

**NATIONAL FIRE PROTECTION ASSOCIATION RECOMMENDATION**

The National Fire Protection Association (NFPA) provides the definitive control methods to prevent sprinkler systems from freezing. NFPA 13 Section 8.16.4.1.3 states that, "where aboveground water-filled supply pipes, risers, system risers, or feed mains pass through open areas, cold rooms, passageways, or other areas exposed to temperatures below 40 degrees F, the pipes shall be protected against freezing by insulating coverings, frostproof casings, listed heat tracing systems, or other reliable means capable of maintaining a minimum temperature between 40 degrees F and 120 degrees F." Section 8.16.4.4 states "that where listed heat tracing systems are used, they shall be supervised."

Consistent inspection, testing and maintenance of both wet and dry sprinkler systems by competent staff and qualified professional support service are essential to assure that potential freezing conditions corresponding to the exposures are managed effectively. Unheated spaces, penetrations of building enclosures and mechanical conditions should be attended to optimally protect your facility, employees, and customers.

**WINTER LOSS EXAMPLES**

A three-story sprinklered building was unoccupied over the holidays. During the break, the heat in the building was turned down. The piping in the wet system froze in a room on the third floor and flooded the building. The sprinkler system alarm malfunctioned and the damage was not discovered until employees returned to work. There was over a foot of water in the basement when the leak was discovered. Property losses caused by the water damage resulted on all floors of the building and exceeded \$700,000.

An HVAC damper was left open in a mechanical room during a snap of cold weather, allowing the temperature of the room to drop below freezing. This caused the piping of the wet sprinkler system to freeze. The pipe burst and caused damage in excess of \$250,000.

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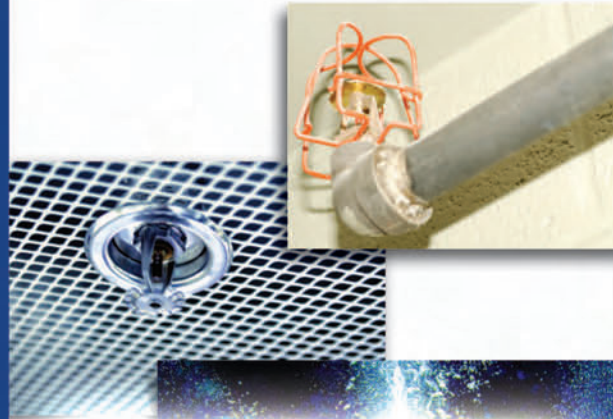


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**SPRINKLER SYSTEM**

**PREVENTING WINTER LOSSES**



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### **ARE YOU AT RISK?**

When it comes to sprinkler systems, frozen water in wet and dry sprinkler fire suppression systems could pose significant risks for your business, including impaired fire protection, costly direct repairs to the system, indirect costs associated with surrounding damages, possible business interruption costs and a loss of customer confidence in a competitive market environment.

While it may be impossible to eliminate every hazard you may face, we can assist you in reducing your exposure to sprinkler system losses by helping you anticipate your vulnerabilities and plan accordingly. Selective's safety management property technical specialists are able to share their expertise and help you protect your facility.

### **BEWARE OF UNHEATED SPACES**

Unheated spaces, such as vaults, crawl spaces, basements, attics, stair towers, or storage areas are common potential areas where freezing temperatures occur. Even where provisions have been made to insulate unheated space, this protection may become compromised over time. The original installation of insulation may not protect sprinkler piping adequately. Insulating material may be damaged or deteriorated. Inadequately heated spaces may develop from new drop ceiling installations, new partitions, and other changes.

Any breach in a building enclosure can induce a freezing condition. Cracks and penetrations of masonry walls, conduit chases, ventilation and drainage channels, or compromised doors, windows, and unheated loading docks are all possible sources of freezing temperatures that could affect the integrity of a sprinkler system. Mechanical heating, ventilating, and air conditioning (HVAC) systems are typically designed with negative air flow to draw fresh air into a building. Sprinkler piping exposed to this inflow could also be susceptible to freezing.

Mechanical failure due to freezing can occur for different reasons. Original installation or subsequent additions may be faulty; with an inconsistent history of inspection, testing and maintenance service. Improperly maintained water flow alarm appliances, or interrupted service between the appliance and alarm supervision service can delay a timely response, magnifying the cost of damage.

### **HOW WILL YOUR SPRINKLER SYSTEM REACT TO FREEZING CONDITIONS?**

Water and steel behave quite differently under freezing conditions. Steel contracts and water expands below 32 degrees Fahrenheit (F). The opposing forces induce significant stress, resulting in pipe, valve or component failure. Chlorinated Poly Vinyl Chloride (CPVC) pipe and fittings, found in light hazard commercial and/or residential systems, will be more quickly affected at a freezing temperature than steel sprinkler piping due to CPVC - adhesive retraction which can begin at 40 degrees Fahrenheit (F). Additionally, there is the added potential failure of the sprinkler head saddle or plug with the potential to produce wider damage than pipe leakage.

A one-eighth inch break in a piping system can release hundreds of gallons of water daily. An ordinary hazard sprinkler design with a standard sprinkler head can release thousands of gallons of water over the same period through a failed head. Electrical hazards can be created if water contacts wiring and outlets. Temporary emergency power may be required until electrical problems can be fully evaluated and corrected.

A freezing condition can exist without symptoms. The sprinkler system can be impaired without your knowledge until the system is tested, attempts to function in an emergency situation, or is revealed through building damage after natural thawing. The costs can be unexpected, and quite considerable. Defrosting and examination of the scope of damage should only be done under competent professional supervision and can be time-consuming and expensive, all during a period of suppression system impairment

### **DRY SPRINKLER SYSTEMS ARE ALSO SUSCEPTIBLE TO FREEZING**

Dry sprinkler systems are intended to function in unheated spaces, but are also susceptible to freezing damage. There are a number of potential means for water to enter the system. Dry system valve assemblies are required to be heated. Unheated space around the riser can cause freezing and subsequent damages.

Inconsistent or faulty inspection, testing and maintenance can result in the presence of water. Inadequate drainage after a full trip test can result in water accumulation susceptible to freezing. Air pressure drops in the system during cold weather can trip the valve, allowing water to enter the system. Air supplied to a dry system through a compressor can introduce moisture collected at low points and be susceptible to freezing. Air leakage can allow water to fill the system and freeze.

Inadequate slope design or changes in system configuration, particularly failure to add drains with system expansion, can result in water accumulation and vulnerability to freezing. Damaged pipe hangers can result in a change in pitch, thereby allowing water to accumulate.

