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Water Vapor Transmission of Pressure Sensitive Tapes

1. DEFINITION

1.1 Water vapor transmission is the weight of water vapor allowed through a controlled area of a tape within a specified period and under controlled conditions.

2. SIGNIFICANCE

2.1 Water vapor transmission is an important property to be determined when tape is to be used to seal against humidity.

3. TEST SPECIMEN

3.1 Three test specimens at least 48 mm (2") wide and 150 mm (6") long shall be prepared from each sample roll.

4. EQUIPMENT - See Appendix B

4.1 A humidity cabinet that shall provide a relative humidity of 90% to 95% at a temperature of 38˚C ± 0.5˚C (100˚ ± 1˚F) 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 negligible. Equipment known as the general foods cabinet, or equivalent, is satisfactory for this test.

4.2 Water vapor cup. Figure 1.

4.3 Eight mesh anhydrous calcium chloride.

4.4 Analytical balance.

5. TEST METHOD

5.1 Fill the cup to within 3 mm (1/8") of the opening with eight mesh anhydrous calcium chloride and assure that it will not make contact with the adhesive of the test specimen. Apply the tape specimen, adhesive face down, over the opening to allow a minimum of 12 mm (1/2") of tape to be in contact with the sides of the flange and 24 mm (1") to be in contact with the ends. The tape adhesive shall be brought into intimate contact with the flange using ample finger pressure. The tape shall be trimmed to the flange dimensions. If air bubbles are apparent in the applied tape, a new specimen should be prepared. See Figure 2.

5.1.1 When the adhesive is lacking or has insufficient bonding strength to the flange to maintain a seal during the exposure period, and when the parties concerned are interested exclusively in the barrier properties for pathways normal to the surface of the tape backing, a pressure sensitive material such as aluminum foil-backed pressure sensitive tape can provide assurance that only the 24 mm x 100 mm (1.0" by 4.0") area at the flange opening is exposed and all edges covered.

5.2 Place the assembly in the humidity cabinet for 24 h conditioning period. Remove from the cabinet, cool for 15 min. at standard conditions, and weight on an analytical balance to the nearest third decimal place. This weight is W1 in paragraph 6.1.

5.2.1 For materials with a WVTR of 2.5 g/100 sq inches/24 h or less, after the initial weighing, return the assembly to the humidity cabinet for 72 h, remove, condition at standard conditions for 15 min., and weigh. Use this weight as W2 in paragraph 6.1.

A Summary of Changes section appears at the end of this test method.

5.2.2 For materials with a WVTR of > 2.5 g/100 sq inches/24 h, after the initial weighing, return this assembly to the humidity cabinet for 48 h. Remove, condition for 15 min., and weigh. Use this weight as W2 in paragraph 6.1.

6. REPORT

6.1 Calculate the water vapor transmission rate (WVTR) for each specimen in g/100 sq inches of tape area in 24 h to the nearest 0.05 g as follows:

Water Vapor Transmission Rate (WVTR) equals:

$$\frac{(W2 - W1) \times 2400}{T \times A}$$

where:

W1	=	weight (in grams) before exposure period
W2	=	weight (in grams) after exposure period
T	=	exposure time (in hours)
A	=	area (in square inches) of opening in dish (4).

6.2 Report the average of the transmission rates for the three specimens.

Another method for determining water vapor penetration rate of pressure sensitive tape is ASTM D 3833.

SUMMARY OF CHANGES

- Made consistent metric references of 24 mm and 48 mm for standard 1" and 2" tape rolls.

Figure 1. Water vapor cup side view.

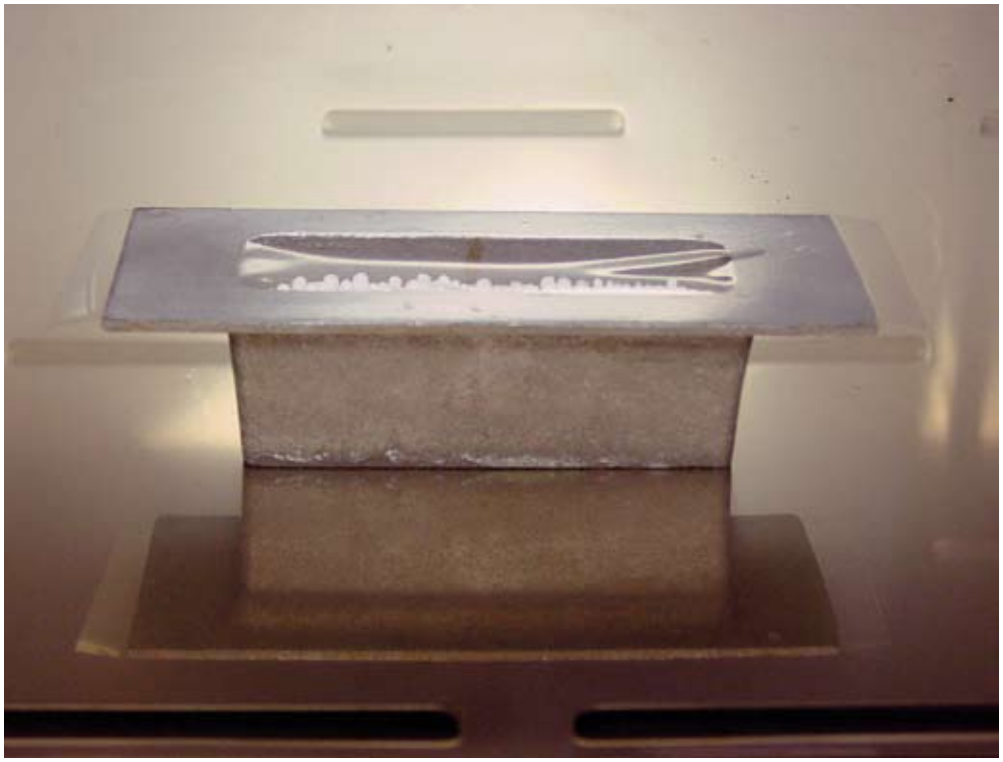

Figure 2. Water vapor transmission rate testing.