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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Interior Floor Industrial Association (I.F.A)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS A 1454:2005** has been replaced with this Standard.

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Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Test methods — Resilient floor coverings

Introduction

This Japanese Industrial Standard has been prepared based on the fourth edition of ISO 105-B02 published in 1994, the first edition of ISO 23996 published in 2007, the first edition of ISO 23999 published in 2008, the first edition of ISO 24341 published in 2006, the second edition of ISO 24342 published in 2007, the first edition of ISO 24343-1 published in 2007, the first edition of ISO 24344 published in 2008, the first edition of ISO 24345 published in 2006, the first edition of ISO 24346 published in 2006 and the first edition of ISO 26987 published in 2008 with some modifications of the technical contents to reflect the actual situation in Japan. Specifications of indentation test (clause 9), dimensional stability after immersion in water (clause 12), test of thermal expansion coefficient (clause 13), curling test (clause 14), slip resistance test (clause 17), abrasion resistance test (clause 18), flameproof test (clause 19), caster resistance test (clause 21), electric characteristic test (clause 23) and VOC test (clause 24) not given in the corresponding International Standards are added in this Standard.

The portions given sidelines or dotted underlines are the matters in which the contents of the original International Standards have been modified. A list of modifications with the explanations is given in Annex JA.

In addition, the comparison table between previous and current editions of this Standard on technically significant revisions is given in Annex JB.

1 Scope

This Standard specifies the test methods for resilient floor coverings such as vinyl floor coverings, linoleum floor coverings, rubber floor coverings, poly olefin floor coverings used mainly for building floors.

NOTE : The International Standards corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 105-B02 : 1994 *Textiles — Tests for colour fastness — Part B02 : Colour fastness to artificial light : Xenon arc fading lamp test*

ISO 23996 : 2007 *Resilient floor coverings — Determination of density*

ISO 23999 : 2008 *Resilient floor coverings — Determination of dimensional stability and curling after exposure to heat*

ISO 24341 : 2006 *Resilient and textile floor coverings — Determination of length, width and straightness of sheet*

ISO 24342 : 2007 *Resilient and textile floor-coverings — Determination of side length, edge straightness and squareness of tiles*

ISO 24343-1 : 2007 *Resilient and laminate floor coverings — Determi-*

nation of indentation and residual indentation — Part 1 : Residual indentation

ISO 24344 : 2008 Resilient floor coverings — Determination of flexibility and deflection

ISO 24345 : 2006 Resilient floor coverings — Determination of peel resistance

ISO 24346 : 2006 Resilient floor coverings — Determination of overall thickness

ISO 26987 : 2008 Resilient floor coverings — Determination of staining and resistance to chemicals

(Overall evaluation : MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) listed below shall be applied.

- | | |
|--------------|---|
| JIS A 1453 | <i>Method of abrasion test for building materials and part of building construction (abrasive-paper method)</i> |
| JIS A 1455 | <i>Anti-static effect of floor coverings and installed floors — Methods of measurement and evaluation</i> |
| JIS A 1901 | <i>Determination of the emission of volatile organic compounds and aldehydes for building products — Small chamber method</i> |
| JIS A 1902-1 | <i>Determination of the emission of volatile organic compounds and aldehydes for building products — Sampling, preparation of test specimens and testing condition — Part 1 : Boards, wallpaper and floor materials</i> |
| JIS A 5430 | <i>Fiber reinforced cement boards</i> |
| JIS A 5536 | <i>Adhesives for resilient floor coverings and woody floorings</i> |
| JIS B 7502 | <i>Micrometer callipers</i> |
| JIS B 7503 | <i>Dial gauges</i> |
| JIS B 7506 | <i>Gauge blocks</i> |
| JIS B 7507 | <i>Vernier, dial and digital callipers</i> |
| JIS B 7512 | <i>Steel tape measures</i> |
| JIS B 7516 | <i>Metal rules</i> |

- JIS B 7524 *Feeler gauges*
- JIS B 7526 *Squares*
- JIS C 1302 *Insulation resistance testers*
- JIS G 3101 *Rolled steels for general structure*
- JIS G 3522 *Piano wires*
- JIS G 4053 *Low-alloyed steels for machine structural use*
- JIS G 4305 *Cold-rolled stainless steel plate, sheet and strip*
- JIS K 2240 *Liquefied petroleum gases*
- JIS K 6253 *Rubber, vulcanized or thermoplastic — Determination of hardness*
- JIS K 6900 *Plastics — Vocabulary*
- JIS K 7204 *Plastics — Determination of resistance to wear by abrasive wheels*
- JIS K 7350-2 *Plastics — Methods of exposure to laboratory light sources — Part 2 : Xenon-arc lamps*
- JIS K 7362 *Plastics — Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources*
- JIS K 8180 *Hydrochloric acid (Reagent)*
- JIS K 8576 *Sodium hydroxide (Reagent)*
- JIS L 0804 *Grey scale for assessing change in colour*
- JIS L 0841 *Test methods for colour fastness to daylight*
- NOTE : Corresponding International Standard : **ISO 105-B01** *Textiles — Tests for colour fastness — Part B01 : Colour fastness to light : Daylight (MOD)*
- JIS R 3202 *Float glass and polished plate glass*
- JIS R 5201 *Physical testing methods for cement*
- JIS R 5210 *Portland cement*
- JIS Z 8801-1 *Test sieves — Part 1 : Test sieves of metal wire cloth*
- JIS Z 8901 *Test powders and test particles*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS K 6900** and the following shall apply.

3.1 embossing

providing asperities to the surface of floor coverings

3.2 afterflame time

time until a test piece is flamed out after the flame of a burner is extinguished in flameproof test

3.3 delamination

peeling between layers which constitute floor coverings in multi-layer floor coverings

3.4 test specimen

object obtained by sticking a test piece taken from a sample to a flat base with adhesives

3.5 char length

length of the carbonized portion of a test piece in flameproof test

3.6 standard colour fading

fading of colour to the difference comparable to the gray scale No. 4 for assessing change in colour specified in **JIS L 0804** between an exposed test piece and an unexposed test piece in colour fastness test

3.7 blue scale

white cotton cloth coloured with dye having a difference in fading, and exposed simultaneously with a test piece in colour fastness test

3.8 conditioning period

period of time during which a test piece is placed at the predetermined temperature condition and/or humidity condition before the test

4 Testing items

The testing items and applicable test clauses shall be as given in Table 1.

Table 1 Testing items

Items	Applicable test clause
Dimensions of floor tile	6
Squareness of floor tile	7
Dimensions of floor sheet	8
Indentation test	9
Residual indentation test	10
Dimensional stability after exposure to heat	11
Dimensional stability after immersion in water	12
Test of thermal expansion coefficient	13
Curling test	14
Stain resistance test	15
Colour fastness test	16
Slip resistance test	17
Abrasion resistance test	18
Flameproof test	19
Peel resistance test	20
Caster resistance test	21
Flexibility test	22
Electric characteristic test	23
VOC test	24
Density	25

5 Common matters

5.1 General matters

In this clause, the test piece and the test board on which a test piece is placed are specified.

5.2 Test piece

5.2.1 Preparation of sample

The preparation of the sample shall be as follows.

- a) The sample of a floor tile shall be the product overall.
- b) For the sample of a floor sheet, sample I, sample II and sample III shall be taken from the positions given in Figure 1 except for the dimension measurement, the caster resistance test and the electric characteristic test.

The sample for the measurement of length shall be the product overall cut out upon the agreement between the purchaser and the manufacturer as part of the procurement, and the sample for the measurement of thickness and the sample for the measurement of width shall be obtained by cutting out the product overall to a length of 1 500 mm as given in Figure 6.

The sample for the caster resistance test and the sample for the electric characteristic test shall be those obtained by cutting out the product to the dimensions by approximately 100 mm larger in length and width of the test piece as given in Table 3.

Unit : mm

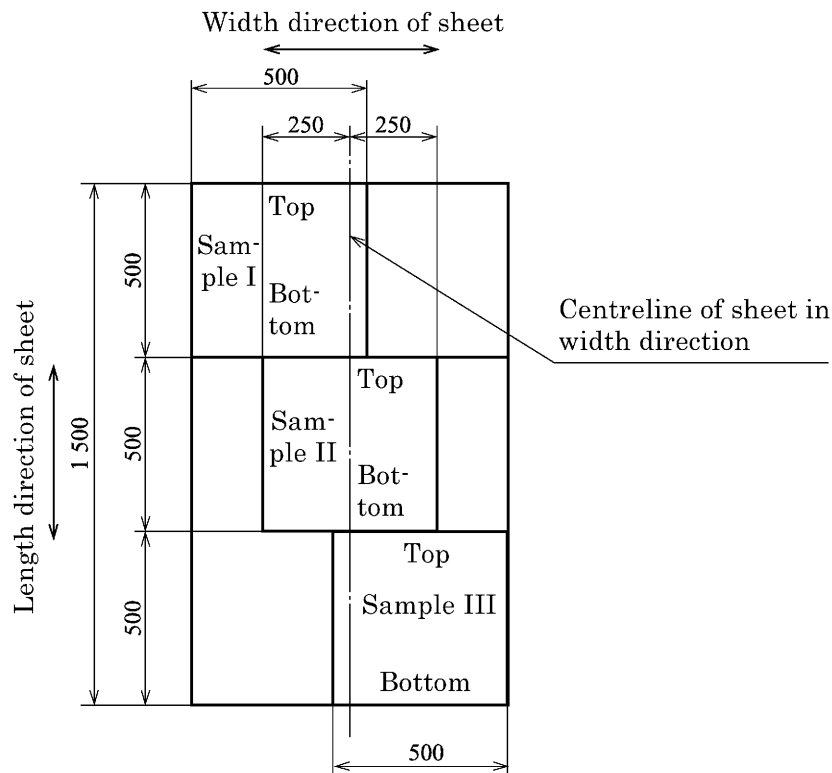


Figure 1 Sampling position of floor sheet

5.2.2 Preparation of test piece

The test piece shall be prepared from the sample specified in 5.2.1 cutting to the dimensions as given in Table 2 and Table 3.

Table 2 Dimensions of test piece and number of test pieces of floor tile

Items			Dimensions of test piece (length × width) mm	Number of test pieces
Dimensions of floor tile			Product overall	3
Squareness of floor tile			Product overall	3
Indentation test			100 × 100	3
Residual indentation test			50 × 50	3
Dimensional stability after exposure to heat			Product overall	3
Dimensional stability after immersion in water			Product overall	3
Test of thermal expansion coefficient			Product overall	3
Curling test			Product overall	3
Stain resistance test			100 × 100	1
Colour fastness test			50 × 75	1
Slip resistance test			200 × 300	1
Abrasion resistance test			250 × 300	2
Flameproof test			220 × 400	3 for length and width directions respectively
Caster resistance test	Method A	Method A-1	Product overall	1
		Method A-2	Product overall	1
	Method B		Product overall	1
Flexibility test			50 × 225	24
Electric characteristic test	Antistatic performance test		Product overall	5
	Volume electric resistance test		Product overall	3
VOC test			165 × 165	2
Density	Method A		30 × 30 or 36 min. in diameter	3
	Method B		Product overall	3

Table 3 Dimensions of test piece and number of test pieces for floor sheet

Items			Dimensions of test piece (length × width) mm	Number of test pieces
Dimensions of floor sheet			Length of product cut out × width of product	1
Indentation test			100 × 100	3
Residual indentation test			50 × 50	3
Dimensional stability after exposure to heat			300 × 300	3
Dimensional stability after immersion in water			300 × 300	3
Stain resistance test			100 × 100	1
Colour fastness test			50 × 75	1
Slip resistance test			200 × 300	1
Abrasion resistance test			250 × 300	2
Flameproof test			220 × 400	3 for length and width directions respectively
Peel resistance test			50 × 150	3 for length and width directions respectively
Caster resistance test	Method A	Method A-1	250 × 300 to 350 × 350	1
		Method A-2	600 × 600 to 700 × 700	1
	Method B		750 min. in diameter	1
Flexibility test			50 × 225	24
Electric characteristic test	Antistatic performance test		300 × 300 to 900 × 900	5
	Volume electric resistance test		300 × 300 to 900 × 900	3
VOC test			165 × 165	2
Density	Method A		30 × 30 or 36 min. in diameter	3
	Method B		100 × 100 min.	3

5.2.3 Conditioning of test piece

The test piece shall be conditioned in the laboratory or in the room under the conditions as given in Table 4. The conditioning of the test piece for testing items not listed in Table 4 shall be as specified in the specifications of respective test methods.

The test piece specified in 5.2.2 prepared from the sample specified in 5.2.1 which has been left as it is under the conditioning conditions given in Table 4 shall be deemed as the conditioned test piece.

Table 4 Conditioning conditions of test piece

Items	Conditioning conditions of test piece		
	Temperature	Humidity	Period
Dimensions of floor tile	23 °C ± 2 °C	(50 ± 10) %	12 h min.
Squareness of floor tile			
Dimensions of floor sheet	23 °C ± 20 °C	(65 ± 25) %	2 h min.
Indentation test	23 °C ± 2 °C	(50 ± 10) %	12 h min.
Residual indentation test			
Dimensional stability after exposure to heat			
Dimensional stability after immersion in water			
Stain resistance test			
Colour fastness test			
Slip resistance test			
Abrasion resistance test		(60 ± 20) %	
Flameproof test		(50 ± 10) %	
Peel resistance test			
Caster resistance test			
Electric characteristic test		(25 ± 3) %	48 h min.
VOC test	As specified in JIS A 1902-1 .		
Density	23 °C ± 2 °C	(50 ± 10) %	12 h min.

5.3 Test board

The dimensions of the test board on which a test piece is placed shall be larger than those of the four sides of the test piece in each side by 20 mm or more, and the material shall be either of that given in Table 5.

Table 5 Test board

Test board	Material
Float glass or polished plate glass	that specified in JIS R 3202 of thickness of 6 mm or more
Stainless steel plate	that specified in JIS G 4305 of thickness of 3 mm or more

5.4 Measuring instrument

The measuring instrument used for a test shall be preserved for the period equivalent to the conditioning period of a test piece or the standing period of a test piece under the conditions of the laboratory specified in each test item in order to accommodate itself to the temperature and/or humidity of the test.

6 Dimensions of floor tile

6.1 General matters

In this clause, the measuring method of the dimensions of floor tile is specified.

6.2 Measuring device

The measuring device used for this measurement shall be as follows.

- a) **Thickness measuring device** Micrometer callipers specified in **JIS B 7502** of which the minimum scale is 0.01 mm or the dial gauge specified in **JIS B 7503** of which the minimum scale is 0.01 mm
- b) **Measuring device used for measuring method A of length and width** Vernier callipers specified in **JIS B 7507** of which the minimum scale is 0.05 mm
- c) **Measuring device used for measuring method B of length and width** That equipped with the support bar to support a test piece and the dial gauge specified in **JIS B 7503** of which the minimum scale is 0.01 mm, which are arranged on the test board of stainless steel plate (see Table 5) as given in Figure 2

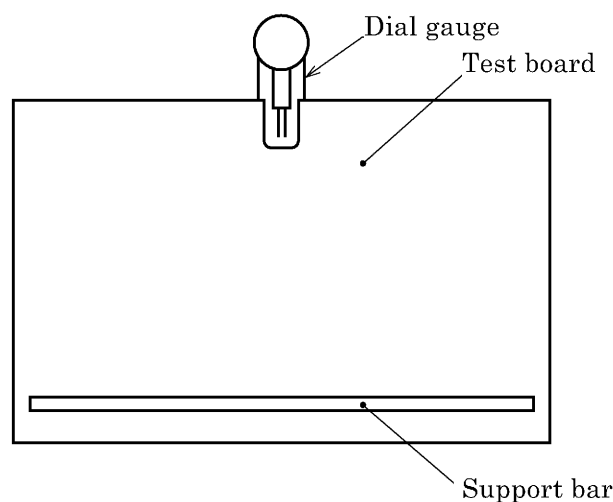


Figure 2 Measuring device used for measuring method B of length and width (example)

6.3 Temperature and humidity of laboratory

This measurement shall be performed in the laboratory at a temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and humidity of $(50 \pm 10)\%$.

6.4 Measuring procedure for overall thickness

The measuring procedure shall be as follows.

- a) The measurement positions shall be four points (a, b, c, and d) at approximately 10 mm inside from both of longitudinal and horizontal sides of a floor tile as given in Figure 3. However, when the above-mentioned measurement position is on a concave portion of an embossed floor tile product, the measurement position shall be made to be on a convex portion near the said concave portion.
- b) The overall thickness of a floor tile shall be measured at the measurement positions specified in a) using the measuring device specified in 6.2 a) in the laboratory specified in 6.3. The mean value of measured values shall be taken as the measured value of the test piece.

Unit : mm

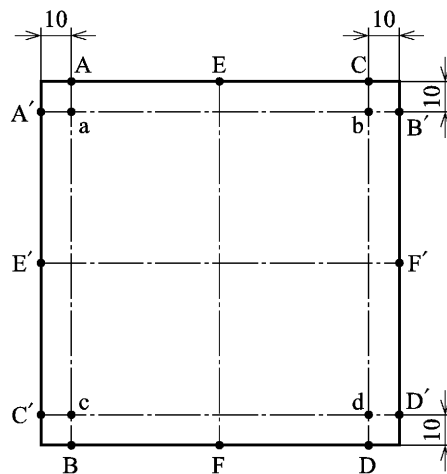


Figure 3 Measurement positions of dimensions of floor tile

6.5 Measuring procedure of measuring method A of length and width

The measuring procedure shall be as follows.

- As given in Figure 3, the measurement positions shall be two lines parallel to one side of the floor tile at approximately 10 mm inside (AB and CD) and one line obtained by connecting almost middle points of these lines (EF), and two lines intersecting at right angles to those lines which are parallel to one side of the floor tile at approximately 10 mm inside (A'B' and C'D') and one line obtained by connecting almost middle points of these lines (E'F').
- The length and width shall be measured at the measurement positions specified in a) using the measuring device specified in 6.2 b) in the laboratory specified in 6.3. The mean value of measured values shall be taken as the measured value of the test piece.

6.6 Measuring procedure of measuring method B of length and width

The measuring procedure shall be as follows.

- The measurement positions shall be as specified in 6.5 a).
- In order to check the parallelism of the support bar, set the block gauge of Class 2 specified in JIS B 7506 corresponding to the dimensions of the test piece on the measuring device specified in 6.2 c) as given in Figure 4 a), make the probe of the dial gauge specified in 6.2 c) contact with both ends of the block gauge, read the difference between both ends, and check whether the difference is within 0.01 mm. When the difference is 0.01 mm or more, adjust the attachment of the support bar and the attachment of the dial gauge.

After checking the parallelism, set the reading of the dial gauge to "0" when it contacts the central part of the block gauge.

- Set the test piece on the measuring device specified in 6.2 c) as given in Figure 4 b),

set the floor tile on each measurement position as given in Figure 3, and make the probe of the dial gauge specified in 6.2 c) contact with the test piece. Take the value obtained by adding the dimension of the block gauge specified in b) to the reading of the dial gauge when the probe contacts the test piece as the measured value. For other measurement positions, perform the measurement by the same method.

The values for length and width shall be the mean value of measured values of respective measurement positions.

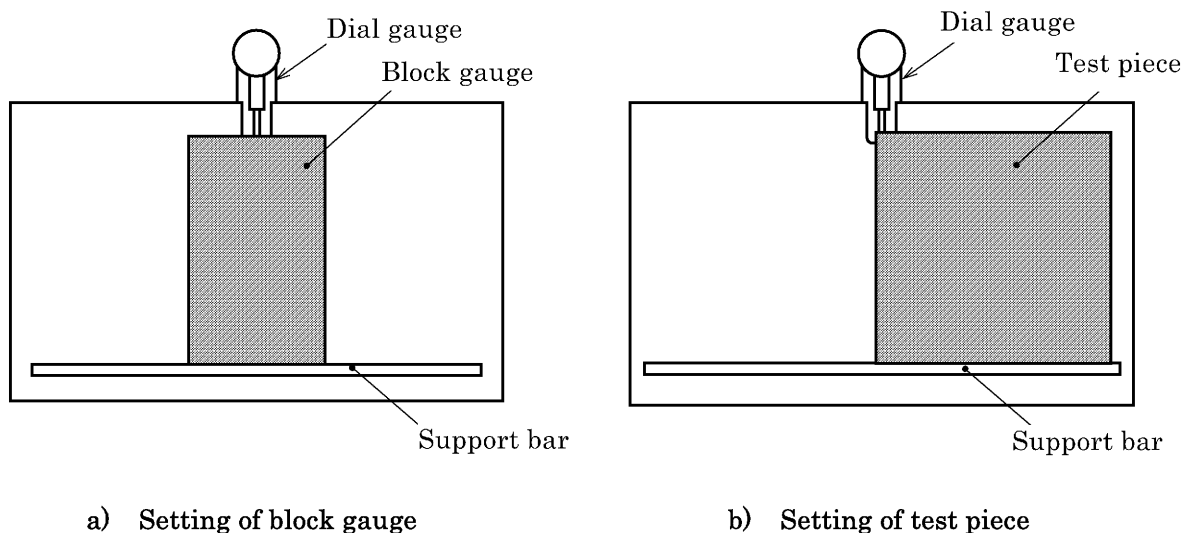


Figure 4 Measuring method B of length and width

6.7 Expression of measurement results

The expression of measurement results shall be as follows.

- a) The measured values of length and width of floor tile shall be expressed by rounding them to one decimal place in millimetres with the indication whether the value is measured by using the measuring device specified in 6.2 b) or the measuring device specified in 6.2 c).
- b) The measured value of thickness of floor tile shall be expressed by rounding it to two decimal places in millimetres.

7 Squareness of floor tile

7.1 General matters

In this clause, the measuring method of the squareness of floor tile is specified.

7.2 Measuring device and measuring instrument

The measuring device and measuring instrument used for this measurement shall be as follows.

- a) **Measuring device** I-shape ruler or Rectangle ruler specified in **JIS B 7526** whose length of both sides shall be larger than the length of the largest side of a floor tile

When the length of the largest side of a floor tile is 1 000 mm or more, the measuring device shall be the Rectangle ruler equivalent to the Rectangle ruler of nominal dimension of 1 000 mm of Grade 2 specified in **JIS B 7526**.

- b) **Clearance measuring instrument** Dial gauge specified in **JIS B 7503** of which the minimum scale is 0.01 mm or feeler gauge specified in **JIS B 7524**

7.3 Temperature and humidity of laboratory

This measurement shall be performed in the laboratory at a temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and humidity of $(50 \pm 10)\%$.

7.4 Measuring procedure

The measuring procedure shall be as follows.

- a) Set the floor tile on the test board specified in 5.3 and measure the clearance between the floor tile and the measuring device using the clearance measuring instrument specified in 7.2 b) by pushing its one side to one side of the measuring device specified in 7.2 a) so as not to be deformed as given in Figure 5. When the clearance does not exist in the end part but in the middle of the side as given in Figure 5 b), measure this clearance using the clearance measuring device specified in 7.2 b).
- b) For the measurement of squareness, measure for four sides of the floor tile, take the largest clearance between the tile side and the measuring device specified in 7.2 a) as the measured value of the test piece.
- c) The squareness of floor tile shall be the mean value of measured values of each test piece.

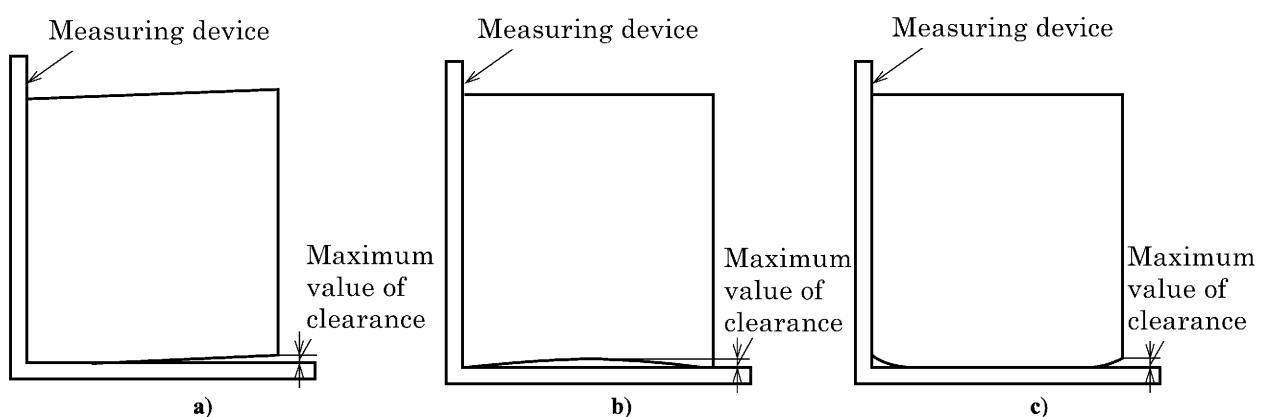


Figure 5 Measurement positions of squareness of floor tile

7.5 Expression of test results

The squareness of the floor tile shall be expressed by rounding it to two decimal places in millimetres.

8 Dimensions of floor sheet

8.1 General matters

In this clause, the measuring method of the dimensions of floor sheet is specified.

8.2 Measuring device

The measuring device used for this measurement shall be as follows.

- a) **Thickness measuring device** Micrometer callipers specified in JIS B 7502 of which the minimum scale is 0.01 mm or the dial gauge specified in JIS B 7503 of which the minimum scale is 0.01 mm
- b) **Length measuring device** Steel tape measure specified in JIS B 7512 of which the minimum scale is 1 mm
- c) **Width measuring device** Metal rule specified in JIS B 7516 of which the minimum scale is 1 mm or steel tape measure specified in b)

8.3 Temperature and humidity in room at measurement

This dimension measurement shall be performed in the room at a temperature of $23\text{ }^{\circ}\text{C} \pm 20\text{ }^{\circ}\text{C}$ and humidity of $(65 \pm 25)\%$.

8.4 Measuring procedure

8.4.1 Measurement position

The measurement positions shall be as follows.

- a) The measurement positions of thickness shall be ten points in total of four points (a, b, and c and d) and six points (e, f, g, h, i and j) divided into quarters between a and b and between c and d respectively on the floor sheet cut out to 1 500 mm in length as given in Figure 6.

However, when the above-mentioned measurement position is on a concave portion of an embossed floor sheet product, the measurement position shall be made to be on a convex portion near the said concave portion.

Unit : mm

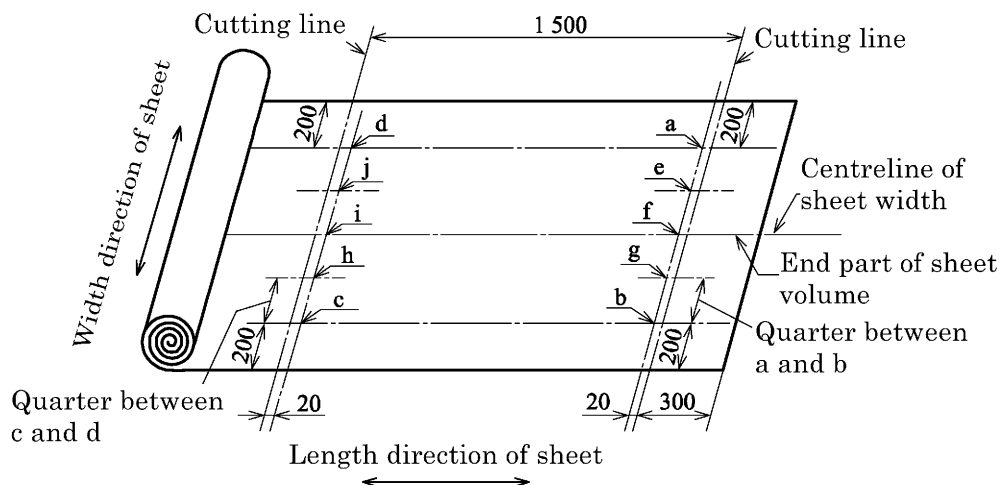


Figure 6 Measurement positions of thickness of floor sheet

- b) The measurement positions of length shall be two points of both ends of the product cut out to the length determined upon the agreement between the purchaser and the manufacturer as part of the procurement documents.
- c) The measurement positions of width shall be three points near both ends and near the centre in the length direction of the sheet cut out as given in Figure 6.

8.4.2 Measuring procedure

The measuring procedure shall be as follows.

- a) Measure the thickness of the floor sheet at the measurement positions specified in 8.4.1 a) in the room of temperature and humidity specified in 8.3 using the thickness measuring device specified in 8.2 a), and take the mean value as the measured value.
- b) Measure the length of the floor sheet at the measurement positions specified in 8.4.1 b) in the room of temperature and humidity specified in 8.3 using the length measuring device specified in 8.2 b), and take the value of shorter length as the measured value.
- c) Measure the width of the floor sheet at the measurement positions specified in 8.4.1 c) in the room of temperature and humidity specified in 8.3 using the width measuring device specified in 8.2 c), and take the value of shortest length as the measured value.

8.5 Expression of measurement results

The expression of measurement results shall be as follows.

- a) The thickness of floor sheet shall be expressed by rounding it to two decimal places in millimetres.
- b) The length of floor sheet shall be expressed by rounding it to two decimal places in metres.
- c) The width of floor sheet shall be expressed by rounding it to the integer in millimetres.

9 Indentation test

9.1 General matters

In this clause, the indentation test method A and the indentation test method B of floor coverings shall be specified.

9.2 Indentation test method A

9.2.1 General matters

The method for measuring the depth of indentation of floor coverings in water is specified.

9.2.2 Measuring instrument

The measuring instrument used for this test shall be as follows.

- a) **Indentation testing machine** An apparatus of which the tip as given in Figure 7 has the hemispherical steel rod indenter of $6.35 \text{ mm} \pm 0.01 \text{ mm}$ in diameter, which gives a load of $133 \text{ N} \pm 1 \text{ N}$ to a test piece

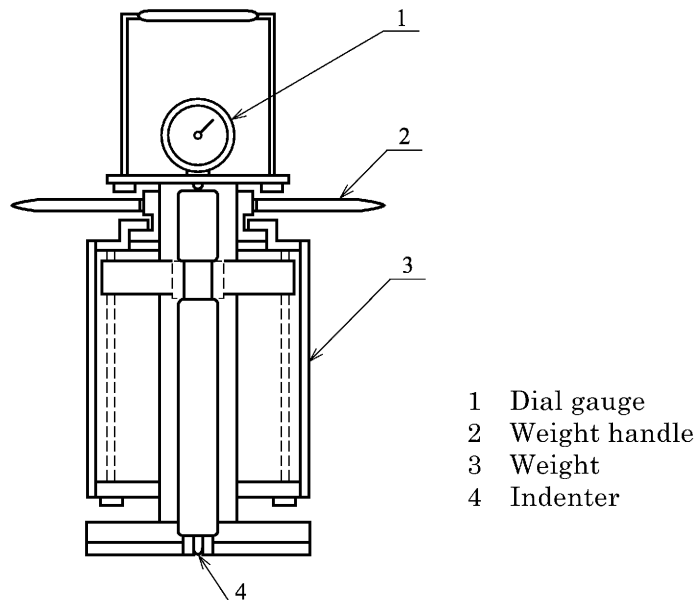


Figure 7 Indentation testing machine (example)

- b) **Water bath** That having a thermo-regulator which is capable of adjusting water temperature at $23 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$ and $45 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$, and a capacity capable of immersing the test piece sufficiently
- c) **Indentation depth measuring device** Dial gauge specified in JIS B 7503 of which the minimum scale is 0.01 mm

9.2.3 Test temperature

This test shall be performed in water at a water temperature of $23 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$ or at a water temperature of $45 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$.

9.2.4 Test procedure

The test procedure shall be as follows.

- a) Adjust the water bath specified in 9.2.2 b) to a water temperature of $23 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$ or a water temperature of $45 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$, place the test piece horizontally in the water bath with its surface upward on the test board specified in 5.3, and after leaving it as it is for 15 min, place the indentation testing machine specified in 9.2.2 a) which is maintained at the same temperature in the same water bath on the test piece.
- b) In the beginning of the test, after applying a load of 9 N to the test piece by the indentation testing machine specified in 9.2.2 a), adjust the scale of the indentation depth measuring device specified in 9.2.2 c) attached to the indentation testing machine specified in 9.2.2 a) to the zero point within 5 s. When the test tempera-

ture is a water temperature of $23\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$, after applying a load of 133 N by the indentation testing machine specified in 9.2.2 a), read the depth of indentation after 60 s by the indentation depth measuring device specified in 9.2.2 c) and take it as the measured value of the test piece at a temperature of $23\text{ }^{\circ}\text{C}$. When the test temperature is a water temperature of $45\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$, after applying a load of 133 N by the indentation testing machine specified in 9.2.2 a), read the depth of indentation after 30 s by the indentation depth measuring device specified in 9.2.2 c) and take it as the measured value of the test piece at a temperature of $45\text{ }^{\circ}\text{C}$.

- c) The value obtained by averaging the measured values of the test piece for each test temperature shall be taken as the depth of indentation.

9.3 Indentation test method B

9.3.1 General matters

The method for measuring the depth of indentation of floor coverings in the air is specified.

9.3.2 Measuring instrument

The measuring instrument used for this test shall be as follows.

- a) **Indentation testing machine** As specified in 9.2.2 a)
- b) **Indentation depth measuring device** As specified in 9.2.2 c)

9.3.3 Temperature and humidity of laboratory

This test shall be performed in the laboratory at a temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and humidity of $(50 \pm 10)\%$.

9.3.4 Test procedure

The test procedure shall be as follows.

- a) Place the test piece on the test board specified in 5.3 with its surface upward, and place the indentation testing machine specified in 9.3.2 a) on the test piece.
- b) In the beginning of the test, after applying a load of 9 N to the test piece by the indentation testing machine specified in 9.3.2 a), adjust the scale of the indentation depth measuring device specified in 9.3.2 b) attached to the indentation testing machine specified in 9.3.2 a) to the zero point within 5 s. After applying a load of 133 N by the indentation testing machine specified in 9.3.2 a), read the depth of indentation after 60 s by the indentation depth measuring device specified in 9.3.2 b) and take it as the measured value of the test piece.
- c) The value obtained by averaging the measured values of the test piece shall be taken as the depth of indentation.

9.4 Expression of test results

The expression of test results shall be as follows.

- a) The depth of indentation at a temperature of $23\text{ }^{\circ}\text{C}$ shall be expressed with the indication whether the test method is according to the indentation test method A or

the indentation test method B.

- b) The depth of indentation shall be expressed by rounding it to two decimal places in millimetres.

10 Residual indentation test

10.1 General matters

In this clause, the residual indentation test method A and the residual indentation test method B of floor coverings are specified.

10.2 Residual indentation test method A

10.2.1 General matters

The method for measuring the depth of residual indentation of floor coverings by applying a load of 356 N to floor coverings is specified.

10.2.2 Measuring instrument

The measuring instrument used for the residual indentation test method A shall be as follows.

- a) **Residual indentation testing machine** That having the steel rod of 4.5 mm in diameter of which the tip as given in Figure 8 is flat and shall be capable of applying a load of 356 N to the test piece
- b) **Thickness measuring device** Dial gauge specified in **JIS B 7503** of which the minimum scale is 0.01 mm

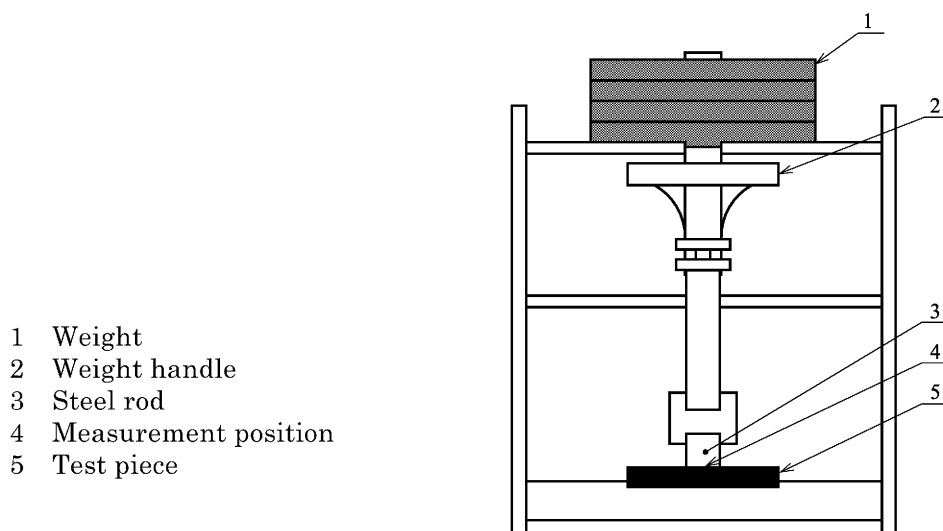


Figure 8 Residual indentation testing machine (example)

10.2.3 Temperature and humidity of laboratory

This test method A shall be performed in the laboratory at a temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and humidity of $(50 \pm 10)\%$.

10.2.4 Test procedure

The test procedure shall be as follows.

- a) **Measurement position** The measurement position shall be the central part of the test piece, and the mark of $\times$ shall be attached on the surface of the test piece so as to be easy to see.

The measurement position of the test piece in the case of an embossed product shall be on its convex portion.

- b) **Measurement of thickness before test** Measure the thickness of the test piece at the measurement position specified in a) using the thickness measuring device which is specified in 10.2.2 b), and take it as the thickness before test (t_0).
- c) **Setting of test piece** Set the test piece as given in Figure 8 so that the tip of the steel rod of the residual indentation testing machine specified in 10.2.2 a) touches the mark of $\times$ attached on the test piece.
- d) **Loading of test load** After setting the test piece, load the test load specified in 10.2.2 a) to the test piece gently.
- e) **Loading time of test load** The loading time shall be 10 min.
- f) **Measurement of thickness after test** When the loading time has elapsed, remove the load promptly, then after 60 min, measure the thickness of the test piece at the measurement position specified in a) using the thickness measuring device specified in 10.2.2 b), and take it as the thickness after test (t_1).

10.3 Residual indentation test method B

10.3.1 General matters

The method for measuring the depth of residual indentation of floor coverings by applying a load of 222 N to floor coverings is specified.

10.3.2 Measuring instrument

The measuring instrument used for this test shall be as follows.

- a) **Residual indentation testing machine** An apparatus of which the tip as given in Figure 8 has the hemispherical steel rod of 19 mm in diameter, which gives a load of 222 N to a test piece
- b) **Thickness measuring device** As specified in 10.2.2 b)

10.3.3 Temperature and humidity of laboratory

This test shall be performed in the laboratory at a temperature $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and humidity of $(50 \pm 10)\%$.

10.3.4 Test procedure

The test procedure shall be as follows.

- a) **Measurement position** As specified in 10.2.4 a).
- b) **Measurement of thickness before test** Measure the thickness of the test piece at the measurement position specified in a) using the thickness measuring device which specified in 10.3.2 b), and take it as the thickness before test (t_0).
- c) **Setting of test piece** Set the test piece as given in Figure 8 so that the tip of the steel rod of the residual indentation testing machine specified in 10.3.2 a) touches the mark of × attached on the test piece.
- d) **Loading of test load** After setting the test piece, load the test load specified in 10.3.2 a) to the test piece gently.
- e) **Loading time of test load** The loading time shall be 5 min.
- f) **Measurement of thickness after test** When the loading time elapsed, remove the load promptly, then after 60 min, measure the thickness of the test piece at the measurement position specified in a) using the thickness measuring device specified in 10.3.2 b), and take it as the thickness after test (t_1).

10.4 Calculation of test results and expression of test results

The calculation of test results and expression of test results shall be as follows.

- a) **Calculation of test results** The depth of residual indentation (D) shall be calculated according to formula (1).

$$D = t_0 - t_1 \dots\dots\dots(1)$$

where, D : depth of residual indentation (mm)
 t_0 : thickness before test (mm)
 t_1 : thickness after test (mm)

- b) **Expression of test results** The expression of test results shall be as follows.
 - 1) The depth of residual indentation shall be expressed with the indication whether the test method is according to the residual indentation test method A or the residual indentation test method B.
 - 2) The measured value of the depth of residual indentation shall be the mean value of the calculation results of each test piece, which shall be expressed by rounding it to two decimal places in millimetres.

11 Dimensional stability after exposure to heat

11.1 General matters

In this clause, the measuring method of the dimensional stability after exposure to heat of floor coverings, and the calculation method of the rate of length change and the rate of width change by heating are specified.

11.2 Measuring device

The measuring instrument used for this test shall be as follows.

- a) **Dimension measuring instrument** The dimension measuring instrument shall be as follows.
 - 1) **Dimension measuring instrument A** Vernier callipers specified in JIS B 7507 of which the minimum scale is 0.05 mm
 - 2) **Dimension measuring instrument B** Measuring instrument specified in **6.2 c)**
- b) **Thermostatic oven** That of which length of each side shall be 450 mm or more and to which a stirrer capable of adjusting the temperature inside the thermostatic oven at $80\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ is attached

11.3 Temperature and humidity of laboratory

This test shall be performed in the laboratory at a temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and humidity of $(50 \pm 10)\%$.

11.4 Test procedure

The test procedure shall be as follows.

- a) **Measurement position** The measurement position shall be as follows.
 - 1) For the floor tile, as specified in **6.5 a)**.
 - 2) For the floor sheet, the measurement positions of the test piece cut out in dimensions as given in Table 3 shall be two lines parallel to one side of the floor sheet at approximately 10 mm inside (AB and CD) and one line obtained by connecting almost middle points of these lines (EF), and two lines intersecting at right angles to those lines which are parallel to one side of the floor sheet at approximately 10 mm inside (A'B' and C'D') and one line obtained by connecting almost middle points of these lines (E'F') as given in Figure 9.

Unit : mm

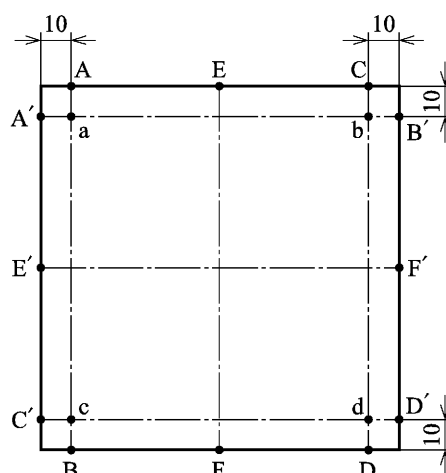


Figure 9 Measurement positions of length and width change of floor sheet by heating

- b) **Dimension measurement before heating** The dimension measurement before

heating shall be as the following of 1) or 2).

- 1) Measure the dimension of the test piece at the measurement positions specified in a) using the dimension measuring instrument A specified in 1) of 11.2 a), and take it as the dimension before heating (L_0).
- 2) Measure the dimension of the test piece at the measurement positions specified in a) using the dimension measuring instrument B specified in 2) of 11.2 a) according to the method specified in 6.6, and take it as the dimension before heating (L_0).
- c) **Heating of test piece** Place the test piece horizontally in the thermostatic oven specified in 11.2 b) at a distance of 50 mm or more up and down, left and right from the inside wall of the thermostatic oven, and heat the test piece leaving it as it is at a temperature of $80\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for 6 h.
- d) **Heat release of test piece** After heating, take out the test piece, and release the heat in the laboratory specified in 11.3 leaving it as it is for 1 h.
- e) **Dimension measurement after heating** The dimension measurement after heating shall be as the following of 1) or 2).
 - 1) After heat release, measure the dimension of the test piece at the measurement positions specified in a) using the dimension measuring instrument A specified in 1) of 11.2 a), and take it as the dimension after heating (L_1).
 - 2) After heat release, measure the dimension of the test piece at the measurement positions specified in a) according to the method specified in 6.6 using the dimension measuring instrument B specified in 2) of 11.2 a), and take it as the dimension after heating (L_1).
- f) **Measurement of amount of dimensional change after heating** For the amount of dimensional change after heating, take the value obtained by subtracting the dimension of the test piece before heating (L_0) from the dimension of the test piece after heating (L_1) as the amount of length and width change.

11.5 Calculation of test results and expression of test results

11.5.1 Calculation of test results

The dimensional stability after exposure to heat (L_h) shall be calculated according to formula (2) for length and width, respectively.

$$L_h = \frac{L_1 - L_0}{L_0} \times 100 \dots\dots\dots(2)$$

where, L_h : dimensional stability after exposure to heat (%)
 L_0 : dimension before heating (mm)
 L_1 : dimension after heating (mm)

11.5.2 Expression of test results

The expression of test results shall be as follows.