

Ice Arena Mold Contamination

by Todd Bradley

Mold or "Toxic Mold Syndrome" is a hot topic. Cases of black mold or toxic mold are frequently reported in newspapers and industry trade journals. Since ice arenas can be ideal sources for growth of molds that are hazardous to some individuals, managers and arena operators need to know about this evolving problem. This article addresses the basics of the problem and the conditions and challenges in treating mold areas.

Typical ice arenas operate between 50° and 65° F. As nature warms and humidifies the outdoors, indoor relative humidity can rise. High relative humidity promotes some types of mold growth. Roof or piping leaks and normal operation of locker room showers can add moisture to buildings. If these high humidity conditions are not removed, mold contamination can result.

Mold spores exist in the air as a normal part of nature. They can be found in all indoor and outdoor environments. Atmospheric mold spores are generally dormant until they find a receptive area for growth. As mold spores find this area, they grow into "Mold" and release more spores and mycotoxins. These mycotoxins and additional spores can cause allergic reactions in some individuals.

California has passed legislation requiring testing of structures to verify the absence of mold contamination. Some insurance companies have removed general liability coverage for mold remediation; separate policies have to be purchased for "Mold" coverage.

There is much confusion over what is mold contamination. Currently there are no standards for mold concentration and there is little information available to determine which molds are "toxic" and at what levels. While the mold issue has been publicized as the next "asbestos" remediation opportunity, experts agree that mold does not rise to this level of concern. The reality is, mold is present in our environment and some people seem to be more sensitive than others to specific concentrations of mold.

Stachybotrys or "Black Mold" has been identified as a source of allergic reaction. Other mold types are being investigated. Penicillium, Aspergillus, Alternaria, Epiccocum, Cladosporium, and Chaetium are all molds under investigation. Each mold is promoted by different nutrient source materials and may cause some allergic reactions in some individuals.

Moisture tends to be the key controllable factor in the active growth of mold spores. Low relative humidity or dehumidification will reduce or eliminate the start of mold formations. By maintaining a dry environment, mold spores will not have a key critical component needed for growth.

It is important to note that once mold is established, it will create its own moisture source and can be self-supporting. Drying the environment before remediation is complete can disburse spores in search of the components needed for growth. Uncer-

tainty and fear are currently driving the market to identify hazardous molds and concentration levels to establish guidelines for specific health risks.

Mold Growth Is Facilitated by 4 Primary Factors.

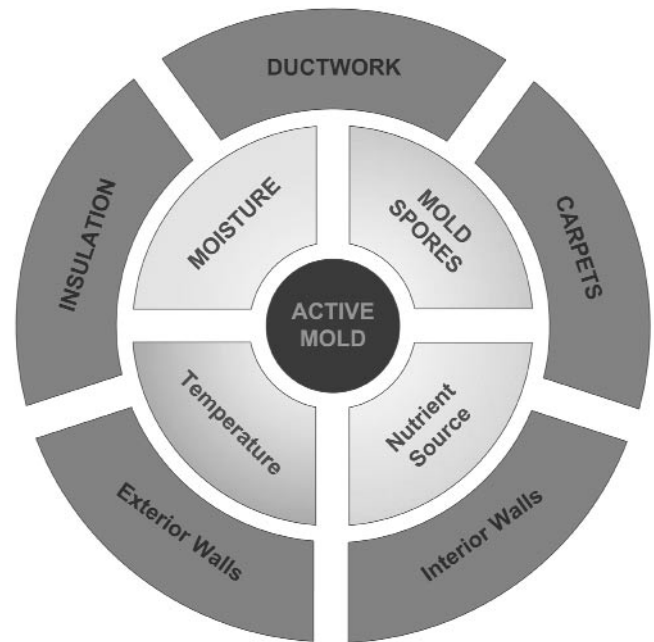


Figure 1

Mold growth can be found in exterior and interior walls, insulation, ductwork and carpets (See Figure 1 outer ring). The requirements for active growth of spores (temperature, moisture, a nutrient source and the presence of mold spores, as shown in Figure 1-inner circle) facilitate the breeding of mold.

Once mold is established, remediation is required. Mold can form in any area impacted with high humidity. Water leaks, floods or improper humidity control of interior areas can result in mold growth.

Generally, any mold on porous surfaces such as insulation, ceiling tiles or drywall requires removal by a trained technician and proper disposal and replacement of damaged surfaces. Once the mold is established, it is virtually impossible to eradicate.

With virtually every surface a nutrient source, the most controllable factor is humidity. The level of humidity control that is effective varies with the type of spores present. The American Society of Heating, Refrigeration and Air-Conditioning Engineers recommended target control level is 40-60% relative humidity. Most recreational ice arenas do not actively control temperature. The ambient temperature follows the radiant cooling effect of the ice sheet. Temperatures between 40° and 65° F are normal internal temperatures. Because the ice arena is cool, this is a unique challenge for humidity control.

For the past 10 to 12 years, most state-of-the-art ice arenas have incorporated desiccant dehumidification to prevent fog and condensation. By controlling humidity, it improved the efficiency of the ice plant and eliminated condensation. Another benefit was noted, the reduction of odors generally related to musty or moldy conditions.

The recommended control levels to optimize ice arena operations is 40% relative humidity at 55°-65°F. This humidity level helps indoor air quality by limiting mold growth in most parts of the arena. Understanding the building and wall structure is important, as high relative humidity can reside in enclosed wall spaces or improperly placed vapor barriers. Minor leakage from high humidity areas or leaks in vapor barriers can rapidly condense in wall cavities or insulation systems.

Interior mold prevention needs to be taken into account when designing a building. A vapor barrier needs to be placed closest to the warm surface to reduce the potential for interior wall condensation. See figure 2. This can be challenging in an ice arena, because some building contractors place the vapor barrier on the wrong side of the insulation systems, allowing water vapor to penetrate through porous insulation and condense on the "cool side" exposed to the interior of the ice arena. The ice arena provides a cool surface in the summer months when the outdoor humidity levels are the highest.

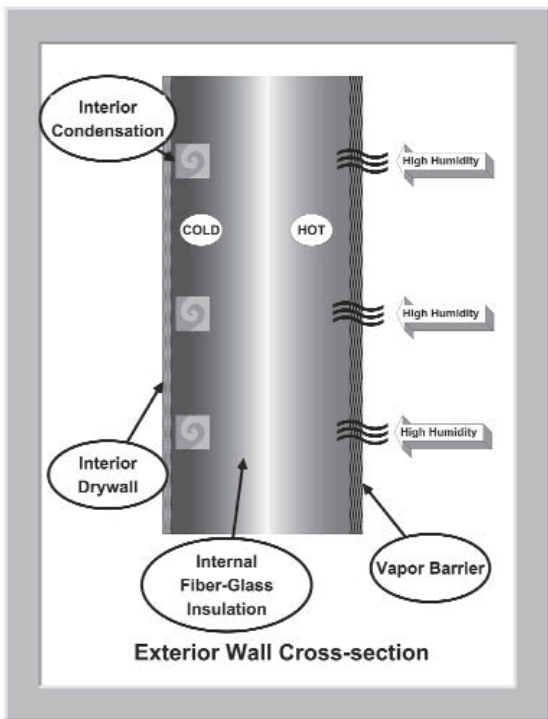


Figure 2

The most controllable area in ice arenas is the infiltration and conditioning of outside air. During summer months, outside air brings large quantities of moisture into the cool ice arena. Each 1,000 standard cubic feet per minute (SCFM) of outside air can bring in up to six gallons of water vapor. Typical building codes require small recreational arenas, with less than 200 seats, to bring in up to 11,000 SCFM from the outside to maintain good control of CO₂. If this air is brought in unconditioned, the rink can condense 66 gallons per hour on the ice sheet and interior components.

Design recommendations for desiccant dehumidification systems target a 35° dew point with 55° rink conditions. This will provide an interior relative humidity of approximately 40%, which will retard any potential mold formation on most surfaces in the arena. Any interior surface will have to be less than 35° F to condense moisture.

It is important to monitor and maintain proper interior relative humidity to eliminate the potential for mold and promote a healthy environment. In the event of a broken pipe or flooding, it is important to dry the building quickly so mold can't establish itself. Additional rental dehumidifiers may be required to quickly dry out the structure. Many water damage contractors have the proper tools to quickly dry out a building, so replacement of walls and flooring are not required.

If a manager suspects mold contamination what should he/she do? The first issue is to determine the cause and correct it. The legal community has targeted mold as a potential health threat. Because children may be involved, it is important to react properly and quickly to correct the situation. Remediation contractors and microbiologists recommend complete replacement of contaminated building products, once mold is present. If the existing mold cannot be killed, it can be bleached to stop the growth, but once the area becomes moist again, the mold will continue to grow.

With some molds, quickly drying the space will cause the molds to release more spores in search of a new home. Tests can be performed by microbiologists to determine the type of mold and recommended remediation steps.

Most experts agree that the key to mold control is moisture control. If remediation is required, the Environmental Protection Agency (EPA) has a "Mold Remediation – Keys, Steps and Resource List" available on the EPA Website. Most large communities have water damage remediation contractors available to advise on mold problems. It is important that the selected contractor be trained in mold abatement procedures to ensure proper containment and disposal of damaged building materials. The best prevention is to control humidity; however, if mold is present in an ice arena, seek immediate help from qualified professionals.

Resource Information:

- U.S. Environmental Protection Agency, www.epa.gov/iaq/molds
- National Indoor Air Quality Institute, www.indoor-air-quality.net

References:

- ASHRAE Humidity Control Design Guide, ISBN 1-883413-98-2
- ASHRAE IAQ Applications Newsletter, Fall 2002, "The Proposed Mold Law"
- US Environmental Protection Agency, "Mold Remediation in Schools and Buildings"
- National Indoor Air Quality Institute, "Indoor air Quality Solutions", "Asthma and Indoor Air Quality"
- Engineering and Fire Inspections, "Got Mold"

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