12222 for a minimum of 24 h prior to the test. The closing of the test specimens and the testing shall also take place under these conditions.

8 Procedure

8.1 Peel strength

8.1.1 Measure the effective width (3.2) of both a hook and loop tapes (see 6.1.1), according to EN 12240, to an accuracy of 0,5 mm and use the smaller of these two values as the width of all the assembled fasteners.

8.1.2 Place four test specimens (see 6.1.4) cut from the loop tape on a flat surface with the pile uppermost.

8.1.3 Gently place one of the test specimens cut from the hook tape on top of each of the loop test specimens (see Figure 6), so that:

- Two of the fasteners are assembled so that the ends marked “1” (see 6.1.3) on both the hook and loop specimens coincide: Type A assembly.
- Two of the fasteners are assembled so that the end marked “1” on the hook test specimen coincides with the end marked “2” (see 6.1.3) on the loop test specimen: Type B assembly.

8.1.4 Consolidation of fasteners:

8.1.4.1 Adjust the roller device (5.2) to produce a force, in N, numerically equal to, or within 1 N of the effective width of the fastener, in mm, as measured in 8.1.1.

8.1.4.2 Take the assembled fastener (see 8.1.3) and traverse the full length of it with the roller device (5.2).

8.1.4.3 Turn the fastener over and repeat the procedure in 8.1.4.2.

8.1.4.4 Repeat the procedure in 8.1.4.2 and 8.1.4.3 a further four times so that the fastener has been transversed by the roller a total of ten times.

8.1.5 Partly peel open one type A and one type B assembly (see 8.1.3) from the end where the hook tape is marked 1. Partly peel the remaining type A and type B assembly from the end where the hook tape is marked 2, (see Figure 6). In all cases take care not to peel more than 40 mm of the fastened length.

8.1.6 Take an assembly and clamp one of its free separated ends into each of the jaws of the tensile testing machine (5.1.1) ensuring that the longer edges of the specimen fastener are parallel to the axis of the machine.

8.1.7 Turn on the recording system of the tensile testing machine.

8.1.8 Operate the tensile testing machine with a jaw separation rate of 100 mm/min ± 10 mm/min until at least 50 mm of the fastened length has been separated.

8.1.9 Turn off the recording system (5.1.3).

8.1.10 Repeat the procedure in 8.1.6 to 8.1.9 for the other three assemblies.

8.1.11 Repeat the procedure in 8.1.2 to 8.1.10 a further two times using the same pieces of tape to produce a total of twelve results, three for each of the four test configurations shown in Figure 6.

8.1.12 For each of the twelve graphs of force versus jaw separation produced by the recording system determine the average peeling force, in N.

NOTE The mean peeling force can be estimated by visually comparing areas on the force versus extension graph. When a horizontal line is drawn at the average peeling force, the area bounded by the line and the portion of the force versus extension curve above the line will be equal to the area bounded by the line and the portions of the curve below the line.