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Use the Guiding Principles for Mold Control to Keep Your Home or Building Dry

Introduction:

Welcome to the Responsible Solutions to Mold Coalition, a group of building materials companies, trade associations, academic and governmental bodies formed to communicate accurate, science-based information on mold and moisture control. The centerpiece in this effort is what we call The Guiding Principles—both Residential and Commercial.

Developed by Experts in Building Science

They were developed by our Technical Committee, comprising some of the nation's leading experts in building science and moisture control. The basis for our recommendations is simple: if you prevent moisture from entering a home or building, you'll prevent mold. Mold cannot grow without moisture. The best way to approach any mold problem is to find out where the water or moisture is coming from (and stop it), and find out where it goes. Buildings will get wet—it's inevitable—but as long as the water can drain away from the structure, you'll be in good shape.

Good Design, Good Building Practices and Maintenance Can Control Mold/Moisture Problems

Effective mold and moisture control is a matter of good building design, good building practices and ongoing maintenance. Mold-resistant products can play an important role in preventing mold, but they should not be relied upon as the principal defense in stopping mold and moisture problems. If continually exposed to water, mold-resistant products will fail. Therefore, taking a systems approach—paying attention to design, building practices and maintenance—is the key to successfully keeping moisture at bay.

How to use the Guiding Principles

You can use our information in several ways. First, decide whether you're interested in residential or commercial construction by clicking on one of the two icons. Once you've selected the icon, you can then select one of the areas of the home or building you want to explore by clicking on the red buttons. You can also print either version of the Guiding Principles by clicking on a button.

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Construction/General



Keep the building and materials dry

Building materials should be protected from the weather before they are installed. They should be covered by a tarp and raised off the ground. In the case of drywall, it should be delivered to the job site close to the time it will be installed.

Drywall should not be installed until the building is closed in.

Elevator shafts are often exposed to the weather during construction; mold-resistant shaft wall panels and drywall should be installed. If the panels become wet, there should be sufficient time built into the schedule so that they can be dried before the application of joint compound and paint.

If the basement traps water, sump pumps should be installed to remove any standing water.



Schedule all trades in a manner that minimizes water intrusion

All trades on a jobsite should be aware of steps they can take to keep moisture intrusion to a minimum. In the course of accomplishing their tasks, plumbers, electricians and other trades may penetrate walls and floors—providing a ready path for water to enter the building. Those penetrations should either be sealed or flashed to keep water at bay.

Water intrusion can be minimized if various trades are scheduled in a way that they do not create water intrusion opportunities that are not corrected in a timely fashion.

A good example of this is scheduling the roofing contractor and the sheathing contractor in a manner that allows the intersection of these two planes to be properly flashed and sealed.

Design/Mechanical Issues



Roofs need to provide a clear path for water to exit the building

Flat roofs should slope to a drain.

Roof drains should be kept clear in order to provide a path for the removal of literally tons of water that can collect on a flat roof.

Improper flashings around parapets and roof penetrations can also lead to severe water intrusion.

Enough time should be provided to properly dry concrete before being covered with plywood or other roofing substrates and materials.

The roof design must accommodate the significant weight of HVAC units and other equipment placed on the roof to avoid the creation of water-collecting valleys.



Avoid condensation that may be created by improper insulation within wall cavities

Exterior wall cavities should be properly insulated. Cavity insulation should completely fill the cavity to prevent the formation of convection cells within the wall that can negatively affect both moisture and energy management.

Wet spray-on cavity insulation must be allowed to dry before wallboard installation.

Thermal bridging through metal studs can result in condensation and shadowing on wall surfaces due to daily and seasonal temperature changes. It is important to provide a thermal break within exterior wall cavities. Careful selection of exterior cladding, sheathing and insulation systems can help control this phenomenon.

Computer modeling is a powerful tool that can greatly enhance the designer's ability to accommodate significant daily and seasonal temperature swings.



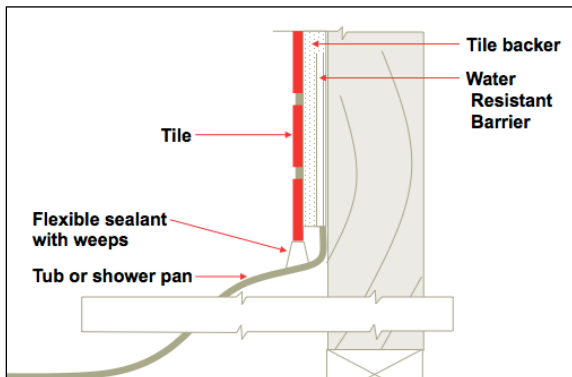
Keep wall cavities clear of dust and debris before sealing

Before drywall is installed, the wall cavities should be vacuumed or blown clear of all debris that may have collected. Debris combined with moisture may lead to mold growth within wall cavities.



Do not put pipes in exterior walls

Pipes placed in exterior walls may freeze. While frozen pipes commonly occur in northern climates, they can also occur in the southern United States when pipes run through unconditioned spaces and building cavities. Pipes should not be run where cold drafts might be possible such as areas close to outside walls in basements. Pipes in exterior walls may generate condensation that can be trapped in insulated walls that cannot adequately drain. If pipes must be placed in exterior walls, it is important that insulation go on the outside of the pipes and wall cavity.



Install water resistive barriers behind shower installations

Use water resistive barriers behind shower installations. Water will pass through tile grout; therefore, a water resistive barrier behind the tile that drains into the tub or shower pan is an important feature, unless specifically recommended to the contrary by tile backerboard manufacturers.



Ensure shower pans drain

It is important to pay special attention to the grade of any shower floor installation. This is true not only for the tile surface, but equally important for the cement base upon which the tile is installed. If it's not sloped toward a drain, water will pool and could drain toward the wall framing which, if left continually damp, will induce mold growth.

Interior Construction



Install wallboard only after the building is closed in

Wallboard should be installed during the controlled phase of construction when the building envelope is enclosed. There are three phases during the construction process: 1) exposed phase; 2) partially exposed phase; and 3) controlled phase.

Because wallboard needs to be kept dry during all phases of its transport, storage and installation, it should be installed only during the third phase of the construction process in which moisture can be carefully controlled.

Wallboard should be installed one-quarter inch off of the floor so that minor spills don't come in contact with it. Fill the resulting space with a sealant in order to retain air-tightness of the wallboard at its base for energy, comfort and acoustical control.



Allow time for sprayed insulation to dry

Wet-sprayed or foam insulation requires drying time before wallboard is installed. The drying time depends on the climatic conditions and may require several days. Mechanical drying equipment should be used to speed this process when climate conditions are not conducive to natural drying.



Ventilate during construction

During construction in warmer weather, doors and windows should be kept open to allow for natural drying of joint compound, tile grout and eventually paint.

Avoid the use of portable kerosene or propane fired heaters in enclosed spaces. Hydrocarbon-fueled heaters produce large quantities of water vapor and carbon dioxide as combustion byproducts, and can cause potentially serious moisture and health effects for both the building and the workers if the space is not adequately vented. Simply raising the air temperature does not dry the structure if excessive amounts of humidity are also added to the air by the heating process.

When climate conditions are not conducive to drying, the use of mechanical drying equipment specifically intended to introduce low humidity air should be considered.

One of the best guards against these problems is to allow enough time to pass between various construction phases so that materials that require drying have sufficient time to do so.



Concrete floors need to dry before covering

Floor coverings should not be installed over a concrete slab until the floor has dried sufficiently.

Uncured concrete introduces gallons of moisture into a new building. It must be allowed to dry either through ventilation or mechanical drying.

Before poured concrete is covered with gypsum or other substrates, it should be monitored for water content using standard moisture content measurement techniques for concrete to avoid trapping residual moisture.

Concrete slabs should be poured over a vapor retarder.



Interior conditioned spaces need to be balanced for temperature

HVAC systems must be balanced throughout the building in order to avoid overcooling interior rooms. For example, storage rooms which are used infrequently may become overly cool, which may cause condensation on the room surfaces that could lead to mold growth.



Lavatories and showers need special design details

Commercial lavatories and shower facilities require special attention to avoid moisture build-up resulting in mold growth. This includes extra ventilation to the outdoors, and the use of an approved tile-backerboard around tubs and showers. Conventional wallboard is fine to use in the rest of commercial lavatories, but a mold-resistant board will offer greater protection.

Exterior Construction



Walls need to drain

Exterior walls must be designed to incorporate a water resistant barrier (WRB) behind the cladding system as well as an air barrier and thermal insulation. The WRB must be configured to drain out of the wall, not into the wall assembly.

Flashing and overlap details around windows and doors are particularly susceptible to water leakage. WRB and air barrier designs must be carefully integrated into the wall and joint systems to maintain their functional integrity and durability for the life of the building. Consideration must be given to ensuring that component details that will require periodic maintenance, such as caulking, are designed to be accessible and can be maintained and repaired without requiring difficult or expensive disassembly and reconstruction of the wall.



Install roof, window and door flashings

Flashings should be installed around all roof lines, windows and doors, ensuring that the water flows out of the building. Flashings must drain the water onto the water resistant barrier and to the exterior of the building, not into the building. This requires careful attention to the overlap, gasketing and sealing details to make sure gravity and wind driven rain water does not drain into the structure.



Make sure all pipe penetrations through the roof are properly flashed

All roof penetrations, such as vent pipes and other HVAC related piping should be properly flashed and drained to ensure that water drains to a roof drain, sump or the exterior and away from the building, not into the building structure.

Construction/Foundation



Grading around commercial construction should be away from the foundation

Commercial lavatories and shower facilities require special attention to avoid moisture build-up resulting in mold growth. This includes extra ventilation to the outdoors, and the use of an approved tile-backerboard around tubs and showers. Conventional wallboard is fine to use in the rest of commercial lavatories, but a mold-resistant board will offer greater protection.



Install perimeter drains

By ringing the foundation both inside and out with perimeter drains, water will be taken away from the base of the foundation, thereby keeping the foundation and basement dry. It's important that these drains be installed in such a manner that they eventually reach daylight or enter a sanitary sewer, if code allows.



Near-foundation irrigation should be directed away from the building

Irrigation poses three water intrusion risks: 1) daily presence of water near the foundation increases the chance that some of the water will enter the building through cracks in the foundation; 2) a broken spray head can place massive amounts of unwanted water near the foundation; and 3) an incorrect spray head or a misdirected water arc may result in water being sprayed upwards against the walls and windows. Since most commercial buildings have some form of irrigation to maintain flower beds, trees, etc., it is extremely important to ensure that the grade around the building slopes away from the building.



Vertical foundation walls should be coated on the outside with a vapor barrier

Cement is porous and without the protection of this type of barrier, water moving down the side of the foundation may be absorbed and eventually make its way into the basement.

Maintenance



Maintain HVAC drainage pans that may collect water

Drainage pans below HVAC units can become blocked resulting in standing water or overflow. The constant presence of moisture will lead to mold growth.



Keep roofs clear of debris

Make sure that roof membranes are not punctured by loose debris that can be driven into it by maintenance people walking on the surface.

Provide walking paths to protect the roof membrane in high traffic areas such as for maintenance personnel to access rooftop mechanical equipment.



Check windows to ensure caulking seals out moisture

Check windows to ensure caulking is properly installed to keep out moisture. Windows, whose caulking and glazing have failed, provide a convenient entry point for water, leading to the eventual deterioration and failure of windows which can result in costly repairs and replacements.



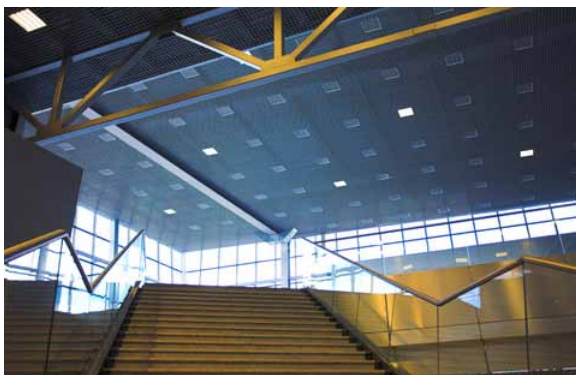
Inspect plumbing fixtures for cracks

Maintenance should include a twice-yearly inspection of all plumbing fixtures to make sure they are not cracked or leaking water into the floor. Also, look for missing tiles or missing grout around shower and sink areas—a sure entry point for water. Tile grout should be sealed. Also, be sure to inspect caulking between tile surrounds and shower pans to ensure water does not penetrate. Pay special attention to corners to ensure water does not penetrate.



Make sure all roof drains are clear

Make sure all drains, scuppers, gutters and downspouts are clear on commercial roofs. It is recommended that they be cleaned out with a hose and brush if necessary so that water has a clear and unobstructed path off the top of the building.



Inspect attics for signs of water intrusion

Discoloration of sheathing, the presence of ice, rusty nails or fasteners are all signs of water intrusion which must be corrected.



Avoid excessive indoor humidity

All exhaust fans in lavatories should be vented to the outdoors. Exhaust ducts should be configured to avoid having water from the moist exhaust air condense and drain back into the occupied space or pool in low areas of the duct. If possible, exhaust fans should run continuously during business hours, particularly in shower areas which may be in constant use.



Watch for water stains or puddles

Regular maintenance should include an ongoing inspection of basements and around all plumbing fixtures to make sure there are no signs of standing water. Common causes of standing water are foundation leaks and leaking pipes.

Mold Remediations

Like other organizations, the Responsible Solutions to Mold Coalition endorses a series of remediation steps developed by the New York City Department of Health and Mental Hygiene. The rule of thumb is that any mold outbreak greater than 10 square feet should probably be dealt with by professional mold remediators. Smaller outbreaks can be cleaned by scrubbing with hot water and detergent. Always use rubber gloves and discard your cleaning materials after use. For more information, please visit (<http://www.responsible moldsolutions.org/pdf/RSMCguidingPrinciples.pdf>).

Another good source of information is the IICRC S520 Standard and Reference Guide for Professional Mold Remediation.