INTERNATIONAL STANDARD

ISO 12947-4

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

Part 4:
Assessment of appearance change

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

Partie 4: Évaluation du changement d'aspect

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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 12947-4 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*

Annex A forms an integral part of this part of ISO 12947.

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

Part 4:
Assessment of appearance change

1 Scope

This part of ISO 12947 is applicable to the assessment of the appearance change of specimens covering all textile fabrics including nonwovens and fabrics where the specifier indicates the end performance as having a low abrasion wear life. This method differs appreciably from those in ISO 12947-2 and 12947-3.

NOTE Further introductory comments are given in ISO 12947-1.

2 Normative references

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 105-A02:1993, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour.*

ISO 139:1973, *Textiles — Standard atmospheres for conditioning and testing.*

ISO 2859-1:—[1)], *Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection.*

ISO 12947-1:1998, *Textiles — Determination of the abrasion resistance of fabrics by the Martindale method — Part 1: Martindale abrasion testing apparatus.*

3 Definitions

For the purposes of this part of ISO 12947 the definitions given in ISO 12947-1 apply.

4 Principle

A circular specimen is subjected to a defined load and rubbed against an abrasive medium (standard fabric) in a translational movement tracing a Lissajous figure. The specimen holder containing the abrasive medium is additionally freely rotatable around its own axis perpendicular to the plane of the specimen. The evaluation of the abrasion resistance of the textile fabric is determined from assessment of the appearance change.

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1) To be published. (Revision of ISO 2859:1989)

Tests are performed using the mass of the specimen holder and spindle alone at (198 ± 2) g.

The surface change of the test specimen is assessed and compared with an untested specimen of the same fabric, with the option of using two methods:

a) abrasion testing to an agreed number of rubs and assessing whether a surface change has occurred;

b) abrasion testing to an agreed surface change and determination of the test interval in which the surface change has been produced.

5 Apparatus and materials

The test apparatus and auxiliary materials are specified in ISO 12947-1.

6 Conditioning and testing atmosphere

The standard temperate atmosphere for conditioning and testing textiles as defined in ISO 139 shall be used, i.e a temperature of (20 ± 2) °C and a relative humidity of (65 ± 5) %.

7 Sampling and preparation of test specimens

7.1 General

Perform sampling in accordance with statistical rules (see ISO 2859-1).

Ensure throughout sampling and specimen preparation that handling imposes the minimum possible tensile stress so as to prevent incorrect extension of the textile fabric.

7.2 Selection of the laboratory sample

Select the laboratory sample from a test lot to be representative of properties of the textile fabric. Check the representative nature of sampling from the start or end of a textile fabric.

Take the laboratory sample from across the full fabric width.

7.3 Sampling of the test specimens from the laboratory sample

Before sampling the test specimens from the laboratory samples, condition the laboratory samples free from tension, for at least 18 h on a smooth horizontal surface with free access of air exposed to the standard atmosphere specified in clause 6.

For woven fabrics, take the specimens so that they each contain different warp and weft threads.

Take the test specimens at least 100 mm from the edge distributed across the entire laboratory sample. Take a sufficient number of test specimens (at least three) to be in accordance with statistical notes (see 7.1).

For patterned fabrics or fabrics with textured surface, take care that the test specimens contain all characteristic parts of the pattern, ensuring that the parts of the pattern likely to be sensitive to abrasion are contained in the test specimens.

7.4 Dimensions of specimens and auxiliary materials

7.4.1 Dimensions of the test specimens

The dimensions of the test specimen shall be at least 140 mm in diameter or length and width.

7.4.2 Dimensions of abradant

The diameter of the abradant shall be 38^{+5}_{0} mm.

7.4.3 Dimensions of the test specimen felt substrate

The diameter of the test specimen felt substrate shall be 140^{+5}_{0} mm.

7.4.4 Dimensions of the abradant foam backing

The diameter of the abradant foam backing shall be 38^{+5}_{0} mm.

7.5 Preparation and mounting of the test specimens and cutting-out and mounting of the auxiliary materials

7.5.1 Preparation

Stamp or cut out the test specimens from the laboratory sample. Give particular attention to the clean status of the cut edges to prevent the occurrence of unwanted material loss in subsequent handling.

Prepare the auxiliary materials in a similar fashion from the available pieces of woven fabric, felt or foam.

NOTE The auxiliary materials may under some circumstances be obtained already prepared to the required dimensions.

7.5.2 Mounting of the specimen

Move the specimen holder guide plate to ensure free access to the abrading tables.

Place the felt on the abrading tables and place the test specimen over the felt.

Compress the felt and test specimen on the abrading table with a pressing weight having a mass (2,5 ± 0,5) kg and a diameter of (120 ± 10) mm.

Fit the clamping ring and secure the felt and test specimen firmly.

7.5.3 Mounting of the abradant

Place the specimen holder nut in the mounting device on the machine frame.

Place the abradant in the specimen holder nut with wear side downward carefully and centrally. Place the foam backing on the abradant.

Place the specimen holder insert in the specimen holder nut, place the specimen holder body over the nut and screw down tightly.

7.6 Useful life of auxiliary materials

Renew the abradant and foam backing for every test.

Inspect the felt for soiling and wear after every abrasion test. If soiling or detectable wear occur replace the felt. Both sides of the felt may be used.

7.7 Preparation of the abrasion machine

After mounting the test specimens and auxiliary materials place the specimen holder guide plate in position and correctly position the specimen holders and spindles at their respective work stations.

8 Abrasion test procedure

Start the abrasion tester after preselecting the number of rubs according to the relevant test series listed in table 1 and completing the preparations in accordance with clause 7. Continue the test without interruption until the prescribed number of rubs is reached.

Depending on the expected number of rubs to reach prescribed appearance change in the test specimen, use the test interval (rubs) listed in table 1, assessing the appearance of the specimen at each interval.

To assess the appearance, carefully remove the specimen holders with the mounted abradant. Remove the test specimens mounted on the abrading table from the testing machine and assess for surface change. If the prescribed surface change has not yet been established, remount the test specimens and specimen holders and continue testing to the next test interval. Ensure that test specimens and specimen holders are returned to the work stations from which they were taken.

Continue this test and assessment sequence until the prescribed surface appearance is observed in the test specimens.

The result, separately recorded for every test specimen, is the number of rubs at which the prescribed surface appearance had not yet been observed. The time interval is thereby determined in which the surface appearance occurs.

In the event of all test specimens not exhibiting the prescribed effect simultaneously, continue the abrasion test with the remaining test specimens until the last of the test specimens exhibits the prescribed effect.

Because the surface appearance of different fabrics may vary, the viewing conditions and surface appearance to be assessed shall be agreed before the start of testing and recorded in the test report.

Table 1 — Test intervals for surface appearance testing

Test series	Expected number of rubs to reach prescribed surface appearance	Test interval (rubs)
a	⩽ 48	16 then every 8
b	> 48 ⩽ 200	48 then every 16
c	> 200	100 then every 50

9 Results

For each test specimen determine the test interval in which the prescribed surface effect occurs (see clause 8). From the individual values calculate the mean and where necessary the confidence limits of the mean.

If required assess shade change in accordance with ISO 105-A02.

NOTE See ISO 5725 for literature on statistical evaluation or visual examination of textiles using ordinal characteristics.

10 Test report

The test report shall include the following information:

a) reference to this part of ISO 12947, i.e. ISO 12947-4;

b) specimen constitution, presentation and technical data for the test sample;

c) details and test series (see table 1) of the method used and a description or representation of basis of assessment (e.g. ordinal scale used, standard samples);

d) test or assessment results:

— the confidence limits of the mean value if applicable;

— whether shade change has been assessed (see clause 9), if applicable;

e) departures from the procedure (e.g. special agreements on the conditions of testing or assessment);

f) date of test.