Moisture Control Performance of Kraft-Asphalt Facing

Technical Bulletin

Background

Building Codes[1] require the use of a "vapor retarder" to control the flow of water vapor through building assemblies, via diffusion. The vapor retarder is generally applied to the interior (living) side of the assembly, with certain exceptions for: 1) climate conditions, 2) where the space adjacent to the assembly is vented, or 3) where "other approved means to avoid condensation are provided". In the case of the climate conditions exception, a vapor retarder is not required but may be: a) applied to the interior side of the assembly, b) applied to the exterior side of the assembly or c) not used at all. Builders and designers should always check with the local building official for requirements specific to the jurisdiction.

The codes define a vapor retarder as *"A vapor resistant material, membrane or covering such as foil, plastic sheeting, or insulation facing having permeance rating of 1 perm (5.7 X 10-1[1] kg/Pa/s/m²) or less when tested in accordance with the desiccant method using Procedure A of ASTM E96"*. The lower the perm value, the more resistant the material is to water vapor flow. So a material with a perm of 0.1 is ten times more resistant to water vapor flow than a material with a perm of 1.

Insulation Facing

The use of materials laminated to a surface ("face") of fiber glass batt or roll insulation, for the purpose of aligning the insulation with the assembly framing members, and/or to function as a vapor retarder, began in the 1950's. Asphalt saturated Kraft paper was one of the initial materials utilized. Perm values for the various facing materials currently applied to Owens Corning™ Pink® Fiberglas™ building insulation range from 0.02 for FSK and PSK, to 1 for Kraft-asphalt.

"Smart" Vapor Retarders

Some materials are rather unique in that their perm rating varies depending on ambient conditions. The code prescribed test method for water vapor permeance – ASTM E96, Procedure A – is also known as the "dry cup" method and represents conditions of lower relative humidity. E96 contains an alternative method, Procedure B, known as the "wet cup", which represents conditions of higher relative humidity. "Smart" vapor retarders have a different perm value for the two test methods.

The practical benefit to this characteristic is that these materials can be used in mixed climate areas – areas that experience a mixture of hot/humid and cold/dry weather. These seasonal weather changes cause the water vapor pressure drive to switch directions, from the inside of the house to the outside and from the outside to the inside. If a vapor retarder is on the wrong side of an assembly in certain climate conditions (e.g., on the interior in hot humid conditions) the risk of condensation within the assembly is greatly increased. A "smart" material will adjust to the conditions, thus minimizing the risk.

Kraft-asphalt – a "smart" choice

Kraft-asphalt is one such "smart" material. Testing per E96 shows its permeance increases significantly as relative humidity increases, thus improving its ability to allow excess moisture flow. The

2005 edition of the ASHRAE Handbook of Fundamentals lists "Blanket thermal insulation backup paper, asphalt coated" as having a water vapor permeance range from 0.4 to 4.2[2]. Independent testing, under the auspices of the National Institute for Science & Technology, found a similar range in water vapor permeance[3].

These data indicate that asphalt coated Kraft paper is suitable for use as a vapor retarder in all U.S. climates covered by the ICC building codes. This is supported by the fact that fiber glass batts with Kraft-asphalt facing have been used in all regions of the U.S., including the hot-humid areas of the Southeast, for decades, with no reported moisture-related problems, when installed in accordance with the manufacturer's instructions and local code requirements.

1 ICC Intl. Residential Code (IRC) Section R318 (2006), "Moisture Vapor Retarders", and ICC Intl. energy Conservation Code (IECC) Section 402.5, "Moisture Control".
2 American Society of Heating, Refrigerating and Air-Conditioning Engineers; 2005 Fundamentals Handbook; Chapter 25, Table 7B.
3 Burch, D.M., Thomas, W.C., and Fanney, A.H., "Water vapor permeability measurements of common building materials," ASHRAE Transactions, v 98(2), 1992, p 486-494.

Please contact 419-248-6557 for additional information. Email: gettech@owenscorning.com

OWENS CORNING INSULATING SYSTEMS, LLC
ONE OWENS CORNING PARKWAY
TOLEDO, OHIO 43659
1-800-GET-PINK®
www.owenscorning.com

Pub. No. 10017860. Printed in U.S.A. August 2012.