MemBrain™ the Smart Vapor Retarder is an innovative polyamide (nylon) film that changes its permeability with the ambient humidity condition. The product's permeance is 1 perm or less when tested in accordance with ASTM E 96, dry cup method, and increases to greater than 10 perms using the wet cup method. This process allows closed building envelope systems to increase their drying potential with seasonal climatic changes. With a high resistance to water vapor in winter, MemBrain™ reacts to relative humidity by altering pore size, allowing water vapor to pass through it. When conditions change and relative humidity increases above 60%, the pores in the material expand and its permeability increases. This transformation permits drying to occur, in either direction, through the process of vapor diffusion. Thus, its lowered resistance value supports the drying process, therefore decreasing moisture accumulation within the construction and potential moisture damage. This product can be used in place of traditional vapor retarders with unfaced fiber glass insulation to provide an insulation system that is ideal in some of the more severe climate condition areas in terms of both temperature and humidity. The product can serve as an alternative to polyethylene film and be used both as a vapor retarder/barrier and as an air barrier system within a building's exterior walls—except in buildings with high indoor relative humidity such as saunas and swimming pools.

Nylon films were introduced in Europe as "smart vapor retarders" by the Fraunhofer Institute for Building Physics (Dr. Hartwig Kuenzel) in the late 1990's. The material has been thoroughly evaluated for vapor diffusion, air leakage control and durability through small scale testing, large scale testing and hygrothermal analysis in the United States and Canada as both an interior vapor retarder and air barrier sytem by CertainTeed Corporation in collaboration with the following organizations.

Oak Ridge National Laboratory (Dr. Achilles Karagiozis)
"Comparison of Water Vapor Permeance Data of Common Interior Building Materials in North American Wall Systems,"10th Canadian Conference on Building Science and Technology, Ottowa, May 2005.
National Research Council of Canada (Dr. Wahid Maref, Dr. Phalguni Mukhopadhyaya)
Canadian Construction Materials Centre (Mr. Bruno DiLenardo)
CCMC Evaluation Report 13278-R, "MemBrain™ - Vapour Barrier and Air Barrier System
Washington State University (Mr. Charles Murray)
US Department of Energy's Building America Program
"The Hygrothermal Performance of Wood Framed Wall Systems Using a Relative Humidity Dependent Vapor Retarder in the Pacific Northwest," Thermal Performance of the Exterior Envelopes of Buildings X, Proceedings of the DOE/ORNL/ASHRAE/BETEC International Conference 2007.
University of Minnesota (Dr. Louise Goldberg)
Polyamide-6 Based Interior Foundation Insulation System: Experimental Evaluation (www.buildingfoundation.umn.edu/CT-FTF/default.htm)
Cloquet Residential Research Facility: Wall Systems Hygrothermal Performance Experimental Evaluation 2007 – 2008 (www.buildingphysics.umn.edu/CTwalls07-08/default.htm)

Poor vapor control between the interior and exterior environment of a building can have expensive consequences from the build up of condensation inside walls. This can cause materials to deteriorate, lead to occupant discomfort, and increase energy consumption. To prevent these problems, builders normally install a vapor retarder/barrier as a control on how much water vapor can diffuse through the surface enclosing a space and as a way to prevent moisture from travelling to a point in the wall where it may condense. Vapor retarders/barriers were originally intended to keep building assemblies from getting wet, but they can sometimes end up preventing assemblies from drying out.

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MemBrain™
The SMART Vapor Retarder