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Water Penetration Rate of Pressure Sensitive Tapes

1. DEFINITION

1.1 Water penetration rate is the weight of the water transmitted through a controlled area of a tape, within a specified time period and under controlled conditions.

2. SIGNIFICANCE

2.1 Water penetration is an important property to determine when the tape may be exposed to water, if it is to be used for sealing purposes.

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 Water vapor cup.

4.2 A container of sufficient depth to cover test specimen with a 24 mm (one-inch) head of water.

4.3 Eight mesh anhydrous calcium chloride.

4.4 Analytical balance.

4.5 Air-circulating oven.

4.6 De-ionized water

5. TEST METHOD

5.1 Fill the cup to within 3 mm (1/8") of the opening with eight mesh anhydrous calcium chloride and ensure that it will not make contact with the adhesive of the test specimen. See Figure 1. 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.

5.1.1 When the adhesive is lacking or has insufficient bonding strength to the flange to maintain a seal during 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 Heat assembly in an air-circulating oven for 30 min. at 49°C (120°F) and cool for 30 min. at standard conditions. See Appendix A. Weigh on an analytical balance to third decimal place. This value is W_1 in paragraph 6.1.

5.3 Submerge the assembly under about one inch of de-ionized water at standard conditions for 48 hours. See Figure 2 and 3.

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

5.4 Remove assembly from water and remove visible water from dish using a lint-free absorbent paper.

5.5 Place the assembly in an air-circulating oven at 49˚C (120˚F) for 120 min. Allow to cool for 30 min. at standard conditions and weigh. This value is W_2 in equation 6.1.

6. REPORT

6.1 Calculate the water-penetration rate (WPR) for each specimen in g/100 sq in. of tape area per 24 h as follows:

$$WPR = \frac{(W_2 - W_1) \times 2400}{T \times A}$$

where:
W_1 = weight (in grams) before exposure period
W_2 = weight (in grams) after exposure period
T = exposure time (in hours) (48).
A = areas of exposed surface (in square inches) (4).

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

Another method for measuring water penetration rate of pressure sensitive tape is ASTM D 3816.

SUMMARY OF CHANGES

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

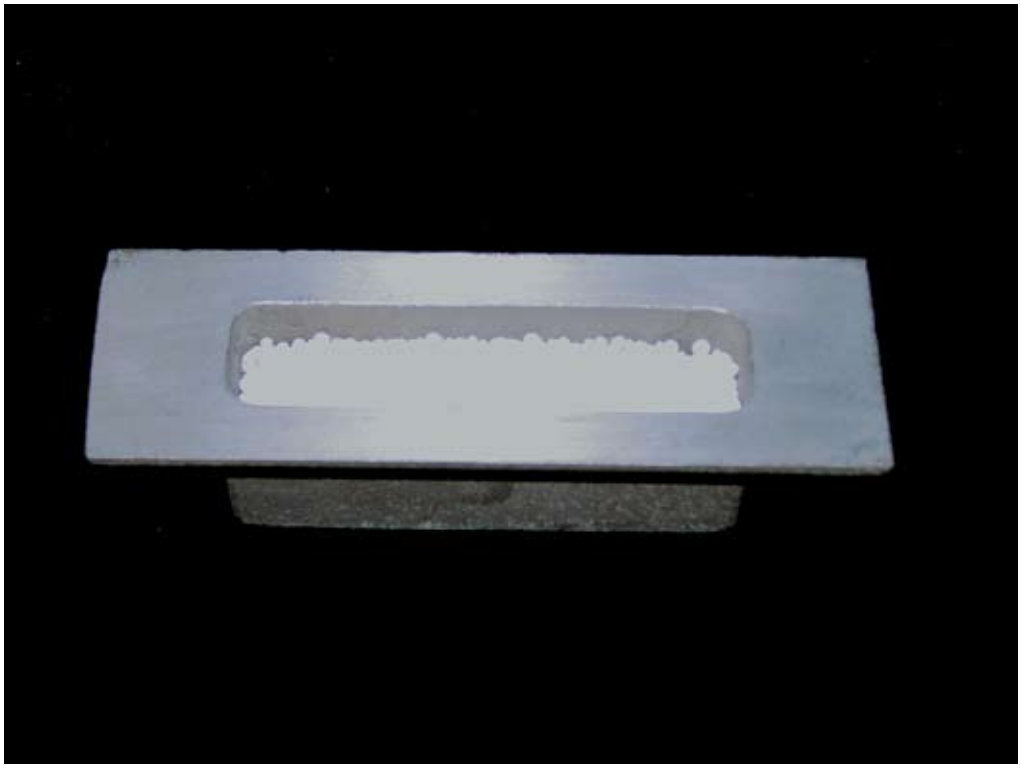

Figure 1. Water vapor cup filled with calcium chloride.

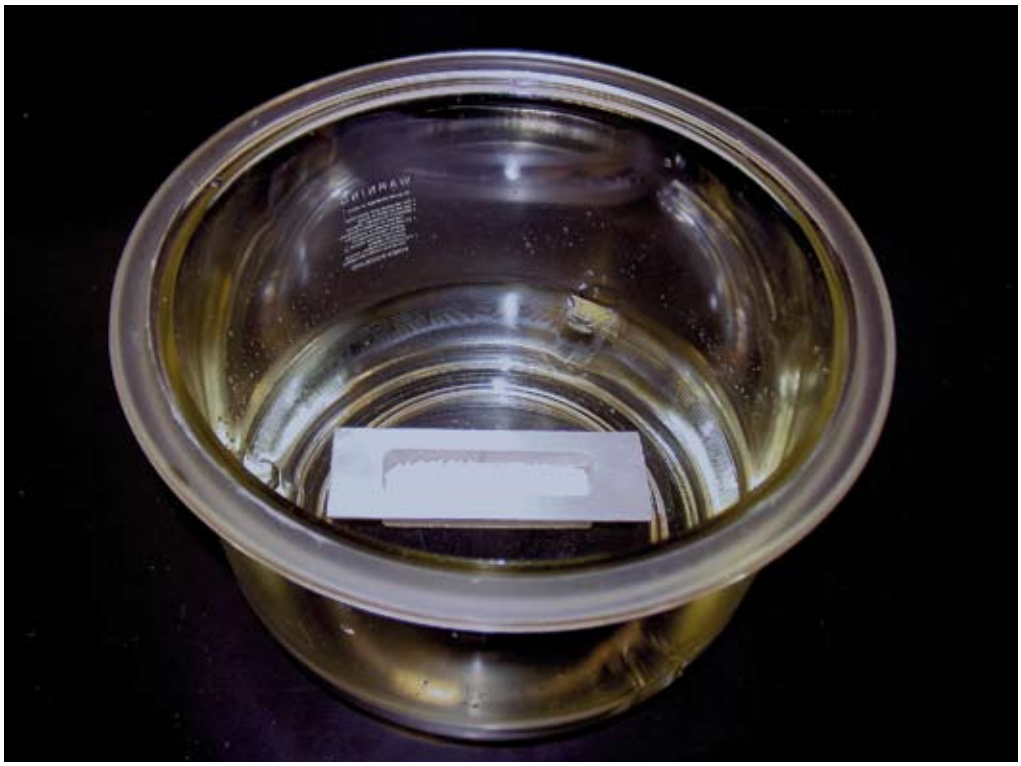

Figure 2. Water vapor cup placed in container.

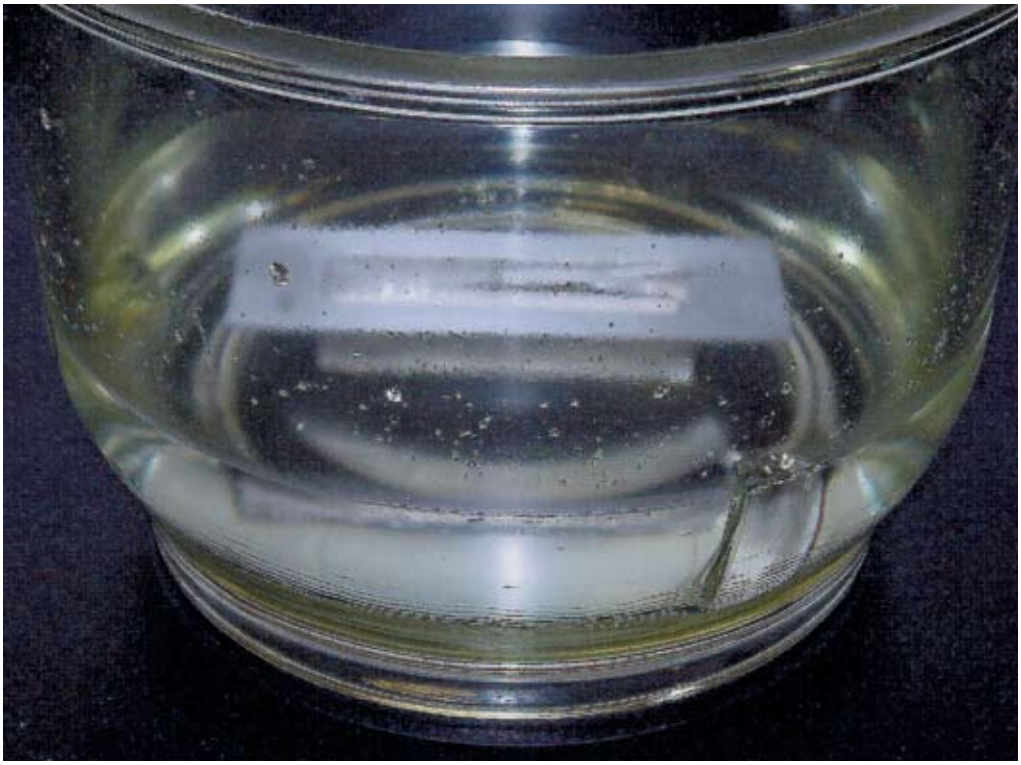

Figure 3. Container with water and test in progress.