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(JPIF/JTPIA/JSA)

Testing method for laminated thermosetting high-pressure decorative sheets

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Foreword

This Japanese Industrial Standard has been 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 The Japan Plastics Industry Federation (JPIF)/Japan Thermosetting Plastics Industry Association (JTPIA)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS K 6902** : 2008), which has been technically revised.

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Testing method for laminated thermosetting high-pressure decorative sheets

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 4586-2** : 2018, Edition 7, with some modifications of the technical contents.

The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies the testing method for the laminated thermosetting high-pressure decorative sheets specified in **JIS K 6903** (hereafter referred to as the high-pressure decorative laminates).

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

ISO 4586-2 : 2018 *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (usually called laminates) — Part 2 : Determination of properties* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard 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) indicated below shall be applied.

JIS B 0601 *Geometrical Product Specifications (GPS) — Surface texture : Profile method — Terms, definitions and surface texture parameters*

JIS B 1501 *Rolling bearings — Balls*

JIS B 7414 *Glass thermometers*

JIS B 7502 *Micrometers*

JIS B 7503 *Mechanical dial gauges*

JIS B 7512 *Steel tape measures*

JIS B 7516 *Metal rules*

JIS B 7751 *Light-exposure and light-and-water-exposure apparatus (Enclosed*

carbon-arc type)

JIS C 7601 *Fluorescent lamps for general lighting service*

JIS G 3141 *Cold-reduced carbon steel sheet and strip*

JIS H 4000 *Aluminium and aluminium alloy sheets, strips and plates*

JIS K 6903 *Laminated thermosetting high-pressure decorative sheets*

JIS K 7100 *Plastics — Standard atmospheres for conditioning and testing*

NOTE Corresponding International Standard : ISO 291 *Plastics — Standard atmospheres for conditioning and testing*

JIS K 7102 *Testing method for colour fastness of plastics upon exposure to light of the carbon arc*

JIS K 7204 *Plastics — Determination of resistance to wear by abrasive wheels*

NOTE Corresponding International Standard : ISO 9352 *Plastics — Determination of resistance to wear by abrasive wheels*

JIS K 7350-1 *Plastics — Methods of exposure to laboratory light sources — Part 1 : General guidance*

NOTE Corresponding International Standard : ISO 4892-1 *Plastics — Methods of exposure to laboratory light sources — Part 1 : General guidance*

JIS K 7350-2 *Plastics — Methods of exposure to laboratory light sources — Part 2 : Xenon-arc lamps*

NOTE Corresponding International Standard : ISO 4892-2 *Plastics — Methods of exposure to laboratory light sources — Part 2 : Xenon-arc lamps*

JIS K 7363 *Plastics — Instrumental determination of radiant exposure in weathering tests — General guidance and basic test method*

NOTE Corresponding International Standard : ISO 9370 *Plastics — Instrumental determination of radiant exposure in weathering tests — General guidance and basic test method*

JIS L 0804 *Grey scale for assessing change in colour*

NOTE Corresponding International Standard : ISO 105-A02 *Textiles — Tests for colour fastness — Part A02 : Grey scale for assessing change in colour*

JIS L 0843 *Test methods for colour fastness to xenon arc lamp light*

JIS R 6251 *Abrasive cloths*

JIS R 6252 *Abrasive papers*

JIS Z 2243-1 *Brinell hardness test — Part 1 : Test method*

NOTE Corresponding International Standard : ISO 6506-1 *Metallic materials — Brinell hardness test — Part 1 : Test method*

JIS Z 2243-2 *Brinell hardness test — Part 2 : Table of hardness values*

JIS Z 2244-2 *Vickers hardness test — Part 2 : Tables of hardness values*

ISO 48-7 *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 7 : Apparent hardness of rubber-covered rollers by Shore-type durometer method*

ISO 209 *Aluminium and aluminium alloys — Chemical composition*

ISO 3668 *Paints and varnishes — Visual comparison of colour of paints*

ISO 4287 *Geometrical Product Specifications (GPS) — Surface texture : Profile method — Terms, definitions and surface texture parameters*

ISO 4288 *Geometrical Product Specifications (GPS) — Surface texture : Profile method — Rules and procedures for the assessment of surface texture*

3 Term and definition

For the purpose of this Standard, the following term and definition apply.

3.1

high-pressure decorative laminate (HPDL, HPL)

sheet consisting of layers of cellulosic fibrous material (normally paper) impregnated with thermosetting resins or metallic material bonded to the surface material (resin impregnated paper) by means of heat and a pressure of at least 5 MPa, of which one or both surface(s) has/have decorative colours and designs

The high-pressure decorative laminates generally consist of the core material impregnated with phenol resin and/or amino group resins (resin-impregnated paper) and the surface material impregnated with amino group resin, mainly melamine resins (resin impregnated paper). The high-pressure decorative laminates for vehicles (railway rolling stock and the like) consist of the resin impregnated paper and the metallic material (for example, aluminium plate) bonded together under the conditions mentioned above, of which the surface layer on one side is decorated as mentioned above. For the metallic plate used for this purpose, the plate specified in **JIS H 4000** or the steel plate specified in **JIS G 3141** shall be used.

NOTE “HPDL” is used as the abbreviation of high-pressure decorative laminates, and synonymous with “HPL” used in **EN 438** (all parts).

4 Appearance

4.1 Principle

Laminates shall be inspected for surface appearance under the fluorescent lamp specified in **JIS C 7601** or an LED or other lamp capable of giving equivalent lighting.

Where colour and surface finish are critical, it is recommended that sheets be checked for colour and surface-finish compatibility before fabrication or installation.

4.2 Apparatus

The apparatus used shall be as follows.

- a) **Horizontal inspection table**, of height 600 mm to 700 mm and large enough to ac-

commodate the largest sheets to be inspected.

- b) **Lamp** Fluorescent lamp specified in **JIS C 7601** or an equivalent LED or other lamp giving an intensity of 800 lx to 1 100 lx.

4.3 Test specimens

The specimen shall be the laminate under test, as supplied by the manufacturer.

4.4 Procedure

Place the specimen, decorative face uppermost, on the inspection table. Wipe it free of any loose contamination with a brush or the like, if necessary. Inspect it visually from the distance required by **JIS K 6903** for defects such as smudges, smears, finger-prints, scratches, foreign particles, damage, irregular colour, uneven luster, or any other form of blemish evident within the decorative surface.

NOTE The indirect light from outside may enhance or minimise the blemishes on the laminate.

4.5 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name and type of the product;
- c) viewing distance and defects found;
- d) any deviation from the specified test method;
- e) date of the test.

5 Thickness

5.1 Principle

The thickness of a specimen is measured using a micrometer or a dial gauge indicator.

5.2 Apparatus

The micrometer specified in **JIS B 7502** or dial gauge specified in **JIS B 7503**, having two flat parallel measuring surfaces of diameter 6 mm or larger and capable of being read to 0.01 mm.

5.3 Test specimens

The specimen shall be the laminate under test, as supplied by the manufacturer.

5.4 Procedure

Check the micrometer or dial gauge for accuracy and then determine the thickness of the specimen to the nearest 0.01 mm. The specimen shall be held in horizontal or vertical position, and the thickness shall be measured at each edge, at a distance of at least 20 mm from the edge of the sheet so that four or more measurements in total can be obtained.

5.5 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name and type of the product;
- c) individual measured values at four or more positions and their mean value;
- d) positions at which measurements were made;
- e) any deviation from the specified test method;
- f) date of the test.

6 Length and width

6.1 Apparatus

The steel tape measure specified in **JIS B 7512** or the metal rule specified in **JIS B 7516**, of sufficient length to measure the greatest dimension of the laminate, and graduated to allow a reading accuracy of 1 mm.

6.2 Test specimens

The specimen shall be the laminate under test, as supplied by the manufacturer.

6.3 Procedure

Apply the apparatus in **6.1** to each edge of the laminate in turn, and measure the length on each edge to the nearest 1 mm.

6.4 Expression of results

The length and width measurement results shall be expressed to the nearest 1 mm.

6.5 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name, type and nominal thickness of the product;
- c) length and width values;
- d) any deviation from the specified test method;
- e) date of the test.

7 Edge straightness

7.1 Apparatus

The apparatus used shall be as follows.

- a) **Metal rule**, specified in **JIS B 7516** and of 1 000 mm length.
- b) **Steel rule**, graduated in 0.5 mm divisions.

7.2 Test specimens

The specimen shall be the laminate under test, as supplied by the manufacturer.

7.3 Procedure

Apply the metal rule to each edge of the specimen in turn, and use the steel rule to measure the maximum deviation X of the edge of the specimen from the metal rule (see Figure 1) to the nearest 0.5 mm.

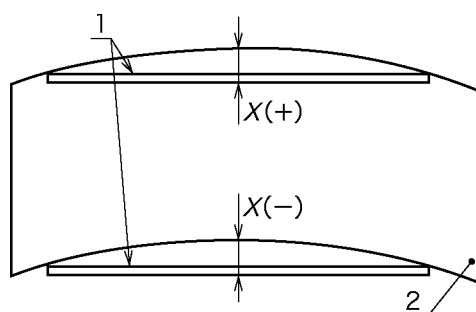
7.4 Expression of results

The maximum deviation from the metal rule shall be recorded for each of the four edges. Results shall be designated (+) if the edge is convex, and (–) if the edge is concave.

7.5 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name, type and nominal thickness of the product;
- c) test result for each of the four edges;
- d) any deviation from the specified test method;
- e) date of the test.



1 : metal rule
2 : test specimen

Figure 1 Edge straightness measurement

8 Edge squareness

8.1 Principle

Select either Method A or Method B depending on the testing environment.

8.2 Method A

8.2.1 Apparatus

The apparatus used shall be as follows.

- a) **Right-angled square**, with one arm of at least 1 000 mm long.
- b) **Metal rule**, specified in **JIS B 7516** and graduated in 0.5 mm divisions.

8.2.2 Test specimens

The specimen shall be the laminate under test, as supplied by the manufacturer.

8.2.3 Procedure

Apply the right-angled square to one corner of the specimen and measure the deviation of the edge of the specimen from the arm of the square at a distance of 1 m from the corner (see Figure 2). Record the results to the nearest 0.5 mm. Repeat the procedure with the square applied to the diagonally opposite corner of the specimen.

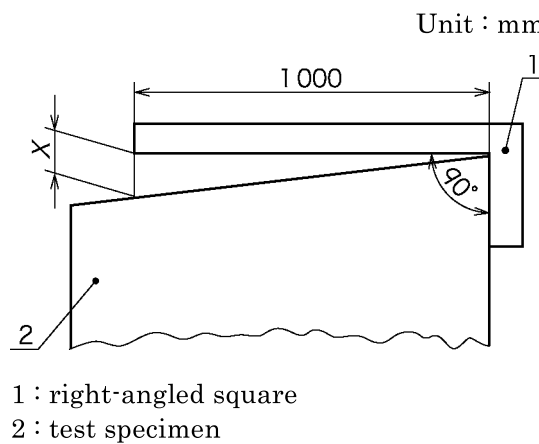


Figure 2 Edge squareness measurement

8.2.4 Expression of results

The maximum deviation from the square shall be recorded for the two diagonally opposite corners.

8.2.5 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name, type and nominal thickness of the product;
- c) test result;
- d) any deviation from the specified test method;
- e) date of the test.

8.3 Method B

8.3.1 Apparatus

The metal rule specified in **JIS B 7516** and graduated in 0.5 mm divisions.

8.3.2 Test specimens

The specimen shall be the laminate under test, as supplied by the manufacturer.

8.3.3 Procedure

Measure the distance from one corner of the specimen to the opposite corner and record as L_1 . Measure the opposite diagonal and record as L_2 (see Figure 3).

$$|L_1 - L_2| = \text{Squareness (absolute value)}$$

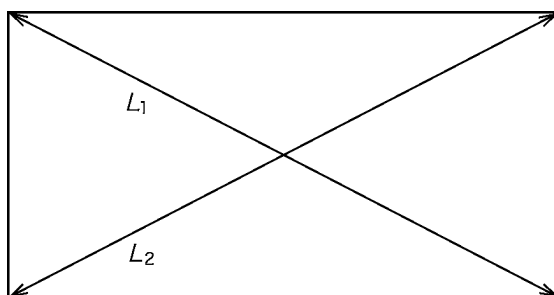


Figure 3 Edge squareness measurement

8.3.4 Expression of results

Squareness is determined as the absolute value of the difference of L_1 from L_2 .

8.3.5 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name, type and nominal thickness of the product;
- c) test result;
- d) any deviation from the specified test method;
- e) date of the test.

9 Flatness

9.1 Principle

Select either Method A or Method B depending on the testing environment.

9.2 Method A

9.2.1 Apparatus

The apparatus used shall be as follows.

- a) **Bow gauge**, of length 1 000 mm graduated to permit a reading accuracy of 0.1 mm (see Figure 4).

9.2.2 Test specimens

The specimen shall be the laminate under test, as supplied by the manufacturer, and stored in the conditions specified by the manufacturer.

9.2.3 Procedure

The test procedure shall be as follows.

- Place the specimen concave side up without restraint on a flat horizontal surface.
- Fix the specimen at both edges at a distance of 1 000 mm, place the bow gauge so that its feet are lightly touching the surface of the specimen in the area of greatest deformation, and measure the flatness deviation (shown on the dial gauge) to the nearest 0.1 mm.

9.2.4 Expression of results

The maximum flatness deviation measured using the bow gauge shall be recorded.

9.2.5 Test report

The test report shall include at least the following information :

- a reference to this Standard, i.e. **JIS K 6902**;
- name, type and nominal thickness of the product;
- maximum flatness deviation;
- any deviation from the specified test method;
- date of the test.

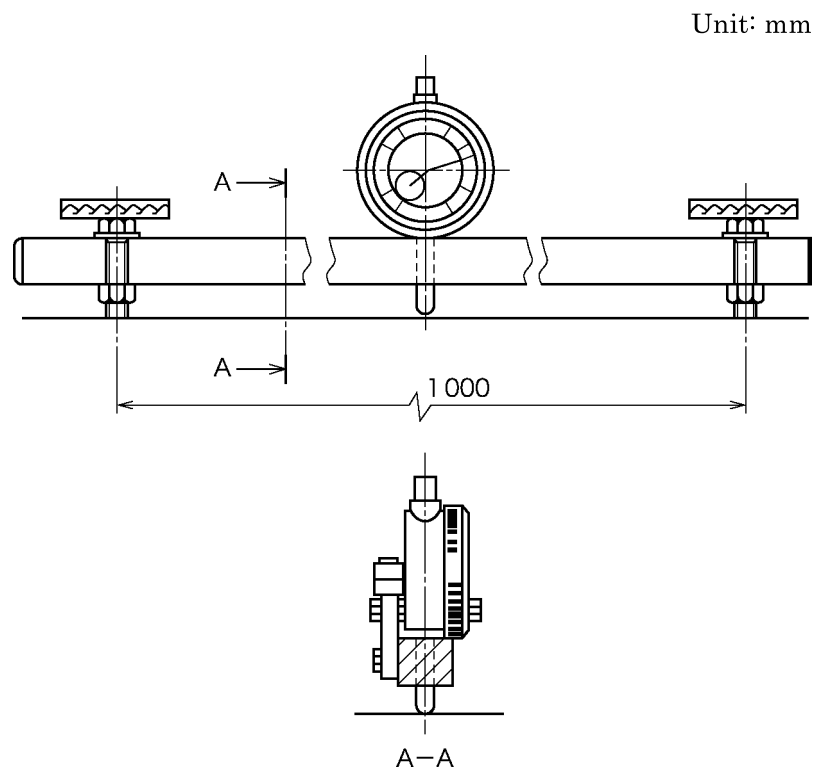


Figure 4 Bow gauge for measuring flatness

9.3 Method B

9.3.1 Apparatus

The metal rule specified in **JIS B 7516** (see Figure 5) of a suitable length, with or without a dial gauge.

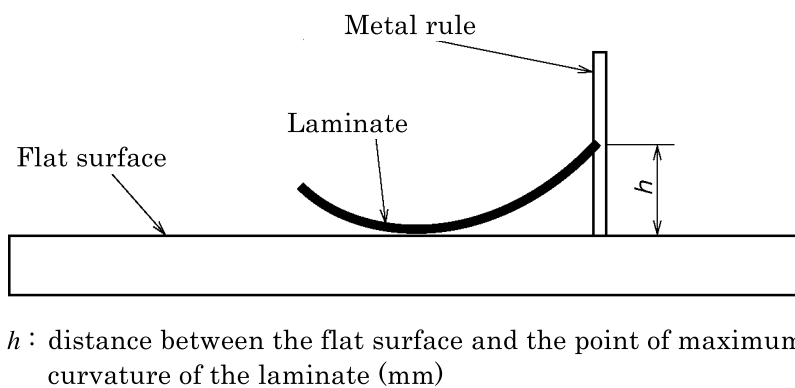


Figure 5 Example of apparatus for measuring flatness

9.3.2 Test specimens

The specimen shall be the laminate under test, as supplied by the manufacturer, and stored in the conditions recommended by the manufacturer.

9.3.3 Procedure

Place the specimen on a flat surface with concave side up. Measure the distance h between the flat surface and the point of maximum curvature of the specimen with a metal rule (see Figure 5).

9.3.4 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name and type of the product;
- c) size;
- d) maximum curvature (mm);
- e) any deviation from the specified test method;
- f) date of the test.

10 Resistance to surface wear

10.1 Principle

Select either Method A or Method B depending on the testing environment.

10.2 Method A

10.2.1 Principle

The test measures the ability of the decorative surface of the laminate under test to resist abrasive wear through to the sub-layer. Abrasion is achieved by rotating a specimen in contact with a pair of loaded cylindrical wheels covered with abrasive paper. The wheels are positioned so that their cylindrical faces are equidistant from the specimen's axis of rotation but not tangential to it. As they are turned by the rotating specimen they abrade an annular track on the specimen's surface. The numbers of revolutions of the specimen required to cause defined degrees of abrasion are used as measures of resistance to surface wear.

10.2.2 Materials

The materials used shall be as follows.

- a) **Calibration plates of rolled zinc sheet**, Taber S-34 or equivalent, having a thickness of (0.8 ± 0.1) mm and a Brinell hardness specified in **JIS Z 2243-2** of (48 ± 2) when tested in accordance with **JIS Z 2243-1**, except that the ball diameter shall be 5 mm and the load 360 N.

NOTE Taber S-34 is available from Taber Industries :

Taber Industries, 455 Bryant St, P.O. Box 164, North Tonawanda, NY 14120. USA.

This information is provided for the convenience of users of this Standard and does not constitute an endorsement of this product.

- b) **Abrasive paper strips**, of abrasive paper specified in **JIS R 6252**, (12.7 ± 0.1) mm wide and about 160 mm long, meeting the following :
 - 1) grammage 70 g/m² to 100 g/m²;
 - 2) open coated 180 grit powdered aluminium oxide having a particle size such that it will pass through a sieve of aperture 100 µm and remain on a sieve having an aperture of 63 µm;
 - 3) adhesive backing (optional).
- c) **Double-sided adhesive tape**, used to bond together the abrasive wheel and the abrasive paper of b), required only if the abrasive paper has no adhesive backing.

10.2.3 Apparatus

The apparatus used shall be as follows.

- a) **Test machine**, as specified in **JIS K 7204**.

NOTE A suitable Taber's abrader is available from Taber Industries :

Taber Industries. 455 Bryant St. P.O. Box 164. North Tonawanda. NY 14120. USA.

This information is provided for the convenience of users of this Standard and does not constitute an endorsement of this product.

- b) **Conditioning chamber**, in accordance with **JIS K 7100**, with a standard atmosphere

of temperature $(23 \pm 2) ^\circ\text{C}$, relative humidity $(50 \pm 5) \%$.

10.2.4 Test specimens

Each specimen shall be a piece of the laminate under test, cut to fit the type of clamping device used. It will usually be a disc of diameter about 130 mm, or a square of about 100 mm with its corners rounded to give a diagonal of about 130 mm, and it will usually have a hole of diameter 6 mm in its centre. Three specimens shall be prepared.

10.2.5 Preparation of specimens and abrasive paper

Clean the surface of the specimens with an organic solvent (e.g. alcohol). Using a suitable marker pen, mark the surface of each specimen with two lines mutually at right angles so that the surface area is divided into quadrants. Precondition the specimens and the abrasive strips of **10.2.2 b)** for at least 72 h in the conditioning chamber of **10.2.3 b)** before testing. After preconditioning seal the paper strips in suitable polythene bags (maximum 10 strips per bag) until required for immediate use.

10.2.6 Procedure

The test procedure shall be as follows.

- a) **Preparation of abrasive wheels** Bond a strip of preconditioned unused abrasive paper to each of the rubber covered wheels, using either the adhesive backing, if present, or the double-sided adhesive tape of **10.2.2 c)**. Ensure that the cylindrical surface is completely covered, but without any overlapping of the abrasive paper.
- b) **Calibration of abrasive paper**
 - 1) Prepare two abrasive wheels with preconditioned unused strips of abrasive paper from the batch to be used for testing.
 - 2) Clamp a zinc plate of **10.2.2 a)** in the specimen holder, start the suction device, set the revolution-counter to zero, lower the wheels and abrade the zinc plate for 500 revolutions. Wipe the zinc plate clean and weigh to the nearest 1 mg. Replace the abrasive paper on the wheels with preconditioned unused strips from the same batch, clamp the same zinc plate in the specimen holder, lower the abrasive wheels and operate the suction device. Abrade the zinc plate for an additional 500 revolutions, then wipe it clean and reweigh it to the nearest 1 mg. Its loss in mass shall be (120 ± 20) mg.
 - 3) Any batch of abrasive paper which causes a loss in mass of the zinc plate outside this permitted range shall not be used for testing.
- c) **Abrasion of specimen**, checked as follows.
 - 1) Perform the test immediately after removal of the specimen and calibrated abrasive paper from the preconditioning atmosphere. Prepare two wheels with preconditioned unused abrasive paper from the same batch previously approved by calibration. Fit the wheels to the machine and set the revolution counter to zero.
 - 2) Clamp the specimen in the holder, ensuring that the surface of the specimen is flat. Lower the abrasive wheels on to the specimen, start the suction device and

begin abrading the specimen. Examine the specimen for wear after each 25 revolutions and examine the abrasive paper for clogging with abraded particles.

- 3) Replace the abrasive paper after 500 revolutions.
- 4) Continue performing 2) and 3) until the initial wear point (*IP*) is reached. Record the number of revolutions and repeat 1) to 3) until the final wear point (*FP*) is reached. Record the number of revolutions again.

The initial wear point (*IP*) is that point at which the first clearly recognizable wear-through of the print, pattern or plain colour, or clearly recognizable exposure of the paper layer appears. The initial wear point is reached when there are areas of at least 0.6 mm² wear-through in three quadrants out of the four quadrants specified in 10.2.5. The sub-layer for printed patterns is the background on which the pattern is printed; for plain colours it is the first sub-layer of different colour. The final wear point (*FP*) occurs in the case of a patterned laminate when about 95 % of the pattern is removed in the abraded area, and in the case of a plain-colour laminate when an underlayer of a different colour is exposed over about 95 % of the abraded area.

NOTE 1 *IP*-poster is a full-colour photographic visual aid to assist correct interpretation, and increase repeatability and reproducibility in the determination of the initial wear point (*IP*). *IP*-posters are available from the following :

SIS Forlag AB, Box 6455, SE-11382 Stockholm, Sweden TEL +46 8 610 30 60, FAX +46 8 30 18 50

This information is provided for the convenience of users of this Standard and does not constitute an endorsement of this product.

NOTE 2 The dirt size estimation chart can be used to precisely determine the size in mm² of the wear-through area. This chart is available from the following :

TAPPI, Technology Park/Atlanta, P.O. Box 105113, Atlanta, GA 30348-5113, USA, TEL +1 770 446 1400, FAX +1 770 446 6974

This information is provided for the convenience of users of this Standard and does not constitute an endorsement of this product.

10.2.7 Expression of results

Calculate the wear resistance (c) for each specimen using the following formula :

$$c = \frac{IP + FP}{2}$$

where, c : wear resistance
IP : initial wear point (number of revolutions)
FP : final wear point (number of revolutions)

The initial wear point (*IP*) for the sample under test shall be the average of the *IP* values obtained on the three specimens. The resistance to surface wear (c) of the laminate under test shall be the average of the wear resistance values obtained on the

three specimens, rounded to the nearest 50 revolutions.

10.2.8 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name, type and nominal thickness of the product;
- c) mean initial wear point (number of revolutions);
- d) wear resistance (number of revolutions);
- e) any deviation from the specified test method;
- f) date of the test.

10.3 Method B

10.3.1 Principle

The test measures the ability of the decorative surface of the laminate under test to resist abrasive wear. Abrasion is achieved by rotating a specimen in contact with a pair of loaded cylindrical wheels covered with coated abrasive. The wheels are positioned so that their cylindrical faces are equidistant from the specimen's axis of rotation but not tangential to it. As they are turned by the rotating specimen they abrade an annular track on the specimen's surface. The numbers of revolutions of the specimen required to cause defined degrees of abrasion are used as measures of resistance to surface wear.

10.3.2 Apparatus

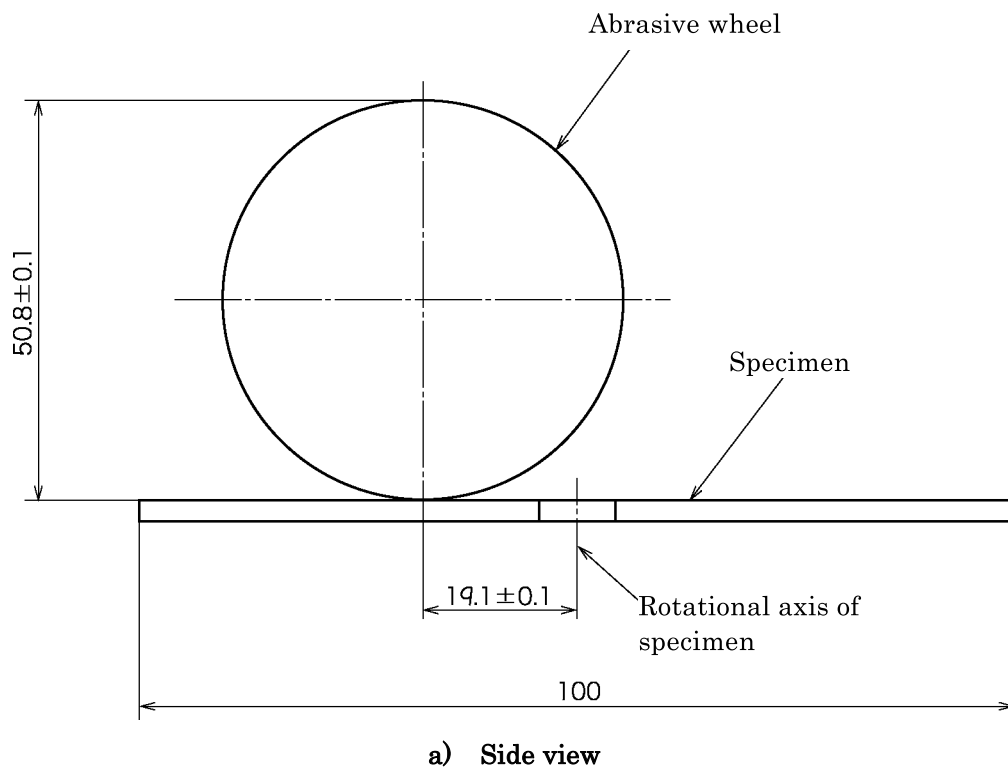
The apparatus used shall be as follows.

- a) **Chemical balance**, with 1 mg of reciprocal sensibility.
- b) **Taber's abrader**, as specified in **JIS K 7204**, structured as illustrated in Figure 6, consisting of CS-0 ¹⁾ abrasive wheels of Taber Industries or equivalent wheels measuring (12.7 ± 0.1) mm in width and (50.8 ± 0.1) mm in outside diameter, and a rubber outside ring of Durometer hardness $A65 \pm 3$ specified in **ISO 48-7**.
- c) **Dust vacuum**, capable of vacuuming the abrasion dust particles clean.
- d) **Conditioning chamber**, capable of maintaining a standard atmosphere of temperature (23 ± 2) °C and relative humidity (50 ± 5) % specified in **JIS K 7100**.
- e) **Coated abrasive** The abrasive paper specified in **JIS R 6252** or abrasive cloth specified in **JIS R 6251** measuring (12.7 ± 0.2) mm in width and (160 ± 0.5) mm in length, with abrasive material of aluminium oxide and of P180 or equivalent, with or without an adhesive backing.
- f) **Calibration plates of rolled zinc sheet** A Taber Industries calibration plate S-34 ¹⁾ or an equivalent plate, measuring approximately 100 mm × 100 mm in size and 0.7 mm to 0.8 mm in thickness, having a 6 mm to 7 mm diameter central hole, polished with No. P400 abrasive paper specified in **JIS R 6252** before each use to the surface

roughness of 0.8 μm or less specified in **JIS B 0601**. The hardness of the plate shall be H43 to HV53 specified in **JIS Z 2244-2**.

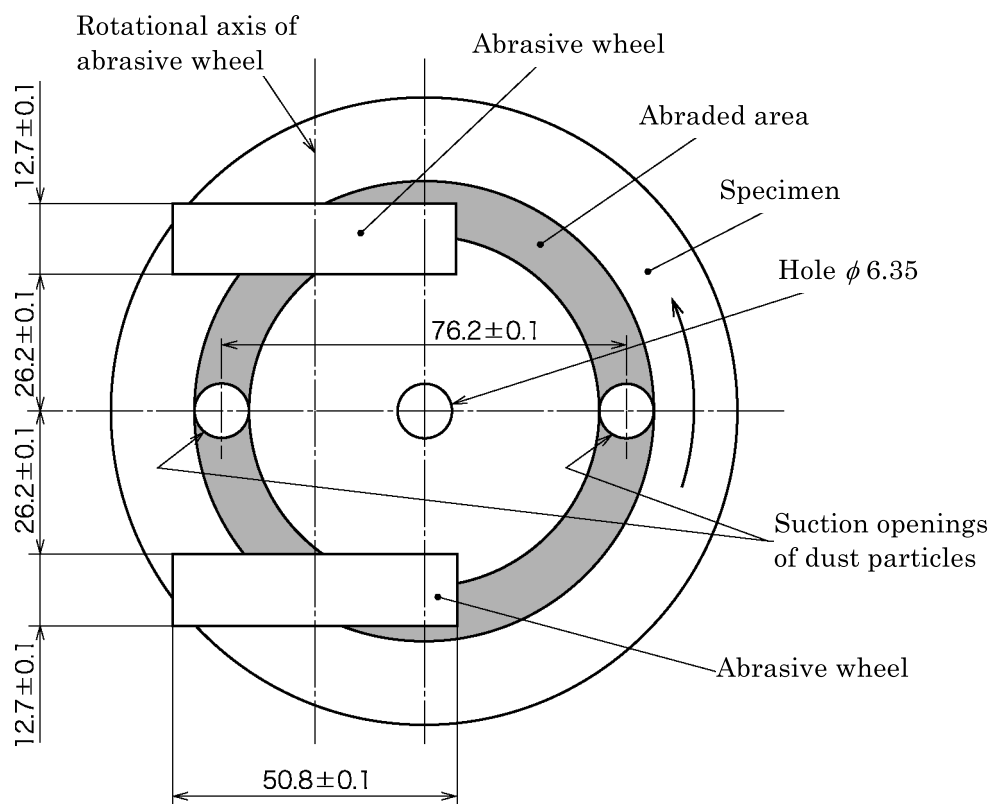
Note ¹⁾ Trade name of the product is supplied by Taber Industries. This information is provided for the convenience of users of this Standard and does not constitute an endorsement of this product.

Unit: mm



a) Side view
Figure 6 Schematic drawing of apparatus

Unit: mm



b) Top view

Figure 6 (concluded)

10.3.3 Test specimens

Cut out from the laminate under test three disc-shaped specimens with about 120 mm diameter or specimens of other shape with an equivalent size (e.g. about 100 mm square) and bore a hole of about 6.5 mm diameter at each of their centres.

10.3.4 Verification of coated abrasive

The verification of coated abrasive shall be as follows.

- a) Precondition the coated abrasives specified in **10.3.2 e)** and the zinc plate specified in **10.3.2 f)** to be used for test and verification in a standard atmosphere of temperature $(23 \pm 2) ^\circ\text{C}$ and relative humidity $(50 \pm 5) \%$ specified in **JIS K 7100** for at least 72 h. The verification shall be performed per batch of coated abrasives. Extract one pair of coated abrasives at random from each batch, and employ these for verification.
- b) Apply the two coated abrasives on two separate abrasive wheels using either the adhesive backing, if present, or an adhesive, wrapping them exactly once around the periphery of the wheels so as to obtain a smooth applied surface.
- c) Attach these two wheels on the shaft of the Taber's abrader specified in **10.3.2 b)**, fix them with attaching screw, and attach a weight to each wheel adjusting the

load to 4.9 N.

- d) Weigh accurately the mass of the zinc plate to the nearest 1 mg using a chemical balance specified in **10.3.2 a)**, and fix it on the specimen turntable of the Taber's abrader.
- e) Connect the Taber's abrader and the dust vacuum specified in **10.3.2 c)** using a hose.
- f) Gently lower the abrasive wheels with coated abrasives onto the zinc plate.
- g) Gently lower the dust suction opening of the Taber's abrader on the zinc plate, and adjust the distance between the opening and the zinc plate to 1 mm to 2 mm.
- h) Run the Taber's abrader and dust vacuum, and rotate the zinc plate 500 revolutions. At every 100 revolutions, stop the rotation, and brush the surface of the coated abrasive to remove clogging.
- i) Detach the zinc plate from the turntable, weigh its mass accurately to the nearest 1 mg using a chemical balance, and determine the mass loss from the difference between this mass and the initial mass measured in **d)**.
- j) Repeat the procedures **b)** to **i)** using a new pair of coated abrasives.
- k) If both results obtained using two pairs of coated abrasives meet $0.130^{+0.045}_{-0.020}$ g, the coated abrasives of that batch can be used for the test, along with the correction factor f calculated according to the following formula :

$$f = \frac{W}{0.130} + 0.4$$

where, W : average loss of zinc plate (g)

- l) If either of the two results fails to meet $0.130^{+0.045}_{-0.020}$ g, repeat the procedures **b)** to **i)** using another pair of coated abrasives extracted at random from the same batch, and if the average of the result of this pair and that of the initial pair meets $0.130^{+0.045}_{-0.020}$ g, the coated abrasives from that batch can be used for the test with the correction factor calculated according to **k)**. If not, the whole batch shall be rejected for use in the test.

10.3.5 Procedure

The test procedure shall be as follows.

- a) Mount the specimen on the turntable of the Taber's abrader horizontally with its decorative surface up.
- b) Extract a new pair of coated abrasives from the batch that passed the verification in **10.3.4**. Apply them on two separate abrasive wheels using either the adhesive backing, if present, or an adhesive, wrapping them exactly once around the periphery of the wheels so as to obtain a smooth applied surface.
- c) Attach these two wheels on the shaft of the Taber's abrader, fix them with attaching screw, and attach a weight to each wheel adjusting the load to 4.9 N.

- d) Connect the Taber's abrader and the dust vacuum using a hose.
- e) Gently lower the abrasive wheels with coated abrasives onto the specimen.
- f) Gently lower the dust suction opening of the Taber's abrader on the specimen, and adjust the distance between the opening and the specimen to 1 mm to 2 mm.
- g) Start the Taber's abrader and dust vacuum to rotate the turntable, and check the specimen at every 25 revolutions to see if it has reached the following conditions.
 - 1) Brush off the abraded particles on the coated abrasives on the abrasive wheels using a brush at every 100 revolutions of the specimen.
 - 2) If the abraded particles have clogged the abrasive paper and cannot be brushed off during the test, redo the test from the beginning.
 - 3) Exchange the coated abrasives on the wheels with new ones at every 500 revolutions of the specimen.
 - 4) If the decorative surface of the specimen is patterned, the printed pattern has been erased by about 50 % or if the decorative surface has no pattern, the colour layer on the printed paper has been first cut away.
- h) If taking the condition in **g) 4)** as the end point, stop the rotation of the specimen upon observing the condition in **g) 4)** and note the number of revolutions up to that point.
- i) Multiply the average of the number of revolutions of three specimens by the correction factor of coated abrasives determined in **10.3.4 k)**, and note the result as the average abrasion value (number of revolutions).

10.3.6 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name and type of the product;
- c) average abrasion value (number of revolutions);
- d) any deviation from the specified test method;
- e) date of the test.

11 Resistance to immersion in boiling water

11.1 Principle

The effect of immersion in boiling water for 2 h is determined by the increase in mass and thickness of test specimens and by noting any change in appearance.

11.2 Apparatus

The apparatus used shall be as follows.

- a) **Balance**, accurate to 1 mg.

- b) **Oven**, capable of being maintained at $(50 \pm 2) ^\circ\text{C}$
- c) **Vessel 1**, containing boiling distilled water or ion-exchanged water.
- d) **Vessel 2**, containing distilled water or ion-exchanged water at $(23 \pm 2) ^\circ\text{C}$.
- e) **Desiccator**, of a suitable size.
- f) **Micrometer thickness gauge**, as specified in **JIS B 7502**. If curvature of the laminate prevents accurate thickness measurement, then a suitable ball-ended micrometer thickness gauge shall be used.
- g) **Heating apparatus** A suitable heating apparatus, for example an electric hot-plate.
- h) **Specimen holder**, to hold specimens vertically during immersion and prevent contact with other specimens or the vessel.

11.3 Test specimens

Three specimens shall be taken from the same laminate, cut from positions not less than 50 mm from the edge of the sheet. Each specimen shall be $(50 \pm 1) \text{ mm}^2$ and of the same thickness; and cut in such a way that no appreciable heat is generated and the edges are free from cracks.

11.4 Procedure

The test procedure shall be as follows.

- a) Dry the three specimens for $(24 \pm 1) \text{ h}$ in the oven specified in **11.2 b)** maintained at $(50 \pm 2) ^\circ\text{C}$, and allow to cool in the desiccator specified in **11.2 e)** placed in an atmosphere at $(23 \pm 2) ^\circ\text{C}$. Weigh each test specimen to the nearest 1 mg (mass m_1).
- b) Measure the thickness of each specimen as specified in Clause 5 to the nearest 0.01 mm, but at the middle of each of the four cut edges (t_1, t_2, t_3, t_4) and with the external edge of the micrometer anvil (measuring end) positioned approximately 5 mm from each edge. Mark the measuring points so that subsequent measurements can be made in the same places.
- c) Place the specimens in Vessel 1 of boiling water specified in **11.2 c)**. Take care to prevent the specimens from making contact over any substantial area with one another or with Vessel 1.
- d) After $(120 \pm 5) \text{ min}$, remove the specimens from the boiling water and allow to cool for $(15 \pm 5) \text{ min}$ in Vessel 2 of distilled or ion-exchanged water specified in **11.2 d)** maintained at $(23 \pm 2) ^\circ\text{C}$. Take them from the water and remove all surface water with a clean dry cloth or with filter paper. Weigh the specimens again to the nearest 1 mg (mass m_2) within 1 min of taking them from the water.
- e) Determine the thickness of each specimen to the nearest 0.01 mm at the same points as before (t_5, t_6, t_7, t_8).
- f) Examine each specimen visually for change in appearance.

11.5 Expression of results

The boiling water absorbed by each specimen is given, as a percentage by mass, by the formula :

$$\frac{m_2 - m_1}{m_1} \times 100$$

where, m_1 : mass of the specimen before immersion (mg)
 m_2 : mass of specimen after immersion (mg)

The percentage increase in thickness at the measuring points of each specimen is given by the formula :

$$\frac{t_5 - t_1}{t_1} \times 100 \quad \frac{t_7 - t_3}{t_3} \times 100$$

$$\frac{t_6 - t_2}{t_2} \times 100 \quad \frac{t_8 - t_4}{t_4} \times 100$$

where, t_1, t_2, t_3, t_4 : thicknesses measured before immersion (mm)
 t_5, t_6, t_7, t_8 : thicknesses measured after immersion (mm)

The percentage by mass of boiling water absorbed by the laminate under test shall be the average of the values obtained on the three specimens.

The percentage increase in thickness of the laminate under test shall be the average of the 12 values obtained at the four measuring points on all three specimens.

The result of the examination for change in appearance shall be the lowest rating of the three specimens assessed in accordance with the following rating scales :

Rating 5 : No visible change.

Rating 4 : Slight change of gloss and/or colour, only visible at certain viewing angles.

Rating 3 : Moderate change of gloss and/or colour.

Rating 2 : Marked change of gloss and/or colour.

Rating 1 : Blistering and/or delamination.

11.6 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name, type and thickness of the product;
- c) average percentage increase in mass of three specimens;
- d) average percentage increase in thickness of three specimens;
- e) the lowest surface condition rating of three specimens;
- f) any deviation from the specified test method;
- g) date of the test.

12 Resistance to water vapour

12.1 Principle

A specimen from the laminate under test is held in place over the neck of a flask containing boiling water, so that the decorative surface of the specimen is exposed to the water vapour. After 1 h, the specimen is removed and allowed to recover for 24 h in normal ambient conditions (5 °C to 35 °C) before examination for any change in appearance.

12.2 Apparatus

The apparatus used shall be as follows.

- Wide-necked Erlenmeyer flask**, of capacity 250 ml and mouth diameter 50 mm.
- Specimen holder and heat screen** A specimen holder capable of fixing the specimen over the mouth of the flask and a heat screen capable of insulating the specimen from the heat generated by the electric hot plate (see Figure 7).

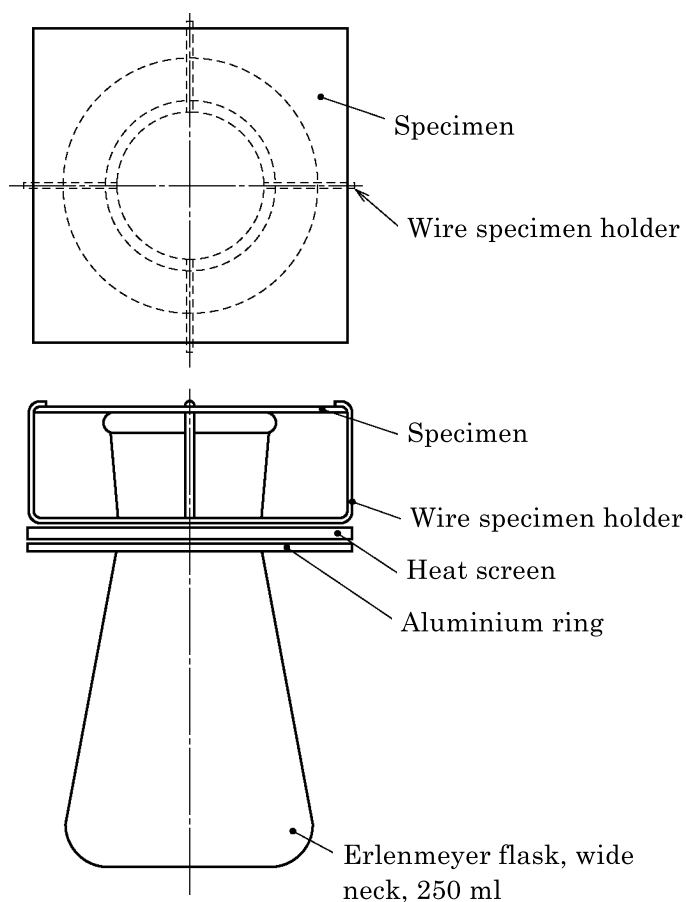


Figure 7 Apparatus for resistance to water vapour

- Non-fibrous filter paper**, capable of absorbing moisture without damaging the specimen. Tissue may be used.

- d) **Magnifier**, of about six magnifications.
- e) **Electric hotplate**, or other suitable heat source.

12.3 Test specimens

The specimen shall be a square of side approximately 100 mm and of the thickness of the laminate under test, cut from the laminate under test. One specimen shall be tested.

12.4 Procedure

The test procedure shall be as follows.

- a) Place approximately 200 ml of water in the flask specified in **12.2 a)** and bring it to the boil on the electric hotplate specified in **12.2 e)**. Place the heat screen in position around the neck of the flask. Place the specimen, decorative face down, centrally over the mouth of the flask and fix it in position with the wire specimen holder (see Figure 7). The specimen holder shall be heavy enough to prevent the specimen from curling away from the mouth of the flask.
- b) After the decorative face has been exposed for 1 h to the vapour from the boiling water, remove the specimen and use the non-fibrous filter paper specified in **12.2 c)** to remove excess water from the surface of the specimen. Allow the specimen to recover for 24 h in normal ambient conditions (5 °C to 35 °C) and then examine the central area of the specimen with the naked eye and with the magnifier specified in **12.2 d)**, for any change in appearance.

12.5 Expression of results

The result of the examination for change in appearance shall be expressed in accordance with the following rating scale :

Rating 5 : No visible change.

Rating 4 : Slight change of gloss and/or colour, only visible at certain viewing angles.

Rating 3 : Moderate change of gloss and/or colour.

Rating 2 : Marked change of gloss and/or colour.

Rating 1 : Blistering and/or delamination.

12.6 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name and type of the product;
- c) the lowest surface condition rating of three specimens;
- d) any deviation from the specified test method;
- e) date of the test.

13 Resistance to dry heat

13.1 General

Select either Method A, Method B or Method C depending on the testing environment.

13.2 Method A

13.2.1 Principle

The test is intended to determine the suitability of decorative laminates for use in kitchens where contact with moderately hot cooking utensils is to be expected.

A standard aluminium alloy block at a specified test temperature of 160 °C is placed in contact with a specimen taken from the laminate under test, bonded to wood chip-board. After 20 min of contact the block is removed. Resistance to the test conditions is assessed by visual examination.

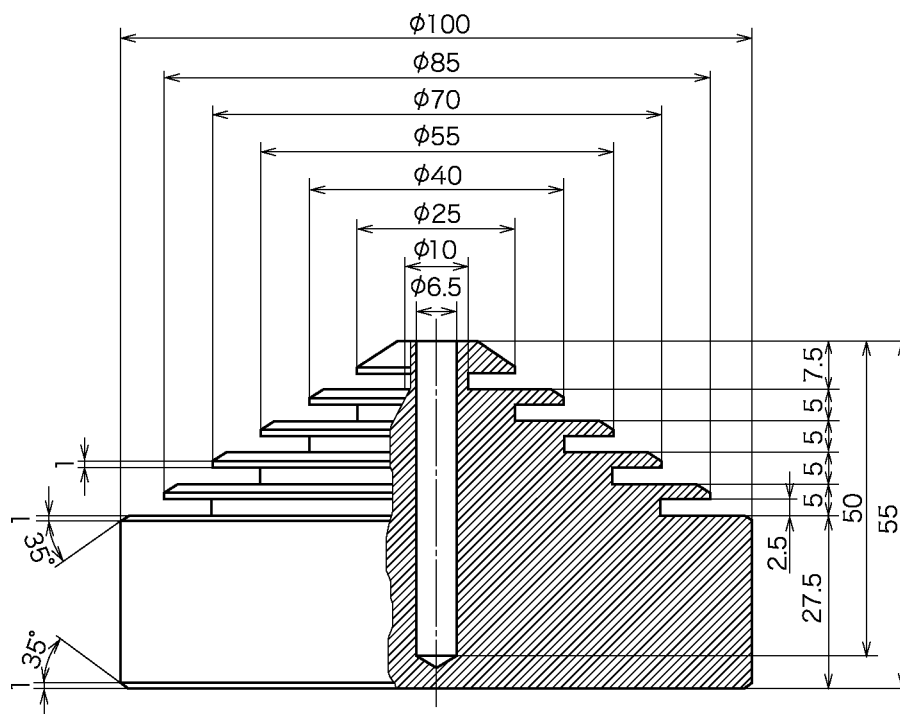
13.2.2 Apparatus

The apparatus used shall be as follows.

- a) **Thermometer**, as specified in **JIS B 7414** capable of insertion to the bottom of the centre bore of the heat source and of measuring the temperature of the heat source to an accuracy of ± 1 °C.
- b) **Heat source**, consisting of a block as shown in Figure 8 manufactured from aluminium alloy according to **ISO 209**, Al Mg Si (alloy shall contain not less than 94 % aluminium). The roughness of bottom surface shall be (2 ± 1) µm, expressed as Ra, according to **ISO 4287** and **ISO 4288**.

NOTE Alloy 6060 and 64430 are suitable.

Unit: mm



Dimensions : ± 0.2 mm of the nominal dimension

Angles : $\pm 2^\circ$ of the nominal angle

Figure 8 Aluminium block used as heat source

- c) **Fine-faced wood particleboard**, (230 ± 5) mm², with a nominal thickness of 18 mm to 20 mm (± 0.3 mm), a density of (680 ± 20) kg/m³, and moisture content (10 ± 3) %. As an alternative, particleboard with a nominal density of 720 kg/m³ and nominal thickness of 19 mm and sanded with 100 grit sandpaper may be used.
- d) **Urea-formaldehyde adhesive**, containing approximately 15 % filler or a PVAc (white glue) or an equivalent adhesive, utilized in accordance with the adhesive manufacturer's instructions.
- e) **Oven**, capable of heating the aluminium block to a temperature higher than the test temperature.
- f) **Cleaning cloth**, consisting of a white soft absorbent cloth.
- g) **Heat-insulating foam**, consisting of a melamine foam, with the following characteristics : density between 8.5 kg/m³ and 11.5 kg/m³; heat conductivity, less than 0.035 W/mK. The foam shall withstand at a temperature 200 °C or higher.
- h) **Diffuse light source**, providing evenly diffused light, giving an illumination on the test surface of $(1\ 200 \pm 400)$ lx. This may either be diffused daylight or be diffused artificial daylight.

The daylight should be unaffected by surrounding trees, etc. When artificial daylight is used it is recommended that it should have a correlated colour temperature

of (5 000 to 6 500) K and a Ra greater than 92, by using a colour matching booth in accordance with **ISO 3668**.

- i) **Fixed frame**, to hold the specimen flat.

13.2.3 Test specimens

The specimen shall be prepared by uniformly bonding a piece of the laminate supplied by the manufacturer to the wood chipboard, using the specified adhesive evenly spread at 80 g/m² to 120 g/m². One specimen (230 ± 5) mm² shall be used. The bonded specimen shall be preconditioned for at least 72 h at temperature (23 ± 2) °C and relative humidity (50 ± 5) % before being used for the test.

For materials of thickness 2 mm or greater, the effect of bonding the specimen is insignificant and the test may be conducted without bonding the specimen, i.e. with the specimen resting in close contact with the particleboard specified in **13.2.2 c)**. This technique is also acceptable for routine quality control testing of laminates less than 2 mm thick. However, in cases of dispute, laminates less than 2 mm thick shall be bonded to particleboard.

13.2.4 Procedure

The test procedure shall be as follows.

- a) The test surface shall be placed horizontally. In case of laminates thick 2 mm or greater, without need of using the adhesive specified in **13.2.2 d)**, hold the specimen in the fixed frame.
- b) The heat source in **13.2.2 b)** shall be at a minimum distance of 15 mm from the edges of the panel.
- c) Where tests are carried out simultaneously, the perimeters of the adjacent specimens shall be separated by a minimum of 50 mm.
- d) The test surface shall be lightly wiped with a clean, soft, white cloth specified in **13.2.2 f)** before the test.
- e) Using the oven specified in **13.2.2 e)**, raise the temperature of the heat source specified in **13.2.2 b)** to a temperature higher than the specified test temperature (160 ± 1) °C, and transfer it to the heat insulating foam specified in **13.2.2 g)** or on a sufficiently large board of wood particleboard.
- f) Place the thermometer specified in **13.2.2 a)** in the centre bore of the heat source. If the temperature is not higher than the specified test temperature (160 ± 1) °C, the heat source shall be placed again in the oven until achieving this higher temperature.
- g) When the heat source reaches the temperature of (160 ± 1) °C, immediately place it on the test surface.
- h) After 20 min in this position, remove the block.
- i) Allow the test surface to stand undisturbed 1 h ± 10 min.

- j) Clean the test surface with a clean, soft, white cloth, and examine the tested area.

13.2.5 Examination of the test specimen

Carefully examine the test surface, with light coming from all directions, for damage, e.g. discolouration, change in gloss and colour, blistering, swelling, delamination and other defects. For this purpose illuminate the decorative surface separately using the light source specified in **13.2.2 h)** and examine from different angles, including angle combinations such that the light is reflected from the test surface and towards the observer's eye.

Viewing distance shall be 0.25 m to 1.0 m.

13.2.6 Expression of results

The result of the examination for resistance to dry heat shall be expressed in accordance with the following rating scale. The slight surface lowness due to the hot aluminium block weight shall not be taken in account in the evaluation.

Rating 5 : No change — Test area indistinguishable from adjacent surrounding area.

Rating 4 : Slight change — Test area distinguishable from adjacent surrounding area, only when the light source is mirrored on the test surface and is reflected towards the observer's eye, e.g. discolouration, change in gloss and colour.

Rating 3 : Moderate change — Test area distinguishable from adjacent surrounding area, visible in several viewing directions, e.g. discolouration, change in gloss and colour, no change in the surface structure, e.g. deformation, cracking, blistering.

Rating 2 : Significant change — Test area clearly distinguishable from adjacent surrounding area, visible in all viewing directions, e.g. discolouration, change in gloss and colour, and/or structure of the decorative surface slightly changed, e.g. slight cracking, slight blistering.

Rating 1 : Strong change — The structure of the surface being distinctly changed e.g. strong cracking, strong blistering and/or discolouration, change in gloss and colour, and/or the surface material being totally or partially delaminated.

13.2.7 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name, type and nominal thickness of the product;
- c) effect on the surface of the specimen expressed in accordance with the rating scale;
- d) any deviation from the specified test method;
- e) date of the test.

13.3 Method B

13.3.1 Principle

A specimen taken from the laminate under test, bonded to wood chipboard to simulate service conditions, is subjected to dry heat by contact with a vessel of defined heat capacity, initially at 180 °C but cooling during the 20 min of contact. Resistance to the test conditions is assessed by visual examination. The test is intended to determine the suitability of decorative laminates for use in kitchens where contact with moderately hot cooking utensils is to be expected.

13.3.2 Apparatus

The apparatus used shall be as follows.

- a) **Heating medium**, dimethyl polysiloxane oil, (100 cSt viscosity) or any other material of similar specific heat which will produce the same result.
- b) **Fine-faced wood particleboard**, (230 ± 5) mm², with a nominal thickness of 18 mm to 20 mm (± 0.3 mm), a density of (680 ± 20) kg/m³, and moisture content (10 ± 3) %. As an alternative, particleboard with a nominal density of 720 kg/m³ and nominal thickness of 19 mm and sanded with 100 grit sandpaper may be used.
- c) **Urea-formaldehyde adhesive**, containing approximately 15 % filler, or vinyl acetate adhesive, or an equivalent adhesive utilized in accordance with the adhesive manufacturer's instructions.
- d) **Vessel** A cast cylindrical aluminium or aluminium alloy vessel, 90.5 mm in inside diameter and 7.6 mm in height (see Figure 9).
- e) **Heat source**, for heating the vessel uniformly.
- f) **Heat-insulating board**, inorganic, and of thickness about 2.5 mm and approximately 150 mm².
- g) **Thermometer**, specified in **JIS B 7414**, range -5 °C to $+250$ °C with an accuracy of 1 °C.
- h) **Fixed frame**, to hold the specimen flat.
- i) **Stirrer**

13.3.3 Test specimens

The specimen shall be prepared by uniformly bonding a piece of the laminate under test to the wood particleboard specified in **13.3.2 b)**, using the adhesive specified in **13.3.2 c)** evenly spread at 80 g/m² to 120 g/m². One specimen (230 ± 5) mm² shall be used. The bonded specimen shall be preconditioned for at least 72 h at temperature (23 ± 2) °C and relative humidity (50 ± 5) % before being used for the test.

For materials of thickness 2 mm or greater, the test may be conducted without bonding the specimen, i.e. with the specimen resting in close contact with the particleboard. This technique is also acceptable for routine quality control testing of laminates 2 mm or less thick. However, in cases of dispute, laminates less than 2 mm thick shall be bonded to particleboard.

Unit: mm

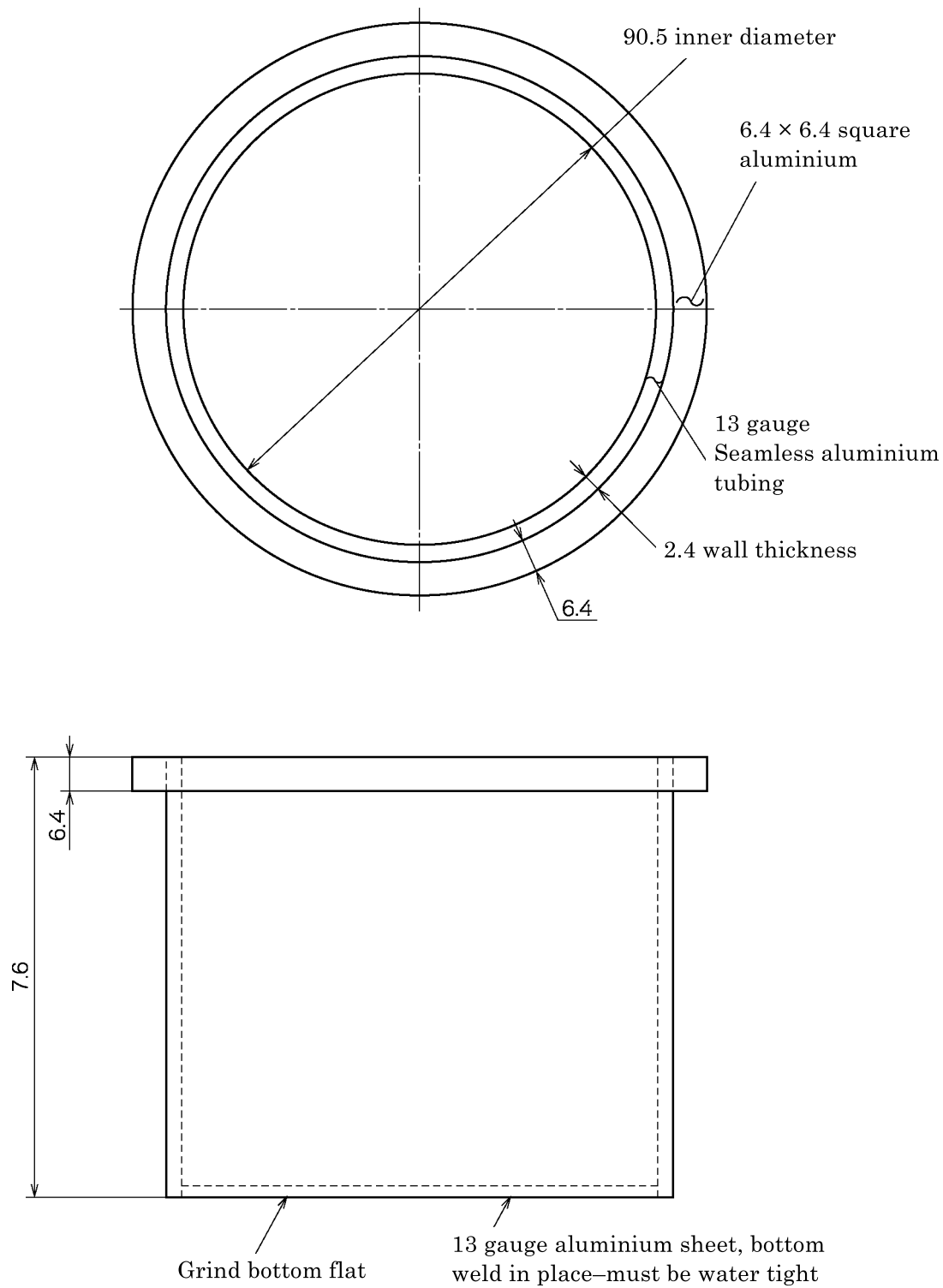


Figure 9 Aluminium heating vessel

13.3.4 Procedure

The test procedure shall be as follows.

- a) Fill the vessel specified in **13.3.2 d)** heated to 180 °C with the heat source specified in **13.3.2 e)** with sufficient heating medium specified in **13.3.2 a)** so that the level is about 15 mm from the top. Fix the thermometer specified in **13.3.2 g)** centrally in the vessel with its bulb about 6 mm from the bottom. Raise the temperature of the heating medium to approximately 185 °C, stirring from time to time. Transfer the vessel to the heat-insulating board specified in **13.2.2 f)** and allow the temperature to fall to (180 ± 1) °C, stirring continuously.
- b) Immediately place the vessel on the surface of the specimen and allow to stand for 20 min without further stirring.
- c) At the end of this period (20 min), remove the vessel and allow the specimen to cool for a period of 45 min. Examine the specimen for surface disturbance, for example blistering, crazing, discolouration or loss in gloss, visible to the naked eye, corrected if necessary, allowing the light to fall on the specimen at various angles of incidence.

13.3.5 Expression of results

The result of the examination shall be expressed in accordance with the following rating scale :

Rating 5 : No visible change.

Rating 4 : Slight change of gloss and/or colour, only visible at certain viewing angles.

Rating 3 : Moderate change of gloss and/or colour.

Rating 2 : Marked change of gloss and/or colour.

Rating 1 : Surface damage and/or blistering.

13.3.6 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name, type and thickness of the product;
- c) effect on the surface of the specimen expressed in accordance with the rating scale;
- d) any deviation from the specified test method;
- e) date of the test.

13.4 Method C

13.4.1 Principle

A specimen taken from the laminate under test, overlaid closely on a wooden heat-insulating board with its decorative face up, is subjected to dry heat by contact with a vessel of defined heat capacity, initially at 180 °C but cooling during the 20 min of contact. Resistance to the test conditions is assessed by visual examination. The test is intended to determine the suitability of decorative laminates for use in kitchens where contact with moderately hot cooking utensils is to be expected.

13.4.2 Apparatus

The apparatus used shall be as follows.

- a) **Wooden heat-insulating board** A chipboard or a particleboard of about 230 mm², and (19 ± 1.5) mm in thickness.
- b) **Vessel** A flat bottom aluminium vessel 130 mm to 160 mm in outside diameter, 1 L in capacity, with a smooth and flat bottom outside face.
- c) **Heat-insulating board** A suitable inorganic heat-insulating board.
- d) **Heat source**, for heating the flat bottom aluminium vessel uniformly.
- e) **Support**, for fixing the specimen to the wooden heat-insulating board horizontally (see Figure 10).
- f) **Thermometer**, with a maximum scale of 250 °C or 300 °C.

13.4.3 Test specimens

Cut out one specimen approximately 230 mm² from the laminate under test.

13.4.4 Procedure

The test procedure shall be as follows.

- a) Place the specimen closely over the wooden heat-insulating board specified in **13.4.2 a)** with its decorative surface up and fix this to the support specified in **13.4.2 e)** in a horizontal position by clamping at two sides.
- b) Put about 500 ml of vegetable oil into the flat bottom aluminium vessel specified in **13.4.2 b)**, and heat until the temperature of the oil becomes about 185 °C. Oil temperature shall be measured at a position approximately 6 mm above the bottom of the vessel. Move this vessel to the heat-insulating board specified in **13.4.2 c)**, and stir the oil continuously until the oil temperature becomes (180 ± 1) °C. Put the vessel on the decorative surface of the specimen fixed over the wooden heat-insulating board, and leave it for 20 min.
- c) Remove the vessel, and visually examine the specimen surface for defects, for example, blistering, crazing and loss in gloss by allowing the light to fall on the specimen at various angles of incidence.

13.4.5 Expression of results

The result of the examination shall be expressed in accordance with the following rating scale :

Rating 5 : No visible change.

Rating 4 : Slight change of gloss and/or colour, only visible at certain viewing angles.

Rating 3 : Moderate change of gloss and/or colour.

Rating 2 : Marked change of gloss and/or colour.

Rating 1 : Surface damage and/or blistering.

13.4.6 Test report

The test report shall include at least the following information :

- a) a reference to this Standard, i.e. **JIS K 6902**;
- b) name and type of the product;
- c) effect on the surface of the specimen expressed in accordance with the rating scale;
- d) any deviation from the specified test method;
- e) date of the test.

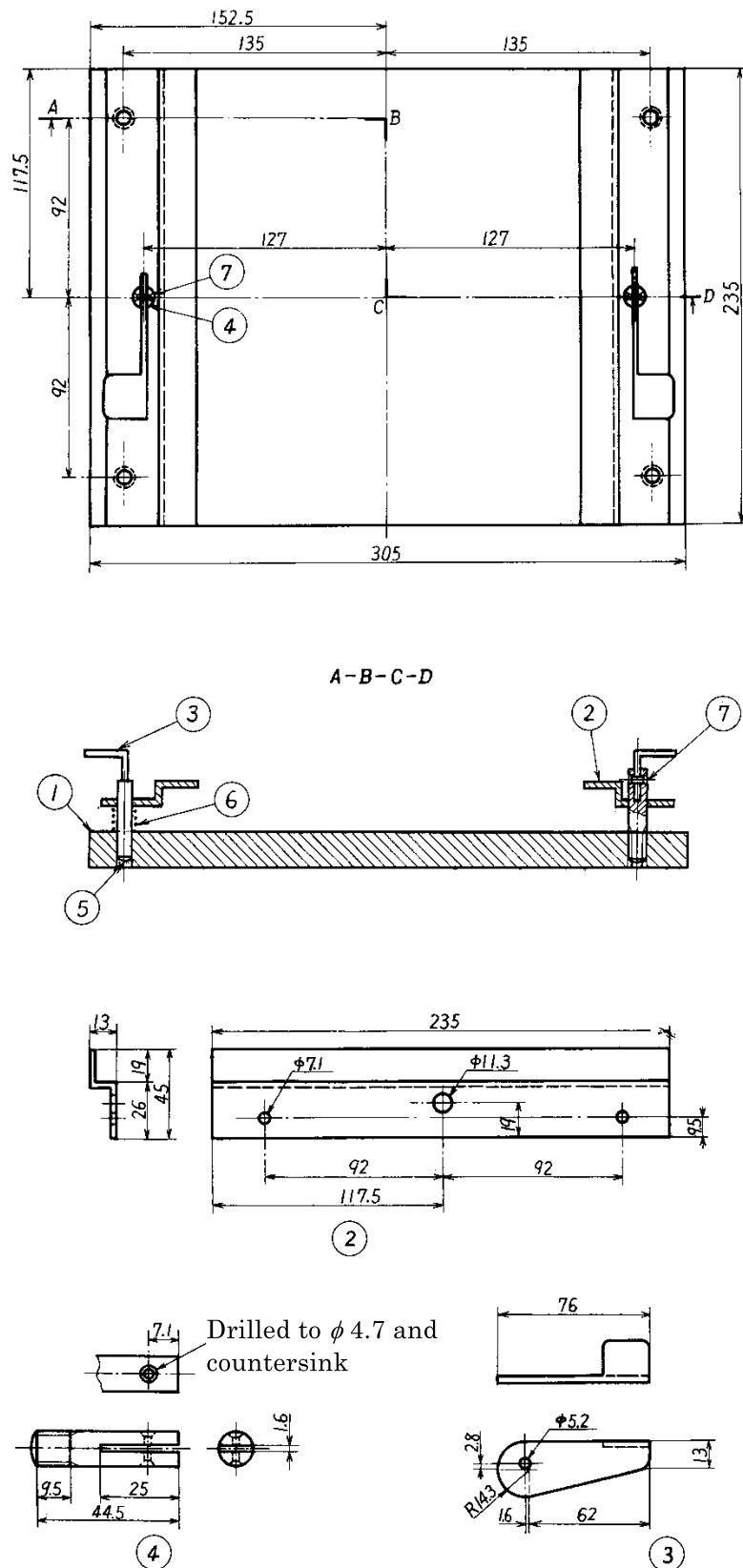


Figure 10 Support

Part number	Title	Quantity
1	Wooden heat-insulating board (nonmetallic)	1
2	Clamp (1.6 mm steel sheet)	2
3	Cam (1.6 mm steel sheet)	2
4	Pin (0.6 mm in diameter, made of cold-rolled steel)	2
5	Guide pin (6.4 mm in diameter)	4
6	Coil spring (made of spring steel wire with 0.8 mm diameter, and measuring 7.9 mm in inside diameter, 12.7 mm in length and 3.2 mm in pitch)	4
7	Rivet (4.8 mm in diameter, made of cold-rolled steel)	2

Figure 10 (concluded)

14 Dimensional stability (at elevated temperature)

14.1 General

Select either Method A, Method B or Method C depending on the testing environment.

14.2 Method A

14.2.1 Principle

This test measures the dimensional changes of specimens taken from the laminate under test over an extreme range of relative humidity at elevated temperatures.

14.2.2 Apparatus

The apparatus used shall be as follows.

- Oven**, capable of being maintained at $(70 \pm 2) ^\circ\text{C}$.
- High-humidity conditioning chamber**, with an atmosphere of temperature of $(40 \pm 2) ^\circ\text{C}$ and relative humidity $(92.5 \pm 2.5) \%$.
- Conditioning chamber**, with a standard atmosphere of temperature $(23 \pm 2) ^\circ\text{C}$ and relative humidity $(50 \pm 5) \%$.
- Means for measuring lengths**, of 200 mm to the nearest 0.02 mm.
- Desiccator**, of a suitable size.

14.2.3 Test specimens

Each specimen shall be cut out from the laminate under test to a length of (250 ± 2) mm and a width of (50 ± 1) mm. The edges shall be smooth and free from cracks. Two measuring marks shall be made on the decorative face of the specimens approximately 200 mm apart and 25 mm from each end.

Eight specimens shall be tested, four of them with their major axes parallel to the machine direction (longitudinal direction) of the fibrous sheet material (for example paper) from which the laminate has been made, and four with their major axes at right angles to the machine direction (transverse direction). Two specimens from each direc-