
Textile floor coverings and textile floor coverings in tile form — Determination of dimensional changes due to the effects of varied water and heat conditions and distortion out of plane

Revêtements de sol textiles et revêtements de sol textiles sous forme de dalles – Détermination de la variation des dimensions et de l'incurvation due aux effets de diverses conditions de mouillage et de chaleur

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Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Apparatus	1
5 Sampling and preparation of specimens	2
5.1 For textiles floor coverings	2
5.1.1 Sampling	2
5.1.2 Number and dimensions	2
5.2 For tiles	2
5.2.1 Tiles of dimensions ≤ 500 mm	2
5.2.2 Tiles of dimensions > 500 mm	2
6 Conditioning	2
7 Test procedure	3
7.1 Initial measurements for textile floor coverings	3
7.1.1 Distortion out of plane	3
7.1.2 Dimensional stability	3
7.2 Initial measurements for tiles	3
7.2.1 Distortion out of plane	3
7.2.2 Dimensional stability	3
7.3 Measurements for textile floor coverings and tiles subjected to varied water and heat conditions	3
8 Expression of results	4
8.1 Dimensional stability	4
8.2 Distortion out of plane	4
9 Test report	4

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 2551:1981), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the scope has been expanded to include the testing of textile floor covering tiles and the determination of distortion out of plane.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Textile floor coverings and textile floor coverings in tile form — Determination of dimensional changes due to the effects of varied water and heat conditions and distortion out of plane

1 Scope

This document specifies a procedure for the determination of the dimensional changes and distortion out of plane likely to take place when textile floor coverings and tiles are subjected to varied water and heat conditions.

The method is applicable to all textile floor coverings and textile floor coverings in tile form.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 139, *Textiles — Standard atmospheres for conditioning and testing*

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

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

dimensional stability

determination of changes in the flat dimensions of a specimen after treatment under various specified conditions of moisture and heat

3.2

distortion out of plane

measurement of the vertical deformation shown by the specimen after treatment under various specified conditions of moisture and heat

4 Apparatus

4.1 Equipment for measurement of dimensional stability, consisting of the following.

4.1.1 Instrument capable of measuring a dimension to an accuracy of 0,05 mm, such as a slide gauge or measuring table or an opto-electronic system or optical bench.

4.1.2 Loading plate, of metal or glass of dimensions slightly smaller than the test specimen, or any other device capable of keeping the specimen flat during measurement of dimensional change.

4.2 Equipment for measurement of distortion out of plane, consisting of the following.

4.2.1 Instrument capable of measuring the vertical dimension to an accuracy of 0,5 mm.

4.2.2 Support plate, of dimensions slightly larger than the test specimen on which to place the specimen during measurement.

4.2.3 Loading plate, of dimensions slightly smaller than the test specimen to put on the test specimen during measurement.

4.3 Steel pins, or other appropriate means of indicating the reference points on the test specimen, if necessary.

4.4 Drying oven, with forced ventilation able to maintain a temperature of $60\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ containing removable shelves of smooth inert material with perforations to permit free circulation of air.

4.5 Container, to hold water at $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, of dimensions at least 20 mm greater than the test specimen and deep enough to permit the test specimen to be submerged.

5 Sampling and preparation of specimens

5.1 For textiles floor coverings

5.1.1 Sampling

Select the specimens according to the directives in ISO 1957.

5.1.2 Number and dimensions

Take at least three test specimens each measuring not less than 250 mm × 250 mm, noting the direction of manufacture.

5.2 For tiles

5.2.1 Tiles of dimensions $\leq 500\text{ mm}$

Take at least three tiles as delivered by the manufacturer, marking to show the direction of manufacture.

5.2.2 Tiles of dimensions $> 500\text{ mm}$

From these tiles, take at least three specimens and reduce the size to dimensions not greater than 500 mm × 500 mm.

6 Conditioning

Condition the test specimens in the standard atmosphere for testing textiles as defined in ISO 139 for at least 48 h or until constant mass.

7 Test procedure

7.1 Initial measurements for textile floor coverings

7.1.1 Distortion out of plane

Make all measurements on the conditioned specimen. Place each specimen with the use surface uppermost on the flat support (4.2.2). Measure the vertical distance between the support plate and the secondary backing, measure this distance in each direction and in the position where it is greatest with the apparatus in 4.2.1, or at various places along each edge (edge curl).

7.1.2 Dimensional stability

Make all measurements on the conditioned specimen when it is completely flat; this can be achieved by use of the loading plate (4.1.2) or other means.

On the conditioned specimen, measure the distance between the edges parallel to the direction of manufacture and between the edges at right angles to the direction of manufacture, each at two locations approximately 200 mm apart. If required by the measurement method adopted, mark the pair of reference points, for example by the use of steel pins (4.3), approximately 200 mm apart on the edge parallel to the direction of manufacture and also on the edge at right angles to the direction of manufacture. Carry out all specimen measurements to the nearest 0,05 mm.

For the determination of the dimensional stability, it is important to measure the backing; the measuring system will determine whether it should be positioned face upwards or downwards.

7.2 Initial measurements for tiles

7.2.1 Distortion out of plane

Make all measurements on the conditioned specimen. Place each specimen with the use surface uppermost on the flat support (4.2.2). Measure the vertical distance between the support plate and the secondary backing, measure this distance in each direction and in the position where it is greatest with the apparatus in 4.2.1, or at various places along each edge (edge curl).

7.2.2 Dimensional stability

For the determination of the dimensional stability, it is important to measure the backing; the measuring system will determine whether the tiles should be positioned face upwards or downwards.

Keeping the conditioned specimen flat with the loading plate (4.1.2), measure the distance between the sides parallel to the direction of manufacture then between the sides perpendicular to the direction of manufacture in at least two different places. Measure to the nearest 0,05 mm with the apparatus in 4.1.1.

7.3 Measurements for textile floor coverings and tiles subjected to varied water and heat conditions

7.3.1 The same test specimen should be treated consecutively by all of the following procedures. In some cases, e.g. for a complaint, only one stage (7.3.2, 7.3.3, 7.3.4 or 7.3.5) can be followed.

7.3.2 Place the test specimen in the oven at $60\text{ °C} \pm 2\text{ °C}$ so that air can circulate freely around the specimen. After 2 h, remove the specimen and perform the measurements in 7.1.2 or for tiles in 7.2.2 at an interval of (5 ± 1) min from the time of removal from the oven.

7.3.3 Immerse the test specimen flat in the water at $20\text{ °C} \pm 2\text{ °C}$. After 2 h, remove the specimen taking care not to distort it (e.g. as a result of its weight). The excess of water is removed by use of blotting

paper, care has to be taken not to distort the sample. Perform the measurements in [7.1.2](#) or, for tiles, in [7.2.2](#) at an interval of (5 ± 1) min from the time of removal from the water.

7.3.4 Place each test specimen in the oven with the use surface uppermost at $60 \text{ }^{\circ}\text{C} \pm 2 \text{ }^{\circ}\text{C}$ for 24 h then perform the measurements described in [7.1.2](#) or, for tiles, in [7.2.2](#) at an interval of (5 ± 1) min from the time of removal from the oven.

7.3.5 Re-condition the specimen in the standard atmosphere for testing textiles for 48 h or until constant mass. After conditioning, measure the distortion out of plane for the tiles and/or textile floor coverings as follows.

- Place each specimen with the use surface uppermost on the flat support ([4.2.2](#)).
- Measure the vertical distance between the support plate and the secondary backing, measure this distance in each direction and in the position where it is greatest with the apparatus in [4.2.1](#), or at various places along each edge (edge curl).

7.3.6 Then measure the dimensions of the specimen as indicated in [7.1.2](#) or for tiles in [7.2.2](#).

8 Expression of results

8.1 Dimensional stability

Calculate the average dimensional change (over the measured specimens) for each direction and each of the stages in the procedure, expressed as a percentage to the nearest 0,1 %, using [Formula \(1\)](#).

Calculate the dimensional change, expressed as a percentage of the mean, using [Formula \(1\)](#):

$$\frac{(l_m - l_o) \times 100}{l_o} \quad (1)$$

where

l_o is the arithmetic mean of the initial measurements;

l_m is the arithmetic mean at each stage.

Indicate the result with a "-" if it is a shrinkage and a "+" if it is an increase.

Whenever possible, the results may be expressed in the form of a graph.

8.2 Distortion out of plane

Normally, this is done only for tiles but in some cases, it can be requested for broadloom carpets.

For each specimen, express the greatest measurement of distortion out of plane measured according to [7.3.5](#).

9 Test report

The test report shall include the following information:

- a) a statement that the procedure was conducted in accordance with this document, i.e. ISO 2551:2020, and details of any operations not included, or optional;
- b) the complete identification of the product tested including type, source and the manufacture reference numbers;