



## Glass Fiber Air Transmission Systems: Preventing Moisture Accumulation in Ducts

*In this issue we will address the sources of water accumulation in unused ducts located in unconditioned spaces; the problems associated with moisture accumulation; and the means of prevention.*

During the heating season, unused air conditioning ducts located in unconditioned spaces can become saturated with water unless certain precautions are taken. Low duct temperatures often result in condensation which can accumulate in substantial amounts of water during the winter months.

### Sources of Moisture in the Home

The source of accumulated water in unused or non-operating ducts is the air within a home. All air contains some water in the form of water vapor. However, in winter, inside air typically has more water vapor than outside air. When water vapor laden air cools to a low enough temperature, it condenses, forming liquid water.

It doesn't matter what the duct is made of — bare sheet metal, fiber glass lined sheet metal, wrapped metal, duct board, or flexible duct — the physical laws governing this phenomenon are the same for all materials.

### How Moisture Accumulates in Ducts

Ducts without heated air flowing through them will cool to temperatures near that of the unconditioned space. Insulation, by itself, will not keep unused duct temperatures elevated or stable.

Insulation will slow down the rate of heat flow through the duct wall, but unless this heat is replaced, the temperature in the duct will fall. When the temperature falls low enough, the moisture laden air from within the home will begin to lose its moisture and form condensation.

Unless heat is supplied to the inside of the duct, condensation will continue to form and water will begin to accu-

multate within the duct. If the temperature in the duct is low enough, frost and ice will form.

Not until the unconditioned space warms up and the ice melts will the problem become evident.

## Problems Associated With Moisture

If there is dust or dirt present in a duct where water has accumulated, conditions are ripe for promoting mold growth.

A recent study by Duke University researchers, Jerry J. Tulis, Ph.D and Wayne R. Thomann, Dr.P.H. observed that in order for fungal spores to germinate, moisture is required. And, in order for sustained fungal growth to occur, both moisture and nutrients are required. Sustained mold growth occurs when wet conditions are produced through condensation. Wherever moisture is available, microbial growth can be found on all surfaces of the HVAC system, including metal flex duct, the flat surfaces of metal ducts, plastic-lined flex duct, caulks and sealants, conditioning coils, metal sound attenuators, mixing box dampers and internal duct liners.

The researchers concluded that, in the presence of moisture, fungal growth can and does occur on all surfaces of the ventilation system, whether comprised of metal, plastic, rubber, fiber glass, or other material.

## Moisture Prevention

Preventing moisture is not difficult. Unused duct systems should be sealed during the heating season. Just closing register dampers will probably not be sufficient. Dampers are not air tight and will allow the moist indoor air to move into the duct.

### Sealing Ducts

It is recommended that all duct openings, supplies and returns, be sealed to prevent intrusion of both air and vapor.

- n Remove the register or return grill and tape the duct openings closed.
- n Larger openings can be sealed by taping plastic sheeting over the openings.
- n In areas of high humidity, such as bathrooms and kitchens, care should be taken to ensure that complete seals are made.
- n In less severe conditions, sealing on the exterior of registers and grills may be sufficient.
- n Tape and plastic sheeting serves as both air and water vapor barrier.

### Running Fans Not a Solution

Some people attempt to alleviate the problem by running a fan continuously for the duct systems during the winter months. The hope is that enough heat will be brought into the duct to prevent con-

densation. Although this may work in milder climates, it is not a guarantee and may even aggravate the problem by supplying much larger quantities of moisture-laden air to the cold duct.

In addition, there is the increased cost to the homeowner because of the heat lost through the duct system. The best solution is to seal the ducts.

## About NAIMA

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

The Air Handling Committee of NAIMA provides information about indoor air quality as it pertains to its members' products.

For more information contact:

NAIMA  
44 Canal Center Plaza  
Suite 310  
Alexandria, Virginia 22314  
Tel: 703/684-0084  
Fax: 703/684-0427  
E-mail: [insulation@naima.org](mailto:insulation@naima.org)  
Website: <http://www.naima.org>

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CertainTeed Corporation  
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