Johns Manville

Technical Bulletin
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Moisture Management with the JM Spider® Custom Insulation System

Moisture in Buildings

Moisture management is increasingly being recognized as an important success factor in the construction and operation of buildings. Moisture in many forms affects buildings, from rain and groundwater to humidity in the air. The moisture management challenge begins during the construction process when some 9000 gallons of water are introduced with the materials used to construct a typical home. Concrete, wood, and interior finish materials all contain moisture, but properly managed it will not compromise the durability of the building or the comfort of the occupants.

JM Spider's relatively light density and low adhesive ratio means that it is installed with 1/4 the moisture per cavity compared to wet spray cellulose insulation. Once installed, JM Spider dries quickly because the glass fibers cannot absorb and retain moisture. Therefore the JM Spider insulation system does not add excessive moisture or prevent drying of the structure. In building operation, JM Spider's inorganic glass fibers do not hold moisture or sustain mold growth. For added insurance, the adhesive contains a preservative to protect it against mold growth.

This bulletin addresses a number of common questions about moisture management with JM Spider insulation. If there are other questions please contact your local Johns Manville sales representative or call the Product Information Center at 1-800-654-3103.

Application Moisture

JM Spider is installed using a small amount of water-soluble adhesive. The blowing machine and adhesive pump should be set for a fiber/adhesive ratio where there is just enough adhesive to contact the fibers but not so much that the installed insulation is wet. With typical machine settings the installed moisture ranges from 10 to 20%, and the insulation feels barely damp to the touch. Using more adhesive is wasteful and does not appreciably increase bonding.

The moisture content of installed insulation can be checked in several ways. Common hand-held moisture meters give quick readings, but most are calibrated for measuring wood and their accuracy when they are used on insulation is questionable. A direct check of moisture ratio involves measuring the flow rate of fiber and adhesive separately by collecting samples of each for 1 minute and weighing them. Another way is to remove some insulation from the wall, weigh it, dry it, and re-weigh it to reveal how much of the initial weight was water. After several checks, a good crew will be able to estimate moisture content from the machine settings and the way the insulation installs and feels.

On a moisture percentage basis, JM Spider is typically installed with lower moisture content than dry wood. U.S. Dept. of Commerce standards for the wood products industry specify that dry softwood lumber be supplied at maximum moisture content of 19%, and plywood/OSB 18%. In most climates the lumber dries further if it is properly protected at job sites. Decay or mold growth does not occur when the wood moisture content is below 20%, according to information published by the Southern Pine Council and the Western Wood Products Association.

Drying Time

Although JM Spider is installed dry by wood standards, it is prudent to allow some drying to take place before covering the insulation. The temperature, relative humidity, and ventilation at the job site, as well as the initial moisture content of the insulation and the properties of the adjacent building materials affect drying.

On a warm, dry day, most of the added moisture in JM Spider evaporates into the inside air within a few hours. Of course evaporation is slower on a rainy or cold day. The drying rate is increased if the building is well ventilated and/or heated. (Be aware that propane heaters can add moisture to the building.) Once the insulation is covered, the whole wall structure continues to dry at a slower rate until it reaches the level of its surroundings.

The other construction materials in the wall also affect how the cavity dries. Wood sheathing absorbs some moisture and dries to the exterior. In contrast, a water vapor-impermeable material like foil-faced sheathing restricts drying to the exterior. On the interior side, unpainted gypsum board allows drying to continue to the inside. But where a polyethylene vapor retarder is installed, most drying must occur in the exterior direction.

Considering those factors, the wall can almost always be confidently enclosed within a day of JM Spider installation, when applied moisture will normally have dried to well below typical wood moisture levels. Testing and modeling are being done to document specific drying times in the full range of conditions. In the meantime, initial studies on typical wood frame walls support the following general recommendations for scheduling construction work. These times are conservative, and where a low adhesive ratio is used, less drying is needed.

JM Spider System Drying Time Recommendations

Covering with:	Exterior Sheathing	Weather	Wait Time
Gypsum board	OSB or plywood	warm & dry	1-3 hours
	OSB or plywood	cold or rainy	4-10 hours
	Foil or foam	warm & dry	2-6 hours
	Foil or foam	cold or rainy	4-12 hours
Polyethylene VR	OSB or plywood	warm & dry	2-6 hours
	OSB or plywood	cold or rainy	8-20 hours
	Foil or foam	warm & dry	4-12 hours
	Foil or foam	cold or rainy	8-24 hours

Use of Vapor Retarders

Vapor retarders have traditionally been used to reduce the amount of interior moisture penetrating walls where it can condense on cold surfaces during the winter. This practice is most important in cold climates where moisture tends to migrate from the warm humid inside to the colder outside during most of the year.

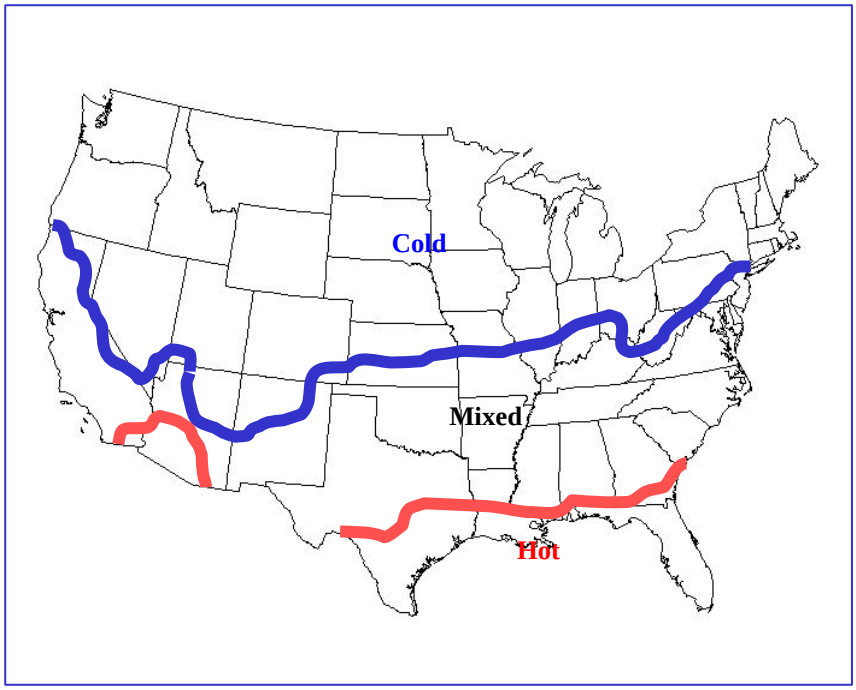
In hot, humid climates where air conditioning predominates and moisture flow is often reversed, it is now generally recognized that interior vapor retarders are not needed.

In mixed climates throughout the central U.S., vapor retarder practices vary according to local building codes and builder preferences. Where required, JM Spider insulation should be covered with a separate vapor retarder. Where not mandated by code, vapor retarder installation is optional depending on the building design. Designers should consider local weather conditions, expected interior humidity levels, and the entire wall construction - especially the nature of the exterior wall sheathing. Information to help builders with this design decision is available through building handbooks, computer moisture modeling tools, and building science consultants. Local historical experience is often the best guide.

JM Spider has features that can reduce the need for vapor retarders in moderate climates. The gap-free installation reduces the chance of air currents drawing humid air into and throughout wall cavities. In conjunction with proper caulking or foaming of joints and penetrations into the cavity, the insulation's air circulation control goes a long way in preventing unwanted moisture entry. Also, if exposed to moisture, JM Spider's inorganic fibers do not absorb and hold water, and the adhesive contains a mold inhibitor to protect the product from mold growth.

However, no insulation alone prevents vapor diffusion through the wallboard. In colder climates, experience and modeling show that most walls stay drier with a vapor retarder in place, and one should be installed unless a moisture analysis on that specific design indicates otherwise. Vapor retarder choices include polyethylene sheet, variable vapor retarders, vinyl wall covering, and vapor retarder paint (rated 1-perm or less) on the gypsum board.

The map below groups the climate zones from the 2004 Supplement to the International Energy Conservation Code (IECC) into three general climate types. Many building departments base their R-value and vapor retarder requirements on the IECC zones or similar criteria. Where builder discretion is allowed, the following vapor retarder guidelines are offered for JM Spider insulated walls, subject to consideration of local climates and building design details.



General JM Spider Guidelines

Cold Climates (IECC Zones 4M, 5 and above): Vapor retarders usually required

Mixed Climates (IECC Zones 3 & 4): Vapor retarders optional

Hot Humid Climates (IECC Zones 1 & 2): Vapor retarders not recommended