SLOVENSKI STANDARD
SIST EN 13780:2003

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Sprijemna zapenjala – Ugotavljanje dolžinske strižne sile

Touch and close fasteners - Determination of longitudinal shear strength

Haftverschlüsse - Bestimmung der Längsscherfestigkeit

Fermetures auto-agrippantes - Détermination de la résistance a la traction longitudinale

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61.040	Pokrivala. Dodatki k oblaļ ilom. Spenjanje oblaļ il	Headgear. Clothing accessories. Fastening of clothing

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Touch and close fasteners - Determination of longitudinal shear strength

Fermetures auto-agrippantes - Détermination de la résistance à la traction longitudinale

Haftverschlüsse - Bestimmung der Längsscherfestigkeit

This European Standard was approved by CEN on 12 December 2002.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

This document (EN 13780:2003) 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of an identical text or by endorsement, at the latest by August 2003, and conflicting national standards shall be withdrawn at the latest by August 2003.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies a method for determining the longitudinal shear strength of a touch and close fastener.

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 12240, Touch and close fasteners - Determination of the overall and effective widths of tapes and the effective width of a closure.

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

EN ISO 7500-1, Metallic materials - Verification of static uniaxial testing machines – Part 1: Tension/compression testing machines (ISO 7500-1:1999).

3 Terms and definitions

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

3.1
longitudinal shear strength
maximum force per unit effective area required to separate the two tapes forming the specified closure in a shearing action under the specified conditions of test

3.2
effective area of a closure
effective area of a closure is the product of the effective width of a closure and the length of a closure

4 Principle

Mated component tapes of a touch and close fastener are separated at a constant rate such that the separation occurs progressively along the closure in a direction parallel to the length of the tapes forming the closure and in the plane of the closure.

5 Apparatus

5.1 *Constant rate of extension tensile testing machine*, as specified in EN ISO 7500-1, connected to a computer, via a suitable interface, capable of recording data at a rate of at least 20 points per second.

5.2 *Metal roller, made of phosphor-bronze*, with a diameter of (100 ± 2) mm (see Figure 2), which shall be selected in accordance with Table 1.

Table 1 — Selection of metal roller

Effective width of closure *W* as determined by EN 12240 mm	Metal roller mass kg
$W \leq 12{,}0$	1,0 ± 0,1
$12{,}0 < W \leq 25{,}0$	2,5 ± 0,1
$25{,}0 < W \leq 52{,}0$	5,0 ± 0,1
$W > 52{,}0$	10,0 ± 0,1
NOTE The most important parameters for the roller are its diameter and mass. Its width should be chosen in accordance with the specific density of the phosphor-bronze used in its manufacture.	

5.3 *Set of forks with a handle* (see Figure 3) which engages the metal roller (5.2) and allows the roller to be moved without any extra down force being applied (see Figure 4).

6 Test specimens

Cut 4 test specimens of both male and female components at least 100 mm long and mark each with an "X" at one end and a "Y" at the other end, such that each test specimen of like tape is marked identically.

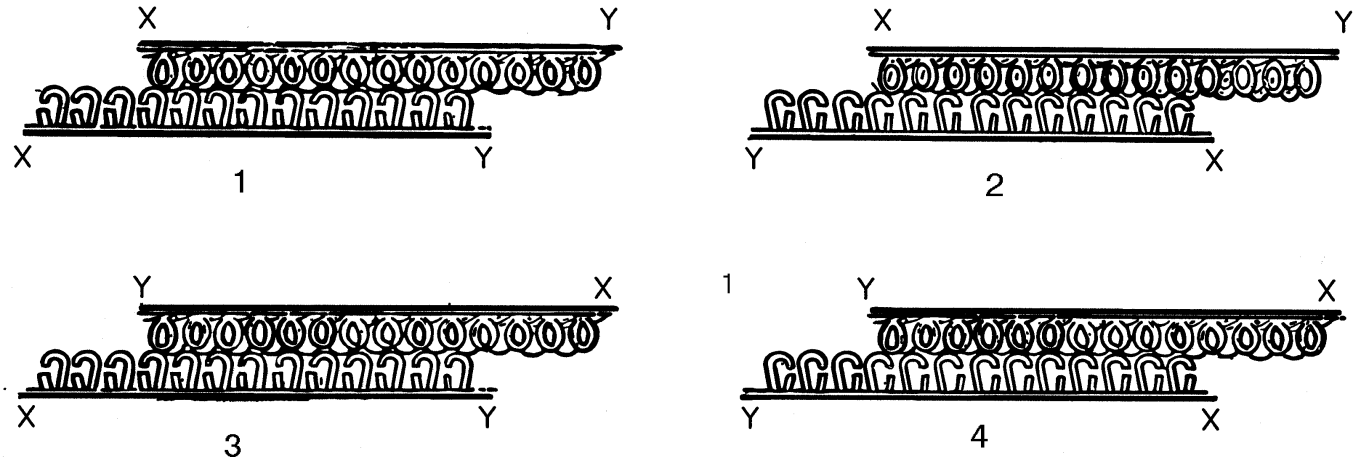
7 Conditioning

Condition the test specimens for a minimum of 24 h in accordance with the standard temperate atmosphere for testing as specified in EN 20139. The closing of the test specimens and the testing of the touch and close fasteners shall also take place under these conditions.

8 Procedure

8.1 Combinations of closure

Make 4 closures in total, 1 closure each being made as per the combinations shown in Figure 1.



Key

1 Combination A
2 Combination B
3 Combination C
4 Combination D

Figure 1 — Longitudinal shear strength combinations of closure

8.2 Method of closure

Select the length of overlap in accordance with the following table:

50 mm for fastener systems comprised of woven hook tape and woven loop tape;

20 mm for fastener systems comprised of either woven or knitted mushroom tape and knitted loop tape;

20 mm for fastener systems comprised of a plastic male tape and knitted loop tape;

50 mm for fastener systems not listed here above, but in the event that tensile failure occurs to either of the tapes during testing, the overlap should be reduced to 20 mm.

Make each closure as follows:

Place the male tape on a flat surface with the pile uppermost and then place the female tape on top with the pile facing downwards so that only the selected length of overlap together with the overall width make a closure, using minimal hand pressure.

Traverse the metal roller (5.2) at a rate of approximately 200 mm/s along the tapes in one direction, then immediately traverse in the opposite direction, then turn the mating tapes over.

Repeat the procedure until the roller has traversed the mating tapes 5 times in each direction i.e. a total of 10 times.

Take care that the centre of gravity of the roller does not deviate from the centre line of the tapes during this operation.

Take care that the roller covers the entire width of the mating tapes.

NOTE The tapes are turned over to minimise curvature.

8.3 Conduct the test for each closure

Set up the tensile testing machine (5.1) such that the jaws are 100 mm apart.

Mount the combined test specimen into the jaws of the tensile testing machine (5.1) such that the free end of the female tape is in the upper jaw and the free end of the male tape is in the lower jaw, taking care to align the test specimen in order that the force applied is uniformly distributed across the width of the closure.

Set the tensile machine in motion at a constant rate of jaw separation of (100 ± 10) mm/min. Record force against jaw separation, until either the closure has been separated or one of the tapes has undergone tensile failure. Record the mode of failure.

9 Calculation and expression of results

9.1 In the event that a tensile failure occurs, then the breaking force shall be considered as the force required to shear the closure.

9.2 Calculate the effective area of closure, by multiplying the effective width of the closure by the length of the overlap and express the result in square centimetres.

$$A_e = \frac{L_o \times W_e}{100} cm^2 \quad (1)$$

9.3 For each combination calculate the longitudinal shear strength by dividing the maximum force required to shear the closure by the effective area of the closure and express the result in newtons per square centimetre.

$$S_i = \frac{F_i}{A_e} N / cm^2 \quad (2)$$

9.4 Calculate the mean longitudinal shear strength of the closure by calculating the arithmetic mean of the longitudinal shear strengths of the 4 combinations.

Notes to the above calculations :

W_e = effective width of the closure (mm)

L_o = length of overlap (mm)

A_e = effective area of the closure (cm^2)

F_i = individual force required to shear a closure (N)

S_i = individual longitudinal shear strength (N/cm^2)

9.5 Express the minimum longitudinal shear strength of the closure of the 4 combinations.

9.6 Express the maximum longitudinal shear strength of the closure of the 4 combinations.