
**Resilient floor coverings — Determination
of flexibility and deflection**

*Revêtements de sol résilients — Détermination de la flexibilité et de la
déformation*

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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 24344 was prepared by Technical Committee ISO/TC 219, *Floor coverings*.

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Resilient floor coverings — Determination of flexibility and deflection

1 Scope

This International Standard specifies methods for determining the flexibility and deflection of resilient floor coverings.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

flexibility

ability of a resilient floor covering to be bent without breaking or cracking

3 Principle

3.1 Method A (for determining flexibility)

The test piece shall be bent 180° around a mandrel under specified conditions.

3.2 Method B (for determining deflection)

The test piece is deformed with a cylinder with a radius of curvature much greater than the test piece thickness by a force centred between two fixed supports.

4 Apparatus

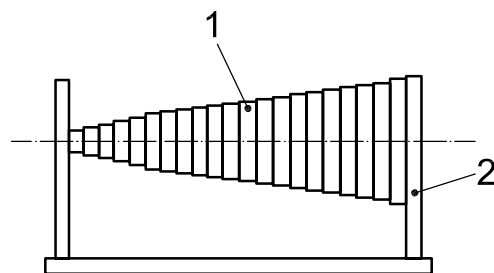
4.1 Method A

4.1.1 Fixed metal mandrels, with nominal diameters ($\pm 0,05$ mm) as follows: 120, 110, 100, 90, 80, 70, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, 7 mm (see Figure 1).

The contacting faces of the rods shall be a minimum of 60 mm in length.

4.1.2 Stand or other device, to firmly support the mandrel in a horizontal position during the test.

4.1.3 Die or knife or similar, to prepare test specimens with uniform smooth edges.



Key

- 1 mandrel
- 2 support

Figure 1 — Mandrel

4.2 Method B

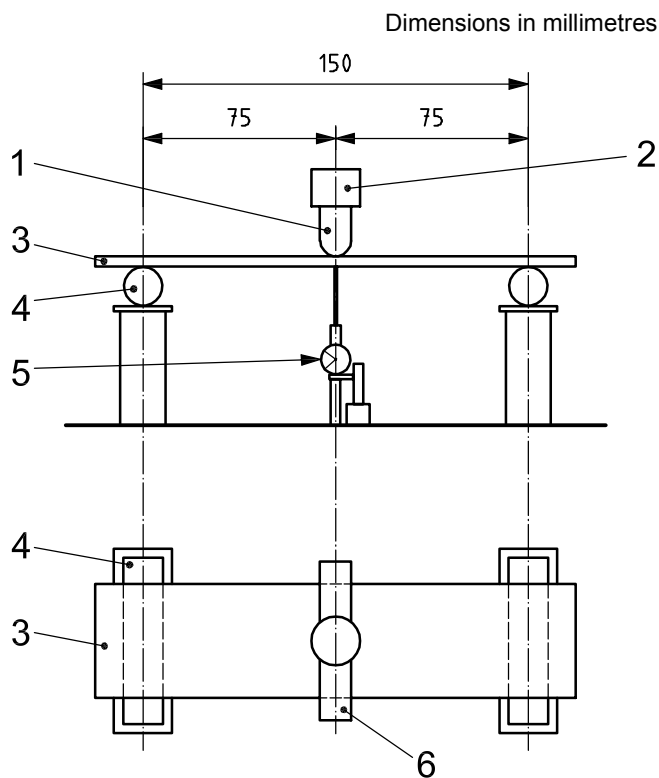
4.2.1 Test piece stand (deflection frame), as shown in Figures 2 and 3, comprising two metal cylinders, of diameter 8 mm and minimum length 60 mm, with a distance of 150 ± 5 mm between the two axes of the cylinders.

4.2.2 Tensile test apparatus, capable of holding the test piece stand.

4.2.3 Parallel bar with a radius of 4 mm, centred between the two cylinders, which can be displaced in the vertical plane of symmetry of the stand at a speed of (100 ± 5) mm/min and a movement of at least 65 mm at a load of 4,5 kg.

4.2.4 Cutting device, for cutting the samples to 50 mm $\times$ 250 mm.

4.2.5 Water bath, capable of maintaining a temperature of $(25 \pm 0,5)$ °C.

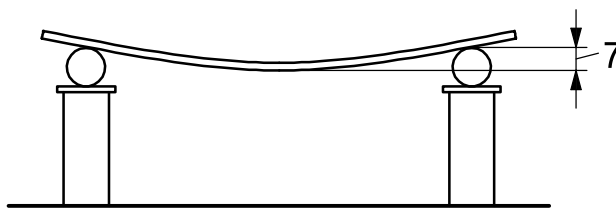


Key

- 1 steel bar radius, $r = 4$ mm
- 2 load
- 3 specimen
- 4 steel bar, $r = 4$ mm
- 5 dial gauge
- 6 loading bar

Figure 2 — First example of deflection frame

Dimensions in millimetres

**Key**

1 deflection, mm

Figure 3 — Second example of deflection frame**5 Sampling and selection of specimens for both methods**

Take a representative sample from the material to be tested. Take six specimens from each sample, each measuring 250 mm × 50 mm, at equal distances from each other. The distance between the outer edge of the test specimen being at least 100 mm. Take three specimens in the direction of manufacture and three in the transverse direction.

Prepare the specimen by means of a die, knife, or other similar instrument, so as to produce uniform smooth edges. Specimens with nicked or fractured edges should not be tested. If necessary, place the sample in an oven at 30 °C for 15 min before cutting the test pieces. Ensure that the edges of the test pieces are clean-cut without notches.

6 Atmosphere for conditioning and testing**6.1 Method A**

Condition the test pieces and mandrels at a temperature of $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity for 24 h and perform the test in the same environment.

Specimens shall be flat and conditioned on a flat surface not leaving any curvature.

6.2 Method B

Store the test pieces in a water bath at $25 ^\circ\text{C} \pm 0,5 ^\circ\text{C}$ for a minimum of 3 h before testing.

7 Test procedure**7.1 Method A**

7.1.1 Place the test piece over a mandrel with the wearing surface facing out and with the major axis of the specimen perpendicular to the major axis of the mandrel.

7.1.2 Holding the specimen at each end, bend the material around the mandrel through an angle of 180° at a uniform rate within 3 s to 5 s to complete the bend. Maintain a good contact between the specimen and mandrel.

7.1.3 At the completion of the bending operation, examine the specimen face visually in the bent position for breaks, cracks, or other damage. When required by the detailed specification, straighten the specimen at the same rate at which it was bent, and examine the back for the same faults.

If the machine direction cannot be determined by the appearance of the material, three specimens shall be cut parallel to one edge of the material and three shall be cut perpendicular to that edge. Report that the machine direction could not be determined.

7.1.4 Repeat the steps in 7.1.1 to 7.1.3, with the specimen face inside against the mandrel. Examine the back visually, while the specimen is still in the bent position, for cracks, breaks, or other damage. Then straighten the specimen and examine the wearing surface. Use fresh specimens for the part of the test with the specimen face inward.

7.2 Method B

7.2.1 Ensure that the deflection speed of the tensile test apparatus is 100 ± 5 mm/min.

7.2.2 Centre the test piece in the frame.

7.2.3 Ensure that the three bars are parallel and that the centre-bar is accurately centred between the two outside bars. Position the frame so that the test sample can be placed with the wearing surface touching the centre-bar, and the back surface touching the two other bars, without deflection of the sample. This is the zero point for measuring deflection.

7.2.4 Ensure that the deflection-measuring device accurately measures the relative movement between the centre-bar and the frame holding the two outer bars.

7.2.5 Start the machine and record the deflection at the point where the sample breaks, or pulls free from the outer bars. Record the deflection to the nearest 1,0 mm. Remove the sample from the apparatus, and return the deflection frame to the zero point described in 7.2.3.

Repeat the process described above on the next test piece and start testing it.

NOTE If a pendulum weighing system is used on the test machine, which has appreciable movement of the attached jaw, the mechanism can be locked in place to make measurement of the deflection easier, and maintain the specified deflection rate, since measurement of the load is not required. Electronic load cell machines usually have negligible movement.

8 Expression of results for both methods

Report the results of the tests as cracking or not cracking, ignoring any effects within 10 mm of the edges of the test piece.

8.1 Method A

When the material is required to pass a specified mandrel, report the passing or failing of each test piece relative to this mandrel. The pass criteria is that neither the face nor the back may exhibit breaks, cracks, or other permanent damage (a different size mandrel may be specified for the machine- and cross-machine direction).

If no mandrel diameter is specified, report the smallest mandrel around which the material may be bent without showing breaks, cracks or other permanent damage.

8.2 Method B

Record the maximum deflection on the dial gauge at break for each test piece.

9 Test report

The test report shall contain the following information:

- a) a reference to this International Standard, ISO 24344, Method A or B;
- b) a complete identification of the product tested, including type, source, colour and manufacturer's reference numbers;
- c) previous history of the sample;
- d) for method A, the appearance of cracking, etc. after testing with the specified product mandrel, together with the diameter of the mandrel used;
- e) for method B, whether or not cracking has occurred at a specific deflection;
- f) deflection for each specimen, information about the direction of the long dimension of the sample (that is, the machine direction or across-machine direction);
- g) any deviation from this International Standard which may have affected the results;
- h) the date of the test.

10 Precision and bias statement

Due to the subjective nature of these test methods, no precision and bias can be established.