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# PROTECTING FIRE SPRINKLER SYSTEM PIPES FROM FREEZING IN CHAPTER FACILITIES



*A resource for Fraternity and Sorority House Corporation Officers*

## Prevent Your Sprinkler System from Freezing this Winter

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As the winter season is upon us, it is an important time to check on the sprinkler systems in your chapter facility to ensure that pipes are properly protected and heated from the elements. Each year, there are several incidents across North America where fraternity facility sprinkler pipes freeze because of lack of maintenance and human error. Damage costs resulting from frozen sprinkler pipes can reach a million dollars or more, especially in multi-story houses where pipes break on the top floor and then water cascades to the bottom floors all the way to the basement. In most every case the water damage could have been prevented had the chapter and house corporation taken some basic and common-sense precautions. Exposed to freezing temperatures, sprinkler system's pipes can burst, leaving the building drenched in inches or even feet of water. To ensure an accident like this doesn't happen, there are a few precautionary measures to take when the weather gets cold.

### Check Your Heating System

Ensure the water running through your sprinkler system does not freeze during winter by checking your heating system as the weather gets cold. Regular maintenance is an important part of running your chapter house and winter is the most important time to have your furnace or heating systems in top shape. While you are checking the heating system, also look around the entire building for cracks in windows and drafty areas. Seal up any gaps you find to keep your property warm and safe throughout the coldest months of the year.



### Keep Temperatures Up

Even if the chapter is away for holiday breaks for several days or weeks, it is important to keep the heating system operating at all times. **NEVER TURN THE HEAT OFF IN THE FRATERNITY FACILITY IN THE WINTER OR SPRING.** Buildings with wet sprinkler systems should not allow temperatures to drop lower than 60 degrees Fahrenheit, so switch the thermostat to low instead of switching it off when the chapter members will be away on vacation. In many fraternity facilities, a thermostat setting of 60 degrees does not necessarily mean the temperature throughout the entire premises is actually 60 degrees. Often even at 60 degrees some peripheral areas can be 10 to 15 degrees cooler, that is why a minimum temperature of 60 degrees is always recommended. Setting the thermostat to 40 degrees for example can mean other parts of the chapter house could be 30 degrees or lower, possibly resulting in frozen pipes and substantial water damage.

### **Inspect Every Room Prior to Closing the Chapter House for Winter or Spring Break**

A common cause of frozen sprinkler or water pipes in fraternity facilities is members leaving windows open in their rooms and then leaving to go home for winter break. Even if the heat is left on and operating, an open window in a member's room can easily cause the temperature to fall below freezing in the room resulting in burst sprinkler pipes from freezing. Always have a chapter officer, house manager, and or house corporation member conduct a room by room search the day the house will be closing for winter or spring break to make sure that all doors and windows are closed. **OPEN WINDOWS ARE ONE OF THE MOST FREQUENT CAUSES OF FROZEN PIPES, ALWAYS MAKE SURE THE FACILITY IS THOROUGHLY CHECKED AND ALL WINDOWS ARE CLOSED BEFORE LEAVING ON A HOLIDAY BREAK.**

### **Schedule a Winter Sprinkler System Maintenance Appointment**

Any fraternity house that has a sprinkler system should be under contract with a qualified fire protection and sprinkler system maintenance contractor. Sprinkler systems need to be maintained; which includes annual main-drain tests, scheduled maintenance and thorough pre-winter season inspections. Keeping sprinkler systems operational and from freezing requires regular preventative maintenance by professionals.

### **Each Chapter and House Corporation should Appoint a Weather Monitor**

Each chapter and house corporation should appoint a winter weather monitor that will check the daily and weekly weather forecasts constantly to be on the look out for freezing temperatures, especially temperatures that are forecasted to be at least 10 degrees colder than normal. This is especially true during any period that the chapter house is closed for winter or spring breaks or when occupancy will be limited. Planning for unusually cold winter periods in advance and being prepared for them can prevent pipes and sprinkler systems from freezing beforehand. Develop a plan of action for when weather forecasts predict freezing temperatures that can put the chapter house at risk of frozen sprinkler pipes.



# How to Prepare Your Sprinkler Systems for the Winter

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## For Sprinkler Systems in General

Whether your chapter house has a wet or dry sprinkler system, these tips apply. Take note that preventative maintenance will be the most helpful way in avoiding any potential problems:

- Insulate the attic, soffits, and eaves on your building.
- Make sure there is enough weather-stripping on exterior doors and windows.
- Locate any damage or leaks in both windows and doors and ensure they are repaired prior to winter.
- Perform seasonal maintenance on any heating sources, including radiant heating.

## For Dry Sprinkler Systems

Your building might be equipped with a dry sprinkler system. Consider some of these questions:

1. Make sure the air compressor system is fully operational and well maintained at all times.
2. Make sure that all gauges are operating and reflecting normal recommended readings.
3. Make sure all maintenance requirements are completed and that the entire system is prepared for winter.
4. Check for and fix any possible drips or leaks that could affect the performance of the sprinkler system.

## What Happens If You Don't Prepare?

If you don't prepare your sprinkler systems, here are some of those consequences:

- **Exploding sprinklers:** You should know that a frozen pipe can burst and even explode due to the pressure from freezing. Sprinkler systems can freeze solid cracking piping. It is important to keep water pipes, radiator heating pipes, boilers and sprinkler systems from freezing over – frozen pipes and sprinklers mean extensive property damage from water leaks.
- **It Won't Work:** You might not expect winter to have any [obvious](#) fire hazards, but the phenomenon of fire is always unpredictable and winter months are the most common time of year for house fires. The last thing needed is for a fire to break out in your chapter house only to find that the sprinklers have failed. Protect your building and everyone in it by making sure your sprinklers systems will activate when needed.





# Additional Cold Weather Preventative Maintenance for Fire Sprinklers

## Can Fire Sprinklers Freeze?

Yes, as the temperatures drop below freezing throughout much of the country during fall, winter and spring months, the risk of freezing water pipes is an increasing danger. Damage to sprinkler systems can not only result in frozen pipes causing significant water damage, but also prevent the sprinkler system from operating during a fire.



## Fire Sprinklers Aren't Winterized. They're Maintained.

If you work with a reputable fire sprinkler company, then your fire sprinklers should be prepared for any harsh elements during their annual scheduled maintenance and inspections. Don't be fooled by companies offering "winterization" for your fire sprinklers as cold weather preparation should already be part of regular maintenance, if required.

If the temperature in the area where your fire sprinkler system is located doesn't get below 50 degrees Fahrenheit, then there is no need to worry about the sprinkler pipes freezing. If the sprinkler system is in an area that may experience freezing temperatures, then there are steps that should be taken to reduce the risk of the sprinkler system freezing. The steps to take depend on the type of fire sprinkler system you have installed.

## The Two Types of Fire Sprinklers

Reducing the risk of your fire sprinkler system freezing depends on the type of fire sprinkler system installed. The type that is found inside many fraternity houses is a **wet system**. In a wet system, the pipes of the sprinkler system are full of water. Once a sprinkler head is activated by the heat of a fire, the water sprays out, similar to what would happen when turning on a faucet.

The second type of sprinkler system is a **dry system**, which can typically be found in parking garages and attics or storage areas where the temperatures can drop below freezing. In a dry system, the pipes are pressurized with air that holds the water back from the main water line. When a sprinkler is activated, the air is released, which allows the water to flow through the pipes and out the sprinkler head.

While dry systems are less susceptible to freezing compared to wet systems in cold weather conditions, they are still capable of freezing. This is due to the fact that the air in the pipes contains moisture, which can condense in the low points of the pipes and freeze. Due to the differences in the systems, they each require their own unique steps to reduce the risk of freezing. Having a maintenance contract with a reputable sprinkler contractor is the best way to ensure your sprinkler system is in working order and prepared for the winter months.

### **Cold Weather Preventive Maintenance for Wet Fire Sprinkler Systems**

While most wet fire sprinkler systems are installed in buildings where the temperature won't drop below 50 degrees, there are certain applications where they may be susceptible to freezing, like when part of the wet system is run out to an unheated attic, storage area or garage that is exposed to the elements.

To keep the water inside the pipes of a wet fire sprinkler system from freezing in areas where the temperature may drop below 50 degrees, some systems include an antifreeze loop. By adding antifreeze to the water in the fire sprinkler pipes, the freezing point is much lower, reducing the risk of the pipes freezing.

During the annual inspection, the fire sprinkler professional will take test samples from the fire sprinkler system to ensure the proper concentration of antifreeze is in the water. If the proper concentration of antifreeze is not sustained, it could lead to a frozen or burst fire sprinkler pipe.



### **Cold Weather Preventive Maintenance for Dry Fire Sprinkler Systems**

A dry fire sprinkler system's pipes aren't full of water, like in a wet system, which means there's no need for antifreeze. The dry system is full of air that contains moisture and can condense in the low points of the system, which can freeze and burst the pipes.

To prepare for the colder temperatures in the winter, a fire sprinkler professional will check and drain the low points of the system where drains are located to dispose of the condensation. The fire sprinkler technician will also check the pitch or angle of the pipes to the drains to make sure that the condensation flows properly to the low point drains. If the pitch isn't correct, the condensation can collect elsewhere in the pipes where it could be at risk of freezing in the winter.

During the warmer months, the fire sprinkler professional will perform an annual inspection which may include flushing the fire sprinkler system. After flushing the system with water to ensure the system is operating properly, the pipes are then blown out with air to dry them. Once all the pipes have been dried out, they are sealed and pressurized with air. A professional will usually recommend that the low points are checked and drained every few days after flushing, due to the increased moisture in the newly pressurized lines.

## What Can I Do to Lower the Risk of Sprinklers Freezing?

While there isn't much else that is needed beyond regular draining and inspections of dry systems, there are additional steps that one can take to prevent a wet system from freezing and bursting.

The biggest danger to a wet fire sprinkler system freezing (without an antifreeze loop), is the temperature. The temperature where the wet fire sprinkler system is installed should not drop below 60 degrees Fahrenheit. You need to ensure the building heat is working in all areas where the fire sprinkler system is located. **MAKE SURE ALL EXTERIOR DOORS AND WINDOWS ARE CLOSED BEFORE HEADING HOME FOR ANY WINTER or SPRING BREAKS.** One of the most common causes of a wet fire sprinkler system freezing is that the heat in a building is accidentally turned off, or the temperature is set too low or loses power.



If there are vents that are blocked or shut off, open them to allow the heat to disperse and warm the room or area where the fire sprinkler system is located. Areas that pose the greatest risk for freezing are attics, stairwells, skylights, entryways, and under floors. If you can't control the temperatures in these areas or seal off the cold air leaks, you should insulate the pipes.

While the fire sprinkler professional should inspect every part of the fire sprinkler system for potential exposure to freezing temperatures and address those issues, it's still a good idea to regularly inspect the areas where the system is installed for cold temperatures. Broken windows, loose siding, damaged roofs, and other changes in a building's exterior can quickly result in a big drop in temperature around the pipes of a fire sprinkler system.



## Get Your Fire Sprinklers Inspected Today

If you haven't had your fire sprinkler system serviced and inspected within the past year, you should call a reputable fire sprinkler company to ensure your sprinkler system is working properly and is not at risk of freezing. Regular inspections and maintenance are always the cheapest and easiest way to avoid damage from the winter cold. Contact a reputable fire sprinkler company today to schedule an inspection of your fire protection system.

# Sprinkler System Freeze-Up Prevention Program Example

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## Before Cold Weather Hits

- A. Designate a “weather watcher” to monitor conditions, implement procedures, and organize a well-trained Emergency Response Team (ERT).
- B. Train the ERT to properly protect vulnerable areas where pipes may freeze, by opening vents and making sure adequate heat reaches the area.
- C. Locate thermometers in hard-to-heat areas that house vulnerable piping and monitor regularly.
- D. If you must leave facilities unattended, provide a supervised alarm system to monitor power supply, building temperature, low-water fuel trips on boilers, water temperature on exposed water-storage tanks, and process controls.

## Prevention of Pipe Freeze-Ups

- A. Ensure the building envelope/exterior is in good condition and close unnecessary openings, especially doors and windows.
- B. Replace insulation where needed after making repairs.
- C. Program building and equipment heating and insulation systems to maintain a minimum temperature of 60°F (16°C).
- D. Check heating equipment to ensure it will maintain the building temperature above 60°F (16°C) and a minimum of 50°F at the coldest points in the building (e.g., corners at the windward end of the building, at the eaves, and in spaces with no direct heat).
- E. Provide adequate and safe additional emergency heating equipment in areas prone to freezing, and set it to activate automatically when the temperature falls below 60°F (16°C).
- F. Identify any concealed space, such as the space above a suspended ceiling or a crawl space below the floor, that may contain vulnerable piping. Consider providing temporary interior openings to allow heat to reach those areas.
- G. **Boilers:** Have your Boiler Maintenance Service Company Double-Check your system and make sure:
  - 1. Drain idle equipment completely.
  - 2. Elevate low points or provide drain valves on condensate return lines.
  - 3. Remove low points and dead ends, where possible.
  - 4. Provide steam traps on piping or equip it with drain valves.
  - 5. Install low-water fuel cutoff devices with a minimum of exposed piping.
  - 6. Consider heat-tracing lines for piping that carries water to the water glass, low-water fuel cutoff column and feedwater regulator.
  - 7. Provide alarms for important piping systems.
- H. Make sure fuel supplies will be adequate, particularly if supplied on an “interruptible” contract. If the back-up fuel is oil, verify the tank is full and the delivery system to the heating unit is fully operational.
- I. Check pressure-vessel vents, relief valves and safety valves to ensure moving parts are protected from water accumulation or vapor freezing.
- J. Build and install windbreaks to protect outdoor equipment, piping and instruments.
- K. Check dryers on instrument air systems for proper operation.
- L. Fire protection equipment
  - 1. Place thermometers inside buildings at strategic locations near sprinkler systems, for example – to monitor building temperature.



2. Know the location of underground water mains. Ensure adequate depth of cover is maintained, especially where construction, excavation or erosion has occurred.

#### **For Dry-Pipe Systems:**

- A. Maintain dry-pipe valve room temperature above 50°F (10°C) by insulating the enclosure and installing a safe space heater.
- B. Check piping pitch for drainage of condensate to low-point drains and install more drains, if necessary.
- C. Drain low points frequently and install more drains, if necessary.
- D. Make sure the system is thoroughly drained after annual trip test.
- E. Take the air supply for the compressor from within the space protected by the sprinkler system; if moisture build-up is a problem, provide an air dryer, or use compressed nitrogen.
- F. Repair air leaks in the piping system to keep the dry valve from tripping if compressor power is lost.

#### **For Fire Pumps:**

- A. Maintain pump room temperature above 50°F (10°C).
- B. For diesel-engine drives, maintain a room temperature of at least 70°F (21°C).
- C. If pump suction is from an open reservoir, make sure the intake and pipe are below the frost level underground and deep enough in water to prevent ice obstructions.
- D. For gravity and suction tanks:
  1. Flush circulating heaters and piping.
  2. Make sure heaters' circulation pumps are operating.
  3. Overhaul any steam traps and strainers.
- E. Check hydrants for tightness and repair any leaks. Also check buried valves and repair any leakage.

#### **During Freezing Temperatures**

- A. The "weather watcher" should check the weather daily (using National Weather Service or equivalent) and keep the ERT informed of cold weather conditions.
- B. Monitor and record the temperature in hard-to-heat areas that contain vulnerable equipment; repeat every few hours during particularly cold weather.
- C. Check temperature in critical areas at night and on weekends, as well as during the day. Use an alarm connected to a security service or a continuously touring/monitoring watch service.
- D. Take special care when thawing frozen piping and equipment; avoid open flames.

#### **Fire Protection Equipment**

- A. Check both wet- and dry-pipe sprinkler systems regularly to ensure they are ice-free. Make sure systems are checked by professional sprinkler maintenance personnel before winter.
- B. Keep all fire protection-related equipment (e.g., hydrants, hose houses, pumper connections, and sprinkler control valves) free of snow and ice for easy access.
- C. Maintain a minimum temperature of 50°F (10°C) in rooms with dry-pipe sprinkler system valves and fire pumps, and a minimum temperature of 70°F (21°C) in rooms with diesel engine-driven fire pumps.

# The Lowest One Day Mean Temperature by Geographic Area in North America.

