**Best Practices to Control Moisture**

**To control bulk water:** The first place to address bulk water leaks is with building design. Wall and roof structures, as well as weather barrier details, must be designed to shed water away from the building. The goals for controlling bulk water are as follows:

* Design and make sure the walls can and do drain.
* Properly use and install secondary moisture barriers to keep water out; make sure you flash windows.
* Be sure brick and cultured stone have adequate air space to allow moisture to drain down and out.

Of all the conditions that support mold (air, warm temperatures, food and moisture), moisture is the easiest one to control in a building. You can control relative humidity indoors by venting moisture at the source and by creating warmer uniform temperatures throughout a room. For example, if warm ceiling air begins to cool around an air leak in a wall, the relative humidity increases, creating the required moisture for mold growth.

**To control airborne moisture,** the first place to begin is to air-seal the building to reduce air infiltration or exfiltration. Stop the air and you will stop the moisture.

* Seal cracks on the inside, and install a breathable weather barrier on the outside. Air infiltration accounts for most moisture transfer in and out of a building.
* Reduce temperature gradients by increasing insulation levels, by maintaining circulation of warm air, and by adding high-performance glazing to windows.
* Use ventilation to remove excess moisture from inside the building.

**The Four D’s of Moisture Control**

To control moisture and the fungal growth that can result from the accumulation of moisture, follow the principles known as “The Four D’s”: deflection, drainage, drying, and durable components.

**Deflection** is a combination of good design and properly installed cladding and flashing. The goal is to “deflect,” or direct, water away from the roof and house before it can make its way into roof or wall assemblies. Tactics include:

* Avoid roof designs with features that will trap and hold water, like horizontal valleys.
* Make sure that every piece of flashing, building wrap, roofing, and siding, is lapped over — rather than tucked behind — the piece below it. When installing a housewrap, this means starting at the bottom for proper shingling. Gable ends should be wrapped as well. Make sure that all penetrations like wires, pipes, air conditioning line sets, panel boxes, dryer vents and the like are flashed or taped. Windows and doors should be flashed in a way that properly sheds water to daylight, not into the wall. The building should be watertight before the cladding is installed.
* Grade the landscape around a building so that water naturally flows away from the foundation.

A 1-inch rain on a 2,000-square-foot roof will deposit over 1,200 gallons of water. So it’s important to design structures so they won’t funnel water into themselves.

**Drainage** simply means that when water gets behind the cladding (which it will) it must have a path to drain out. Keeping that path open includes the following approaches:

* Do not block weep holes in windows and vinyl siding.
* Avoid “reverse shingling” building wrap and flashing materials.
* Do not fill the drainage plane behind brick or stone veneer with mortar, and make sure these walls have weep holes (and that these weep holes are above finished grade).

**Drying** means using construction products that allow wet components to dry as fast as possible. It is easy, very easy, for building components in walls to get wet. All cladding systems leak. The problem is that it takes days, weeks, or months for them to dry out. Most buildings don’t dry very well. If water gets into a wall assembly — wetting the sheathing, insulation, or framing, for example — then impermeable building materials like polyethylene vapor retarders, low-perm housewraps, and building felt can make it very difficult for that wet wall to dry. However, a properly designed wall can “breathe,” so moisture can evaporate quickly.

To ensure that walls dry quickly:

* Use breathable weather-resistive barriers to provide a drainage plane and protect the wall sheathing and other components from water intrusion. Be sure to use a *high-permeability* material for this barrier. Permeability is typically indicated as a perm rating, and anything with a perm rating of 25 or higher is good. A spun-bonded product with a perm rating of 50 or higher is preferable. This type of product essentially works like a Gortex jacket — water and air cannot get in, but moisture vapor can get out — and allows any building components that get wet a better ability to dry.
* Never tape the joints on sheathing.
* Avoid creating a double vapor barrier: do not use vinyl wall paper or a poly vapor retarder with foam sheathing.

**Durable**, water-resistant components in a wall system will make it less susceptible to moisture damage. For example, arch-topped, brick-mold windows are almost impossible to flash. Instead, use a flanged window with a nail fin, cover the fin with a durable peel-and-stick flashing product, and then be sure to overlap the flashing with a building wrap.