INSULATION FACTS #72

NAIMA
North American Insulation Manufacturers Association

Mineral Fiber Insulation Products for Commercial and Industrial Applications:

The Facts About Mold Growth

Introduction

Mineral fiber insulation products which include both fibrous glass and mineral wool materials used in commercial and industrial applications have been incorrectly cited for contributing to mold growth. The fibers and binder materials used to make mineral fiber insulations do not provide a nutrient source for mold growth. Testing in accordance with UL[1] and ASTM[2] standards confirm that mineral fiber insulation does not support mold growth.[3]

Fact #1:

Controlling water is the most practical way to prevent microbial growth

Sustained mold growth appears when mold spores are combined with liquid water, a nutrition source and a temperature conducive to growth – the operating temperature in most buildings is ideal.[4] It would be impractical to control either the operating temperature, the presence of mold spores in the air or the presence of a food source, which can be as common as dust. This leaves the control of moisture as the most viable option for preventing mold growth. Researchers found that sustained mold growth could occur only when wet conditions were present, either through condensation or when water entered the insulation assembly. Eliminating the source of the liquid water will reduce the likelihood of sustained microbial growth.[5]

Fact #2:

Mold growth is not surface specific

According to experts at Duke University,[6] microbial growth can be found on most common building materials when the proper conditions exist. Microbial growth will even occur on non-porous surfaces if a surface food source (dust), moisture and adequate temperature conditions exist.[7]

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Fact #3:

Mineral Fiber insulations do not support mold growth

Mineral Fiber insulations are primarily inorganic and inert and do not provide a source of food for microbial growth.[8] The belief that microbes can utilize the binder and the mineral fiber as a food source that enables them to grow is simply not true.[9]

Fact #4

Mold growth can be prevented

The conditions which promote mold growth - the presence of dust and dirt combined with water - do not normally occur in properly designed, installed, operated and maintained systems. A regular maintenance schedule, along with a properly designed and installed insulation system, reduces the likelihood that conditions might exist that promote mold growth.

Fact #5

Wet Mineral Fiber Insulation – Should It Be Replaced?

NAIMA does not provide specific recommendations addressing the issue of replacing wet insulation used in commercial and industrial applications. It is very subjective whether insulation needs to be replaced after being exposed to water. In general, mineral fiber insulation is very resilient when it comes to moisture exposure because the insulation is made of moisture resistant fibers and binders.

Whether or not the insulation should be replaced after getting wet depends on several factors. Below are some of these factors and guidance to help one decide whether to replace wet insulation or not:

- **Presence of mold or mildew growth.** Any insulation materials (including jackets) that exhibit signs of mold or mildew growth should be replaced.
- **The amount and intensity of water or moisture the insulation is exposed to.** If the insulation is exposed to rain or running water that is strong enough to cause the insulation to change shape (i.e. compact or erode) the insulation should be replaced.
- **The cleanliness of the water.** Rain is likely to be cleaner than rising floodwaters. Any insulation that is exposed to flood waters should be replaced as it may contain any number of unsanitary or harmful substances. Water from condensation is typically clean. However, insulation wet from condensation may indicate a system problem that will require the system to be redesigned and the insulation to be replaced. Whatever the reason, the source of the water must be eliminated before new insulation is installed. If the insulation is wetted by any liquid other than water, give careful consideration to whether the insulation should be replaced. If the other liquid could serve as a food source for microbial growth, it is best to replace the insulation.

In addition to inspecting the insulation material, other system components such as facings, tapes, banding, etc. should be inspected for water damage and replaced as necessary.

Summary

Mold spores are everywhere in nature and the built environment. Scientific research demonstrates that with sufficient water and an appropriate food source, mold will grow on virtually any surface. The key to minimizing the possibility of mold growth is managing liquid in the built environment and reducing the possibility of condensation.

All insulation on below-ambient systems requires special design considerations to deal with the flow of water vapor toward all cold surfaces. Vapor retarders can be an effective means of controlling vapor flow, but special design, installation, and maintenance considerations must be addressed. Water vapor flow is an issue no matter what insulation materials are used.

The conditions that promote mold growth do not normally occur in properly designed, built and maintained systems. However in systems such as chilled water systems that operate continuously, water may accumulate for an extended period of time. Where temperature conditions are right, mold growth can occur provided there is a nutrient source. Mineral fiber insulations, in general, are products that have very good resistance to microbial growth if the material is not exposed to wet conditions for an extended period of time.

How To Prevent Moisture Problems and Mold Growth in Cold Systems

Periodic inspections are necessary to identify any damaged or under-performing areas of the insulation system. Common causes of moisture on the surface include pipe leaks, mechanical abuse, gasket failures, insufficient thickness, a break down of the vapor retarder system and poor workmanship. If replacement of insulation is required, the system should be examined for the cause of the failure, and the problem corrected prior to insulating. Make sure the system is shut down and dry prior to installing the new insulation.

General Maintenance Procedures

Maintenance procedures include inspection, detection and remediation of probable sources of energy leaks and/or moisture problems.

NAIMA makes several system design and maintenance recommendations to improve operations and prevent mold growth:

- Install insulation systems with the proper condensation control thickness as determined by the NAIMA 3E PLUS® computer program available for free at www.pipeinsulation.org
- Promptly acknowledge the problem, identify the source, and permanently repair all areas where water has accumulated.
- During the summer, cooling coils should be run at a low enough temperature, and for a long enough period of time, to properly dehumidify conditioned air. Wherever possible, below ambient systems should be contained in a conditioned space where the lower humidity does not allow condensation to occur.
- Insulation systems should be installed so that equipment maintenance personnel have easy and direct access to inspect and promptly repair trouble areas.
- Materials with hard surfaces where moisture collection has promoted microbial growth should be cleaned and disinfected with detergents, chlorine-generating slimicides (bleach), and/or proprietary biocides. Care should be taken to insure that these chemical agents are removed before the systems are reactivated.

References

1. *UL181 Standard for Factory-Made Air Duct and Air Connectors.*
2. *ASTM C 1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings,* and *ASTM G22 Standard Practice for Determining Resistance of Plastics to Bacteria.*
3. *Knauf Insulation 1998 ASTM C1338-96 Test Results.*
4. *Mold, Cause, Effect and Response,* FWCI, March 2002, p. 31. http://awci.org/mold-series-1.pdf
5. *Fungal Contamination of HVAC Surfaces: The Role of the Dew Point in Microbial Amplification,* Jerry J. Tulis, and Wayne R. Thomann; Occupational and Environmental Medicine Division, Duke University Medical Center, Durham, N.C., 1997.
6. *ibid*.
7. *Mold Remediation in Schools and Commercial Buildings*, EPA, 2 June 2001, p.2. http://www.epa.gov/iaq/molds/mold_remediation.html
8. *The New Complete Book of Home Remodeling, Improvement and Repair,* A.M. Watkins, 1979, p. 171.
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About NAIMA

NAIMA is the association for North American manufacturers of fiber glass, rock wool, and slag wool insulation products. Its role is to promote energy efficiency and environmental preservation through the use of fiber glass, rock wool, and slag wool insulation, and to encourage the safe production and use of these materials.

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