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Cellulose Insulation, Moisture, and Vapor Barriers

Cellulose is the only insulation in common use that actually manages moisture. Moisture moves by two transport mechanisms: air movement and diffusion. Of these two, air movement is the more significant; accounting for over 98% of the total, and it is the primary cause for moisture related building failures. When cellulose insulation is blown or sprayed into a cavity at a density above 3.2 lbs/cf, the cellulose will impede the movement of air generated by wind, stack effect, and mechanical imbalances within the building. By blocking the movement of moisture-laden air, cellulose will reduce moisture movement to manageable levels within the building assemblies. Any remaining moisture moving by diffusion will be further blocked by primers and paints used on the interior surfaces.

In our Northeast climate, a vapor barrier is not only unnecessary but can also be potentially harmful, especially during the summer months in air-conditioned buildings, when warm moist air passes through wall assemblies and condenses on the outside of the cool poly vapor barrier. The hygroscopic nature of cellulose insulation allows it to manage and wick moisture from areas of greater to lesser concentrations, thus preventing damaging amounts of moisture from accumulating, as long as the path is not blocked by a vapor barrier. During most of the year in the Northeast, a vapor permeable wall will tend to dry to the outside, while in the summer, this same wall will tend to dry to the inside.

The tens of thousands of homes weatherized with cellulose insulation since the 1970's, with no vapor barriers and no evidence of mold or structural damage, are a testament to this claim. Sophisticated moisture modeling by Mark E. Kelley III, PE, demonstrates that cellulose insulated building assemblies without a vapor barrier show faster drying and lower overall moisture levels over identical assemblies with vapor barriers installed.

In summary, we do not recommend the use of vapor barriers with cellulose insulation, except in circumstances of exceptionally high moisture levels, such as an indoor pool facility, and we warrant our cellulose insulation for the life of the building when installed by an approved GreenFiber insulation contractor.