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The moisture transmission rate of a material is referred to as its permeability, stated in perm inches. This number is not dependent on the materials' thickness. Its' permeance, however, is dependent on thickness much like the R-value in heat transmission. Dividing the permeability of a material by its' thickness gives the materials' permeance, stated in perms. Permeance is the number that should be used to compare various products in regard to moisture transmission resistance.

Water vapor permeance is also a measurement of vapor transmission, however it is a performance evaluation, and not a property of a material. U.S. units are typically reported as perm-inch (1 perm-inch = the passage of 1 grain of vapor through 1ft² of 1 inch thick material in 1 hour under a pressure difference of 1 inch of mercury). Water vapor permeability is commonly used to describe the water vapor passage through bulk materials such as thermal insulation. U.S. units are typically reported as perms (1 perm = the passage of 1 grain of vapor through 1ft² of material in 1 hour under a vapor pressure of 1 inch of mercury). Water vapor permeance is commonly used for reporting the water vapor that passes through thin materials such as insulation coatings. [Note: 1 ng/(s.m².Pa) = 1.459 perm/inch]

Permeability is the rate that water or vapor will pass through a membrane. The test used is Moisture Vapor Transmission ASTM-E 96 or Moisture Vapor Permeability D-1653. The results are measured in "perms". The lower the number the less moisture vapor will come through the membrane. This is extremely important in immersion conditions. Lower permeability is better.

Everything is permeable ... it's just that some things are more permeable than others. Flake filled systems and systems loaded with carbon show less permeability than non- filled systems.

Factors:

1. The size of the molecule of the liquid: Distilled water and hydrochloric acid will rapidly permeate a liner due to the small molecular size of these elements.
2. Temperature: We know that heating material will lower viscosity. Warm or hot liquids will permeate faster than cool liquids.
3. The thickness of the Membrane: The thicker the membrane the less a liquid or gas will go through the liner thus the lower the perm rating.

Definition: The rate of water vapor transmission per unit area per unit of vapor pressure differential under test conditions. It may be expressed as perm-centimeter (g/24 hr·m²·mm Hg·cm) of the thickness or perm-inches (grain/hr·ft²·in Hg·in) of thickness.

WATER VAPOR TRANSMISSION.

Definition: The amount of water vapor passing through a given area of a plastic sheet or film in a given time, when the sheet or film is maintained at a constant temperature and when its faces are exposed to certain different relative humidities. The result is usually expressed as grams per 24 hours per square meter (g/24 hr·m²).

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