

# Creating comfortable living spaces

How spray foam plays a role in helping reduce the risk of mold growth



**ICYNENE®**

The Evolution of Insulation



Nobody wants mold and indoor air pollution in their home. However, by applying modern building science principles, together with high-performance building materials, you can help reduce the risk of mold growth occurring, and help create a comfortable living space.

## What is Mold?

Mold describes a large family of microorganisms that produce spores. Airborne mold spores contain proteins that have been identified as having the ability to trigger adverse reactions in people who suffer from allergies, asthma or other respiratory problems. The familiar mildew smell that we associate with basements typically comes from mold that grows in damp spots.

Some forms of indoor mold produce toxic compounds called “mycotoxins”. Exposure to mycotoxins can represent a health risk to both non-allergic and allergic individuals. While it is not clear how much mold toxin exposure it takes to cause illness, or what kind of symptoms are likely, recent research does demonstrate that mold toxin is a potential health hazard.<sup>1</sup>

## Indoor Pollutants

In the mid 1990s, the American Lung Association, the American Medical Association, the U.S. Consumer Product Safety Commission, and the U.S. Environmental Protection Agency (EPA) put health professionals on alert to recognize the many effects of indoor pollutants on human health. Studies from the United States and Europe indicated that individuals in industrialized nations spend more than 90 percent of their time indoors. The U.S. EPA underlines the seriousness of indoor pollution:

*“... the concentrations of many pollutants indoors exceed those outdoors. The locations of highest concern are those involving prolonged, continuing exposure – that is, the home, school and workplace.”<sup>2</sup>*





Errors or oversights in a building's design, construction, use and/or maintenance may contribute to mold growth or indoor pollution. Some of the conditions most often contributing to mold and indoor pollution problems include:

### **1 Rain leakage and other moisture penetration**

- Rain or melted snow can enter through leaks in the roof or exterior sheathing.
- Ground water can enter through the basement or crawlspace.

### **2 Plumbing problems**

- Plumbing pipes and fixtures may ultimately corrode and fail, given enough time. Without prompt repairs, the resulting leakage can cause considerable water damage and mold growth.
- Similarly, washing machines and dishwashers can malfunction and allow water leakage that often results in building damage and mold growth, particularly if it is not detected early.

### **3 Walls and ceilings that allow air to flow through the building envelope**

- There can be a great deal of air leakage through outside walls and ceilings (together refers to the 'building envelope'). Air leakage through this building envelope can allow moisture to condense within the walls and ceilings, depending on the outdoor temperature and humidity.
- In northern (winter) climates, moisture-laden air going out through the walls can cause condensation when it reaches the cold outer layers of the wall. In southern

climates, warm, humid outside air leaks inward and can cause condensation when the air reaches air-conditioned materials inside (e.g. the backside of drywall, or cold air-conditioning ducts).

### **4 Poor insulation and cold spots that attract moisture**

- Some buildings may have no insulation, or there are places where the insulation is inadequate or has settled over time. In winter climates, this can leave cold spots that attract moisture condensation and cause mold growth. In humid southern climates, inadequate insulation may expose air-conditioned materials inside to the warm moist air from outside, again leading to condensation and mold growth.

### **5 Materials that emit pollutants:**

- Building materials that have volatile organic compounds (VOCs)
- Common household products

### **6 Inadequate or faulty ventilation:**

- Excess moisture from all the normal activities of daily living (showers / cooking) and stale air can accumulate without adequate controlled ventilation.

## Minimizing the Risk

Buildings are a complex, interconnected set of building materials and systems carefully woven together. Change one part of a building and you can affect many others. Any building material product used in constructing the building must be able to work in a positive and mutually beneficial manner with all the other building components.

This inter-dependency is the underlying principle behind the “systems approach”. The systems approach is a method of design, construction, inspection and testing that accounts for the interactions of the various building components, such as the foundation, walls, roofs, doors, insulation and mechanical systems, along with factors like site, climate and occupant behavior.<sup>3</sup> If these interactions are not accounted for, nature will prevail and problems could occur.

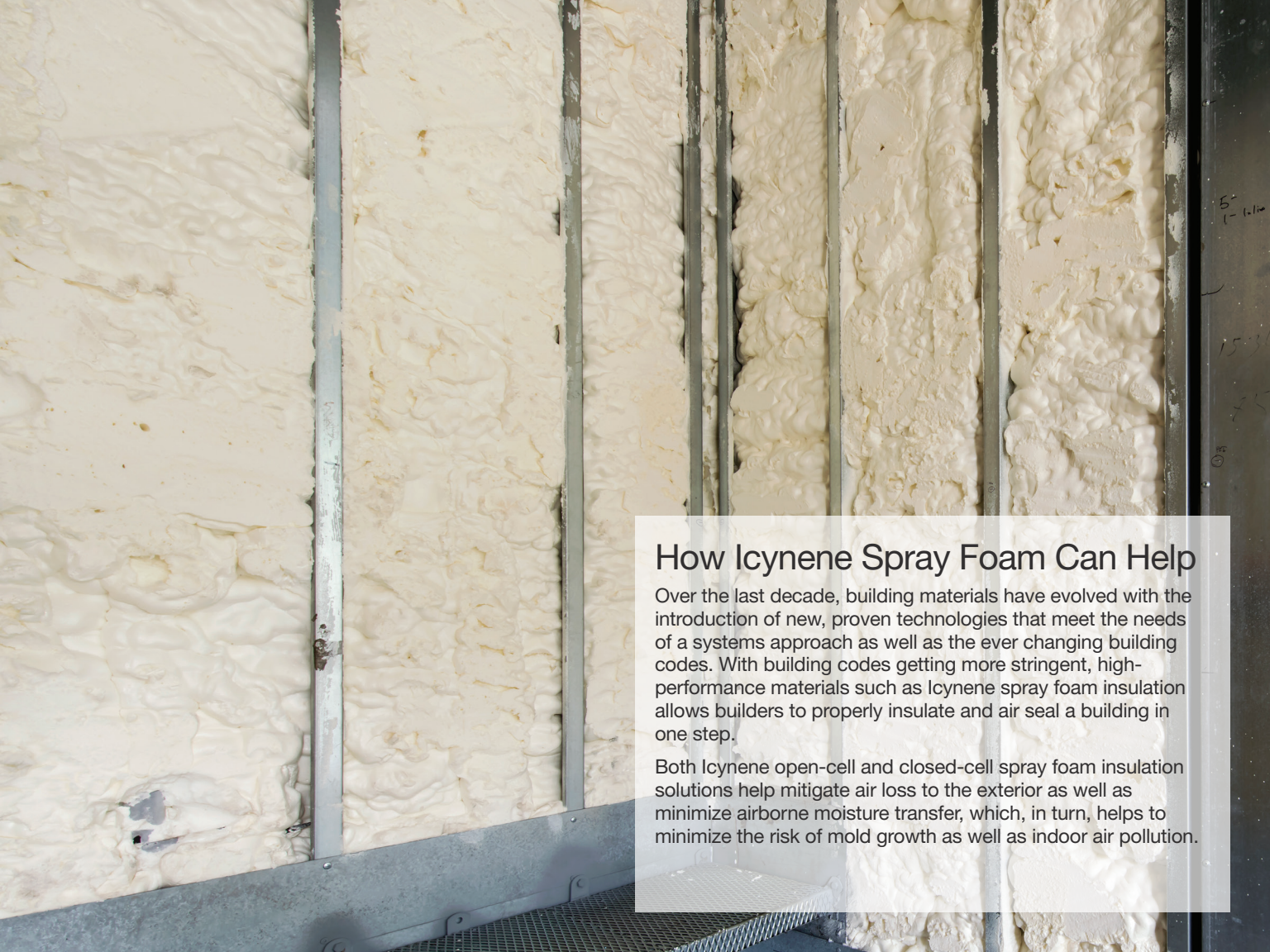
Combining the systems approach with high-performance building materials allows designers and builders to create buildings and homes that are comfortable and efficient for occupants. Builders get fewer callbacks and complaints, building owners get better value and architects are assured that their concepts can become reality.

Things to consider:

- Use a full rain-screen and drainage plane around the entire building.
- Establish good drainage away from the building.
- Eliminate air leakage in walls and ceilings.
- Insulate to provide a continuous thermal barrier.
- Choose low-emission materials.
- Install adequate ventilation.







## How Icynene Spray Foam Can Help

Over the last decade, building materials have evolved with the introduction of new, proven technologies that meet the needs of a systems approach as well as the ever changing building codes. With building codes getting more stringent, high-performance materials such as Icynene spray foam insulation allows builders to properly insulate and air seal a building in one step.

Both Icynene open-cell and closed-cell spray foam insulation solutions help mitigate air loss to the exterior as well as minimize airborne moisture transfer, which, in turn, helps to minimize the risk of mold growth as well as indoor air pollution.



## Air & Moisture Control

Applied by a trained, licensed contractor, Icynene insulates and air seals where it is applied within the building envelope to help minimize moisture movement, condensation and mold growth. Icynene spray foam products have been comprehensively tested by third party organizations and has been proven not to be a food source for mold.

## Continuous Thermal Barrier

Icynene spray foam is sprayed into walls, ceilings, floors and basements as a liquid and rapidly expands within seconds to fill all cracks and voids in the of building envelope in which it is applied. The resulting foam forms a continuous thermal barrier that minimizes cold spots and minimizes air loss which can lead to HVAC equipment operating more efficiently. This, in turn, can lead to reduced heating and cooling costs.





## Using Icynene in Residential Construction

Icynene helps builders and architects realize the true potential of their unique residential designs. For instance, Icynene spray foam can be applied to the underside of the roof deck to create an unvented, conditioned attic assembly. A fundamental requirement of an unvented attic assembly is the use of air-impermeable insulation. This helps to minimize the infiltration of moist air, reducing latent air-conditioning loads and providing further reductions in energy consumption. With Icynene, insulation can be placed under the roof deck, and the attic becomes conditioned space allowing for right-sizing of air-conditioning units and additional energy savings.



# Speak with your local licensed Icynene contractor today.

Call 1.800.758.7325 or visit [icynene.com](http://icynene.com) to learn more about Icynene spray foam insulation.



## References

1. Murtoniemi, T., Nevalainen, A., Suutari, M., Toivola, M., Konulainen, H., and Hirvonen, M-R. "Induction of Cytotoxicity and Production of Inflammatory Mediators in RAS264.7 Macrophages by Spores Grown on Six Different Plasterboards". *Inhalation Toxicology*, 2001; 13:233-247.
2. American Lung Association, American Medical Association, U.S. Consumer Product Safety Commission, and U.S. Environmental Protection Agency. "Indoor Air Pollution: An Introduction for Health Professionals". 1994. U.S. Government Printing Office 1994-523-217/81322. Available U.S. Environmental Protection Agency, (6607J) Washington, D.C. 20460. (page 1)
3. R. Nicklas, Controlled Environments Inc.

## Additional Literature

- Canada Mortgage and Housing Corporation has a number of mould-related publications illustrated on its website <http://www.cmhc-schl.gc.ca> or through its Canadian Housing Information Centre at 1-800-668-2642, CMHC, 700 Montreal Road, Ottawa K1A 0P7.
- Indoor Air Quality Handbook, by Spengler, J.D., Samet, J.M., and McCarthy, J.F., eds., McGraw-Hill, 2001, ISBN 0-07-445549-4. Contains extensive bibliographies of scientific papers on all current indoor air quality issues.
- Ontario Lung Association, 2002. "Indoor Air Pollutants in Residential Settings: Respiratory Health Effects and Remedial Measures to Minimize Exposure". Available online at the Lung Association website [http://www.on.lung.ca/cando/IAPRS\\_contents.html](http://www.on.lung.ca/cando/IAPRS_contents.html). (see Section 2.3.2.3 "Summary of Selected Evidence [on mold]").
- American Academy of Pediatrics, Committee on Environmental Health. "Toxic effects of Indoor Molds". *Pediatrics* 1998; 101(4):712-714.

\* Savings vary. Find out why in the seller's fact sheet on R-values. Higher R-values mean greater insulating power.

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