CostGard™ *A Necessary Step To Healthy and Sustainable Buildings*

Condensate Drain Systems

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HVAC systems are a major contributor to building health and sustainability; both favorable and unfavorable. They can supply the air needed for ventilation. And, they can accommodate filtering systems that are capable of removing any or all the following health-threatening pollutants: second-hand smoke, radon, carbon monoxide, carbon dioxide, volatile organic compounds, asbestos fibers, mold spores, legionnella, and other bacteria.

These provisions alone, however, are not sufficient to ensure dry and uncontaminated HVAC systems as necessary for healthy and sustainable buildings. Visits to scores of facilities in Florida; the Carolinas; Washington, DC; Michigan; Ohio; Georgia; Louisiana; and Texas indicate that in many buildings both the design and maintenance of HVAC systems frequently fall short. **Figure 1** shows internal photographs of typical air handlers observed at various facilities. The conditions depicted show the effects of wetness caused by the failure to successfully remove condensate from the air handlers. As a result, all surfaces downstream of the fan, including the ductwork, become favorable growth places for mold, bacteria, and other contaminating pathogens.

It may seem that air handlers located remote to the conditioned space have little effect on building health, but that is far from the case. In fact, all the air in the building passes through air handlers several times an hour creating critical health-threatening conditions. Even the most efficient air filters do not remedy this situation because they are generally installed in the air stream ahead of the contaminated region. Attempts to place HEPA filters downstream have been unsuccessful because condensate is carried onto the filter creating another source of contamination.

The health threat caused by failure to remove condensate is not limited to air handlers and ductwork. Uncontrolled condensate often overflows from the drain pan and contaminates occupied space, as illustrated in **Figure 2**.

The widespread existence of conditions like those shown in **Figures 1 and 2** are well known in the industry. But there seems to be little concern. The cause is generally attributed to the failure of building owners to maintain the systems. The fact is, the failure to remove condensate is usually not the result of poor maintenance, but the unpreventable failure of traps in the condensate drain system. Typical field installations are depicted in **Figure 3**. In each case, the trap geometry is clearly unacceptable. Further, even with acceptable trap geometry, successful maintenance of these systems is impossible because there are no provisions for debris clean-out, trap priming, and freeze protection (where needed).

Figure 1: Damaged Air Handlers

Figure 2: Damaged & Contaminated Ceilings

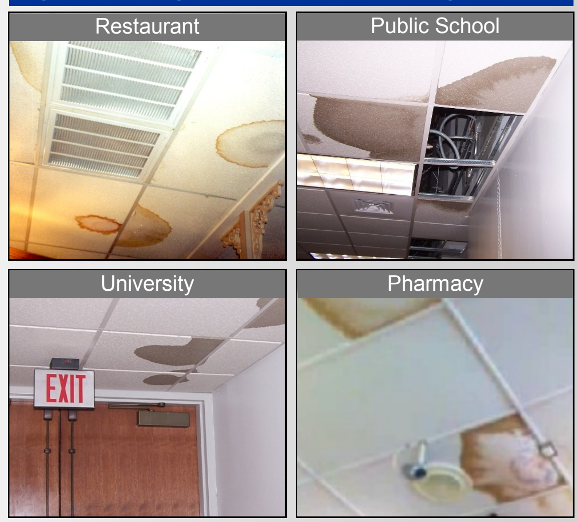

Figure 3: Traps That Meet National Codes

ASHRAE Standard 62-89R

[American Society of Heating, Refrigerating and Air Conditioning Engineers]

5.6.4 Drains and Drain Pans. *Condensate traps exhibit many failure modes that can impact on indoor air quality. Trap failures due to freeze-up, drying out, breakage, blockage, and/or improper installation can compromise the seal against air ingestion through the condensate drain line. Traps with insufficient height between the inlet and outlet on draw-through systems can cause the drain to back-up when the fan is on, possibly causing drain pan overflow or water droplet carryover into the duct system. The resulting moist surfaces can become sources of biological contamination. Seasonal variations, such as very dry or cold weather, may adversely affect trap operation and condensate removal.*

Figure 4. Fluidic Flow Control

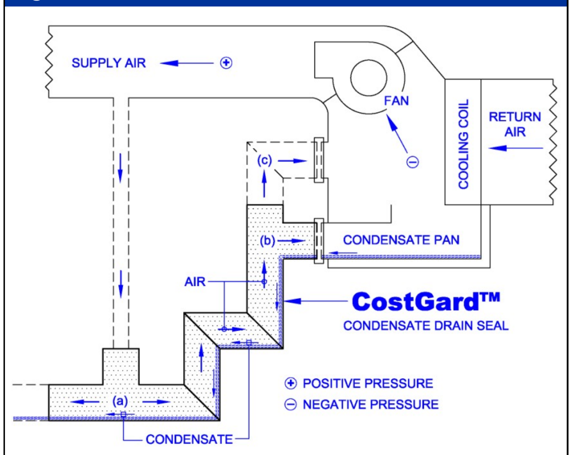

Figure 5. Typical Installation

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Video Demonstration | Installed Systems

Some Users | How To Specify

Why condensate traps are unacceptable is clearly revealed in **ASHRAE 62-89R, Paragraph 5.6.4,** included as a sidebar.

Despite the adverse effects of trapped condensate drain systems on building health and sustainability, use of the failure-prone condensate trap remains the "industry standard." Further, the two most widely used national mechanical and plumbing codes simply state that drain systems shall be trapped, leaving design and operation success to others. (Note that each of the failed drain systems in **Figure 3** is trapped.) New designs that adhere to the "industry standard" are continuing to add damaging and health-threatening drain systems to the millions of such systems already in use.

Within the industry, the only entity burdened by drain system failures and the associated health-threatening conditions is the building owner. For those building owners anxious to reduce this burden, there is a means for doing so: a fluidic flow control device, the CostGard™ Condensate Drain Seal. It uses air instead of water to form the drain seal and eliminates all problems caused by the condensate trap.

Figure 4 illustrates the operating principles of this drain seal and **Figure 5** shows a unitary rooftop typical installation.

In terms of performance, the CostGard™ Condensate Drain Seal creates a drain system which under all operating conditions:

- allows condensate to flow freely from the drain pan,
- prevents outside air from being drawn into the unit,
- eliminates the blowing of condensate from the pan onto internal components, and
- prevents condensate overflow caused by flow blockage or negative pan pressure.

And it:

- is not affected by algae (a cause of trap blockage),
- requires no priming,
- precludes damage caused by freezing temperatures,
- has no moving parts, and
- is maintenance free.

Few in the air conditioning industry could dispute the need to meet these requirements. Such a system would greatly increase the potential for achieving truly healthy and sustainable buildings, with an appreciable reduction in building operating costs.

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