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Preventing Frozen Pipes

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Facility managers of restaurants located in states that experience freezing weather for much of the winter must learn to adapt to its climate. They must consider construction and insulation aspects, the design and installation of plumbing and mechanical systems and adhere to practices that seal the building envelope.

Here are the basic steps to prevent pipes and equipment from freezing:

- Internal building temperature must remain above 32 degrees Fahrenheit.

- The building envelope must be sealed tight to keep out the cold.

- Pipes exposed to outside air flow below freezing should be insulated, heat-traced and thermostatically controlled.

- Slow-flowing water can still freeze under the right conditions, but dripping faucets may help to prevent a freeze-break.

When Pipes Freeze

When water freezes in a pipe, it expands approximately 9 percent greater than its original mass. A closed pipe, whether it is plastic, copper or iron, cannot withstand the pressure that the freezing water creates and explodes. If water in a closed pipe expands enough to create a freeze-plug, the pipe bursts. A burst pipe will typically occur down stream of the freeze-plug due to the trapped water creating extreme water pressure between the freeze-plug and a closed outlet. Water then escapes and serious damage can result.

Research conducted by the Building Research Council at the University of Illinois has established a threshold for pipe freezing. Field tests of residential water systems subjected to winter temperatures demonstrated that, for un-insulated pipes installed in an unconditioned attic, the onset of freezing occurred when the outside temperature fell to 20 degrees Fahrenheit or below.

Of course, freezing can happen above 20 degrees Fahrenheit if pipes are exposed to cold air without insulation, especially on a windy day. This can happen if there is a breach in the building's envelope. Examples include poor wall or attic insulation and un-insulated piping usually resulting from unsealed holes or gaps around building services such as roof drain scuppers, gas piping penetrations, and telephone, video or data cables.

Best Practices

In external mechanical rooms of restaurants, it is common practice to bring the water service and fire mains into the building. Domestic hot and cold water piping, water heaters and boilers, water softeners, backflow preventers, thermal expansion tanks, pressure booster pumps, recirculating pumps, thermostatic mixing/tempering valves and other mechanical components that may be subjected to freezing may be found in these rooms. If there is a water heater or boiler located in the room, the International Plumbing Code requires "adequate combustion air" for fuel-fired appliances. This may mean direct air shafts ducted from the rooftop and/or air louvers in the wall or doors. This area is based upon the cumulative total of the BTUs within the room. (British Thermal Units is the amount of heat energy needed to raise the temperature of one pound of water by one degree Fahrenheit.) It is good practice to install a thermostatically controlled forcedair unit heater in the mechanical room to help offset combustion air temperatures in the winter.

In addition, electric heating tapes and cables can run along pipes to prevent water from freezing. These products must be used with extreme caution and installed by a professional in accordance with manufacturers' recommendations to avoid the risk of fire. Check to make sure the product conforms to UL 2049. Tapes and cables with a built-in thermostat will turn heat on automatically when needed; tapes without a thermostat have to be plugged in each time heat is needed, which runs the risk of them being forgotten about.

Be proactive. Discuss your options with your trusted plumbing contractor and develop a plan to prevent costly repairs and insurance claims resulting from pipes freezing.

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