

BREATHER MEMBRANES FOR WOOD FRAME WALLS

A breather membrane is a water-resistant material which will allow water vapour to pass through when there is a difference in humidity on opposite sides of it. Breather membranes are used on the outside of frame walls under the exterior finish material. They have three functions to perform:

- 1) to shed moisture and restrict any rain water which penetrates past the exterior finish from reaching the wood wall,
- 2) to perform as a breather material allowing any moisture within the wall cavity to escape by diffusion through the membrane to the exterior, and
- 3) to act as a wind barrier to restrict movement of air through the wall.

To qualify for the above functions the breather membrane must have good "water resistance", good "water vapour permeability", and good "air barrier properties". All of these properties can be measured in a laboratory, and building codes require minimum levels of performance. The Canadian standard for breather membranes is CAN 2-51.32 and the U.S. standard is UUB-790a.

Water Vapour Permeability: Canadian Standard CAN 2-51.32 requires a water vapour permeance of 2.0 (minimum) to 16.5 (maximum) metric perms when tested according to ASTM E 96-90. One metric perm is equivalent to 87 nanograms/Pascal, second, sq. meter (ng/Pa.sec.m²).

Water Resistance: U.S. Standard UUB-790a requires a minimum water resistance rating of 10 minutes for grade D breather paper when tested according to UU-P 31b (ASTM 779). Although the National Building Code of Canada does not set test standards for this, some localized jurisdictions require 30 minute or 60 minute ratings. (Water resistance is a measure of the time it takes for sufficient dampness to permeate through a material to cause an indicator dye on its surface to turn colour when the opposite side of the material is in contact with water).

Air Barrier Performance: There are no specific air-barrier standards set for breather membranes in the National Building Code however wall assemblies must meet the requirements of Section 5.4 "Air Leakage". As a component in the wall system, the breather membrane should contribute to the overall wall performance. Air-barrier performance values are shown below for various products.

Discussion

Breather membranes are intended to function as a secondary protective layer beneath the external wall cladding. High winds or capillary forces can sometimes cause moisture to seep behind the wall cladding during rainy periods. This moisture will reach the breather sheet and migrate downwards on its surface. The breather sheet is intended to prevent this moisture from reaching the wood wall sheathing, however because most cladding is attached with nails or screws which penetrate the breather sheet, moisture can sometimes pass through at these penetrations and reach the wood sheathing, especially if there is a wind-induced pressure differential in the wall assembly. Moisture can also pass through as a vapour if it is held trapped against the breather sheet for long periods of time.

Once moisture reaches the wood sheathing it can cause wood rot to occur, especially when the exterior cladding is a type which restricts the rate of drying. With present day construction methods, walls do not easily dry inwards, so moisture must dry externally through the cladding. Cladding which is continuous and has no gap between it and the wall sheathing will be the most restrictive to rapid wall drying (eg: stucco or panel-type cladding).

Preventing Water Damage to Frame Walls

The following are some suggestions:

- 1) **Always use TWO LAYERS of Breather Membrane.** The outer layer of paper can become damp from wet cladding; however the inner layer keeps the wood wall separated from direct contact with this dampness. The outer layer can take the abuses of numerous wet and dry cycles in the wall, while the inner layer remains unaffected over time.

Two layers, when tested in the water resistance test, achieve a result of greater than 2.5 hours, compared to 30 – 45 minutes that 1 layer of 30 Minute building paper achieves.

- 2) **Create a DRAINAGE CAVITY between the cladding and wall sheathing.** (RAINSCREEN Construction) The National Building Code of Canada (N.B.C.) states that 'drainage is required' when a wall assembly may be penetrated by moisture (Par A-5-6.2.1). The B.C. Building Code in paragraph 5.4.5.1 states that 'Where there is a likelihood of some penetration, drainage shall be provided to take water to the outside.' Some jurisdictions have enacted laws requiring that a cavity be built behind certain types of cladding (eg: Vancouver, B.C. for multi-unit buildings).

A drainage cavity can be created by using vertical wood strapping nailed to the wall over the breather membrane. Cladding is then installed over the wood strapping usually over a second backing sheet. HAL-TEX RAINSCREEN BREATHERBOARD can be used as a backing for stucco over vertical strapping since it is rigid enough to span between spaced supports.

Architects, Building Envelope consultants and concerned builders are becoming very cognizant of the need to protect wall structures from water damage. The suggestions given above and the products listed below are intended to help achieve these goals.

- **HAL-TEX "30 MINUTE" Building Paper:** A medium-weight asphalt saturated kraft paper with good strength and pliability which meets the 30 minute water resistance test. This product is suitable for general purpose use. May be used in a single ply or double ply application under wood, metal, vinyl or stucco siding. Meets CAN 2-51.32 and U.S. Standard UUB-790a.

Product Weight:	4.13 lb/100 ft ²
Tensile Strength:	>5.7 N/ mm
Water Vapour Permeability (1ply):	420 ng/ Pa. sec. m ² (4.8 metric Perms)
Water Resistance Rating (1-ply):	30 - 45 minutes
Water Resistance Rating (2-ply):	>2.0 Hours
Air Barrier Rating @ 100 Pa:	0.175 L/m ² , sec. 1-ply

- **HAL-TEX "60 MINUTE" Building Paper:** A heavy-duty asphalt saturated kraft paper with superior strength and extra thickness. Meets or exceeds 60 minutes of water resistance. This product is suitable for use as a breather membrane where a higher degree of moisture protection is desired. May be used under stucco or other types of siding in a 1-ply or 2-ply application. Meets CAN 2-51.32 and U.S. Standard UUB-790a.

Product Weight:	7 lb/ 100 ft ²
Tensile Strength:	>7 N/ mm
Water Vapour Permeability:	320 ng/ Pa. sec. m ² (3.6 metric Perms)
Water Resistance Rating:	60 - 90 minutes
Air Barrier Rating @100 Pa:	0.120 L/m ² , sec. 1-ply

- **HAL-TEX "DOUBLE-PLY 30" BUILDING PAPER:** A two ply breather membrane consisting of two-layers of medium-weight (30 minute) asphalt kraft paper semi-adhered to each other at 16 inch intervals with 2-inch wide vertical strips of rubberized self-sealing asphalt adhesive designed to seal around nails or other fasteners which pass through at the seal strips. (Also available in a Double-60 format.)

The double-ply material functions as a breather membrane yet achieves a very high water resistance rating thus minimizing the amount of dampness which reaches the wood wall sheathing. Suitable for use on wood frame buildings under stucco or siding where a high degree of moisture protection is desired. Each ply meets CAN 2-51.32 and U.S. Standard UUB-790a.

Product Weight:	9.8 lb/ 100 ft ² (479g/sq.m)
Tensile Strength:	>8 N/ mm
Water Vapour Permeability:	260 - 300 ng/ Pa. sec. m ² (3 - 3.4 metric Perms)
Water Resistance Rating:	2.5 to 3 Hours (combined)
Air Barrier Rating @100 Pa:	0.080 L/m ² , sec.

- **HAL-TEX "RAINSCREEN BREATHERBOARD":** An asphaltic board made up of a button-punched fibreglass sheet coated with high-melt asphalt, then faced on each side with asphalt-kraft building paper. The punched holes create numerous voids within the coated inner ply through which water vapour can pass. RAINSCREEN BREATHERBOARD is designed for use wherever a semi-rigid water-resistant sheet is required to bridge over spaced supports. Will remain functional under the most adverse of wet/dry conditions within a wall structure.

Width x Length:	1 meter (40") nom. x 2 meter (80") nom.
Thickness:	2.0 mm (3/32") nom.
Tensile Strength:	400 N/25mm (90 lb/linear inch)
Water Vapour Permeance:	300 - 400 ng/Pa. S. m ² (ASTM E96 Wet Method) 80 - 120 ng/Pa. S. m ² (ASTM E96 Dry Method)
Diffusion Water Resistance:	> 10 hrs. (UUB-790a Indicator method with one side wet)

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