INTERNATIONAL STANDARD

ISO 23996

First edition
2007-12-15

Resilient floor coverings — Determination of density

Revêtements de sol résilients — Détermination de la masse volumique

Reference number
ISO 23996:2007(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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 23996 was prepared by Technical Committee ISO/TC 219, *Floor coverings*.

Resilient floor coverings — Determination of density

1 Scope

This International Standard describes two methods for determining the density of homogeneous resilient floor coverings and solid layers of other resilient floor coverings.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 24342, *Resilient and textile floor-coverings — Determination of side length, edge straightness and squareness of tiles*

ISO 24346, *Resilient floor coverings — Determination of overall thickness*

3 Terms and definitions

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

3.1
density
quotient of mass divided by volume

4 Sampling

Take three tiles or a sample of at least 1 000 mm × 1 000 mm for sheet material.

5 Atmosphere for conditioning and testing

Condition the samples at a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) % for a minimum of 24 h. Maintain these conditions when conducting the test.

6 Method A

6.1 Principle

A test piece of known mass is immersed in a liquid and reweighed, and its density is calculated.

6.2 Apparatus

6.2.1 **Balance**, with a sensitivity of 1 mg.

6.2.2 **Pad straddle**, or other stationary support.

6.2.3 **Beaker**, of 200 ml capacity.

6.2.4 **Thin wire**, of maximum diameter 0,125 mm.

6.2.5 **Freshly distilled water**, containing not more than 0,1 % of wetting agent (to help in removing air bubbles) at a temperature of (23 ± 2) °C.

6.3 Selection of specimens

Take three test specimens at equal distances from the sample, the distance between the outer edge of the sample and the nearest edge of the test piece being at least 100 mm, or from individual tiles. Each test specimen should have minimum dimensions of 30 mm × 30 mm or a diameter of 36 mm.

6.4 Test procedure

Weigh the test specimen with the thin wire suspended around it. Record the mass, m_1. Immerse the test specimen, still suspended by the wire, in the distilled water contained in the beaker on the pan straddle or other stationary support. Remove adhering bubbles with a fine wire. Mark the level of immersion and record the mass of the immersed test specimen, m_2. Immerse the remaining test specimen at the same level.

6.5 Calculation and expression of results

Calculate the density, ρ, in kilograms per cubic metre, of the test specimen from the following equation:

$$\rho = (m_1 \times \rho H_2O)/(m_1 - m_2)$$

where

m_1 is the initial weight of the test specimen, in kilograms;

m_2 is the weight of the immersed test specimen, in kilograms;

ρH_2O is the density of water, at the temperature specified in 6.2.5, in kilograms per cubic metre.

Calculate the mean result for the three test specimens and express the result to the nearest 1 kg/m^3.

6.6 Precision statement

A round-robin test will be conducted to determine the precision of this method.

7 Method B

7.1 Principle

A test piece of known dimensions is weighed and its density calculated from the quotient of mass and volume. This method cannot be used if the surface and/or back side has a texture.

7.2 Apparatus

7.2.1 Apparatus described in ISO 24342, for measuring the side length and width of the rectangular sample.

7.2.2 Apparatus described in ISO 24346, for measuring the thickness of the sample.

7.2.3 Balance, with a sensitivity of 1 mg.

7.3 Selection of specimens

Cut three test specimens of at least 100 mm × 100 mm using a rectangular shape. From the sample, cut the test specimens at equal distances from each other. The distance between the outer edge of the sample and the nearest edge of the test specimens shall be at least 100 mm.

In the case of tiles, take the three individual tiles.

7.4 Test procedure

For each test, measure and record the thickness and the dimensions to the nearest 0,1 mm. Weigh each test specimen separately and record the mass to the nearest 10 mg.

7.5 Calculation and expression of results

Calculate the density, ρ, in kilograms per cubic metre, using the following equation and round off to the nearest 0,01.

$$\rho = 10^6 \times M/V$$

where

M is the mass of the test specimen, in grams;

V is the volume of the test specimen, in cubic millimetres.

Calculate the mean value of the three test specimen and round off to the nearest 0,1 kg/m^3.

7.6 Precision statement

A round-robin test will be conducted to determine the precision of this method.

8 Test report

The test report shall contain the following information:

a) a statement that the tests were performed in accordance with this International Standard (ISO 23996), method A or B;

b) date(s) on which the tests were carried out;

c) complete identification of the product tested, including type, source, colour and manufacturers' reference numbers;

d) previous history of the sample;

e) any deviation from this International Standard which may have affected the results;

f) mean value of the density.

Bibliography

[1] ISO 1183 (all parts), *Plastics — Methods for determining the density of non-cellular plastics*

[2] EN 436, *Resilient floor coverings — Determination of density*