SLOVENSKI STANDARD
SIST EN ISO 13937-1:2000

01-julij-2000

Tekstilije - Nadaljnje trganje tekstilij - 1. del: Ugotavljanje sile nadaljnjega trganja z uporabo balistiļ ne nihalne metode (Elmendorf) (ISO 13937-1:2000)

Textiles - Tear properties of fabrics - Part 1: Determination of tear force using ballistic pendulum method (Elmendorf) (ISO 13937-1:2000)

Textilien - Weiterreißeigenschaften von textilen Flächengebilden - Teil 1: Bestimmung der Weiterreißkraft mit dem ballistischen Pendel (Elmendorf) (ISO 13937-1:2000)

Textiles - Propriétés de déchirement des étoffes - Partie 1: Détermination de la force de déchirure a l'aide de la méthode balistique au pendule (Elmendorf) (ISO 13937-1:2000)

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ICS:

59.080.30	Tkanine	Textile fabrics

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English version

Textiles - Tear properties of fabrics - Part 1: Determination of tear force using ballistic pendulum method (Elmendorf) (ISO 13937-1:2000)

Textiles - Propriétés de déchirement des étoffes - Partie 1: Détermination de la force de déchirure à l'aide de la méthode balistique au pendule (Elmendorf) (ISO 13937-1:2000)

Textilien - Weiterreißeigenschaften von textilen Flächengebilden - Teil 1: Bestimmung der Weiterreißkraft mit dem ballistischen Pendel (Elmendorf) (ISO 13937-1:2000)

This European Standard was approved by CEN on 2 July 1999.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

The text of EN ISO 13937-1:2000 has been prepared by Technical Committee CEN/TC 248 "Textiles and textile products", the secretariat of which is held by BSI, in collaboration with Technical Committee ISO/TC 38 "Textiles".

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 October 2000, and conflicting national standards shall be withdrawn at the latest by October 2000.

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.

Introduction

EN ISO 13937 has been prepared in the context of several test methods for the determination of certain mechanical properties of textiles using mainly tensile-testing machines, e.g. tensile properties, seam tensile properties, tear properties, seam slippage. Test requirements for these standards agree where appropriate. The results obtained by one of the methods should not be compared with those obtained by other methods.

EN ISO 13937 specifies methods for the determination of tear force of fabrics. Part 1 describes a ballistic pendulum method and parts 2 to 4 describe methods using tensile-testing machines.

1 Scope

This part of EN ISO 13937 describes a method known as the ballistic pendulum (Elmendorf) method for the determination of tear force of textile fabrics. The method describes the measurement of the tear force required to propagate a single-rip tear of defined length from a cut in a fabric when a sudden force is applied.

The test is mainly applicable to woven textile fabrics. It may be applicable to fabrics produced by other techniques, e.g. to nonwovens (with the same under-mentioned restrictions as for the woven fabrics).

In general the test is not applicable to knitted fabrics and woven elastic fabrics. It is not suitable for highly anisotropic fabrics or loose fabrics where tear transfer from one direction to another direction of the fabric during the tear test is likely to occur.

NOTE 1: For tests using tensile-testing machines part 2 of EN ISO 13937 describes a single tear method known as the trouser test, part 3 the wing test and part 4 the tongue test method.

NOTE 2: For the ballistic pendulum method for coated fabrics see ISO 4674-2. For the trapezoidal test method, see ISO 9073-4 for nonwovens or ISO 4674 for coated fabrics.

2 Normative references

The following normative documents contain provisions through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 139 Textiles - Standard atmospheres for conditioning and testing

ISO 1974:1990 Paper - Determination of tearing resistance (Elmendorf method)

ISO 10012-1 Quality assurance requirements for measuring equipment - Part 1: Metrological confirmation system for measuring equipment

3 Terms and definitions

For the purposes of this part of EN ISO 13937 the following terms and definitions apply:

3.1 tear force
Force required to propagate a tear initiated under the specified conditions.

NOTE: The tear force is qualified as "across warp" or "across weft" according to whether the tear is made across the warp (warp threads are torn) or weft (weft threads are torn) respectively.

3.2 length of tear
Measured from the beginning of the tear to the termination point.

4 Principle

The force required to continue a slit previously cut in a fabric is determined by measuring the work done in tearing the fabric through a fixed distance. The apparatus consists of a pendulum carrying a clamp which is in alignment with a fixed clamp when the pendulum is in the raised, starting position with maximum potential energy.

The specimen is fastened in the clamps and the tear is started by cutting a slit in the specimen between the clamps. The pendulum is then released and the specimen is torn completely as the moving jaw moves away from the fixed one. The tear force is measured.

5 Sampling

Select samples either in accordance with the procedure laid down in the material specification for the fabric, or as agreed between the interested parties.

In the absence of an appropriate material specification, an example of a suitable sampling procedure is given in annex B.

An example of a pattern for cutting test specimens from the laboratory sample is given in annex C. Avoid test areas with folded or creased places, selvedges and areas not representative of the fabric.

6 Apparatus

6.1 General

The system for metrological confirmation of the pendulum testing machine shall be in accordance with ISO 10012-1. For calibration of the apparatus, follow directions given in annex B of ISO 1974:1990

6.2 Pendulum testing machine, in which the test specimen is held between two jaws, one movable and the other fixed to the frame. The moving jaw is attached to a pendulum which can fall under the influence of gravity. The pendulum shall provide for the test specimen to be torn without coming in contact with the pendulum during the test.

The apparatus is made up of the following parts:

6.2.1 A rigid framework, supporting the pendulum and a fixed jaw, as well as a knife to cut a slit, and a measuring device. It is fitted with a level and positioned to prevent any movement during test.

6.2.2 A pendulum, that is free to swing about a horizontal axis on a bearing, with means for holding the pendulum in the raised starting position (pendulum stop) and releasing it instantly.

The mass of the pendulum shall be alterable by adding masses or by exchanging pendulums.

6.2.3 A mechanical or electronic device for determining the maximum amplitude of the first swing, and thus the energy used to tear the test specimen. The reading may be given directly in terms of tear force. Means for providing zero setting of the instrument.

6.2.4 A movable jaw integral with the pendulum **and a fixed jaw** integral with the framework. These jaws shall be 3 mm ± 0,5 mm apart in order to permit the passage of the knife. The clamps are so aligned that the specimen clamped in them lies in a plane parallel to the axis of the pendulum, the plane making an angle of 27,5° ± 0,5° with the perpendicular line joining the axis and the horizontal line formed by the top edges of the clamping jaws. The distance between the axis and the top edges of the clamping jaws is 104 mm ± 1 mm.

The dimensions of the clamping faces of the jaws are not critical. A width of 30 mm to 40 mm and a height of preferably 20 mm but not less than 15 mm have been found to be suitable.

When the pendulum is in the raised starting position, the clamping faces of both jaws shall be in the same plane perpendicular to the plane of swing of the pendulum. The surface state of the clamping faces and the force applied to the jaws applied shall permit the test specimens to be held without slipping.

6.2.5 A sharp knife to begin the tear of the test specimen by cutting a slit of 20 mm ± 0,5 mm mid-way between the two jaws.

6.3 Equipment for cutting out test specimens, preferably a hollow punch or template to give test specimens of the dimensions shown in figure 1.

7 Atmosphere for conditioning and testing

The atmospheres for preconditioning, conditioning and testing shall be as specified in ISO 139.

8 Preparation of test specimens

8.1 General

From each laboratory sample two sets of test specimens shall be cut, one set in the warp direction and the other in the weft direction. Align the short side of the test specimens exactly parallel to warp or weft direction to assure that the tear will propagate within the notch.

For other than woven fabrics use the relevant designation for direction e.g. length and transverse.

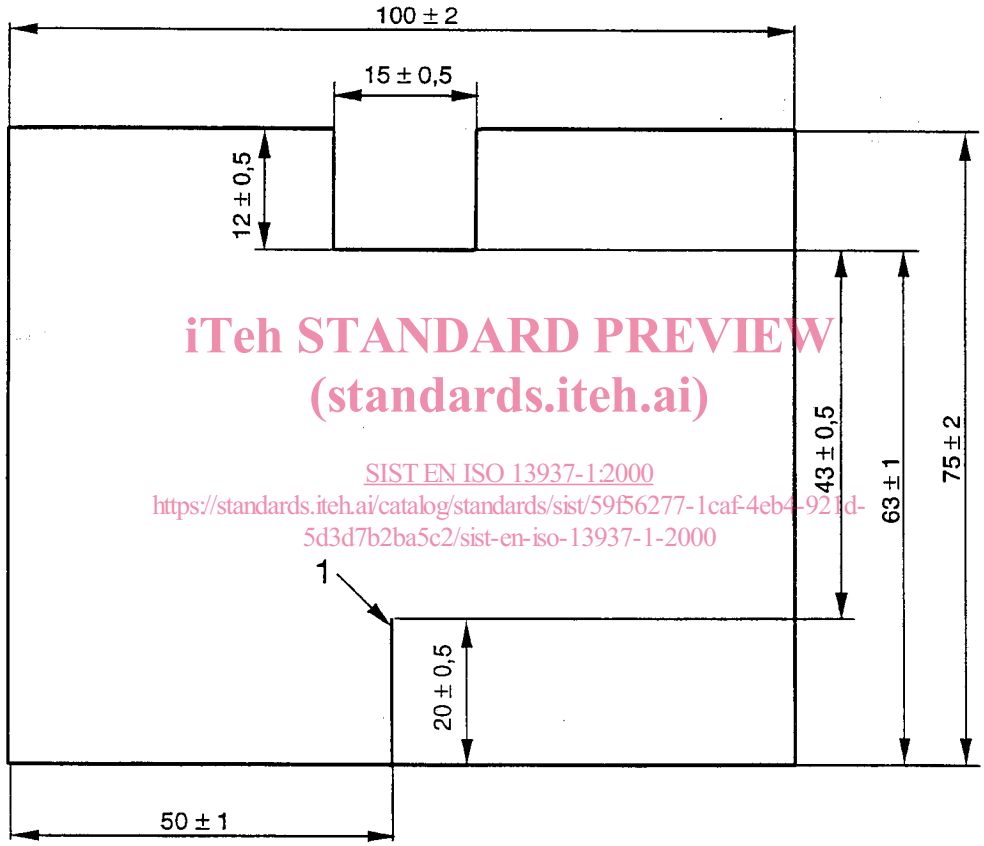
Each set shall consist of at least five test specimens, or more if agreed. In accordance with clause 5 and annex C, no two test specimens shall contain the same longitudinal or transverse threads, and no specimen shall be cut within 150 mm of the edge of the fabric.

8.2 Shape and dimensions

The test specimen shall be cut out according to the design shown in figure 1.

Slightly different shapes (e.g. with rounded edges, positioning aids for jaw alignment) are acceptable provided the tearing length remains 43 mm ± 0,5 mm.

All dimensions in mm



1 Slit

Figure 1 - Dimensions of test specimen