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**Fabrics - Determination of water vapor transmission rate -
Dish method**

织物透湿量测定方法 透湿杯法

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Fabrics - Determination of water vapor transmission rate - Dish method

1 Subject content and scope of application

This standard specifies the method for determining the water vapor transmission rate of fabrics using the dish method. This standard includes two methods: Method A (absorption method) and Method B (evaporation method). Method A shall be used for arbitration.

This standard applies to all types of fabrics, including permeable coated fabrics.

2 Terms

Water vapor transmission rate (WVT)

The mass of water vapor passing through a unit area of fabric, in a specified time under conditions of constant water vapor pressure on both sides of the fabric, which is expressed in $\text{g}/(\text{m}^2 \cdot \text{d})$ under these conditions.

3 Principle

A dish filled with a desiccant or water and sealed with a fabric sample is placed in a sealed environment, at a specified temperature and humidity. The water vapor transmission rate is calculated, based on the change in mass of the dish (including the sample and desiccant or water) over a specified period of time.

4 Apparatus and materials

4.1 Test chamber

The test chamber temperature control accuracy is $\pm 0.5\text{ }^{\circ}\text{C}$; the relative humidity control accuracy is $\pm 2\%$; the circulating air velocity is $0.3 \sim 0.5\text{ m/s}$.

4.2 Dish and accessories

4.2.1 The dimensions of the dish and accessories are shown in the Figure below.

4.2.4 Washers shall be made of rubber or polyurethane plastic.

4.2.5 The width of the ethylene adhesive tape shall be greater than 10 mm.

4.2.6 Dishes sealed by other methods may be used as long as they meet the two dimensions of 60 mm inner diameter and 22 mm dish depth.

4.3 Balance

The balance accuracy shall be 0.001 g.

4.4 Reagents

4.4.1 Desiccant: Anhydrous calcium chloride (chemically pure), particle size 0.63 ~ 2.5 mm. Dry it in an oven at 160 °C for 3 hours before use.

4.4.2 Water: Distilled water.

4.5 Standard sieve

Sieve of 0.63 mm and 2.5 mm pore size each.

4.6 Desiccator, graduated cylinder

5 Specimens

The specimen diameter is 70 mm. Take 3 specimens from each sample (the number of specimens may also be determined according to relevant provisions). When testing both sides of the sample, take three specimens from each side and mark them. When testing coated fabrics, unless otherwise specified, the coated side shall be the test surface. Specimens shall be cut 1/10 of the fabric width from the edge and no less than 2 meters from the end of the piece. Specimens should be free of defects that could affect the test results.

6 Test procedures

6.1 Method A: Moisture absorption method

6.1.1 Test conditions

Temperature: 38 °C, relative humidity: 90%, airflow velocity: 0.3 ~ 0.5 m/s.

6.1.2 Place the desiccant into a clean, dry dish, ensuring the desiccant is flat. The desiccant filling height shall be 3 ~ 4 mm from the bottom surface of the specimen.

6.1.3 Place the specimen, with the test surface facing up, on the dish. Install the washer and pressure ring; tighten the nut; seal the pressure ring, washer, dish from the sides

with ethylene adhesive tape as shown. This completes the test assembly.

6.1.4 Promptly place the test assembly horizontally in a test chamber, which has reached the specified test conditions. Allow 0.5 h for equilibration before removing.

6.1.5 Quickly cover the corresponding lids and equilibrate them in a silica gel desiccator at approximately 20 °C for 30 minutes. Weigh each assembly according to its number, with an accuracy of 0.001 g. Weighing time for each assembly shall not exceed 30 s.

6.1.6 Remove the lids and quickly place the test assembly into the test chamber. After the 1 hour test, remove the assembly and weigh it according to 6.1.5. The order of weighing the assemblies shall be consistent each time.

6.2 Method B: Evaporation method

6.2.1 Test conditions

Temperature: 38 °C, relative humidity: 2%, air flow rate: 0.5 m/s.

6.2.2 Pour 10 mL of water into a clean dry dish.

6.2.3 Place the specimen, with the test surface facing down, on the dish. Install the washer and pressure ring; screw on the nut; seal the pressure ring, wash, dish from the sides with ethylene adhesive tape as shown. This completes the test assembly.

6.2.4 Place the test assembly horizontally in a test chamber, which has reached the specified test conditions. After 0.5 hours of equilibration, weigh each test assembly within the chamber according to its number, with an accuracy of 0.001 g.

6.2.5 After 1 hour of testing, weigh the test assembly again in the same order. If weighing is required outside the chamber, the ambient temperature of the dish must not differ from the specified test temperature by more than 3 °C during weighing.

7 Test results

The water vapor transmission rate of the specimen is calculated according to the following formula:

$$\text{WVT} = \frac{24 \cdot \Delta m}{S \cdot t}$$

Where:

WVT - Water vapor transmission rate per square meter per day (24 hours), g/(m²·d);

Δm - Difference between two weighing of the same test assembly, g;

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