



ABCO Technical Bulletin

Vapor Retarder and Vapor Barriers

A vapor retarder is a specially treated paper, thin plastic sheeting, or low-permeance paint that prevents condensation of water vapor inside wall or ceiling materials. This trapped moisture can cause damage to the wallboard and paint as well as structural deterioration. The vapor retarder must have a vapor permeance (the rate that moisture can pass through materials) of not more than 1.0 perm (tested in accordance with ASTM Standard E96-80). The 2006 International Energy Conservation Code® defines a vapor retarder as "A vapor-resistant material, membrane or covering such as foil, plastic sheeting, or insulation face having a permeance rating of 1 perm or less when tested in accordance with the desiccant method using Procedure A of ASTM E96. Vapor retarders limit the amount of moisture vapor that passes through a material or wall assembly."

The term vapor barrier is somewhat misleading since it does not completely bar the transmission of water vapor. A vapor barrier is actually a vapor-resistant membrane, and is more properly called a vapor retarder. Vapor retarders are typically available as membranes or coatings. Membranes are generally thin, flexible materials, but also include thicker sheet materials sometimes called structural vapor retarders. Materials such as rigid foam insulation, reinforced plastics, aluminum, and stainless steel are relatively resistant to water vapor. These types of vapor retarders are usually mechanically fastened and sealed at the joints.

Thinner membrane types come in rolls or as integral parts of building materials. A common example of this is aluminum or paper-faced fiberglass roll insulation. Polyethylene, a plastic sheet material, on the inside of building assemblies in cold, mixed-humid, marine, hot-dry and hot-humid climates is not generally a good idea; drying of building assemblies in these climates occurs on the inside as well as on the outside.

Interior drying is typically necessary in air-conditioned enclosures. Interior vapor barriers such as polyethylene and vinyl wall coverings should never be installed in air-conditioned buildings. Polyethylene sheeting has been a commonly used product in Colorado. Recent developments in building science have shown this material should not be used in the Denver Metro area (Zone 5).

An air retarder is different from a vapor retarder in that it blocks only air and liquid water, not water vapor. Air retarders block drafts of hot or cold air caused by winds and pressure differences between the inside and outside of the house. A housewrap is one form of an air retarder. Typical exterior housewraps are not vapor retarders.

Chapter 4 of the 2006 International Energy Conservation Code®, section 402.5, Moisture Control (mandatory) addresses vapor retarders.

"The building design shall not create conditions of accelerated deterioration from moisture condensation. Above-grade frame walls, floors and ceilings not ventilated to allow

moisture to escape shall be provided with an approved vapor retarder. The vapor retarder shall be installed on the warm-in-winter side of the thermal insulation.

Exceptions:

1. In construction where moisture or its freezing will not damage the materials.
2. Frame walls, floors and ceilings in jurisdictions in Zone 1, 2, 3, 4A and 4B. (Crawl space floor vapor retarders are not exempted.)
3. Where other approved means to avoid condensation are provided."

Any material that has a perm rating of 1 or less is considered to be a vapor retarder. The following table shows the perm rating of some common building materials that are consistent with the ASHRAE Handbook of Fundamentals and other industry sources.

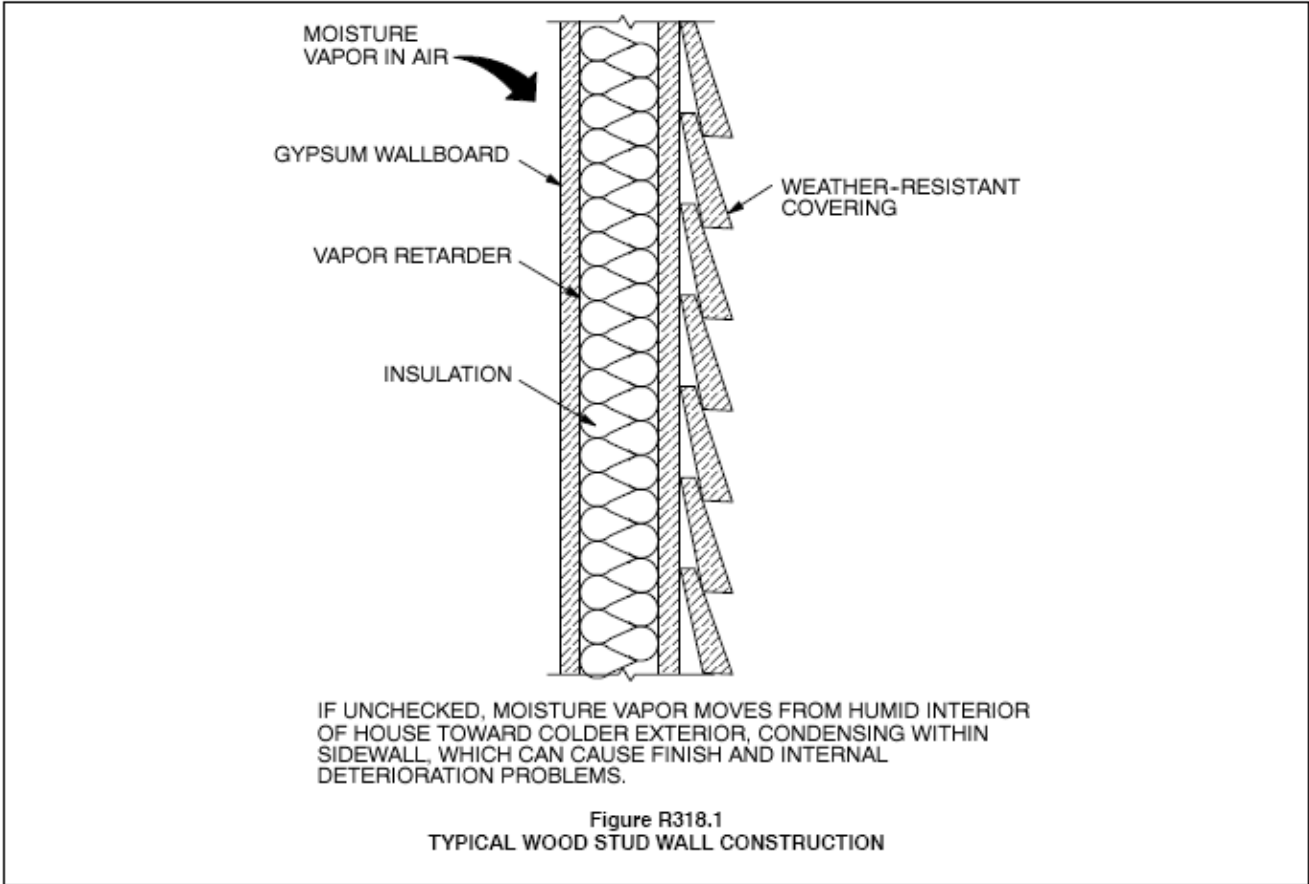
<u>Vapor Retarders</u>	<u>Perm Rating</u>
Insulation Facing, Kraft	1.0
1/4-inch plywood (Douglas fire, exterior glue)	0.7
Insulation Facing, Foil Kraft Laminate	0.5
Vapor Retarder Latex Paint, .0031 in thick	0.45
.002 in Polyethylene Sheet	0.16
.004 in Polyethylene Sheet	0.08
.006 Polyethylene Sheet	0.06
Aluminum Foil .00035 in thick	0.05
Aluminum Foil .001 in thick	0.01

<u>Not Vapor Retarders</u>	<u>Perm Rating</u>
3/8-inch Gypsum Wall Board (plain)	50
4-inch unfaced mineral wool	30
Typical Latex Paint, ~ .002 in thick	5.5 to 8.6
4.4 lb./100 ft. ² Asphalt Saturated Sheathing Paper	3.3
1/4-in Plywood (Douglas fir, interior glue)	1.9
Dupont Tyvek Homewrap®	48
Dupont Tyvek StuccoWrap®	36
Barricade Building Wrap®	63
DOW Weathermate Plus®	46.6
Fortifiber Jumbo Tex®	29
Fortifiber Jumbo Tex 2-ply®	14

Paint can serve as a vapor retarder to reduce the diffusion of water vapor through materials, such as drywall, replacing 4-mil polyethylene sheets and coated Kraft paper. Benjamin Moore Paints recently introduced Moorcraft Latex Vapor Barrier Primer Sealer 260®. With a perm rating below 1.0, this product meets the requirements of a vapor retarder with a single coat. Other manufacturers also offer latex vapor retarder paint.

The code allows other approved alternatives to meet the vapor retarder requirements. The code official or other authority having jurisdiction must approve this alternative.

ABCO Construction Services Corporation suggests that you consult with a Building Science Professional about use of vapor retarders and vapor barriers before installation.



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