

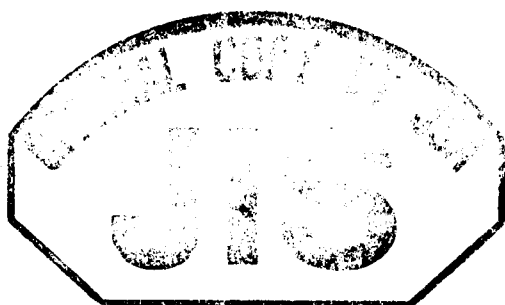
JIS

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JAPANESE INDUSTRIAL STANDARD

Testing Methods for Water Vapour Permeability of Clothes

JIS L 1099—1985



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JAPANESE INDUSTRIAL STANDARD

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Testing Methods for Water Vapour
Permeability of Clothes

L 1099-1985

1. Scope

This Japanese Industrial Standard specifies testing methods for water vapour permeability⁽¹⁾ of clothes.

Note ⁽¹⁾ The water vapour permeability means the value of mass (g) of water vapour passing clothes at specified temperature and humidity converted to per 1 m² and 1 h.

2. Classification of tests

As to the tests, the following three classes are specified and these are respectively separate independent test methods. In the case of testing, carry out by selecting the suitable method from these methods.

(1) Method A(a) Method A-1 (Calcium chloride method)(b) Method A-2 (Water method)(2) Method B (Calcium acetate method)3. Taking-out of sample

The sample shall, as a rule, be taken-out in the case of woven fabrics from the part excluding each 1/10 of total width from both ear ends and 1 m or more from the end, and in the case of knitted fabric, from the part apart by 50 cm or more from the end and for that having ear, from the part apart by 10 cm or more from the ear end.

Applicable Standards:

JIS K 8125-Calcium Chloride (for U-Tube)

JIS K 8363-Potassium Acetate

JIS L 0217-Care Labelling of Textile Goods

Corresponding International Standard:

ISO 2528-Sheet materials - Determination of water vapour transmission rate - Dish method

Reference Standards:

JIS K 6549-Testing Method for Water Vapour Permeability of Leather

JIS Z 0208-Testing Methods for Determination of the Water Vapour
Transmission Rate of Moisture - Proof Packaging Materials
(Dish Method)

4. Testing methods

4.1 Method A

4.1.1 Method A-1 (Calcium chloride method)

- (1) Apparatus and material For the apparatus and material, the following shall be used.
- (a) Thermohygrostat The thermohygrostat capable of circulating the air kept at the specified temperature and humidity at wind speed of approximately 0.5 m/s⁽²⁾.

Note (2) The wind speed 0.5 m/s means that, when measured at a position approximately 10 cm from the central part of wind blowing out opening, the wind speed is in the range of 0.3 to 1.0 m/s.

- (b) Chemical balance The chemical balance capable of weighing the mass of test body to the nearest 1 mg.
- (c) Water-vapour permeable cup The water-vapour permeable cup is, as a rule, to be that shown in Fig. 1, and its material quality is non-permeable for water vapour and under the test conditions it is free from corrosion and change of water-vapour permeable area.
- (d) Moisture absorption agent The moisture absorption agent specified in JIS K 8125.
- (2) Operation Take-out three sheets of circular test piece of approximately 7 cm in diameter from the sample of 3. Put the moisture absorption agent into the water vapour permeable cup preliminarily warmed to approximately 40°C up to the position of approximately 3 mm from the upper end of the cup. Next, as shown in Fig. 1, direct the surface of test piece toward the moisture absorption agent side, place so as to be concentric circle to the water vapour permeable cup, equip the packing and ring sequentially and fix by wing nut. Further, seal the equipped side face with vinyl adhesive tape and take it as the test body. Put this test body into the thermohygrostat in which the air at 40 ± 2°C, 90 ± 5 % RH in humidity circulates, after 1 h take out the test body and immediately measure the mass a_1 (mg). Next, again enter this test body into thermohygrostat, after 1 h take out the test body and immediately measure the mass a_2 (mg).
- (3) Calculation Obtain the water vapour permeability according to the following formula, and express by average value of three times (until integer place).

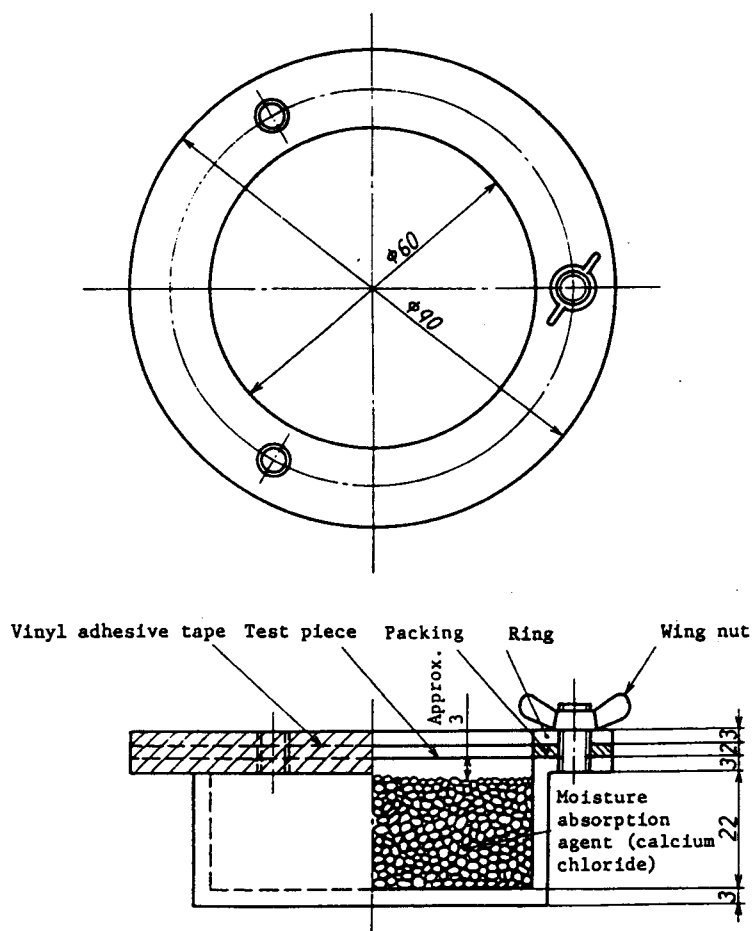
$$P = \frac{10 \times (a_2 - a_1)}{S}$$

where, P : water vapour permeability [g/(m².h)]

S : water vapour permeable area (cm²)

Fig. 1. Water vapour permeable cup (Method A-1)

Unit: mm



4.1.2 Method A-2 (Water method)

- (1) Apparatus and material For the apparatus and material the following shall be used.
 - (a) Thermohygrostat The thermohygrostat specified in 4.1.1 (1).
 - (b) Chemical balance The chemical balance specified in 4.1.1 (1).
 - (c) Water-vapour permeable cup As a rule, the water vapour permeable cup shown in Fig. 2 and of which material quality is non-permeable for water vapour and free from corrosion and change in water vapour permeable area under the test conditions.
- (2) Operation Take out three sheets of circular test piece of approximately 8 cm in diameter from the sample of 3. Put the water⁽³⁾ at approximately 40°C into the water-vapour permeable cup preliminarily warmed at approximately 40°C up to the position of approximately 10 mm from the upper end of the cup. Next, as shown in Fig. 2, lade with directing the back face of test piece toward the water side so as to be concentric to the water-vapour permeable cup, equip the packing and ring sequentially and fix by wing nut.

Further, seal the equipping side face with adhesive tape and take it as the test body. Put this test body into the thermohygrostat in which the air at $40 \pm 2^\circ\text{C}$ in temperature, and $50 \pm 5\%$ RH in humidity circulates, after 1 h take out and immediately measure the mass a_1 (mg). Next, put this test body again into thermohygrostat, after 1 h take out the test body and immediately measure the mass a_2 (mg).

Further, for dealing of test body sufficient care is required so as not to wet the test piece with water in the water-vapour permeable cup.

Note (³) Distilled water or ion-exchanged water

- (3) Calculation Obtain the water vapour permeability according to the following formula and express by average value of three times (to integer place).

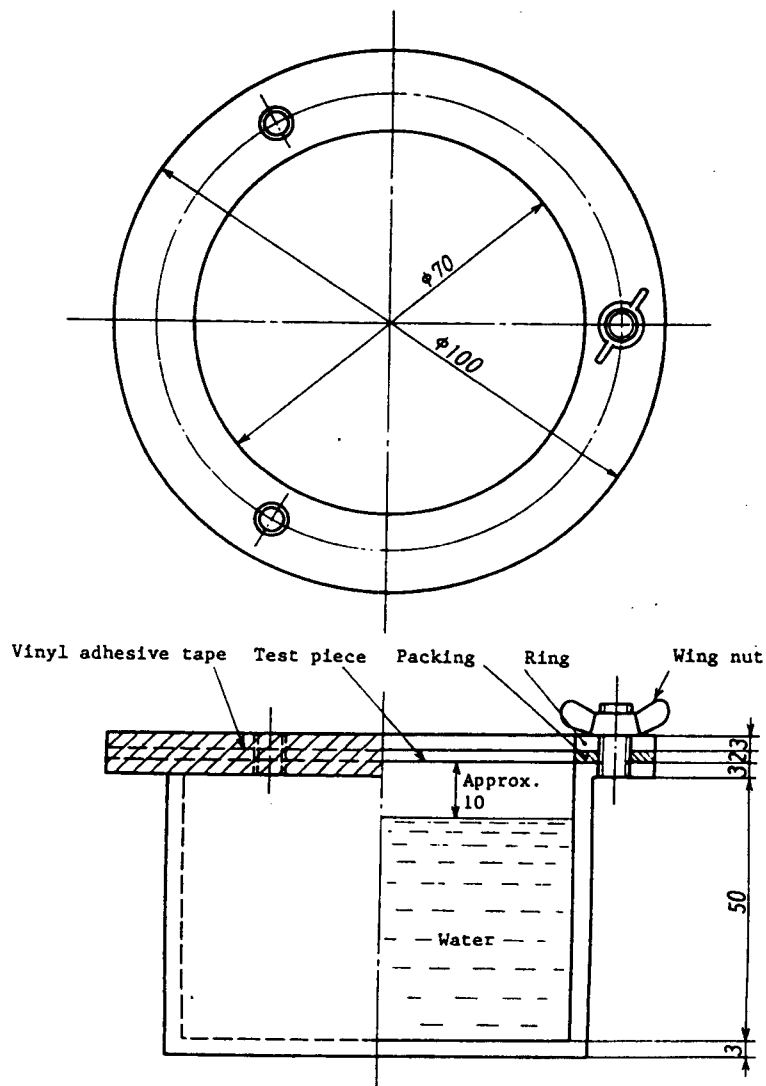
$$P = \frac{10 \times (a_1 - a_2)}{S}$$

where, P : water vapour permeability [$\text{g}/(\text{m}^2 \cdot \text{h})$]

S : water vapour permeable area (cm^2)

Fig. 2. Water vapour permeable cup (A-2) method

Unit: mm



4.2 Method B (Potassium acetate method)

- (1) Apparatus and material For the apparatus and material the following shall be used.
 - (a) Thermohygrostat The thermohygrostat capable of adjusting at the specified temperature.
 - (b) Chemical balance The chemical balance specified in 4.1.1 (1).
 - (c) Water-vapour permeable cup As a rule the water vapour permeable cup shown in Fig. 3 of which material quality is water-vapour non-permeable and free from corrosion and change in water-vapour permeable area under the test conditions.
 - (d) Test-piece supporting frame The test-piece supporting frame made of synthetic resin of cylinder shape of approximately 80 mm in bore, approximately 50 mm in height and approximately 3 mm in thickness.
 - (e) Water tank The water tank capable of being received in constant temperature apparatus and having such structure as to be capable of fixing the test-piece supporting frame.
 - (f) Auxiliary film for measuring water-vapour permeability The auxiliary film for measuring water vapour permeability having micro-multi porous structure of approximately 80 % in porosity rate⁽⁴⁾, made of polytetrafluoroethylene film of approximately 25 μm in thickness.

Note (4) The porosity rate means the rate of porous space to the volume.

 - (g) Moisture absorption agent The moisture absorption agent specified in JIS K 8363.
- (2) Operation Take out three sheets of test piece of size of approximately 20 cm x 20 cm from the sample of 3. Place the water tank containing water at approximately 23°C in temperature into the constant temperature apparatus in which the air at 30 $\pm$ 2°C in temperature circulates. As shown in Fig. 3. equip the test piece to the test piece supporting frame so as the back face of test piece is directed to the outside of supporting frame with the rubber band, and fix this test piece supporting frame so as to float in the water in water tank in the constant temperature apparatus. Next, put the potassium acetate solution⁽⁵⁾ kept at approximately 23°C in temperature into the water vapour permeable cup by approximately 2/3 of the cup volume, equip the auxiliary film for measuring water vapour permeability by rubber band and take it as the test body. After measuring the mass a_0 (mg) of this test body with the film equipped side upward, immediately overturn the test body and put into the test piece supporting frame. After 15 min, take out the test body, turn reversely and measure the mass a_1 (mg).

Note (5) Add potassium acetate 300 g to water 100 ml, leave as it is for 24 h, and the condition where the crystals are deposited.

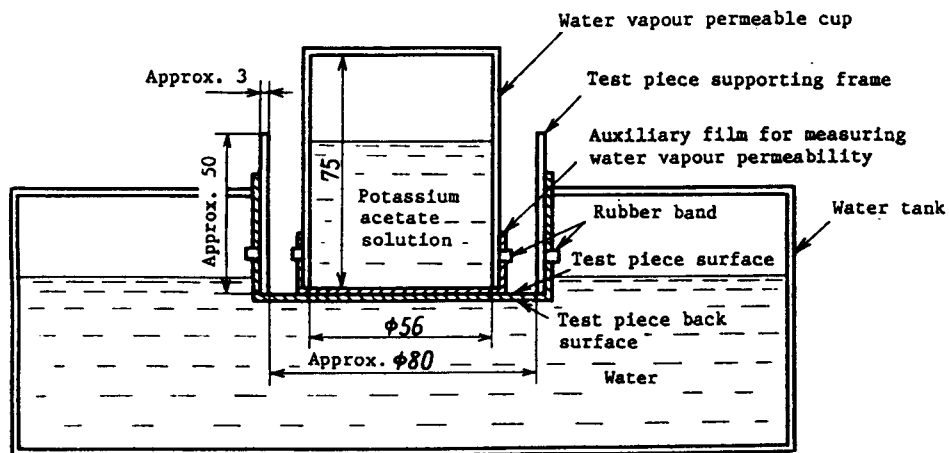
- (3) Calculation Obtain the water vapour permeability according to the following formula and express by the average value of three times (to the integer place).

$$P = \frac{40 \times (a_1 - a_2)}{S}$$

where, P : water vapour permeability [$\text{g}/(\text{m}^2 \cdot \text{h})$]
 S : water vapour permeable area (cm^2)

Fig. 3. Water vapour permeable cup (Method B)

Unit: mm



Remarks: This testing method is not applicable to the sample in which the water permeates at the time of test.

5. Test record

On the test record the classification of test and average value shall be described, and in the case where particularly the test piece is preliminarily treated, the details, be appended.

Example 1: Method A-1 200 $\text{g}/(\text{m}^2 \cdot \text{h})$

Example 2: Method B 1000 $\text{g}/(\text{m}^2 \cdot \text{h})$ repeated the operation of 103 of JIS L 0217 three times.

L 1099-1985
Edition 1

Japanese Text

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