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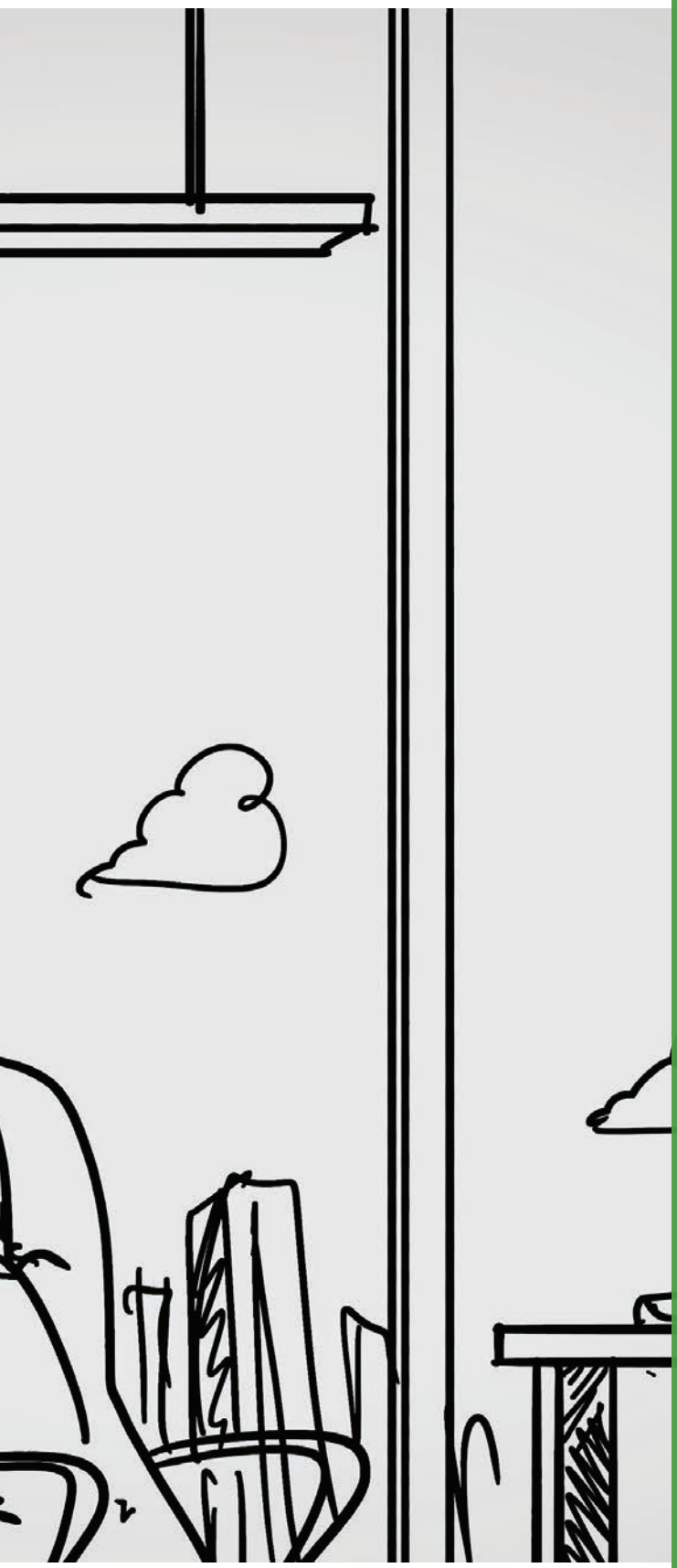
ENVIRONMENTAL CONSULTANTS



Indoor Environmental Quality Commercial

- Industrial Hygiene
- IAQ/Mold Assessments
- Water Loss Projects
- Restoration Project Mgmt
- Post Remediation Testing
- Building Science
- Asbestos Surveys
- Lead Inspections
- Bacteria Testing
- Allergen Sampling
- Heavy Metals
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- Volatile Organic Compound Analysis
- Water Quality Testing
- LEED Testing

Introduction

According to The Occupational Safety and Health Administration (OSHA) experts believe more people suffer from the effects of indoor air pollution than from outdoor air pollution. It is estimated that Indoor Air Quality (IAQ) problems cost the US economy as much as $168 billion per year and there have been several high profile indoor air quality litigation cases that have been settled for sizable amounts over the past several years. It should be noted that most Indoor Environmental Quality (IEQ) problems are preventable when a proactive approach is taken.

The Center for Disease Control and Prevention (CDC) estimates that the majority of Americans spend 90% of their time indoors with many of those hours in a workplace environment. Poor indoor air quality in a workplace environment affects building occupants. Providing a safe workplace is not only a regulatory requirement it is also an effective way of improving performance and ultimately the bottom line. Reduced worker productivity, increased absenteeism, occupant/employee complaints and the increase for potential litigation are all direct results of unsatisfactory indoor environmental conditions.

The purpose of this ebook is to highlight some of the different types of environmental issues that require consideration for commercial buildings and spaces.

Moisture Intrusion

The building envelope also known as the building enclosure is the physical boundary between interior and exterior environments of a building and offers protection from air, temperature and moisture. It serves as the outer shell to help maintain the indoor environment. According to the Centers for Disease Control and Prevention (CDC), building design and operation are integral to limiting the water and nutrients that foster mold growth. Causes of moisture intrusion vary and can be due to leaks in floors, walls, roofs, windows and doors as well as defective or improperly installed building components.

Moisture intrusion in buildings causes billions of dollars in property damage every year and can threaten the health and safety of the building occupants. In a study conducted by the American Insurance Association between 2007 and 2009 there were approximately $9.1 billion dollars spent in property losses associated with water damage. Water intrusion can lead to structural damage, microbial problems, sick building syndrome (SBS) and unnecessary litigation.

Primary causes of indoor moisture problems in buildings include:

- Use of building materials that are repeatedly or deeply wetted before the building is fully enclosed
- Poor control of rain and snow resulting in roof and flashing leaks
- Wet or damp construction cavities
- Moisture-laden outdoor air entering the home or building
- Condensation on cool surfaces

Controlling moisture entry into buildings and preventing condensation are critical elements of protecting buildings from mold and other moisture related problems such as pest infestation and damage to building components. Moisture migration in buildings is highly complex and depends on a variety of factors, including the climactic conditions.

It is extremely important to prevent uncontrolled moisture from entering the building envelope through window and door openings, seams, footings, roofs or other openings. In virtually all areas of the country, an exterior weather barrier to prevent moisture from entering construction cavities should be in place. Wet or damp construction cavities (e.g., spaces between interior and exterior walls), attics, and plenums are major sources of mold and can contribute significantly to indoor air quality problems. In addition, moisture can damage the structure and degrade the performance of insulation, increasing energy and operating costs.

In the event materials get wet, dry water damaged materials as quickly as possible, preferably within 24 hours. Due to the possibility of mold and bacteria growth, materials that are damp or wet for more than 48-72 hours may need to be discarded.

Temperature and Humidity

Temperature and relative humidity are two of several parameters that affect thermal comfort and cause potential problems related to indoor air quality. Satisfaction with the thermal environment can also be influenced by such factors as radiant temperature, air velocity, occupant activity level, and clothing. ASHRAE Standard 55-2009, Thermal Environmental Conditions for Human Occupancy, presents guidelines that are intended to achieve thermal conditions that at least 80% of the occupants would find acceptable or comfortable.

Relative humidity levels below 25% are associated with increased discomfort and drying of the mucous membranes and skin, which can lead to chapping and irritation. Low relative humidity also increases static electricity, which causes discomfort and can hinder the operation of computers and paper-processing equipment. High humidity levels (>60%) can result in condensation within the building structure and on interior or exterior surfaces and the subsequent development of mold. In most situations, ideal indoor relative humidity levels are between 30% - 60%. ASHRAE specifies a range between 25% and 60%.

Temperature and Humidity

Below are some factors to consider when assessing a commercial space for temperature and humidity related issues:

Temperature

1. Check for any evidence of high or low temperatures. Are these due to occupant interference, such as installation of heaters or new equipment?
2. Check for local sources of heating or cooling, such as un-insulated floors over a garage or overhang, solar load through windows, or cold window frames.
3. Ensure that thermostats are functioning, calibrated, correctly located, and not obstructed or enclosed
4. Check for evidence of thermal gradients; the floor-to-ceiling differential should not exceed 5 °F.
5. Check for a balanced air distribution network (even air circulation and air current). Do occupants use fans?
6. Check for any obstruction of air circulation, such as high office partitions, taped diffusers, or perimeter units blocked by paper, books, or cabinets.
7. Look for diffusers directly over occupants or close to return slots

Relative humidity

1. Check humidifier operation, including excess scale or rust, blocked nozzles, broken pump, and areas of stagnant, dirty water.
2. Look for a defective or poorly calibrated humidistat located in the return air duct.
3. Look for condensation caused by excess humidity or by insufficient thermal insulation of the building shell.
4. Check for chemical additives used for water treatment.

Managing the relationship between temperature and humidity will control thermal comfort within the space and reduce the potential for the presence of biological contaminants including mold.

Mold

Molds are organisms that may be found indoors and outdoors. They are part of the natural environment and play an important role in the environment by breaking down and digesting organic material, such as dead leaves. Also called fungi or mildew, molds are neither plants nor animals; they are part of the kingdom Fungi.

Molds can multiply by producing microscopic spores (2 - 100 microns [µm] in diameter), similar to the seeds produced by plants. Many spores are so small they easily float through the air and can be carried for great distances by even the gentlest breezes. The number of mold spores suspended in indoor and outdoor air fluctuates from season to season, day to day, and even hour to hour.

Mold spores are ubiquitous; they are found both indoors and outdoors. Mold spores cannot be eliminated from indoor environments. Some mold spores will be found floating through the air and in settled dust; however, they will not grow if moisture is not present.

Mold is not usually a problem indoors -- unless mold spores land on a wet or damp spot and begin growing. As molds grow they digest whatever they are growing on. Unchecked mold growth can damage buildings and furnishings; molds can rot wood, damage drywall, and eventually cause structural damage to buildings. Mold can cause cosmetic damage, such as stains, to furnishings. The potential human health effects of mold are also a concern. It is important, therefore, to prevent mold from growing indoors.

Mold does not need a lot of water to grow. A little condensation, in a bathroom or around a window sill, for example, can be enough. Common sites for indoor mold growth include bathroom tile and grout, basement walls, and areas around windows, near leaky water fountains, and around sinks. Common sources of water or moisture include roof leaks, condensation due to high humidity or cold spots in a building, slow leaks in plumbing fixtures, humidification systems, sprinkler systems, and floods.

Besides moisture, mold needs nutrients, or food, to grow. Mold can grow on virtually any organic substance. Most buildings are full of organic materials that mold can use as food, including paper, cloth, wood, plant material, and even soil. In most cases, temperature is not an issue; some molds grow in warm areas, while others prefer cool locations such as bread stored in a refrigerator.

Often, more than one type of mold can be found growing in the same area, although conditions such as moisture, light, and temperature may favor one species of mold over another.

Molds generally prefer a slightly acidic pH. Each mold species has a particular pH at which it grows best.

Asbestos

Asbestos is a mineral fiber that occurs in rock and soil. Because of its fiber strength and heat resistance asbestos has been used in a variety of building construction materials for insulation and as a fire retardant. Asbestos has also been used in a wide range of manufactured goods, mostly in building materials (roofing shingles, ceiling and floor tiles, paper products, and asbestos cement products), friction products (automobile clutch, brake, and transmission parts), heat-resistant fabrics, packaging, gaskets, and coatings.

Examples of where asbestos can be found in a building include (not a complete list):

- Wallboard and tape compound
- Attic and wall insulation
- Vinyl floor tiles and the backing on vinyl sheet flooring and adhesives
- Roofing and siding materials
- Textured paint and patching compounds used on wall and ceilings
- Duct insulation and duct mastic
- Hot water and steam pipes
- Heat-resistant fabrics
- Automobile clutches and brakes

Asbestos fibers may be released into the air by the disturbance of asbestos-containing material during product use, demolition work, building maintenance, repair, and remodeling. In general, exposure may occur only when the asbestos-containing material is disturbed or damaged in some way to release particles and fibers into the air.

Exposure to asbestos increases your risk of developing lung disease. That risk is made worse by smoking. In general, the greater the exposure to asbestos, the greater the chance of developing harmful health effects.

Air toxics regulations under the Clean Air Act specify work practices for asbestos to be followed during demolitions and renovations of all facilities, including, but not limited to, structures, installations, and buildings.

The regulations require a thorough asbestos inspection conducted by a certified licensed asbestos inspector where the demolition or renovation operation will occur.

The regulations require the owner or the operator of the renovation or demolition operation to notify the appropriate delegated entity (often a state agency) before any demolition, or before any renovations of buildings that contain a certain threshold amount of regulated asbestos-containing material.

If asbestos is discovered, the rule requires work practice standards that control asbestos emissions. Work practices often involve removing all asbestos-containing materials, adequately wetting all regulated asbestos-containing materials, sealing the material in leak tight containers and disposing of the asbestos-containing waste material as expediently as practicable, as the regulation explains in greater detail.

Failure to comply with county, state and federal regulations can result in large fines, civil and criminal penalties.

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