INTERNATIONAL STANDARD

ISO 10834

First edition
1992-11-15

Textile floor coverings — Non-destructive measurement of pile thickness above the backing — WRONZ gauge method

Revêtements de sol textiles — Mesurage non destructif de l'épaisseur du velours au-dessus du soubassement — Méthode de la jauge WRONZ

Reference number
ISO 10834:1992(E)

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.

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 10834 was prepared by Technical Committee ISO/TC 38, *Textiles*, Sub-Committee SC 12, *Textile floor coverings*.

Annex A of this International Standard is for information only.

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Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Textile floor coverings — Non-destructive measurement of pile thickness above the backing — WRONZ gauge method

1 Scope

This International Standard specifies a method for the measurement of the thickness of pile above the backing of a textile floor covering and is applicable to all textile floor coverings having a pile of cut or looped yarn. Where areas of different construction or thickness exist, these should be tested separately if possible. This method is non-destructive of the floor covering specimen and is useful particularly for production control in manufacture and for measurements on installed carpets.

Due to different loading factors, this method and that of ISO 1766, in which the pile fibres are cut from the substrate, may not give identical results. In case of dispute or where maximum accuracy is required, the pile thickness shall be determined by the method of ISO 1766.

Because of this, care shall be exercised in comparing textile floor coverings with different substrates when using this gauge.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 1766:1986, *Textile floor coverings — Determination of thickness of pile above the substrate.*

ISO 1957:1986, *Machine-made textile floor coverings — Sampling and cutting specimens for physical tests.*

ISO 2424:1992, *Textile floor coverings — Vocabulary.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 pile thickness: The distance between the planes of the upper surface of the pile and the upper surface of the backing when the surfaces are located respectively under conditions of standard pressure and standard loading.

NOTE 1 This definition, being related to the instrument described in this International Standard, differs from the definition "effective pile thickness" in ISO 2424.

3.2 standard loading: A nominal force of 735 mN acting on each needle of a probe.

4 Principle

The pile thickness is determined by measuring the distance between the planes of the pile surface located under a standard pressure and the plane of the backing surface located under a standard loading.

5 Apparatus

5.1 Measuring instrument, as illustrated in figure 1, consisting of the following elements:

5.1.1 Plane circular presser foot, of area between 300 mm^2 and 1 000 mm^2, for locating the upper surface of the pile under a nominal standard pressure of 2,0 kPa.

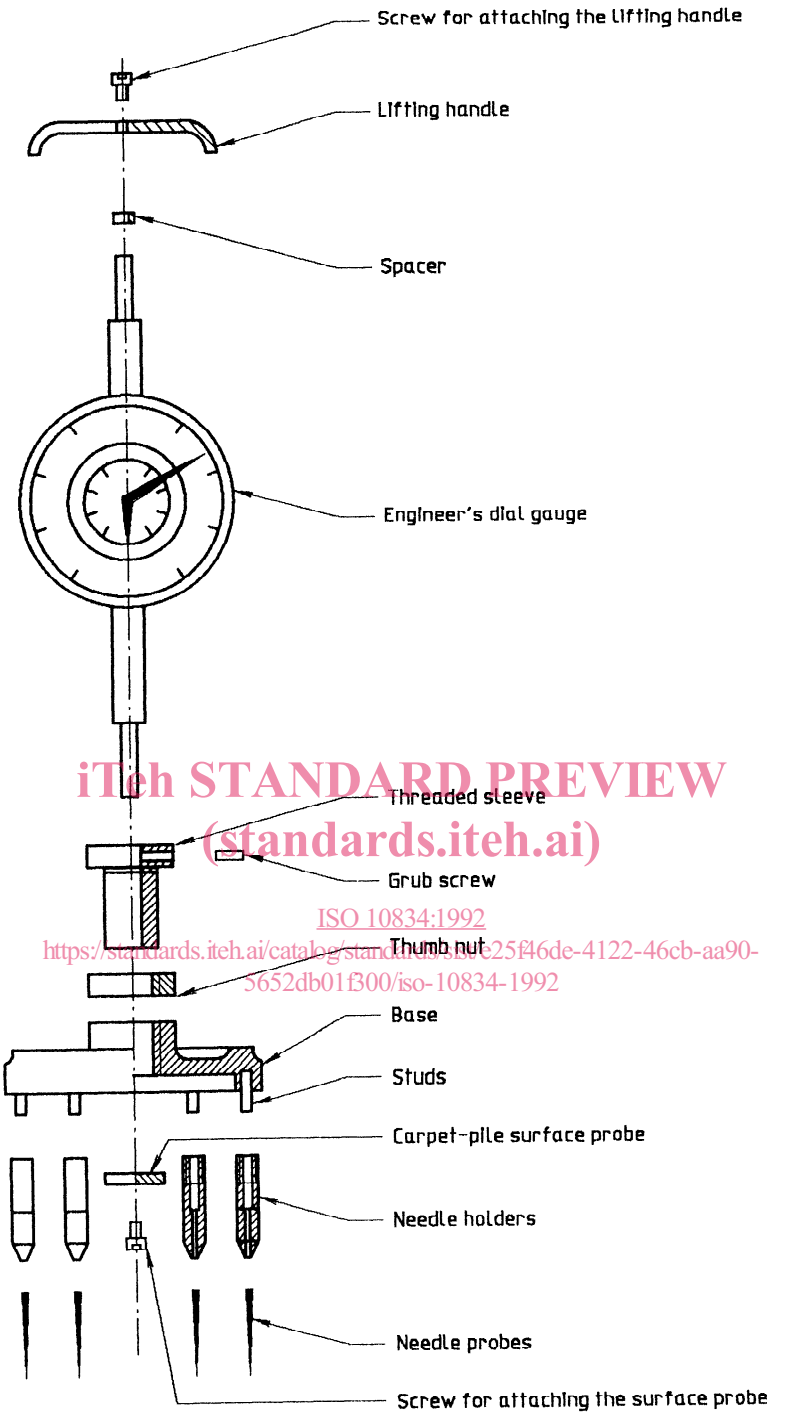

Figure 1 — Exploded diagram of the WRONZ pile-thickness gauge

5.1.2 Annular probe, for locating the upper surface of the backing under standard loading, consisting of six needles with 0,5 mm diameter and 75° tip cone angle (see figure 2), arranged in a circle concentric with the presser foot and with an at least 20 mm larger diameter, the tips of the needles being disposed in a plane parallel to the face of the presser foot with a tolerance of parallelism of 1 in 500.

5.1.3 Smooth baseplate, of dimensions larger than the probe.

5.1.4 Dial gauge, capable of measuring the displacement of the probe and the presser foot to within 0,1 mm over a range of 50 mm.

5.1.5 Lifting handle, attached to the presser foot.

5.2 Straight edge, for example a ruler, for brushing the surface of the specimen.

6 Atmosphere for conditioning and testing

Either conduct the test in the environment where the test material is available, i.e. in the place of manufacture or where the textile floor covering is installed, or conduct the test in one of the standard atmospheres for conditioning and testing of textiles specified in ISO 139.

7 Preparation of test specimens

7.1 Selection

Where possible, select the specimens, or areas of textile floor covering to be measured, in accordance with the directions in ISO 1957.

7.2 Number, area and location of specimens

Prepare sufficient specimens to allow at least 20 measurements to be made. Test specimens shall be at least 120 mm × 120 mm, but they may be of any larger dimensions as required by other tests. Alternatively, several measurements may be made on one larger sample or on a textile floor covering in course of manufacture or already installed, provided the centres of the areas in contact with the presser foot are not less than 75 mm apart and 20 mm from an edge and a substantially smooth horizontal surface (see 8.2) exists beneath the test area. Select the specimens from areas well away from distorted parts of the sample.

7.3 Brushing of pile

For every situation, whether it concerns textile floor covering specimens in the laboratory, or product in the carpet mill or installed carpet, lightly brush the pile, first against and then with the direction of pile lean, using the straight edge (5.2).

7.4 Conditioning

After brushing, lay each laboratory test specimen flat and condition for a minimum of 24 h in the standard atmosphere selected in accordance with clause 6.

8 Procedure

8.1 Place the measuring instrument (5.1) such that its probe (5.1.2) and presser foot (5.1.1) contact a smooth, horizontal surface and adjust the dial gauge (5.1.4) to zero.

Check that all the needles contact the horizontal surface and renew as necessary.

8.2 Ensure the specimen is lying use-surface uppermost on a smooth horizontal surface.

Dimensions in millimetres, except where otherwise stated

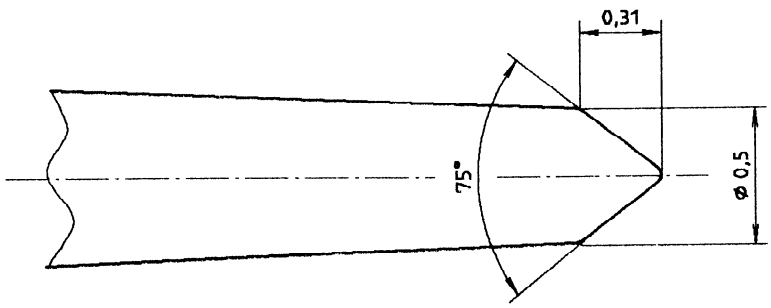

Figure 2 — Tip of a tapestry needle

8.3 Holding the instrument by the lifting handle (5.1.5), lower it gently on to the specimen and note the gauge reading to the nearest 0,1 mm, within 5 s. None of the needles of the probe shall be within 20 mm of the edge of the specimen when a measurement is made. (When a specimen of more than one thickness level or pile construction is being tested, no part of the presser foot shall be within 20 mm of a change of construction.)

The minimum distance between successive measurements shall be 25 mm and, where possible, the measurements shall be located on different machine-direction and cross-direction lines.

8.4 Unless otherwise directed in material specifications, make sufficient measurements to ensure that the mean of the values will have confidence limits (precision) of ± 5 % at a probability level of 95 %.

8.4.1 If the typical coefficient of variation for the style of textile floor covering being tested is reliably known by prior experience, compute the number of measurements required to attain the desired confidence limits, using the equation given in 8.4.5.

8.4.2 If there is no reliable prior knowledge regarding the coefficient of variation for the sample style, make 10 measurements.

8.4.3 Calculate the mean and the coefficient of variation for the measurements made. Compute the confidence limits CL, expressed as a percentage, using the equation:

$$CL = \pm \frac{t \times CV}{\sqrt{n}}$$

where

t is the appropriate value of Student's t;

CV is the coefficient of variation, expressed as a percentage;

n is the number of measurements.

NOTE 2 Annex A contains selected values of Student's t appropriate for use in the majority of situations that will arise in the use of this test procedure.

8.4.4 If the confidence limits fall within ± 5 % (or other specified values), discontinue testing.

8.4.5 If the confidence limits fall outside ± 5 % (or other specified values), compute the total number of measurements n required, using the equation:

$$n = \frac{t^2 \times CV^2}{CL^2}$$

where t, CV and CL are as defined in 8.4.3.

8.4.6 Make the additional measurements required and, using all values obtained, calculate anew the mean, the coefficient of variation and the confidence limits.

8.4.7 Repeat steps 8.4.4 to 8.4.6 as necessary until the final confidence limits fall within ± 5 % (or other specified values).

8.5 When a sample of textile floor coverings has distinct regions of different pile level or of different pile types (loop, cut, tip-sheared), test each level or type separately, following the procedure specified in 8.4.

9 Calculation and expression of results

For each thickness level or type of pile construction in the sample, calculate the arithmetic mean and the coefficient of variation of the pile thickness measurements. Record the mean to the nearest 0,1 mm.

10 Test report

The test report shall include the following particulars:

a) all the information necessary for complete identification of the sample;

b) the date of the test;

c) a reference to this International Standard;

d) for the laboratory test, the standard atmosphere (ISO 139) used and, for tests outside the laboratory, the temperature and relative humidity at the test location, together with any other pertinent information regarding the location;

e) for each thickness level or type of pile construction in the sample, the arithmetic mean of the pile thickness, the coefficient of variation and the number of measurements made;

f) any operations not specified in this International Standard or in the International Standards to which reference is made, or regarded as optional, which might have affected the results.

Annex A
(informative)

Values of Student's t for probability level of 95 % and two-sided confidences (i.e. $\pm$ limits)

Number of specimens	Degrees of freedom	Student's t
4	3	3,182
5	4	2,776
6	5	2,571
7	6	2,447
8	7	2,365
9	8	2,306
10	9	2,262
11	10	2,228
12	11	2,201
13	12	2,179
14	13	2,160
15	14	2,145
16	15	2,131
17	16	2,120
18	17	2,110
19	18	2,101
20	19	2,093
21	20	2,086
22	21	2,080
23	22	2,074
24	23	2,069
25	24	2,064
26	25	2,060
27	26	2,056
28	27	2,052
29	28	2,048
30	29	2,045
31	30	2,042
41	40	2,021
61	60	2,000
∞	∞	1,960

UDC 645.13-0.37:677.017.224:531.717

Descriptors: textiles, floor coverings, textile floor coverings, pile fabrics, tests, non-destructive tests, thickness measurement.

Price based on 5 pages