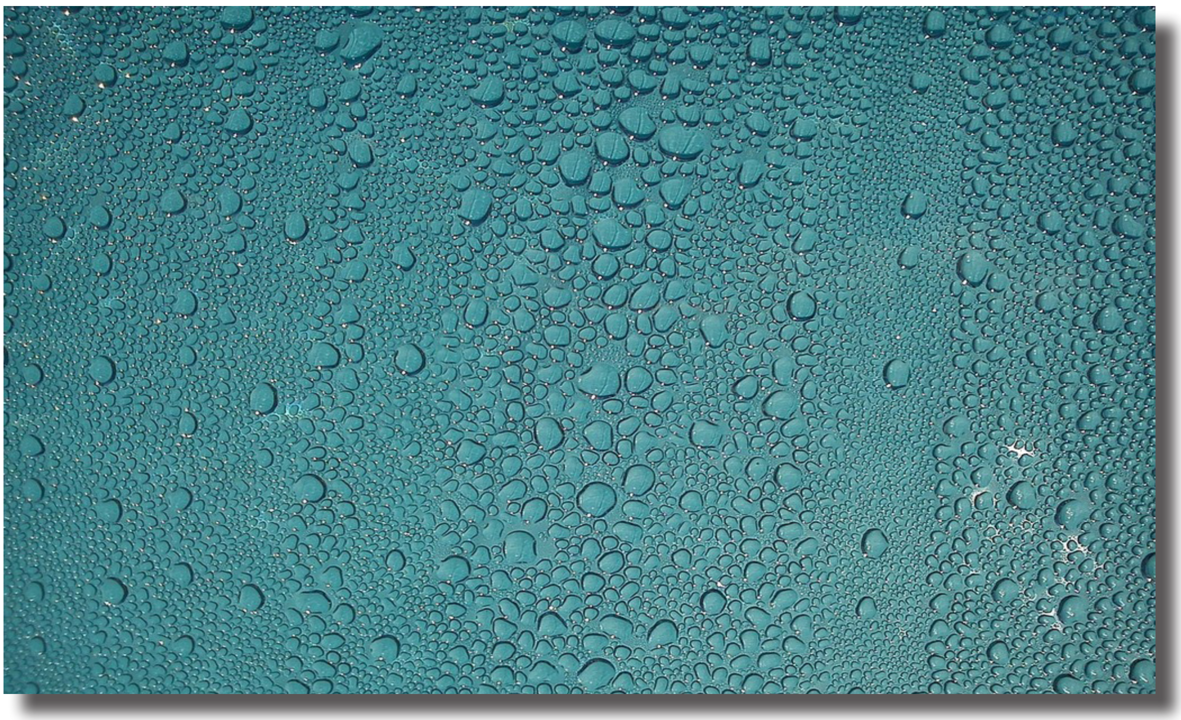
Flow-through Walls & Moisture Control

Fact Sheet



In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists. – Eric Hoffer

Building Biology Institute
The science of healthy buildings

Flow-through Walls & Moisture Control

Health and ecological criteria are the most important considerations in a Building Biology evaluation of a home, school, or office. Most natural options for building materials are more expensive than their industrial counterparts (with the exception of non-commercial products such as sawdust). But the cost of insulating a home is a small drop in the bucket compared to the comprehensive cost of building a home.

Natural insulation materials made from wood byproducts and agricultural fiber are abundant, and can be easily treated by natural and non-toxic methods for fire-resistance, mold and vermin. In North America, a small selection of natural fiber insulation products are commercially available at this time. Internationally, some countries have developed a larger array of insulation products from natural fibers like wool and hemp. Hopefully, it will only be a matter of time before these materials are distributed and manufactured in the United States. These natural options are low in embodied energy, non-toxic, and suitable in a "flow-through" building envelope system.

Building Biology strongly suggests using alternative natural materials, such as earth and straw, as an option for building a healthy home. Historically, these derived methods of construction differ from the standard cavity wall construction techniques, in that manufactured vapor and air barriers are not installed to retard the flow of air and vapor through the walls. Instead vapor and air are allowed to naturally flow through the massive walls. Because temperature change in the flow-through process occurs very slowly, and because dried mud has the ability to absorb and desorb large amounts of moisture without deteriorating, accumulation from condensation is insignificant. When a home is properly constructed using these mass wall techniques, the resulting environment will be comfortable for occupants, with a high degree of temperature and humidity stability. Furthermore, because the solid walls themselves provide insulation, and can be finished with a covering of plaster or furred-out wood applied directly, this eliminates the need for synthetic exterior sheathing, batt insulation, gypsum board, joint fillers, and paint. This also removes and reduces many sources of volatile organic compound (VOC) contamination in the home.

Historically, the building envelope (walls, floors, and roofs) of dwellings were made of materials harvested from nature (i.e. stone, wood, agricultural fiber and clay). These materials were vapor permeable or with diffusible membranes. In Building Biology, a building envelope that allows for the unobstructed flow of vapor molecules is known as the *breathable wall*. Other more appropriate terms for this type of building envelope are: *vapor diffusible wall*, *vapor permeable wall*, or *flow-through wall system*.

It is only relatively recently that buildings have incorporated layers of impermeable plastics into the building envelope. Modern conventional home construction most often consists of spaced 2x6 wood stud construction, with fiberglass batt insulation in-between. When water vapor is allowed to flow through this type of wall, it reaches its *dew point*. Liquid water within the envelope soon causes harm to the building envelope. Moist fiberglass batts lose most of their ability to insulate, and the constant exposure to water causes the wood and the wallboard to mold and rot.

For this reason, a number of strategies are now employed in conventional construction to prevent water vapor from entering the building envelope. These strategies include: putting a vapor retarder on the warm side of the building envelope; using paints and building envelope coverings with low perm ratings to prevent moisture-laden warm air from entering the wall; and cooling and then condensing within the wall cavity. Formerly, these barriers were all called vapor barriers, but because they were not vapor impermeable (usually due to assembly errors or breaks in envelope integrity), they have been renamed “vapor retarders” for applications above grade since 1980. Quite often, over time, these barriers do not work as expected. In much of the country, the warm, moist side of the building envelope is on the outside during the summer and on the inside during the winter. Once water finds its way into the building envelope, it is unable to escape because of the barriers that are in place.