



Preventing Mold in Buildings

How to avoid problems through quality control in design, construction and operation

The risks associated with mold damage represent an increasing problem for property owners and managers. Mold growth is closely linked to moisture intrusion and typically becomes a problem as a result of one of the following problems:

- **Design or Construction Flaws.** Selection of the wrong materials for a building component, installation of damaged materials, improper sizing of the HVAC system and other design flaws can lead to a wide range of conditions that can contribute to mold growth.
- **Building Component or System Failure.** A window or wall structure, or other component may be defective or improperly installed, allowing moisture to intrude.
- **Operational Failure.** Building equipment may not be operated in accord with the design parameters, resulting in leaks, condensation or flooding those results in mold growth.

Buildings change: space may be reconfigured; major equipment may be replaced; tenants may add specialized equipment. Any of these changes can compromise the ability of the building to shed moisture. Therefore, it is critical to establish procedures that prevent moisture intrusion and mold infestations.

Quality Control during Design and Construction

Prevention of water intrusion can be done most effectively during design and

construction. Opportunities to prevent problems shrink as the building process moves from conceptual design through construction. The cost of correcting a problem increases dramatically as the project moves forward, with the most expensive corrections occurring *after* the building is in operation.

Three major design flaws have been found to contribute to building failures:

- Lack of knowledge among designers and contractors in how to prevent defects;
- Lack of communications among members of the design and construction teams;
- Failure to consider unique site factors, climate conditions, or intended uses.

In addition, building owners often accept buildings whose systems may “work” but do not work optimally or as intended. Punch lists tend to focus on items that are critical to opening the building, not its operation. The basic elements necessary to reduce the risk of building failure can be summarized in four ideas:

- **Performance Criteria.** Written design criteria and performance requirements for a building at the very beginning of the project;
- **Design Review.** Evaluation of design and construction documents to identify faults as well as opportunities to improve building technology;

- **Peer Reviews.** Periodic reviews to compare design and construction outcomes to the project criteria;
- **Performance Testing.** Sub-system testing as building components are installed and integrated system performance testing during the start-up phase of the building.

In recent years, there have been great advances in integrating building technology with process improvements in order to address each of these concepts.¹

Protection of Building Materials

Moisture and mold can enter a construction project in many ways. Moisture sensitive materials are sometimes shipped without proper protection from rain, or they might be stored in an unsheltered lot. Buildings are also subject to moisture damage from rain, flooding, or wet processes such as concrete work.

Several steps can be taken to prevent moisture intrusion:

- **Deliver Dry Materials.** Work with suppliers to make sure materials are dry, mold free, and properly protected when they arrive on site;
- **Protect Materials On Site.** Establish procedures and set up areas on the site to protect materials from rain, flood, and construction process water from the time they arrive until they are installed;
- **Never Build Over Problems.** Inspect and document work areas every day to make certain that finish materials are not installed before dry-in or over wet, leaking, or moldy infrastructure;
- **Protect Finished Work.** Inspect completed work to make certain it is dry and mold free;

¹ Readers may be familiar with this quality assurance concept as “building commissioning,”

- **Remediate Immediately.** Discard wet or moldy materials before installation and remove and replace wet or moldy materials as soon as they are discovered.

Prevention through Routine Inspections

Mold prevention requires constant diligence. Routine inspections are the best way to identify and correct mold problems.²

Follow-up is Critical

Problems must be corrected in a timely manner. Mold can grow quickly in the right environment. Any signs of moisture should be cleaned up quickly and the underlying causes should be identified and corrected. Having documentation of a problem and not acting on it is a recipe for future disaster.

Tenant Responsibilities

The same documentation procedures used in routine inspections are also useful in identifying mold problems caused by tenants.³ Typical tenant problems include:

- **Tenant fixtures.** Water damage and mold problems are common in tenant areas where the tenant has responsibility for a drinking fountain, sink, toilet or similar feature, particularly where a cabinet conceals some part of the plumbing;
- **Tenant HVAC systems.** Many tenant spaces have primary or supplemental equipment for heating cooling and ventilation, including exhaust fans, that may bring the building HVAC out of balance or may cause specific drips or condensation related water damage
- **Process Related Problems.** Tenants may be involved in a medical or light manufacturing use that results in water or moisture

² Sample checklists are available from EPA or from insurance company loss prevention departments and can readily be customized for a specific building.

³ However, determination of the tenant’s responsibilities to address mold issues is largely dependant on their lease.

release beyond the capacities of the owner-supplied building systems

In buildings where tenants have plumbing and HVAC related improvements, their spaces should be added to the routine inspection process.

Periodic Environmental Assessments

Some managers conduct routine environmental assessments of tenant spaces and could easily include a provision to identify the presence of moisture and mold. Key elements include:

- Inspection and performance measurements on the HVAC system;
- Inspection of the building envelope, including roof, exterior walls, windows, doors, ground level and below grade level walls;
- Inspection of interior floors, walls and ceilings.

Note that these performance measurements do not include airborne sampling for mold or other contaminants. Testing for mold is not recommended now because there are no acceptable standards against which results can be measured. *However, airborne sampling may be very appropriate in establishing baseline conditions in a building at the time of purchase.*

Mold and Due Diligence

For existing buildings, establishing baseline conditions at the time of acquisition can be helpful in evaluating risk and responsibility as the building ages. Many of the key questions in the allocation of responsibility for mold damage are best answered in relation to historic conditions. While deals may occasionally rise or fall based on mold issues, baseline assessments at the time of acquisition may be most useful in evaluating responsibility for conditions discovered well after purchase, especially with regard to owner-tenant disputes over subsequent mold growth.

Insurance Coverage

Commercial General Liability policies now exclude mold as an insured risk. Supplemental coverage is available but may increase premium costs by about 10-20 per cent. Coverage is only available if the applicant implements a "Water and Mold Prevention Plan" that contains the following:

- Documented measures to prevent water intrusion;
- A maintenance and inspection plan ;
- Periodic assessment of roofs, plumbing, and other systems that impact water intrusion;
- A contingency plan if problems arise;
- Record-keeping to demonstrate compliance with the plan.

Without a plan, it is unlikely that mold coverage will be available.

In the end, however, preventive steps such as these are simply useful ways to prevent mold, with or without insurance coverage. Insurance coverage simply adds a measure of financial security if the unthinkable happens.

Author Contact Information:

George Benda
Chelsea Group, Ltd
(808)552-0225
gbenda@chelsea-grp.com

October 2005