



Protect Your Building During Winter & Prevent Freezing Sprinkler Systems

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Introduction

- Every year, severe weather brings significant damage to buildings, including frozen piping and roof collapse.
- According to the National Weather Service, the impact of winter weather in the United States ranges from **\$3 billion during a normal winter season to \$6 billion during an active winter**, more than any other time of the year.
- Even though you have property insurance, the payments you receive for repair will never cover all of the damages sustained.
- The costs of **business interruption, loss of clientele and loss of employees** can easily exceed the costs to repair your building.
- Losses caused by frozen sprinkler piping occur more frequently when climates not normally associated with cold weather experience cold fronts.

Sprinkler impairments

The most significant contributing factors to impairments of automatic sprinkler systems due to freezing of automatic sprinkler system piping are as follows:

- Wet pipe sprinkler systems located in heated facilities in geographic areas subject to freezing temperatures where the heating was malfunctioned or was turned off.
- Dry pipe sprinkler systems located in geographic areas subjected to freezing temperatures or protecting areas with freezing temperatures with accidental tripping without immediate action taken to drain and restore before systems freeze.
- Formation of ice plugs within dry pipe sprinkler systems protecting areas of low temperatures.



Protecting your facility

- Enclosed spaces
 - Make a visual check in concealed spaces.
 - Suspended ceiling
 - Closets
 - Storage rooms against exterior walls
 - Seal any gaps in wall material and provide insulation if possible and is not present.
 - If these spaces are unheated, make arrangements for heat to be provided (at least 50 degrees Fahrenheit), or provide heat tape that has been certified by Underwriters Laboratories (UL), the Canadian Standards Association (CSA) or Factory Mutual Research Corporation (FMRC).
- During the annual servicing of your fire sprinkler systems by your contractor, have them demonstrate the operation of all valves.
 - Have appropriate personnel rehearse closing the valves so they can shut down the systems in the event of a burst pipe.
- When inspecting the facility, pay particular attention to piping in attics, entries, penthouses, stairways, under floor areas, above ceilings, shipping and other out-of-the way areas where low temperatures may be found.
 - Sources of cold air infiltration should be identified, and leaks or poor seals should be repaired.
- Where drop ceilings are used, remove a few strategically placed ceiling tiles to allow warm air to reach pipes during cold weather.
- Hydrants, tanks, fire department connections, and other sprinkler system accessories and parts should, along with the rest of the sprinkler system, receive service and inspection before the onset of cold weather, with leaks repaired and protection provided.
- If the building is to be unoccupied (e.g., over a vacation period, or over a weekend) when cold weather is present, inspections should be made, to be sure heating systems are functioning properly.
- Roofs should be inspected, to ensure they can withstand snow loads.
 - Following a heavy snow, snow should be manually removed from roofs if the roof strength is in question.
- Gutters, down spouts and roof drains should be kept clear to avoid clogging and freezing.



- All insulation should be inspected and replaced.
- An emergency response plan should be made for winter weather situations (e.g., loss of heat). This plan should include:
 - Appointing a reliable weather watch.
 - Draining of any equipment that contains water that could freeze.
 - Providing sources of temporary heat for a possible heating system failure.
- Train of security or maintenance/facility personnel in how to close the automatic sprinkler valves if a leak or break should occur.
- Identify building areas that are unusually difficult to heat or that lose heat rapidly.
 - Install an ordinary thermometer and monitor temperatures during cold spells.
 - If these areas are unattended, provide low temperature detectors that can be monitored from a central location.
- Conduct a physical survey of the facility, looking for freeze-up potential.
- Identify areas of facility that are critical and depend on continuous heat.
- Develop procedures to be followed if heat or electricity is lost.
- List telephone numbers for internal staff and external contacts (water, electrical, gas, contractors, equipment suppliers)



Wet pipe automatic sprinkler protection

Freezing of wet pipe fire sprinkler systems (which normally have water in the piping at all times) occurs most often due to lack of adequate heat. Open doors, window, vents, broken windows, wall cracks, loose shingles and siding, and other defects in building maintenance can cause system freeze-ups.

- Keep doors, windows and vents closed when not in use or when resulting drafts will allow freezing air to contact sprinkler piping.
- Repair broken windows, doors and other items in need of fixing.
- If there is a fire pump, the room this is in must be heated to at least 50° F.
- If a building's fire protection system will be exposed to cold weather, such as when a building or building section's heating system is planned to be shut down, or if heating is interrupted for more than a few hours, precautionary measures must be taken.
 - The sprinkler system's water may have to be drained and a fire watch established or temporary heating provided.
 - Be sure to notify your property insurance carrier, if required by your insurance policy, if sprinklers will be shut down or other impairment occurs.
- For loading docks or other parts of the system that may have an antifreeze loop system, the specific gravity of the antifreeze must be checked prior to the cold weather season to ensure it has the proper proportions of antifreeze and water.
 - Antifreeze solution should be checked for concentration and replaced is necessary.
 - All antifreeze systems should be inspected per NFPA 25.
- If pipes freeze, turn off the water supply and thaw or repair damaged piping. If the frozen piping affects fire protection systems, use the sprinkler impairment program to notify your insurance carrier.
- Where sprinkler piping may be exposed to outside temperatures, the pipe should be heated or adequately insulated.
- Provide heating of adequate capacity to maintain the temperature at no less than 40-50 degrees Fahrenheit near sprinkler piping during cold weather.



Dry pipe automatic sprinkler protection

Dry pipe sprinkler systems normally do not contain water in their piping and are less likely to freeze during cold weather than wet pipe systems. Still, certain precautions should be taken to ensure that freezing does not occur in dry pipe systems:

- Drain any water or condensate from auxiliary drains and all other low points.
 - Don't forget about drains beneath stairs or platforms.
- Make sure the dry pipe valve and riser on the water supply are adequately protected against freezing.
 - Heat the valve enclosure using electrical heater strips under thermostatic control so that a minimum of 40-50 degrees Fahrenheit can be maintained.
- Ensure that sufficient air is in the dry pipe system to allow for a drop in pressure that occurs during low temperatures.
 - The air pressure should be checked daily during cold weather
 - Inadequate pressure can result in the dry pipe valve tripping and subsequent freezing of the water that enters the piping.
- The air intakes to the compressor should be located in a cold, dry atmosphere. Avoid warm, damp areas as moisture introduced when the air compresses in the piping and collects at low points in the system may freeze.
- Repair or replace broken, missing or lost sprinkler pipe hangers to make sure the system has the proper pitch of sprinkler piping and to provide good drainage.
- A temperature-signaling device monitored by a central station alarm service can be installed in the valve room or enclosure.
- Develop instructions on how to properly maintain the dry pipe system during the winter.
- Dry automatic sprinkler systems with constant temperatures below 32 degrees Fahrenheit (0 degrees Celsius) have a history of obstruction problems from ice plug formation.
 - Ice plugs can form rapidly inside piping systems.
 - When warm air enters the freezer and rapidly cools, moisture present in the air condenses and accumulates in the interior of the piping. As the accumulation becomes larger, it can fill the entire section of the pipe, preventing water flow.
 - If a system has been flooded with water, such as during a test or false trip, potential for ice plugs exists in any area and any piping but is most likely in low points and in undrained areas.



General precautions

- Make sure that employees keep alert for and report potential or existing cold weather problems.
- Check fire protection systems more frequently than normal during cold weather.
- Do not attempt do-it-yourself repairs on fire safety equipment. The services of trained, competent service personnel should be obtained.
- Do not use torches or other open flame devices to thaw pipes or other equipment.
- The use of temporary heating equipment, such as salamanders and other un-vented portable fuel-burning heaters, is not recommended.
 - These heaters introduce fire and health hazards and present unnecessary fire and health risks.
- Do not store excessive quantities of fuel or flammable liquids in areas not designed for that purpose.
- Plan to remove snow from fire hydrants, post indicator valves and fire department pumper connections.
- Prepare, or locate, and maintain a scaled plan or diagram of the facility that clearly shows the location of all fire protection and other emergency equipment.
- Ensure that all fire hoses are properly drained, dried and stored.
- Have plywood and tarps available to make temporary repairs to roofs, walls, etc., or to construct temporary enclosures or wind breaks.
- Begin snow removal as necessary and contract with a snow removal contractor as needed. Emphasis should be placed on the following:
 - Clear snow from access ways, fire hydrants, pump houses, utilities and valves.
 - Clear roof drains and remove ice build up
 - Remove ice buildup from cooling equipment.
 - Collect certificates of insurance from contractors and review contract.
 - Within the contract specify when snow removal will happen (snow depth).
 - Maintain adequate heat
 - Do not place heaters near combustibles or flammables.



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