

## Mold Contamination in Fiberglass in Insulation

### Cause & Detection of Mold Contamination in Fiberglass Insulation in Buildings



Mold and mold-odors in building wall and ceiling and even floor cavities can be traced to leaks into the cavity or in humid climates such as areas in the U.K. and North America if homes in those climates are not properly constructed to keep both leaks and humid air out of the wall, ceiling or floor cavity.

Our own study has shown that significant mold contamination can be found in some building insulation materials even when to the naked eye the insulation looks "clean".

The 720x photographs above and just below show active fungal growth along the surface of a fiberglass insulation fiber collected the suspended ceiling of a building suffering wet conditions and moldy in-slab HVAC ducts.



Fiberglass in building insulation is a topic I have been testing and studying for nearly twenty five years, after having first traced a building mold contamination reservoir to a hidden source in this material. I frequently find high levels of mold-contaminated fiberglass insulation in buildings which contain other large mold reservoirs. I have also detected high levels of problematic mold in fiberglass building insulation where other mold reservoirs were either not present or had been previously removed.

Our moldy building insulation photo at page top (contributed by a reader) shows an obvious case: very wet fiberglass insulation under a roof and extensive black mold growth on at least the insulation surface, probably inside the insulation as well.

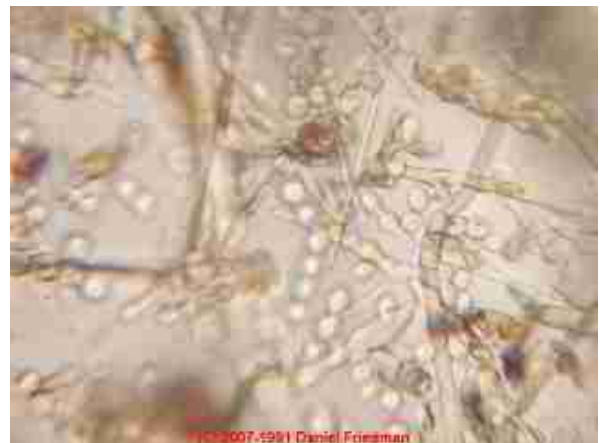
But in a more subtle, and not easily visible form, problematic building contamination by mold is often found in otherwise clean-looking basement fiberglass insulation, crawl space fiberglass insulation, fiberglass wall insulation, **heating or cooling duct fiberglass insulation**, and attic or roof insulation in buildings which have either been wet or have been exposed to high levels of mold from other sources.

That "hidden" insulation mold is the focus of our discussion in this article.

## **Clean-looking Fiberglass Insulation may be Mold Contaminated if Exposed to Wet Conditions or A Secondary Airborne Mold Source**

Except for some superficial "dust staining" that is often simply thermal tracking by house dust, the pink fiberglass insulation shown below (left) looked clean. Unlike our black insulation mold photo above, there was no visible mold on the pink fiberglass insulation shown (below left).

But vacuuming the center (most clean-looking area) of that mold and lab examination of the vacuum dust sample contents showed the long *Penicillium/Aspergillus* spore chains (below right) consistent with local problematic mold growth.



**High levels of mold may be present in fiberglass insulation:** We have measured very high levels of airborne problematic mold spores which were traced to a building reservoir of moldy fiberglass insulation.

Recapping, the pair of photographs (above) shows fairly clean-looking fiberglass insulation over a crawl space which in fact had been subjected to flooding. While the insulation itself did not appear to have been flooded, and while there was no mold visible on or in this fiberglass insulation, a simple vacuum test demonstrated that the insulation was severely contaminated with *Aspergillus sp.* mold.

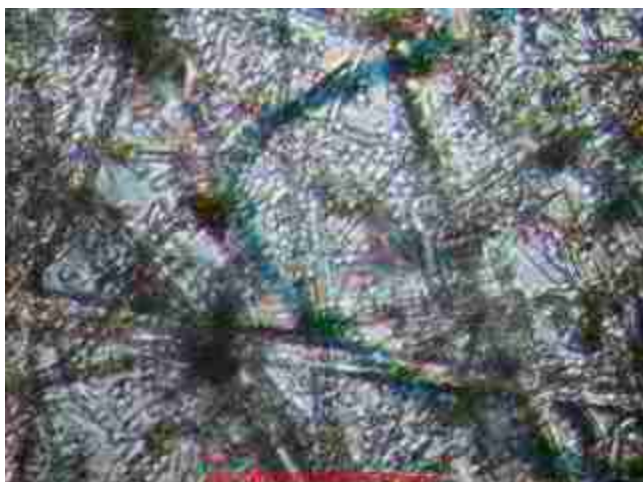
## Fiberglass insulation can host active mold growth

The presence of both mold spore chains and conidiophores of *Aspergillus sp.* in the insulation test samples whose photos are shown above confirmed that not only was the crawl space ceiling fiberglass insulation moldy, but it was supporting active fungal growth.

Our screening samples confirmed that this mold was present in other building areas, most-likely emanating from this mold reservoir of mold-contaminated fiberglass insulation. In some of cases, non-visible mold contamination in fiberglass insulation has been enough to cause IAQ, health, or other mold-related complaints by building occupants.



In the partially-opened basement wall shown here, the water track stains on the cavity side of the exposed drywall (shown after a test cut was made) indicate that water passed in this wall from above.



In this circumstance, even when the fiberglass insulation looks clean, I often find high levels of *Penicillium sp.* or *Aspergillus sp.* in this material. Comparison tests of fiberglass which is new at a building supply store or in homes where the insulation has not been wet nor infested with rodents or other pests, mold is rarely a problem.

The photo at above right shows a very dense presence of *Pen/Asp* spores and spore chains as well as a portion of a conidiophore (lower left) in this insulation test sample, indicating that mold appeared to be growing in the insulation, not simply accumulated there from another building mold reservoir.

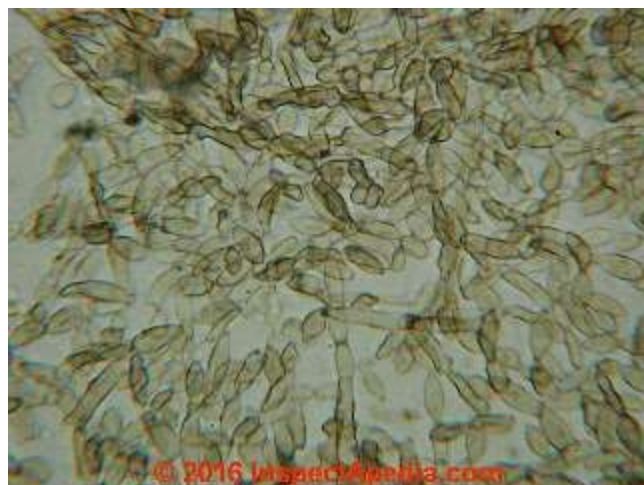
## Mold Growth Found on Fiberglass-Lined HVAC Duct Interiors

### Mold on the Interior Surface of Fiberglass-lined HVAC Ducts



Above: white "growth" found on the interior surface of fiberglass-lined HVAC ducts in a home in Atlanta, GA in 2016. Look closely to see the presence of clear adhesive tape being used to collect a sample from this surface to permit laboratory analysis.

Samples from this fiberglass duct were examined in our InspectApedia.com forensic laboratory. Below: an example of lab test results included these:



Above first photo, sample 2, *Aspergillus* sp. conidiophore and hyphae at upper left, *Penicillium* conidiophore at lower right.

Above second photo sample 2, *Cladorporium* sp. in dense fungal growth on the surface.



## Fiberglass Insulation May Have Been Contaminated by Airborne Mold Spores or Other Pathogens from Other Sources

Just below is an individual *Curvularia*-like mold spore to the left of what is probably a fragment of gypsum or drywall material.

More subtle in this photo are individual *Penicillium/Aspergillus* mold spores. Small and colorless these are harder to see unless the microscopist takes care and time. The combination of these particles in a vacuum sample of fiberglass insulation suggests that this insulation became contaminated by airborne debris, perhaps during demolition of moldy drywall.

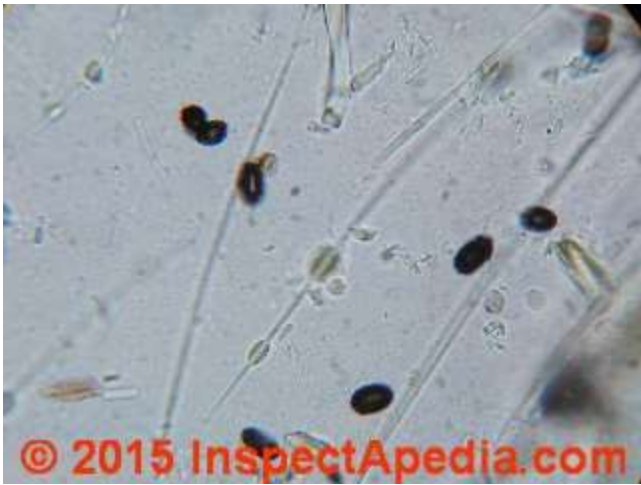


Below is a large hyphal fragment in fiberglass insulation; from this observation we can be confident that wet conditions and growing mold have been present in the building where this sample was collected. The image does not mean that this fungus was necessarily growing in or on the fiberglass itself.



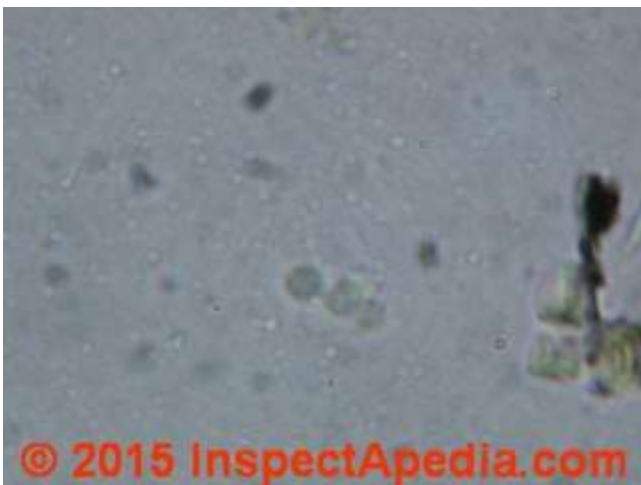
Below are multiple *Stachybotrys chartarum* mold spores in a fiberglass insulation sample and in the background I see some colorless Pen/Asp spores as well. This sample strongly suggests that there has been demolition of moldy materials, probably drywall, in the area where this fiberglass was exposed.

There is no evidence that these fungi are growing on or in this particular insulation sample. Any thick fibrous material can collect airborne particles and can be difficult or impossible to clean completely. This fiberglass insulation should be discarded.



Below my photo illustrates a short three-spore chain of *Penicillium* or *Aspergillus* mold spores. These fungal contaminants are a particular concern because their small size (often in the 1u range) means they can be inhaled deeply into the lungs.

High exposure levels, or repeated exposure to high levels of this type of airborne mold can cause serious illness such as *Aspergillosis*.



Because these spore chains are very fragile and break into individual spores quickly when airborne, when we find a spore chain of *Penicillium* or *Aspergillus* mold in an environmental sample I am confident that there has been or is currently nearby active growth of one or both of these mold genera/species.

I have on occasion found actual *Penicillium* or *Aspergillus* mold conidiophores growing in fiberglass insulation (as well as on or in a very large number of other building materials). These mold contamination problems occur in buildings that have been wet, flooded, or occasionally subject to very high humidity.

## Where to Look for Mold in Building Insulation

For buildings which do not have other known mold reservoirs, special attention needs to be given to inspecting and testing for problematic mold in

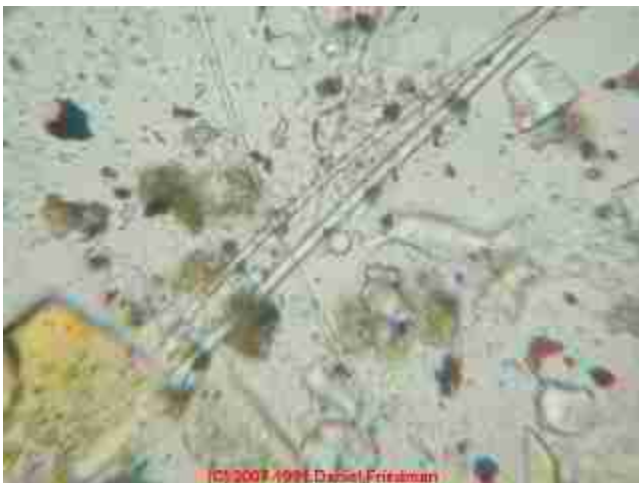
- Fiberglass insulation in any building cavity which has been wet.
- Fiberglass insulation over wet or damp basements
- Fiberglass insulation over crawl spaces

- Fiberglass insulation in attics or roof cavities where there has been leakage
- Fiberglass insulation in building walls subject to leaks from plumbing failures, previous wetting due to building fire extinguishment, or in freezing climates, walls subject to leaks from ice damming.
- Fiberglass heating or cooling duct material, especially if it has been wet from building leaks or A/C condensate mishandling

## Moldy building or duct insulation may look clean on visual inspection



What can be tricky in investigations of mold contamination in building insulation is that severely mold-contaminated fiberglass insulation may look pretty clean to the naked eye.



Special vacuum and agitation methods are needed to sample and test this material and special care is needed in choosing the sample or test location when looking for mold in fiberglass or other building insulation.

The left photo above shows clean fiberglass insulation fragments (taken from a sample of new fiberglass building insulation).