INTERNATIONAL STANDARD

ISO 12947-1

First edition
1998-12-15

Textiles — Determination of the abrasion resistance of fabrics by the Martindale method —

Part 1:
Martindale abrasion testing apparatus

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Textiles — Détermination de la résistance à l'abrasion des étoffes par la méthode Martindale —

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Partie 1: Appareil d'essai d'abrasion Martindale

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Contents

Page

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ISO 12947-1:1998
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

International Standard ISO 12947-1 was prepared by Technical Committee ISO/TC 38, *Textiles*.

ISO 12947 consists of the following parts under the general title *Textiles – Determination of the abrasion resistance of fabrics by the Martindale method*:

— *Part 1: Martindale abrasion testing apparatus*

— *Part 2: Determination of specimen breakdown*

— *Part 3: Determination of mass loss*

— *Part 4: Assessment of appearance change*

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Annexes A and B form an integral part of this part of ISO 12947.

ISO 12947-1:1998

Introduction

The choice of method of abrasion testing is established before the start of the testing and recorded in the test report, since the results of the different methods cannot be compared with each other.

The determination of resistance to pilling of fabrics using the Martindale apparatus is given in ISO 12945, *Textiles — Determination of the resistance to pilling and change of appearance of fabrics*, parts 1, 2 and 3[1)].

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ISO 12947-1:1998
https://standards.iteh.ai/catalog/standards/sist/73b536c9-e4cb-4006-a48e-101102fe8cad/iso-12947-1-1998

1) These three parts of International Standard ISO 12945 are yet to be published.

Textiles — Determination of the abrasion resistance of fabrics by the Martindale method —

Part 1:
Martindale abrasion testing apparatus

1 Scope

This part of ISO 12947 specifies requirements for the Martindale testing apparatus and auxiliary materials for use in the test methods specified in parts 2 to 4 of ISO 12947 for determination of the abrasion resistance of fabrics.

This part of ISO 12947 is applicable to apparatus for the testing of:

a) woven and knitted fabrics;

b) pile textiles having a pile height of up to 2 mm;

c) nonwovens.

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2 Normative references

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The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 12947. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 12947 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 137:1975, *Wool — Determination of fibre diameter — Projection microscope method.*

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.*

ISO 845:1988, *Cellular plastics and rubbers — Determination of apparent (bulk) density.*

ISO 2060:1994, *Textiles — Yarn from packages — Determination of linear density (mass per unit length) — Skein method.*

ISO 2061:1995, *Textiles — Determination of twist in yarns — Direct counting method.*

ISO 2286-3:1998, *Rubber- or plastics-coated fabrics — Determination of roll characteristics — Part 3: Method for the determination of thickness.*

ISO 3074:1975, *Wool — Determination of dichloromethane — Soluble matter in combed sliver.*

ISO 3801:1977, *Textiles — Woven fabrics — Determination of mass per unit length and mass per unit area.*

ISO 5084:1996, *Textiles — Determination of thickness of textiles and textile products.*

ISO 7211-2:1984, *Textiles — Woven Fabrics — Construction — Methods of analysis — Part 2: Determination of number of threads per unit length.*

ISO 12947-2:1998, *Textiles — Determination of the abrasion resistance of fabrics by the Martindale method — Part 2: Determination of specimen breakdown.*

ISO 12947-3:1998, *Textiles — Determination of the abrasion resistance of fabrics by the Martindale method — Part 3: Determination of mass loss.*

3 Definitions

For the purposes of this part of ISO 12947, the following definitions apply.

3.1
abrasion rub
one revolution of the two outer drives of the Martindale abrasion tester

3.2
abrasion cycle
completion of all the translational abrasion movements tracing a Lissajous figure comprising 16 rubs, i.e. 16 revolutions of the two outer drives and 15 revolutions of the inner drive of the Martindale abrasion tester

3.3
inspection interval
number of continuously performed rubs

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3.4
Lissajous figure
figure created by movement which changes from a circle to gradually narrowing ellipses, until it becomes a straight line, from which progressively widening ellipses develop, in a diagonally opposite direction before the pattern is repeated

ISO 12947-1:1998
https://standards.iteh.ai/catalog/standards/sist/...
101102fe8cad/iso-12947-1-1998

3.5
work station
abrading table

4 Principle

The Martindale abrasion tester subjects a circular specimen to a defined load and rubs it against an abrasive medium (i.e standard fabric) in a translational movement tracing a Lissajous figure. The specimen holder, containing either specimen or abrasive medium depending on which method (ISO 12947, Parts 2, 3 or 4) is being used, is additionally freely rotatable around its own axis perpendicular to the horizontal plane.

The specimen is subjected to abrasive wear for a predetermined number of rubs. The number of abrasion rubs making up the inspection interval depends upon the product type and method of assessment.

5 Apparatus

5.1 General

The test apparatus consists of a baseplate on which are mounted the abrading tables and drive mechanism. The drive mechanism consists of two outer drives and an inner drive which cause the specimen holder guide plate to trace a Lissajous figure (see annex A).

NOTE The Martindale apparatus does not generate a perfect Lissajous motion.

The specimen holder guide plate is moved horizontally by the drive mechanism in such a way that every point of the guide plate describes the same Lissajous figure.

The specimen holder guide plate is fitted with bearing housings and low friction bearings which carry the specimen holder guide spindles. The lower end of each specimen holder spindle is inserted into each corresponding specimen holder body. On the upper end of the spindle, loading pieces can be fitted. The specimen holder consists of a body, insert and nut.

The apparatus is fitted with a pre-settable counting device which counts each revolution of one of the outer drives.

5.2 Drive and base plate attachments

5.2.1 Drive

The drive shall be arranged so that the heated exhaust air from the motor ventilation cannot reach the abraded surface. The movement of the specimen holders takes place by means of:

a) two outer synchronised drive units, in which:

— the distance of the axis of the drive units from their central axis is (30,25 ± 0,25) mm;

— the rotational frequency of the outer drive units is (47,5 ± 2,5) min^{-1};

b) an inner drive unit, in which:

— the distance of the axis of the drive unit from its central axis is (30,25 ± 0,25) mm;

— the rotational frequency of the drive unit is (44,5 ± 2,4) min^{-1}.

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The ratio of the rotation of the outer drive units to that of the inner drive unit shall be 16:15, i.e. after 16 revolutions of the outer units, the inner unit has carried out 15 revolutions and it has returned to the starting position of the Lissajous figure.

ISO 12947-1:1998
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The maximum length of stroke of the specimen holder guide plate in both the longitudinal and transverse directions is (60,5 ± 0,5) mm.

5.2.2 Counter

The counter for counting the abrasion rubs shall measure to an accuracy of one rub.

5.2.3 Abrading table

Each of the abrading tables consist of the following elements:

a) abrading table (see figure 1);

b) clamping ring (see figure 2);

c) clamping mechanism to fasten the clamping ring;

d) pressing weight of mass (2,5 ± 0,5) kg and of diameter (120 ± 10) mm.

5.3 Specimen holder guide plate

The specimen holder guide plate is a plate in which three guides engage the drive units. These guides interact so as to ensure a uniform, smooth and low vibration movement of the specimen holder guide plate.

The specimen holder guide spindles are located in bearing housings secured to the guide plate central to each abrading table. Each bearing housing carries two bearings. The guide spindles are freely moving and free from play in the bearings (see also 7.2). These essential requirements are fulfilled by bearing housings and bearings in which:

a) the overall length of the bearing housing is (31,75 ± 0,127) mm;

b) the bearing bore is 7,950 mm with ISO tolerance field H9, the specimen holder guide spindle to be fitted has a diameter of 7,950 mm with ISO tolerance field f7 in accordance with ISO 286-2.

5.4 Specimen holder

The specimen holder assembly consists of the following elements:

a) specimen holder spindle (see figure 3);

b) specimen holder body (see figure 4);

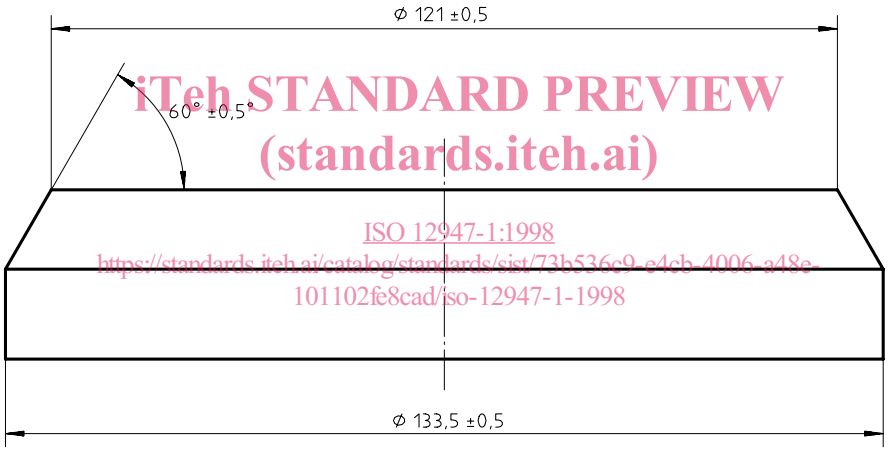
c) specimen holder insert (see figure 5);

d) specimen holder nut (see figure 6).

The combined mass of these components shall be (198 ± 2) g.

The specimen holder assembly (without spindle) is illustrated in figure 7.

Dimensions in millimetres



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ISO 12947-1:1998
https://standards.iteh.ai/catalog/standards/sist/73b536c9-e4eb-4006-a48e-101102fe8cad/iso-12947-1-1998

Figure 1 — Abrading table

Dimensions in millimetres

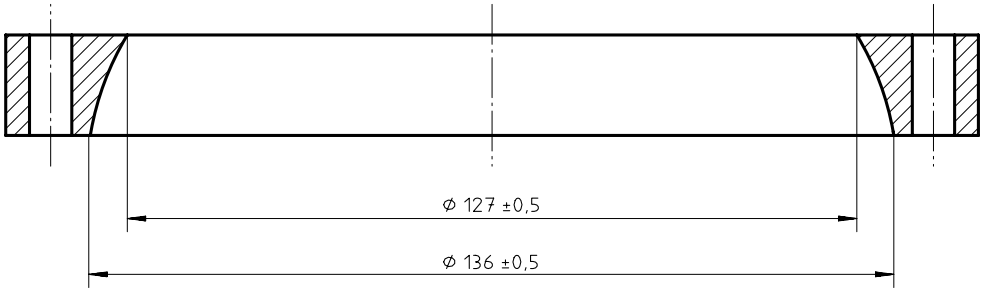

Figure 2 — Clamping ring

Dimensions in millimetres

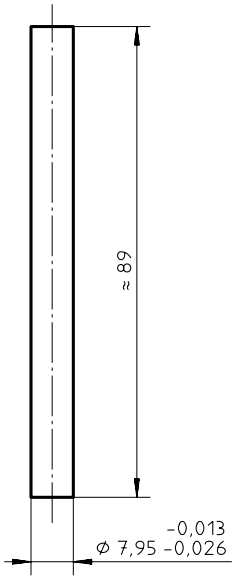

Figure 3 — Specimen holder spindle

Dimensions in millimetres

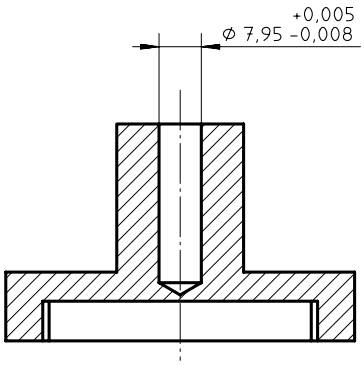

Figure 4 — Specimen holder body

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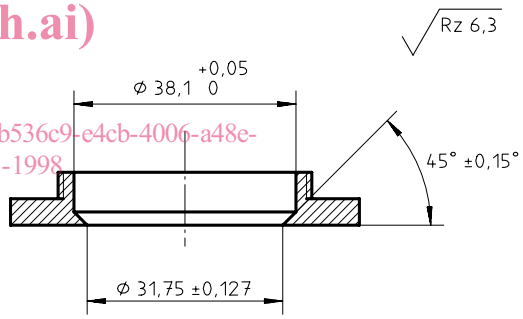
ISO 12947-1:1998
https://standards.iteh.ai/catalog/standards/sist/73b536c9-e4cb-4006-a48e-101102fe8cad/iso-12947-1-1998



Dimensions in millimetres

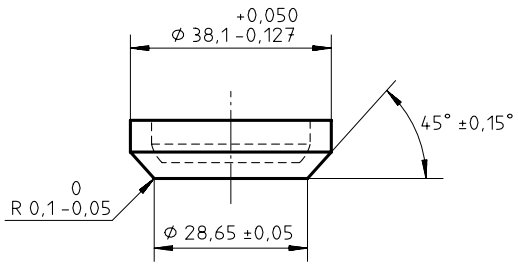


Figure 5 — Specimen holder insert

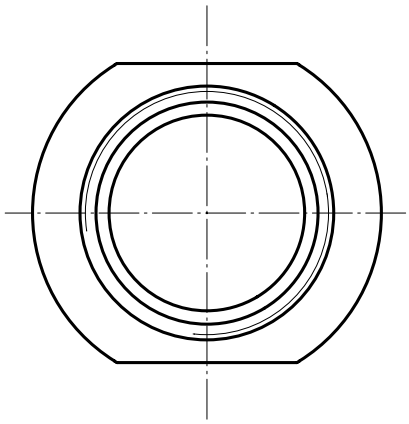


Figure 6 — Specimen holder nut