Construction without a vapor barrier

Moisture problems in walls are due to air leakage and vapor movement, which cause moisture to pass through insulation and to condense on a cold surface. Abundant literature has documented that diffusion is the source of only 1% of moisture transfer, while airborne transfer usually accounts for 99% of moisture migration – and moisture problems.

Airborne moisture movement

ICYNENE has low air permeance, low enough to be classed as an air barrier. Therefore, moisture movement through polyicynene foam by air transfer is nil.

Moisture movement by diffusion

Moisture conveyed by diffusion is usually not a problem as it is so small as to be measured in nanograms (billionths of a gram), and is usually overcome by normal drying cycles (Quirette, National Research Council).

Five inches of polyicynene foam has a vapor permeance of 10 perms. This property allows extremely low rates of moisture diffusion to occur, just enough to allow the breathing that prevents moisture entrapment. Its permeance was conservatively extrapolated from on tests made with 2-inch foam core, without either of the two skins. More foam and the inclusion skins would lower its permeance further.

Such diffusion as does occur through polyicynene foam will pass through the insulation without condensing, provided that the sustrate to which it is attached is equally, or more, vapor permeable.

What happens to moisture

Eyre and Jennings (Saskatchewan Research Council) explain what happens to moisture: "Water vapor will usually pass beyond the dewpoint location without causing condensation or frosting, and will continue to move outward through the cavity until it encounters the right condition (a cold surface) to condense and build up."

Practical performance

Practical experience has been gained using ICYNENE without a vapor barrier, where ICYNENE has been installed by injection into renovated cavity walls. In this situation no opportunity exists for the inclusion of a vapor barrier.

Experience has also been gained where ICYNENE is applied to the underside of steel-deck roofing without a vapor barrier. The experience amply demonstrates that no moisture buildup occurs where the material is used without a vapor barrier.

All that being said, *the building code in your community may dictate that you provide a vapor barrier on the warm side of all insulation materials.* The ultimate authority may not be the building code – it is probably your building professional. In Ontario, for example, the building code allows other methods to be used, provided that the building was designed and approved by a registered architect or engineer.