

Australian/New Zealand Standard®

Methods of test for pressure-sensitive adhesive tape

Method 11.1: Water vapour transmission rate

1 SCOPE This Standard sets out the method for determining the water vapour transmission rate of pressure-sensitive adhesive tape.

2 REAGENT The following reagents are required:

- (a) Methyl ethyl ketone (MEK), reagent grade.

NOTE: Acetone, reagent grade, may also be used.

- (b) Anhydrous calcium chloride, particle size 0.5 mm to 2.0 mm. (Regenerate calcium chloride to a sufficient anhydrous state by heating at approximately 200°C for 2 h.)

3 APPARATUS AND MATERIALS The following apparatus and materials are required:

- (a) *Humidity cabinet*—providing a relative humidity of $96 \pm 2\%$ at a temperature of $38 \pm 2^\circ\text{C}$ with no condensation on the test dishes or in the space in which the test dishes are placed. The circulation over the test dishes shall be regarded as negligible.

Alternatively, a desiccator or other suitable vessel containing a saturated solution of potassium sulfate may be used to provide an atmosphere of approximately 96% relative humidity when maintained at a temperature of $38 \pm 2^\circ\text{C}$ in a suitably regulated electric oven.

- (b) *Test dishes*—in the shape of flat flanged rectangular cups formed of brass sheet, and having the dimensions shown in Figure 1, which shows three sizes of dishes.
- (c) *Analytical balance*—with a capacity of at least 200 g and having an accuracy of ± 0.1 mg.
- (d) *Dry silicon carbide paper*—280 grit.

4 TEST CONDITIONS Testing shall be conducted at $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ relative humidity.

5 PREPARATION OF TEST SPECIMENS The roll, from which the test specimen is to be taken, shall be conditioned at $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ relative humidity for 24 ± 1 h prior to testing.

The test specimen shall be at least 125 mm long.

6 PROCEDURE The procedure shall be as follows:

- (a) Take a test specimen from the freely rotating conditioned roll, the minimum width of which shall be at least the width of the test dish being used, by manually unrolling the roll radially and after discarding the outer three laps of the roll.

NOTE: The speed of removal of the test specimen from the roll is operator-dependent. Usually, a speed of approximately 300 mm/s is attained.

- (b) Polish the flanged surface of the test dish lengthwise with the 280 grit dry silicon carbide paper and clean with the methyl ethyl ketone (MEK).
- (c) After the surface has dried, transfer approximately 25 mL of anhydrous calcium chloride into the dish and spread evenly over the bottom.
- (d) Position the dish in a jig to support the flange, and apply the tape specimen using finger pressure to thoroughly seal the tape to the flange of the test dish. Trim the tape to the edge of the dish.
- (e) Condition the assembly in the humidity cabinet for 24 ± 1 h.
- (f) Remove the assembly from the humidity cabinet, cool for 15 min at $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ relative humidity, and weigh.
- (g) Return the assembly to the test atmosphere for a further 24 ± 1 h, remove and cool again at $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ relative humidity for 15 min, and reweigh.
- (h) Repeat the 24 ± 1 h exposure period until the difference in successive weighings becomes constant. Where this is not attainable after four readings, the fifth reading shall be taken as the final determination. In the event that exposure periods have to be continued beyond normal working periods the gain in mass over such periods shall be reduced to gains in mass for equivalent 24 ± 1 h exposure periods.

7 CALCULATION The water vapour transmission rate, in grams of water vapour transmitted per m^2 of tape area for 24 h, shall be calculated as follows:

$$\text{Water vapour transmission rate (grams/m}^2\text{/24 h)} = \frac{(M_2 - M_1) \times 24 \times 10^6}{T \times A} \dots 7(1)$$

where

M_2 = mass in grams (to the nearest 0.2 mg) after exposure period
 M_1 = mass in grams (to the nearest 0.2 mg) before exposure period
 T = exposure period to the nearest 0.1 h
 A = area in mm^2 of opening of test dish (normally 2500 mm^2)

8 REPORT The following information shall be reported:

- (a) The water vapour transmission rate, in grams of water vapour transmitted per m^2 of tape area for 24 h.
- (b) Reference to this Australian/New Zealand Standard, i.e. AS/NZS 1635.11.1.