

JIS

JAPANESE INDUSTRIAL STANDARD

Testing methods for pilling of woven fabrics and knitted fabrics

JIS L 1076—1992

Translated and Published

by

Japanese Standards Association

Printed in Japan



Documents

18 S
Document Sharing Hub

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

J I S

Testing methods for pilling of
woven fabrics and knitted fabrics

L 1076-1992

1. Scope

This Japanese Industrial Standard specifies the test methods for pilling of woven fabrics and knitted fabrics.

Remarks 1. The standards cited in this Standard are as follows:

JIS K 6301-Physical Testing Methods for Vulcanized Rubber

JIS L 1096-Testing Methods for Woven Fabrics

JIS Z 8703-Standard Atmospheric Conditions for Testing

JIS Z 8806-Methods of Humidity Measurement

2. The units and numerical values given in { } in this standard are in accordance with the customary unit system and appended for informative reference.

2. Definitions

The principal terms used in this standard are as defined below.

- (1) pilling The state of surface of woven fabrics and knitted fabrics where the fibres of the surface have fluffed by being rubbed and the fluff thus produced has been entangled to the form of small ball (namely "pill").
- (2) standard condition of testing room The atmospheric condition of testing room where the temperature is 20°C and the relative humidity is 65 % tolerated with $\pm 2^\circ\text{C}$ and $\pm 2\%$, respectively, as specified in JIS Z 8703.

Remarks: For the measurement of the temperature and humidity above-mentioned, Meteorological Agency type or Assmann's type aspiration psychrometer (JIS Z 8806) shall be employed, and the humidity table based on Sprung's formula shall be used for the calculation of relative humidity.

- (3) standard condition of test sample The state of test sample where the sample has attained the constant mass resulting from being left undisturbed in a testing room kept at the standard condition after the sample is subjected to preheating of $40 \pm 5^\circ\text{C}$ in temperature to let the sample attain the moisture regain not higher than official regain.

Remarks: The fabrics of 0 % in official regain need no preheating. The official regains shall be as given in Table 1 of JIS L 1096.

- (4) constant mass The mass of a test sample at the time when the sample, after being subjected to two successive weighing at an interval of 1 h or longer, shows the fact that the difference in mass between the two weighing comes to be within 0.1 % of the latter mass.

3. Types of test methods

This standard covers six types of test methods enumerated below. These methods are independent and separate of each other, and any method can be selected as appropriate to the purpose.

- (1) Method A (Using ICI type tester)

- (2) Method B (Using TO type tester)
- (3) Method C (Using appearance retention type tester)
- (4) Method D (Using random tumble type tester)
 - Method D - 1 (Using chloroprene sheet lined tester containing cotton fibres)
 - Method D - 2 (Using chloroprene sheet lined tester containing no cotton fibre)
 - Method D - 3 (Using cork sheet lined tester)

4. Testers

4.1 ICI type tester This tester shall consist of the rotating box lined with cork sheet and of the special rubber tubes to be put in the box, as shown in Figs. 1 and 2.

The rotating box shall be a regular hexahedron having inside sides measuring 23 cm, and the lining cork sheet shall meet the requirements specified below.

The use of cork sheet shall be limited to 1500 h rotation, as a rule, and shall be replaced every time when it is damaged or abraded.

Thickness 3 ± 0.2 mm

Density 0.25 ± 0.03 g/cm³

Tensile strength 980 kPa {10 kgf/cm²}

Compressibility 10 to 20 % after load of 690 kPa {7 kgf/cm²} is applied for 1 min

Compression elastic modulus Not less than 75 % 1 min after the removal of load above-mentioned

Grain size 10 to 20 mesh

The special rubber tube shall be of cylinder form having both ends rounded as shown in Fig. 3, and shall meet the requirements specified below.

The use of special rubber tube shall be limited to its mass of 47 g, as a rule, and shall be replaced every time when it is damaged or abraded.

Thickness 3 mm

Length 150 mm

Outside diameter 31 mm

Radius of curvature at corner of both ends (*R*) 4 mm

Mass 51 g

Hardness 42 ± 5 [measured on scale of spring type A hardness tester specified in JIS K 6301. This measurement shall be made for 3 test pieces each of which has been made by cutting the tube equally along lengthwise direction and then triplicated.]

Prior to the first running of tester, the rotating box and rubber tubes shall be subjected to no-load running at a rate of 60 ± 2 min⁻¹ {rpm} for 10 h.

Fig. 1. ICI Type tester

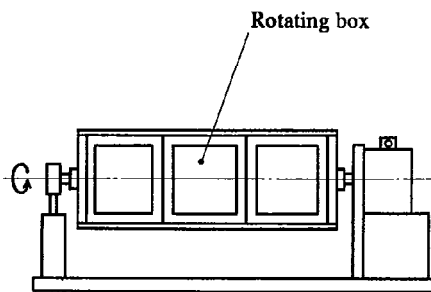


Fig. 2. Inside of rotating box lined with cork sheet

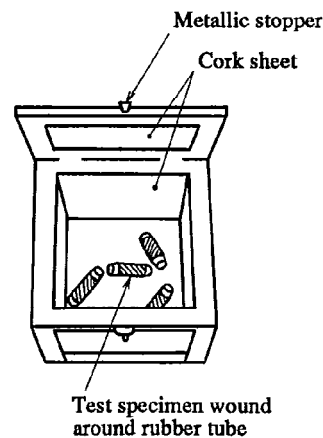
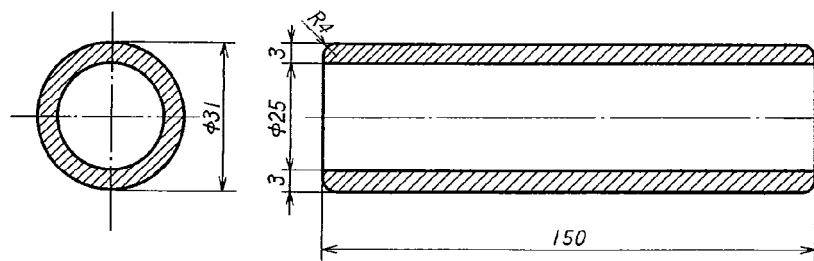


Fig. 3. Special rubber tube

Unit: mm



4.2 TO type tester This tester shall consist of a metallic cylinder and of rotating impellers, as shown in Fig. 4. This tester shall meet the requirements enumerated below.

Inside diameter of cylinder 155 mm

Width of impeller (outside dimension) 120 mm

Height of impeller (outside dimension) 95 mm

Clearance between impeller and inner wall of cylinder Approx. 17 mm

Clearance between bottom of impeller and bottom of cylinder Approx. 26 mm

Rubber band for covering impeller Thickness Approx. 1 mm,

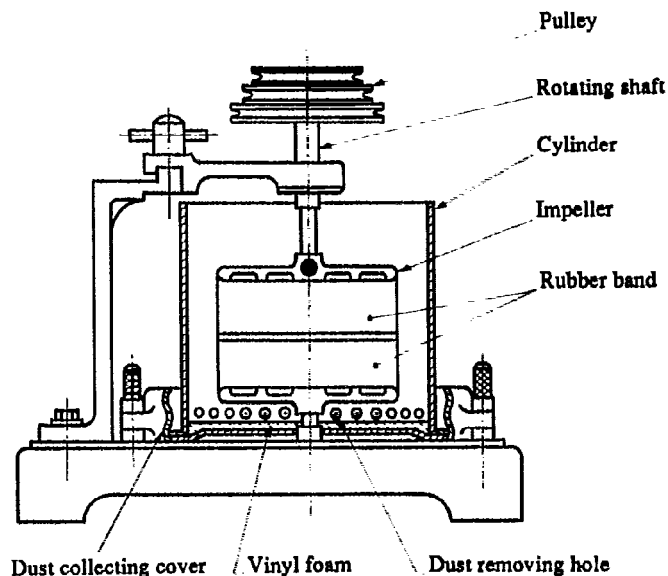
Width Approx. 45 mm,

Periphery Approx. 140 mm

The inner wall of cylinder shall have been finished smooth.

A vinyl foam, approx. 15 mm thick, shall be laid on the inner bottom of cylinder, over which a rubber membrane, approx. 1 mm thick, shall cover. The rubber band and the rubber membrane shall be of pure rubber with smooth surface.

Fig. 4. TO type tester



4.3 Appearance retention type tester This tester shall consist of a test specimen holder, a holder column and a supporting table fitted with an abrasive disk, as shown in Fig. 5. The specimen holder shall be detachable from the holder column, and the holder column shall be capable of sliding upward and downward but have no rotation and shall be capable of contacting with the abrasive disk positioning beneath it. The abrasive disk shall rotate eccentrically at a rate of $85 \pm 3 \text{ min}^{-1}$ {rpm}, plotting the circular track of 3.8 cm diameter.

The tester shall be provided with the accessories described below which can be used in combination where appropriate.

Bottom areas of test specimen holders

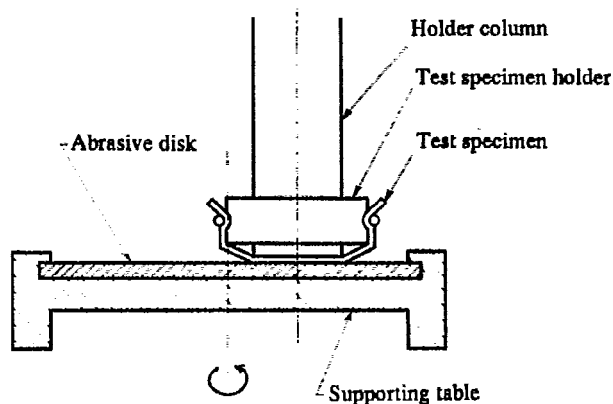
Approx. 13 cm², approx. 20 cm² and approx. 26 cm²

Pressing load (specimen holder and holder column)

Approx. 3.20 N {330 gf}, approx. 3.90 N {400 gf}

Abrasive disk Silicone carbide-made abrasive disk (3 K)

Fig. 5. Main parts of appearance retention type tester



4.4 Random tumble type tester This tester shall consist of a cylinder lined with a sheet of chloroprene or cork and of a pair of rotating impellers. It shall meet the following requirements:

Cylinder 146 mm inside diameter $\times$ 152 mm length

Length of impeller 121 mm

Clearance between impeller end and surface of lined chloroprene or cork sheet
9.5 mm

Chloroprene sheet 3 mm thickness $\times$ 452 mm length, and 47 ± 3 in hardness
(measured on scale of spring A type hardness tester specified
in JIS K 6301)

Cork sheet 1.5 mm thickness $\times$ 148 mm width $\times$ 452 mm length
It shall be as specified in 4.1.

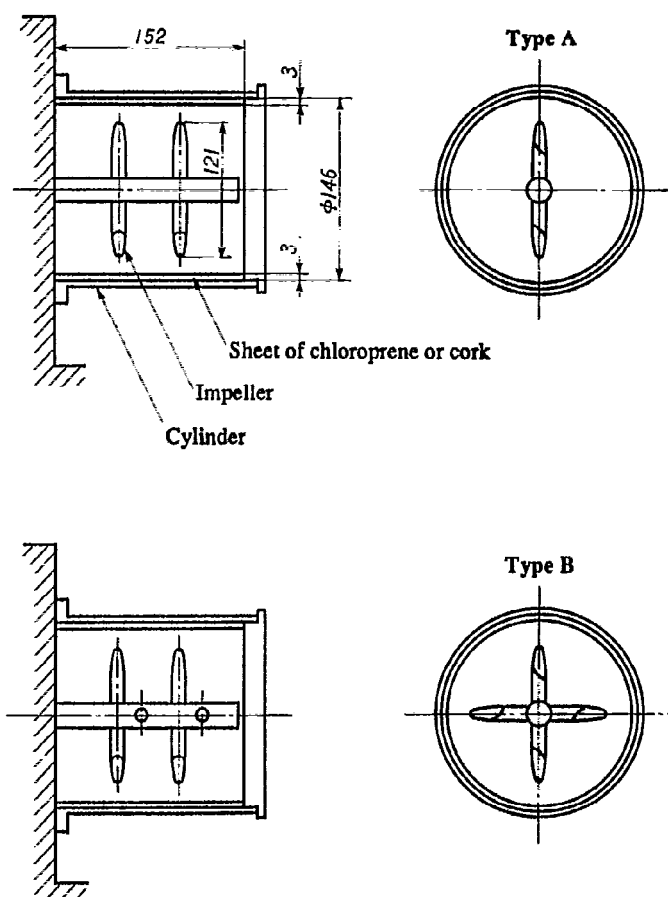
Prior to the use of chloroprene sheet, its surface shall be polished to attain a uniform rough surface with the vibrosander of accessory and No. $\frac{4}{0}$ garnet paper and then cleaned. In principle, its use shall be limited to 30 min on one side, and the chloroprene sheet which has been used for 60 min on both sides shall be refreshed to attain the rough surface again by repeating the above procedure. The use of chloroprene sheet shall be limited to its thickness of 2.8 mm.

The use of cork sheet shall be limited to 10 h on one side, as a rule, and, when its use exceeds 10 h, it shall be used by turning inside out. The cork sheet having been used for 10 h on both sides shall be replaced.

The tester is divided into two types, A and B, according to the construction of impeller.

Fig. 6. Main parts of random tumble type tester

Unit: mm



5. Sampling and preparation of test sample

The test sample shall be taken out, as a rule, of the area 1 m or more apart from the ends and one-tenth of whole width or more distant from both selvage edges both for woven fabrics and for knitted fabrics, and then it shall be subjected to the conditioning at the standard condition.

Remarks: When it is unable to keep the testing room at the standard condition, the test sample shall be put in a hermetic oven kept at a temperature of $20 \pm 2^\circ\text{C}$ and containing 36 % sulfuric acid to obtain the constant mass of sample. In such a case, the temperature and humidity during the test shall be noted in the test report.

6. Test methods

6.1 Method A (Using ICI type tester) Take two test specimens, each measuring $10 \text{ cm} \times 12 \text{ cm}$, out of the test sample having been prepared in accordance with 5., each in the directions of warp and weft for woven fabric and in the directions of wale and course for knitted fabric, wind them around the special rubber tubes specified in 4.1 under the natural condition with care not to apply the tension to the direction of short side, sew the test specimen