INTERNATIONAL STANDARD

ISO 10361

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Textile floor coverings — Production of changes in appearance by means of Vettermann drum and hexapod tumbler testers

Revêtements de sol textiles — Production de changements d'aspect au moyen d'essais au tambour Vettermann et au tambour pour hexapode

Reference number
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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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10361 was prepared by Technical Committee ISO/TC 219, *Floor coverings.*

This first edition cancels and replaces ISO Technical Report ISO/TR 10361, which has been upgraded.

Introduction

This International Standard describes two instruments for fatiguing textile floor covering specimens and the production of changes in appearance in laboratory simulation of wear. The fatigued specimens are examined and assessed by the method described in ISO 9405.

Originally this document describing drum testers for fatiguing textile floor coverings was published as a type 2 Technical Report. This was to keep it in line with ISO/TR 9405 which also had this status and also to allow use of the methods prior to their being given full International Standard status.

After considerable experience with ISO/TR 9405, ISO/TC 219 decided to revise that document with a view to publishing it as a full International Standard. At the same time ISO/TC 219 also agreed to revise ISO/TR 10361 and upgrade it to full International Standard status.

The original work using the testers correlated appearance retention after a number of revolutions with long-term use in a heavy-wear situation. For the Vettermann drum tester, the number of revolutions used was 22 000, whilst the number used with the hexapod tumbler tester was 12 000.

It has now become apparent that a shorter test (in both Vettermann drum and hexapod tumbler) can provide more useful information for the early changes in appearance or for less severe wear sites, and consequently this standard makes allowances for assessment at earlier stages.

Experience in Europe has shown that 5 000 revolutions in the Vettermann drum corresponds well to 4 000 revolutions in the hexapod tumbler test.

Textile floor coverings — Production of changes in appearance by means of Vettermann drum and hexapod tumbler testers

1 Scope

This International Standard describes procedures for using the Vettermann drum tester and the hexapod tumbler tester to produce changes in appearance for all textile floor coverings due to changes in surface structure and colour produced by mechanical agencies. It does not include pilling or colour changes due to other agencies.

Changes produced by these drum testers are assessed in accordance with ISO 9405.

2 Normative references

The following normative documents contain provisions which, 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 139:1973, *Textiles — Standard atmospheres for conditioning and testing.*

ISO 868:1985, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness).*

ISO 1957, *Machine-made textile floor coverings — Selection and cutting of specimens for physical tests.*

ISO 2424, *Textile floor coverings — Vocabulary*.

ISO 9405, *Textile floor coverings — Assessment of changes in appearance*.

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 2424 apply.

4 Principle

A steel ball or a hexapod with studs rolls randomly inside a rotating drum which is lined with the textile floor covering specimens.

After fatiguing, the change in appearance of the specimens is assessed in accordance with ISO 9405.

5 Method A – Vettermann drum method

5.1 Apparatus

5.1.1 Vettermann drum tester, with a metal drum of the following dimensions (see Figure 1):

— internal diameter: 730 mm ± 10 mm;

— internal depth: 270 mm ± 5 mm;

— effective depth: 240 mm ± 7 mm;

— thickness of curved surface: 8 mm ± 0,5 mm.

The drum shall be capable of rotating at a speed of (0,266 ± 0,016) s^{-1} [(16 ± 1) r/min] and shall have facilities for reversing the direction of rotation every 5 min with approximately 1 s stationary time.

The drum system shall incorporate a revolution counter, and specimens shall be held in place by four adjustable retaining segments (thickness 15 mm ± 1 mm) on each side wall of the drum.

Loose pile fibres shall be removed by means of a free-running brush mounted so as to be in light contact with the surface of the specimens, and the fibres extracted by a vacuum cleaner.

Figure 1 illustrates the drum in cross-section.

A vulcanized-fibre backing sheet of size 2 320 mm × 270 mm × 1,5 mm thick and of density 1,1 g/cm^3 to 1,3 g/cm^3 at 20 °C is loosely laid inside the drum shell on the working side.

The sheet remains permanently in the drum.

5.1.2 Steel ball, fitted with 14 cylindrical rubber studs located so as to be equally spaced on the ball surface. The studs shall be replaceable and screwed into flat faces machined into the surface of the ball. See Figure 2.

Diameter of the ball:	120 mm ± 0,2 mm
Distance between diametrically opposed flat stud-mounting faces:	118 mm ± 0,1 mm
Mass without studs:	6 800 g ± 100 g
Mass with 14 studs:	7 600 g ± 100 g

Each stud shall consist of a light grey composite rubber disc attached to a steel backing plate having an integral mounting screw.

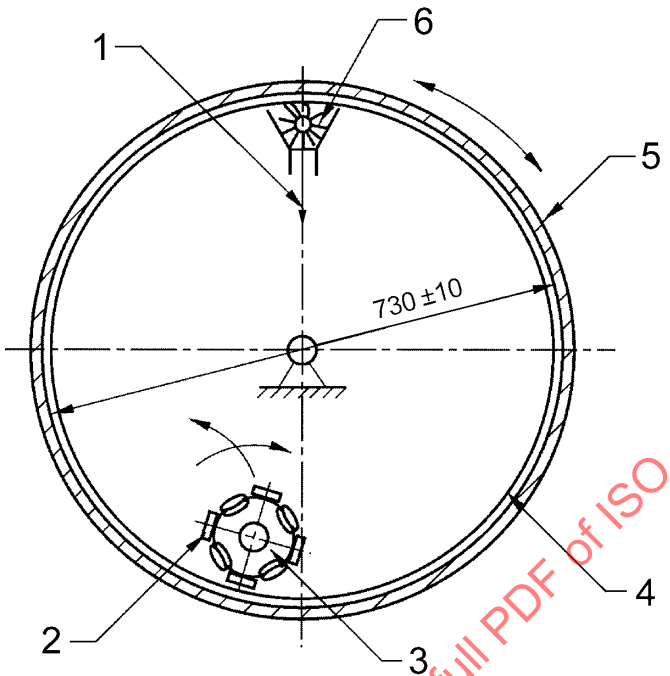
Diameter of stud:	40 mm ± 0,5 mm
Total height (including backing plate, but not mounting screw):	15 mm ± 0,5 mm
Usable thread length:	20 mm
Thickness of steel backing plate:	3 mm
Shore A hardness, measured in accordance with ISO 868	48 ± 3

After each test (22 000 cycles) replace two opposite studs with new ones.[1)] The two studs that have been used longest shall be replaced first.

[1)] Replacement studs for the Vettermann drum tester can be obtained from Schönberg GmbH, Postfach 200364, 40777 Monheim, Germany. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

5.1.3 Upright vacuum cleaner, having a width of suction head at least equal to the width of the specimens.

Dimensions in millimetres



Key

1 Extraction of brushed fibres
2 Rubber stud
3 Steel ball
4 Vulcanized-fibre backing sheet
5 Metal drum
6 Circular brush

Figure 1 — Vettermann drum tester

Dimensions in millimetres,
surface roughgness in micrometres

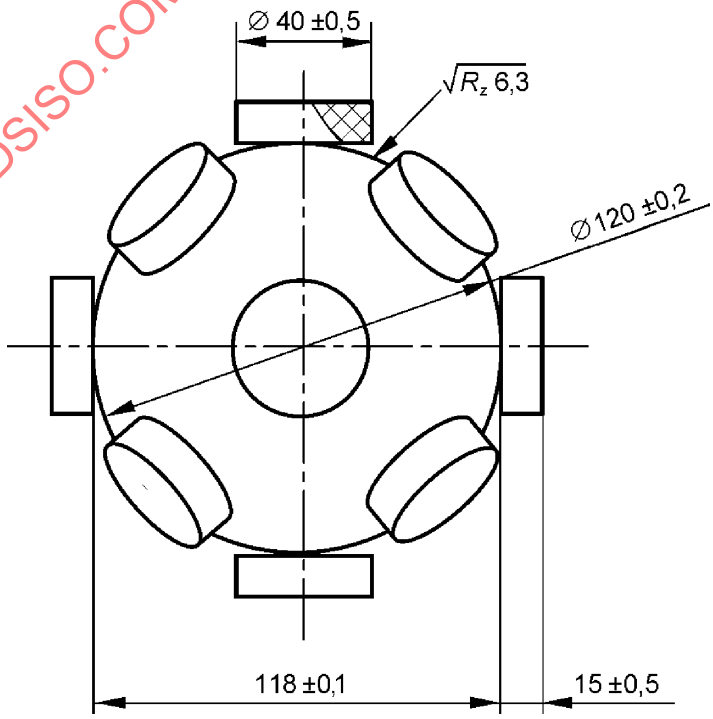


Figure 2 — Steel ball

5.2 Atmosphere for conditioning and testing

Use an atmosphere of relative humility (65 ± 2) %, and of temperature 20 °C ± 2 °C, in accordance with ISO 139, for both conditioning and testing.

5.3 Selection and preparation of test specimens

5.3.1 Selection

Select the specimens in accordance with ISO 1957 to be as representative as possible of the bulk. Before cutting out the test specimens, mark the sample and each test specimen on the back with an arrow set in the direction of pile lay.

NOTE Colour and design may play a large part in the assessment of appearance retention, and this should be borne in mind when selecting specimens.

5.3.2 Number and dimensions

Cut four specimens each measuring 570 mm long in the direction of manufacture by 265 mm wide. Cut a similarly sized and positioned specimen for comparison purposes.

NOTE Provided that there is no fibre or finish transfer, for production control purposes specimens from up to four different samples of similar thickness may be tested at the same time.

For materials with a pronounced direction of pile lay, specimens shall be tested in both machine and cross-machine direction.

5.3.3 Preparation

The test specimens and the specimen for comparison shall be cleaned with the upright vacuum cleaner (5.1.3) as described in 5.4 and left to condition flat, singly, pile uppermost for at least 24 h.

To prevent fraying, apply adhesive tape to the edges of the specimens.

5.4 Procedure

Fit the specimens into the drum (5.1.1), with the use surface towards the centre of the drum and the edges under the retaining segments. Ensure that the ends of the specimens lie near the centre of the retaining segments and clamp firmly.

If required, non-foam backed textile floor coverings may be tested over an underlay by mounting the underlay in the drum (5.1.1) prior to fitting the specimens into the drum as described above.

NOTE Test results apply only to the combination of carpet and specific underlay. They are not valid for combinations with other underlays. For identification of the underlay used it is recommended to give the following details: material, mass per unit area and thickness.

Check that the ball (5.1.2), together with its studs, is clean and free from any contamination, if necessary wiping over with a clean tissue and suitable solvent. Place the ball in the drum. Preset the revolution counter for either

— 22 000 revolutions (which will take approximately 23 h), to simulate long-term use in a heavy-wear situation or

— 5 000 revolutions, to simulate early changes in appearance or for use in less severe wear sites

then switch the machine on to start the test.

After the test, clean the specimens with the upright vacuum cleaner (5.1.3), making four forward and backward passes along the length and ensuring that all of the area is covered and that the final pass is in the direction of pile lay.

Allow the specimens to condition flat, singly and pile uppermost for at least 24 h before assessing in accordance with ISO 9405.

Assessments at Intermediate numbers of cycles may be carried out provided that the specimens are vacuum cleaned and examined as for the final assessment, except that they are assessed immediately without reconditioning.

6 Method B – Hexapod method

6.1 Apparatus

6.1.1 Hexapod tumbler tester, with a plastic drum of the following dimensions:

— internal diameter: 305 mm ± 1 mm;

— wall thickness: approximately 8 mm;

— internal depth: 200 mm ± 1 mm.

The drum shall be capable of rotating at a speed of (0,583 ± 0,033) s^{-1} [(35 ± 2) r/min] and shall have facilities for reversing the direction of rotation every 15 min. The drum system shall incorporate a revolution counter and the drum base and lid shall have a locating groove to hold a specimen backing sheet (6.1.2) flat against the inner wall of the drum. Figure 3 illustrates the drum and lid disassembled and Figure 4 shows the drum in cross-section.

6.1.2 Polyethylene specimen-backing sheet, of size 950 mm × 215 mm × 2 mm thick.

6.1.3 Hexapod, comprising a 50 mm mild steel cube with 25 mm thick plates welded to each face. The outside corners of the plates shall be rounded such that when the studs are fitted and the hexapod placed on a flat surface, no metal touches the flat surface. See Figure 5.

A replaceable polyurethane stud with steel backing shall be screwed centrally into each face.

Diameter of stud:	40 mm ± 1 mm
Height of stud:	15 mm ± 1 mm
Edge radius of stud:	15 mm ± 1 mm
Thickness of steel backing:	3 mm + 0,25 mm
Shore A hardness, measured in accordance with ISO 868:	85 to 100
Total mass of hexapod with its six studs:	3,8 kg ± 0,1 kg

Studs shall be replaced if worn out or damaged and in any case after two years' use.[2)]

6.1.4 Double-sided adhesive tape, 50 mm wide.

6.1.5 Upright vacuum cleaner, having a width of suction head at least equal to the width of the specimens.

2) Replacement studs for the hexapod tumbler tester can be obtained from BTTG, Wira House, West Park Ring Road, Leeds LS16 6QL, UK. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

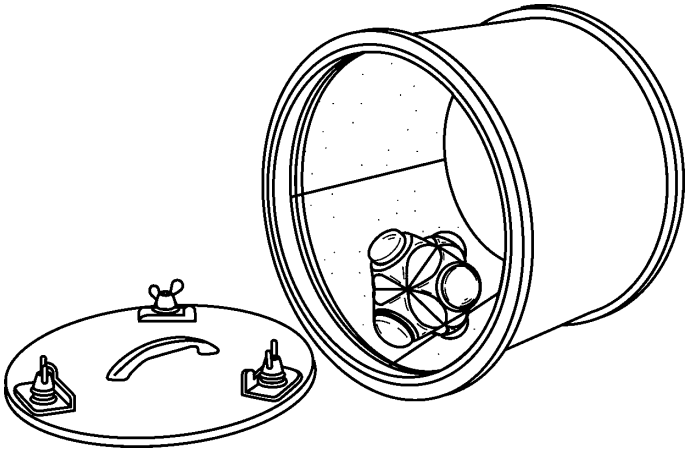
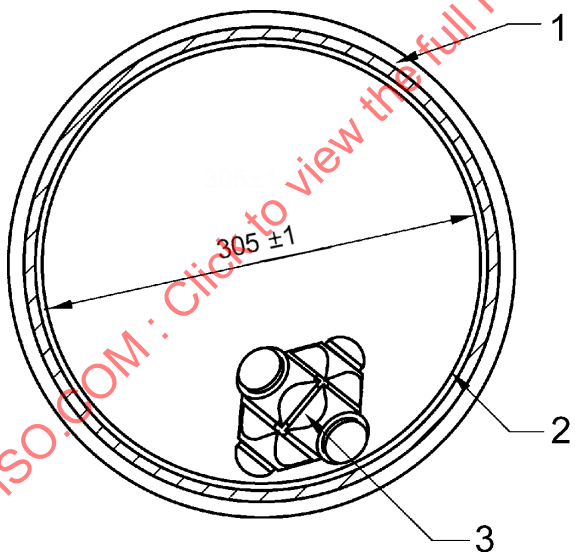


Figure 3 — Hexapod tumbler tester

Dimensions in millimetres



Key

1 Plastic drum
2 Polyethylene specimen backing sheet
3 Hexapod

Figure 4 — Hexapod tumbler cross section