

# Risk Control Bulletin

## Water Damage Prevention – A Property Protection Imperative

RISK CONTROL

Water is one of the most destructive agents when released into a building. Water erodes surfaces; causes rot and deterioration to building materials; creates an environment for mold growth; contributes to indoor air quality issues and damages building finishes.

Most of the root causes of water damage are preventable. They can be managed and addressed with low to no cost strategies that any building owner can implement. Implementing a program to prevent water damage can pay additional benefits in improving occupant comfort, reducing air quality problems and safeguards your staff and visitors from injuries related to water damage.

CNA knows that water damage is a leading cause of property related claims. Water damage issues occur more frequently than fires, thefts or vandalism. The cost of water damage claims continues to escalate as the cost of restoring finishes and replacing damaged building materials escalate. Often this cost is passed onto the policyholder in the form of deductibles for the smaller events. Simple steps to reduce the impact of water damage can pay dividends in the long run.

### Sources of Water Damage

This guide will address three major areas of water damage exposure that every building faces. These three exposures are water use and transport systems, the building envelope and water from outside sources.

- We will examine the building systems that transport or use water as part of their normal function. Developing plans to address these systems and their water damage potential can improve your building system reliability and efficiency as well as protect your facility from a damaging water release.
- The building envelope, (walls, floors and ceiling and roof) are all designed to prevent water intrusion. Simple maintenance and inspection programs can help prevent water damage and damage to the building from water intrusion. The suggestions for protecting your building envelope will pay dividends in reduced damage, extended life of surfaces, possible warranty recoveries, and improved energy efficiencies.
- Water can come from outside sources or an unintended inside source. How you manage and respond to surface water, back up of sewers and drains and other flood hazards is a key risk control element for a property owner. CNA can suggest preventive and response plans that will help address this significant cause of damage.

CNA has a team of risk control professionals who are available to help you with this or other risk control and risk management programs. You can also access risk control information, programs and services via our web site [CNA Commercial Property and Casualty Insurance Provider Carrier Home](#)

### Building Systems

#### Freeze Protection

All of your building systems that use water are subject to freeze damage. Additional guides presented at the conclusion of this bulletin can help you identify freeze exposures and take the necessary steps to prevent damage:

- Winter Freeze Precautions
- Preventing Sprinkler System Freeze-Ups
- Dry-Pipe Sprinkler Valve Heated Enclosure

#### Leak Detection and Reporting

Where there is a leak, there is a flood. You may have heard this phrase. It is very true. Small leaks that are not reported, investigated and repaired can lead to significant damage to your property.

Does your property management program assign a high priority to investigating and correcting every leak reported? Do your tenants know that you will immediately respond to a leak to correct the problem?

You should create awareness that you take water damage prevention seriously. Publicize your reporting process and make sure that leaks get immediate attention. Unreported leaks are leaks that can persist, create hidden damage, promote mold growth and cause unneeded damage to your property.

#### Action Item:

A low cost risk control procedure is to promptly investigate and correct any reported leak. This simple process can prevent significant damage to your property. It is not a costly program, but is one that will recover its costs very quickly. A very simple log, such as the one shown below, can be used to track reports, assignments and results. A review of this log should be part of the quarterly review.

Leak Reported Date	Assigned to	Findings

## Leak Response

When you have a serious leak from piping, equipment, a roof or other building element, you don't have time to put together the tools and plan for a response.

Most businesses have response plans for fires, medical emergencies and other critical events. You should treat water leaks and releases as a critical event for your property. Have a plan, have the equipment and know who to call for immediate assistance.

### Action Item:

Do you have a valve list and shut off valves for your water system identified? Do you exercise these valves to be sure they can be used? Does your staff know the locations of the valves?

Not being able to find a valve can lead to the water running for hours while you wait for someone to find the right valve. A simple program to identify, label and exercise valves can be a critical risk control effort and is a low cost, high return on investment.

### Valve Identification Plan: Your Key to Water Damage Control!



The simple valve tag shown above can be the key to controlling water damage in your facility. Having an effective valve identification program is a low cost water damage prevention and reduction program. This program consists of four simple steps.

1. Identify the valve that controls water supply to specific equipment.
2. Apply a standard highly visible valve identification tag.
3. Exercise the valve to assure proper operation.
4. Advise your employees of the program, identification method, and how to operate the various types of valves.

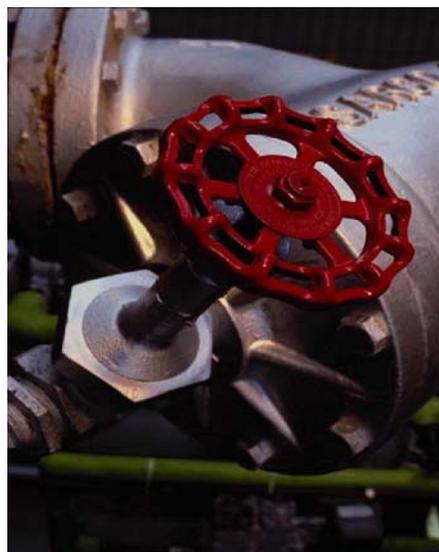
This very simple, low cost action will limit the release of water from damaged plumbing system. This step alone can limit the extent of damage and reduce the loss you experience.

Valve identification tags and labels are widely available. A very flexible system uses a high visibility, write-on tag that allows you to label the valve. The highly visible color you select will easily identify the valve for your staff.

A sample Valve Identification Sheet is shown on the following page. You can identify, locate and document the key valves and their location using this type of sheet.

### Valve Identification Sheet

#### Image of Valve



#### Description and Location

Main incoming water valve is located in the mechanical room in the northwest corner of the building, red handle on far wall.

#### Action Item:

Do you have a leak response kit available? Mops, absorbent pads, wet dry vacuums, squeegees and wet floor warning signs should be immediately available.

#### Action Item:

Do you have an agreement with a water damage restoration firm? Have you authorized your staff to notify the outside resource when needed? Waiting until the next business day to start a clean-up can allow damage to spread and create a greater loss.

Having the proper resources and a plan to respond can be another low cost water damage prevention program.

### Sump Pumps

Your sump pump is a critical piece of equipment. It may be all that stands between you and a flood. Do you pay attention to this critical item? Sump pumps are often taken for granted until they fail to operate. The consequences can be costly. Prevention is a function of preventive maintenance, planning for emergencies and having a reporting system to detect a failure before the flood occurs.

#### Action Item

Is your sump pump on a preventive maintenance program? Check the float switch, discharge the check valves and check the motor for proper operation in accordance with the manufacturer's recommended schedule and procedures.

#### Action Item

Do you need a back up power source? Adding a second pump with a battery back up or connecting your existing pump to emergency power is a low cost, high return undertaking. Many heavy storms can cause power interruptions. You may need your sump pump during the peaks of a heavy storm. Back up power is a prudent risk control action.

#### Action Item

How do you know the pump is not working? Having a high level water detector placed above the float level on the sump pump well will report a pump failure or a water flow that exceeds your pump capacity. Getting this alarm early will allow your water damage response plan to address and control the situation. Depending on the staffing at your facility this alarm can be a local signal or tied into an off premises monitored alarm system.

### Water Heaters

Tank type water heaters create a significant water damage problem if they fail and release their contents into your building. With no excess flow control the damaged water heater will continue to leak until it is discovered and the water supply turned off. Many of these tanks fail due to age. The Building Owners and Managers Association (BOMA) estimates the life span of a tank type water heater at 15 years. You should consider planned replacements of this equipment if it is located in areas that would cause damage if they leak.

#### Action Item

When installing new equipment add a safety pan to catch leaks and pipe the pan to a drain. Water leak detection can be used to close the supply valve and limit the water leak size.

Water heaters are an often forgotten plumbing fixture having a large role in many water damage events.

### HVAC Systems

Your HVAC system is a key system to maintain a comfortable building. If not properly maintained this system can create significant water damage exposures. You should include the HVAC system as part of your water damage prevention efforts. Most HVAC systems create some discharge of condensate. This may be into a pan with a drain or may be piped to a small pump that sends the accumulated water to a drain. Identifying and maintaining these condensate pans and drains is an important control. Water accumulating in these pans can cause corrosion, leakage, and create odor problems. Roof mounted equipment should ideally have the condensate drain piped to a gutter or roof drain too.

Maintaining your HVAC system can control humidity levels in your building. This can control the development of mold, odors and indoor air quality issues. Maintaining these systems pays benefits beyond water damage prevention.

#### Action Item

Identify all condensate drains and place on a preventive maintenance program to keep the drains clear, or maintain the small condensate pumps used to pump water to a drain.

### Water Reuse and Collection Systems

An emerging water damage exposure for building owners is the use of gray water or rain water collection and reuse systems to reduce water consumption for irrigation purposes. This introduces new collection tanks and distribution piping to the plumbing system. As these systems collect water from unregulated sources, they are subject to overflow.

#### Action Item

Be sure your system has automatic diversion to drain excess water and level monitoring in case the diversion becomes clogged. This level control should be part of your inspection and testing program to assure they operate properly. The valves for this system should be part of your valve identification and location program.

### Automatic Shut Off Valves

Your plumber can help you with a number of appliance-specific automatic shut off valves. These systems function on the basis of water detection and electronically controlled valves. These valves can help limit the spread of water from a damaged plumbing fixture. Valves are available that can be attached to the supply for specific appliance or devices or an entire building or section of a building. Consult with your plumbing contractor to select a valve and control system that suits your specific needs.

**Action Item**

Evaluate and install automatic shut off valves where appropriate.

You should incorporate water damage prevention into your facility inspection program. Adding water damage prevention to your other safety inspections such as fire extinguishers, emergency lights, etc., can reinforce the importance of this property risk control effort. It will also keep your staff aware of the items that are needed for a prompt response and recovery effort.

### Valve Inspection Checklist

Inspection Item	Frequency	Findings
Indicate any signs of water leaks at this location. Review of leak reporting log.	Quarterly	
Identify all shut off valves. Is water shut off valve list current?	Quarterly	
Valve locations are labeled and accessible?	Quarterly	
Valves have been exercised?	Annually	
All staff/residents have been trained/informed on valve location and operation?	Quarterly	
Water damage response kit is stocked and available?	Quarterly	
Contact information for water damage restoration form is available?	Semi Annually	
Sump pump maintenance current?	Semi Annually	
Alternate power for sump pump?	Annually	
HVAC condensate pans and drains clean and maintained?	Quarterly	
HVAC system operating to control humidity?	Quarterly	
Have freeze precautions been taken?	Fall and Winter	
Any cold weather valves to be closed?	Fall and Winter	
Low temperature alarms tested?	Fall and Winter	
Are water heaters more than 15 years old?	Annually	
Are water heaters provided with a safety pan piped to a drain?	Annually	
Are there periodic inspections of water heaters, toilets, sinks, and appliance water hoses?	Quarterly	
Are sewer lines periodically inspected and cleaned?	Annually	
Are water reuse and collection systems provided with a safe overflow point?	Annually	
Is the automatic level control on water collection and reuse tanks tested regularly?	Quarterly	
Automatic shut off valve installed where appropriate?	Semi Annually	

## Building Envelope

The first line of defense against water intrusion is the building envelope. This is a complex system of materials. Your building envelope has connections and joints that must work together to expand, contract and retain a watertight envelope. This system needs maintenance and inspections to be reliable. In most cases routine maintenance and inspection is a low to no-cost program that can extend the life of your building envelope and protect you from water leak damage.

### Roofing systems

The roof on your building is a complex system of roof covering, flashing, metal work and sealants that together keep water out. Leaks in this system can deteriorate the insulation under the roof cover, cause rot and structural damage, create mold growth and damage surfaces inside the building. Severe problems with your roof can cause ponding and water retention that can lead to collapse. Snow loads that are not managed can also cause collapse.

#### Action Item

Identify areas of your building roof that are subject to unusual snow loads and plan for removal of the snow.

Roof inspections are the key control to prevent water damage from roof leaks. Visual inspection, verifying roof drains are clear and looking for damage to flashing and edge details, is a no-cost program.

You can supplement this program with regular inspections by a roofing maintenance provider. These firms can correct small deficiencies before they create bigger problems. These inspections may be required to support the warranty on your roof, so review any warranty documents for required inspection frequency and documentation.

Another roof inspection service is aerial infrared which is a simple non-destructive inspection designed to find where moisture is penetrating your roof. It can pinpoint problem areas with exceptional accuracy to eliminate "blind" core testing and unnecessary roof replacements. This proven approach is highly accurate in detecting moisture at its earliest stages so issues can be addressed before there are visible signs, structural damage or business interruptions. By using this proactive predictive tool, a building owner or property manager can significantly extend the life of their roof while reducing overall maintenance expenditures.

#### Action Item

A Risk Assessment Roof Inspection Form can be found at the conclusion of this tool.

### Windows

Windows require routine maintenance to keep them water tight. The most important item to inspect and maintain is the bead of caulk between the window and the structure. Failure of this simple bead of caulk can create water damage, potential for rot and mold development.

#### Action Item

Add window seals and caulk to your annual inspection and maintenance program.

Windows can be damaged in storms and allow water entry. Modern building codes may require windows in coastal areas to have wind speed ratings and impact resistance. When replacing or updating window, consult the local building official to be sure you are providing your building with the most current level of protection.

### Utility and Mechanical Penetrations

The building envelope has numerous points where vents, wires, pipes, and other mechanical and utility rated components penetrate the building envelope. These areas should be initially waterproofed, sealed and arranged to shed and repel water. They should also be part of your inspection and maintenance program to maintain the integrity of these penetrations. Every one of these openings is a potential leak and should be inspected and maintained to prevent that leak from occurring.

#### Action Item

Evaluate utility penetrations for water tight seals.

### Walls

Exterior walls are designed to shed water. They are not designed to hold back standing water. A major source of water intrusion and damage can occur when landscaping, or grading of the exterior soils allow water to drain towards or stand against exterior walls. A routine visual inspection after a rain can easily detect areas where water is accumulating against your building walls. Changing the grade or adding a drain tile network to safely convey this water away is a low cost solution.

**Action Item**

Look at exterior grade for water that runs toward your building. Change the grade or provide a safe drainage path. Look at the use of irrigation systems as well. Continued application of water against your exterior walls can lead to damage and water intrusion. If your irrigation system is wetting the building, you are wasting water and potentially damaging your building. The irrigation system should be adjusted to avoid this damage causing condition.

**Action Item**

Adjust irrigation system to prevent water from wetting the building.

**Building Envelope Self-Inspection**

Inspection Item	Frequency	Findings
Have you completed a quarterly roof inspection?	Quarterly	
Are caulking and seals around windows in good condition?	Semi Annually	
Any evidence of leaks around windows?	Quarterly	
Have all building penetrations been inspected and sealed as appropriate?	Semi Annually	
Exterior walls showing evidence of water damage or accumulation?	Semi Annually	
Does the irrigation system wet the building?	Spring / Startup	

**Outside Sources of Water**

**Back up of Sewers and Drains**

Sewer back up can be addressed by inspection and maintenance to maintain existing systems. Clogged drains should be immediately identified and repaired or cleared. Inspection processes can include video inspection of lines and verifying their condition.

**Action Item**

If you have an identified exposure to sewer back up, the addition of a check valve in the affected line is also a consideration to prevent this type of exposure.

**Surface Water**

Surface water can be managed by proper grading and use of drain tile systems to divert water to a safe area. Changes in adjacent properties can impact your property by diverting water towards your property. Noting any changes in the amount or direction that water is taking on your site can help you identify surface water exposures.

**Action Item**

Proper maintenance of exterior drains in areas such as loading docks, outside stairwells and other areas should be included on a self inspection checklist. A clogged drain in these areas can create an immediate loss exposure for you.

**Flood Hazards**

If you are exposed to flooding from rivers, streams or other bodies of water, you can identify these hazards from flood hazard maps. Flood proofing strategies are available from FEMA to address these exposures. If you have this exposure, then working with an engineering / architectural firm to design a permanent flood proofing solution would be the best solution to this exposure.

People are stunned to learn the extraordinary cost to repair damage arising from flood waters. The National Flood Insurance Program (NFIP) reports that one foot of water in a 1-story building causes content damage averaging 27 percent of the cost to replace. At 2 feet, the average cost is 52 percent. When flood waters are 8 or 12 feet deep, the average repair bill is 66 and 68 percent, respectively.

Structural damage is also much greater than many people contemplate. A one foot flood can cause damage equivalent to 16 percent of the single story structure value. When the depth of flooding increases to 2 feet the damage is estimated at 29 percent of the structure value. When depths are 8 and 12 feet the percentages rise to 44 and 56 percent of the values (US Army Corps of Engineers Study).

Flood hazards must be recognized, planned for and responded to in a prompt and efficient manner. You must have a plan to reduce the exposure and to safeguard your property from the rising waters. The FEMA web site provides advice in regard to flood preparation and mitigation. Go to [www.ready.gov/floods](http://www.ready.gov/floods)

**Action Item**

CNA has a flood preparation checklist to help prepare your facility for a flood. This checklist can be used as the basis for preparing to reduce your loss exposure from a flood.

Recovering from a flood is not an easy process. Having a plan to evaluate, clean and dry mechanical equipment can help reduce the losses you incur.

#### Action Item

Use the guidance in the CNA publication, *Before and After the Flood*, to guide your recovery effort.

#### Outside Sources of Water Inspection

Inspection Item	Frequency	Findings
Are materials stored at least 4" off the floor in areas subject to back-up of sewers and drains?	Quarterly	
Have drains been cleaned or have video inspection to identify potential clogs or obstructions?	Annually	
Any history of surface water intrusion? If so have exterior drains been provided or changes in slope provided to redirect water?	Semi Annually	
Have you identified the FEMA flood zone for your property?	Annually	
If in a flood hazard area, do you have a flood response plan?	Annually	
Have you undertaken flood proofing of the building?	Annually	

#### Builders Risk Projects

A building under construction has unique exposures to water damage. The building is vulnerable as it is being enclosed and the process to install the water using appliances, fixtures and systems create exposures to leaks and unintended releases.

The key to managing this exposure is having a water damage prevention plan for the job site. This plan should detail the proper reporting, response and mitigation steps to be taken in the event of a water damage event during construction or renovation work. Elements of your water damage prevention plan should include:

- Site development should include provisions to grade water away from the project. Accelerate permanent connections to storm water systems and retention areas to protect the job site from water accumulation.
- Initial foundation and footer work should include a documented inspection for water intrusion and immediate action to correct deficiencies. It is at this stage of the project that damaged or missing waterproofing will create an ongoing issue if not corrected. Use a third party inspector to verify that waterproofing systems installed in foundation and footers are properly applied and installed.
- As the building envelope is completed attention should be given to any leaks or water infiltration at windows, roofs or penetrations of the building envelope. These defects are often times easy to repair when they are exposed. The emergence of this issue after finishes are in place magnifies the repair cost and difficulty.
- As mechanical systems are installed consider a policy to shut off water at the end of every work day. This would limit the amount of water that could leak during unattended periods.
- Coordinate testing of plumbing and sprinkler systems with a low pressure air test to verify piping integrity. This simple step can identify potential problems before you apply high pressure water to test the systems.
- Develop a daily closing inspection for the project that includes water damage prevention and leak detection. If security officers are present, train them on water valve locations and operations. They can promptly detect and respond to a leak and prevent significant damage.
- Consider the use of water detection alarms for critical areas of the project - computer rooms, telephone exchanges, electrical vaults. These alarms are low cost and can be moved from job to job.
- Keep a water spill kit with absorbent socks or pigs available to contain and control a spill. Keeping the water on one level of the building will dramatically reduce your loss potential.
- Make water damage prevention a tool box topic for your site staff and subcontractors.

# Risk Control Bulletin

## Winter Freeze-Up Precautions

Too many businesses find themselves unprepared when normal winter weather suddenly turns extreme. During a severe cold spell, sprinkler or water pipes can freeze, burst, and produce devastating losses. Water damage from this type of incident, known as a freeze-up, can affect products in storage, paperwork, records, furniture, machinery, computers, and all types of electronic equipment. If the water leakage goes undetected for an extended period (over a weekend, for example), extensive flooding can result. Total costs often reach hundreds of thousands of dollars.

In "deep-freeze" conditions, a broken window or an open door in an un-insulated or unheated area can let in enough cold to freeze nearby piping and start a catastrophic chain of events. Any equipment that contains or uses water, produces condensate, or depends on pneumatic controls is vulnerable to freezing. Other conditions that make your business susceptible to freeze-ups are heating systems that lack reserve capacity beyond their normal heating load, poor building insulation, and piping run out of doors.

The following guidelines will help you plan for and implement preventive measures to better protect your business from the threat of freeze-ups.

### Before the Cold Sets In

If at all possible, implement these measures in the fall, before the onset of cold weather.

1. Update your Emergency Response Program for winter emergencies to include appropriate response procedures for deep-freeze conditions.
  - Appoint one or more members of the Emergency Response Team to monitor weather forecasts and initiate winter emergency procedures when appropriate.
  - Develop procedures and priorities to be implemented when you lose heat and/or electricity.
2. Determine which processes are dependent upon continued building heat or electricity for safety (i.e., processes that are subject to solidification or runaway reactions) and need prompt attention.
3. Identify equipment, processes, and piping that contains or uses water or other liquid subject to freezing; they will need to be promptly and thoroughly drained if heat or electricity is lost.
4. Identify building areas that are unusually difficult to heat or that lose heat rapidly. Install ordinary thermometers to allow temperature monitoring during cold spells.

5. Identify equipment that is vulnerable to freezing. Prepare the equipment for cold weather by:
  - Draining and securing any idle equipment,
  - Draining condensate frequently,
  - Providing adequate heat or locating the equipment in a heated enclosure, and/or
  - Protecting it with suitable anti-freeze.
6. Service the heating system before the heating season begins. Make sure adequate supplies of alternate fuels are on hand if the system is capable of dual firing.
7. Inspect and maintain the building shell to minimize unnecessary openings. Fix windows and doors so they close tightly. Caulk, insulate, and weather-strip as needed. Close and seal unneeded dampers, louvers, and vents.
8. Drain condensate from dry-pipe sprinkler system piping by opening the priming water level drain valve until the water in the riser has been expelled, and by using the auxiliary drains installed at system low points. If there are any trapped sections of branch line piping, it may be necessary to remove sprinklers and drain the water into a bucket.
9. Open any on-site fire hydrants and allow water to flow until it is flowing clear. This measure flushes any debris from the underground main and exercises the hydrant valve. Then slowly close the hydrant, making sure that it drains. Water can often be heard draining from the hydrant, and you will notice suction if you place a hand over the hydrant hose connection as the drainage occurs.

### During Cold Spells

- Monitor temperatures every few hours in vulnerable areas.
- Provide safe, portable heaters for vulnerable areas that might fall below 40 degrees.
- Provide heat or steam tracing for exterior piping that either contains liquids or needs to maintain constant temperatures.
- Use tarps to erect temporary windbreaks. For a permanent windbreak, consider planting evergreen trees and hedges upwind (prevailing winter wind direction) of vulnerable buildings and equipment.

# Risk Control Bulletin

## Preventing Sprinkler System Freeze-Ups

RISK CONTROL

### Introduction

Cold weather brings the danger of impaired fire protection because of water freezing in sprinkler piping, underground mains, gravity suction tanks or fire pumps. Such freezing not only leaves a risk vulnerable to fire and damage to the building contents, but may also necessitate expensive repairs to the system.

Frequent freezing of automatic sprinkler systems occurs in climates not normally associated with cold weather. It is important that property owners be alert to unusual climatic changes that may cause freezing. They should be prepared to take preventive measures as if in a cold climate.

The following preventive measures should be considered, prior to the cold season.

### Wet Pipe Sprinkler Systems

Freeze-ups in wet sprinkler systems occur most frequently in exposed and out-of-the way places and during weekends or other shut down periods when a sudden cold snap catches a plant unprepared. Most freeze-ups result from failure to provide adequate heat. Others are caused by doors, windows, cracks, loose siding, or similar defects in building maintenance.

- During severe weather conditions, if an interruption of heating service extends more than a few hours, and the temperature in the building drops close to 40 degrees, you may need to drain the water from wet pipe sprinkler piping. If this is not done, ice plugs can obstruct the piping or possibly damage fittings and sprinklers. It would be advisable to become familiar with the operation of your system and drain procedures, prior to the onset of cold weather. It is likely that a contractor may not be able to respond quickly in an emergency. Should you need to do this, remember the protection afforded by the sprinkler system is no longer in effect. Any and all hazardous operations should be curtailed during this period. A continuous fire watch should be posted and provided with first aid fire fighting equipment and the means to summon assistance.
- Provide adequate heating capacity to prevent freezing during the severest protracted cold that might reasonably be expected.
- Pay particular attention to attics, under floor spaces, entries, stair towers, shipping rooms, and penthouses to ensure there are adequate heating ducts and airflow in these areas.

- Where false ceilings are installed under sprinklers or under piping with pendent heads, be sure the concealed space receives sufficient heat.
- Search for isolated drafts or cold air leaks into little frequented areas or spaces where there are sprinkler pipes. Keep in mind the possibility of high winds during periods of low temperatures.
- Repair windows and doors when necessary, and instruct watchmen to keep them tightly closed.
- Enclose pipes exposed outdoors in heated weather-tight boxing.
- Maintain extra heat during periods of extreme cold to keep the sprinkler piping from freezing.
- Check the heating system to make sure it is delivering heat to all areas of the facility.
- Maintain a tight building envelope. Look particularly for places where cold winds can blow in, closing up even small openings and keeping all doors, especially large shipping doors, tightly closed at all times except when they must be opened.
- Check room temperatures frequently, especially if they get near 40 degrees.
- After a prolonged period of abnormally cold weather, make drain tests of sprinkler risers, wherever practicable, to determine if underground mains are frozen. Open the drain wide, let it run 1/2 minute or more, and then shut it off. If the pressure fails to return to normal, clear the mains of ice as soon as possible.
- *DO NOT* use open flames or torches for thawing frozen water pipes near combustible materials or combustible building components.

### Dry Pipe Systems

Dry pipe systems are generally installed in structures where temperatures are expected to drop below 40°F. They are designed for use inside buildings that are unheated, inadequately heated, or that must be open to outside cold temperature for appreciable time periods. Dry pipe systems generally freeze due to water collecting in improperly pitched pipes, failure to remove accumulated water from low point drains, or failure to drain the system properly after the valve has tripped.

- Air is usually supplied to a dry pipe system by a compressor. The air intakes into the compressor should be located in a cold, dry atmosphere. Avoid warm, damp areas, since moisture introduced with the air condenses in the piping and collects at low points where it may freeze. Air driers should be installed on the air intake. An alternative is to use dry nitrogen gas in lieu of air.
- Valve drains should be installed at all low points that cannot be eliminated. These low point drain valves should be periodically opened (at least once a month) to see that the pipes are entirely free of water. Pay particular attention to low points under stairs or platforms.
- Repair, replace or refasten broken, missing or loose sprinkler pipe hangers to ensure proper pitch of sprinkler piping and to provide good drainage.
- Repair all air leaks in the system to prevent the valve from tripping should the compressor lose power.
- It is mandatory that water always be present in supply piping up to the clapper of the dry pipe valve. Compressed air fills the piping from the clapper on the outermost sprinkler head.

Therefore, arrangements must be made to prevent the water in the supply piping to the dry pipe valve from freezing. The best arrangement is to provide a dry pipe valve enclosure, suitably heated to at least 40°F at all times.

- The water supply pipe should come up through the floor in the center of the enclosure if possible. If the floor is concrete laid directly on earth, without air space, the supply pipe will be adequately protected by ground cover until it emerges in the valve enclosure. But if the floor of the enclosure is wood or any other material having appreciable air space beneath it, then the supply pipe beneath the floor must be enclosed and protected with insulation, sand or earth over its entire exposed portion until it enters the valve enclosure.
- The valve enclosure can be heated electrically from permanently mounted heaters under thermostatic control, so that 40°F or higher is always maintained. Steam or hot water heating systems from boilers supplied on 24-hour basis can also be used. A thermometer should be placed in the enclosure and checked at least once a day. *The use of heat tape is prohibited.*
- A temperature signaling device can be installed in the valve room or enclosure monitored by a central station alarm service.

### Antifreeze Systems

These types of systems are generally used in small unheated areas of buildings, such as docks. The system uses an antifreeze solution generally consisting of water and water-soluble liquid, such as a glycerin or certain glycols.

- Antifreeze solutions are recommended only for systems not exceeding 40 gallons.
- The antifreeze solution should be tested annually by a qualified contractor to assure proper solution-to-water mixture.
- Listed plastic CPVC sprinkler pipe and fittings should be protected from freezing with glycerin only.

### Gravity Tanks

Gravity tanks require adequate heat to be maintained during cold weather to keep them from freezing. The formation of ice in the tank itself and on any part of the tank structure should not be allowed. The formation of heavy icicles through leaking of the tank is dangerous as tank collapse may ensue. People may also be endangered by falling icicles.

- Heating devices should be kept in good working order and the water temperature in the tank should be checked daily during freezing weather to maintain a temperature at or above 42°F.
- Service heating and circulation equipment well before the heating season arrives to permit adequate time for repairs or maintenance.

### Fire Pumps

- Keep pump rooms heated; maintain the room temperature above 40°F. Pay particular attention to detached buildings housing pumps.
- For diesel engine drives, maintain the room temperature at 70°F or above.
- Protect the suction source from freezing. If suction is taken from open water, make sure the pipe and intake are located so they will at all times be completely below frost level, underground and deep enough in the water to prevent their being obstructed by ice.
- Intake screens should be kept clear of obstruction by ice.

Call your local CNA Risk Control representative for assistance in implementing this program.

## Dealing with a Frozen Sprinkler System

Should your best efforts fail and you discover your sprinkler system is frozen what immediate action should you take to limit the potential for further damage or an uncontrolled fire while the sprinkler system is impaired?

### Limiting further damage

First, shut the control valve to the affected sprinkler system. Then open the 2-inch drain on the riser and any low point drains on the system. Use plastic tarps in the area of any actual pipe breakage to limit water damage to stock and supplies.

After water flow has been stopped, follow these steps:

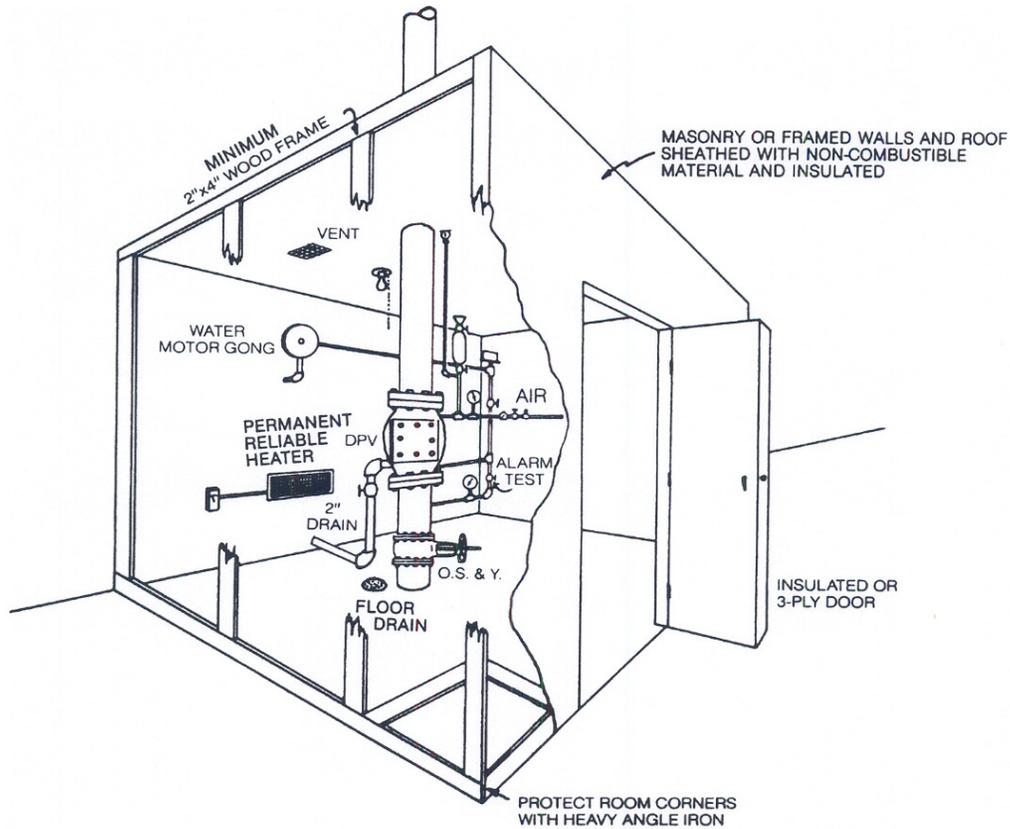
1. Notify the public fire department and CNA's risk control office that your sprinkler system is out of service and requires repairs.
2. Do not attempt to thaw piping in the building by using a torch or open flame device.
3. Cutting and welding or other operations employing an open flame should be prohibited in the area where the sprinkler system is out of service.
4. Hazardous operations such as spray painting, dipping or others using flammable liquids or producing a combustible dust should be suspended while the sprinklers are out of service.
5. A strict "No Smoking" policy should be enforced throughout the affected area.
6. Extra fire extinguishers should be distributed throughout the area.
7. If extensive repairs are required, efforts should be directed toward restoring as much protection as possible by plugging or blocking of the damaged section. **For example, if a single branch line breaks, it is often possible to blank off that one line and return the rest of the system to service until permanent repairs are completed.** Be sure to keep records of all plugs or blind flanges used so you can check they have all been removed when repairs have been completed.
8. Watch service should be provided on a 24-hour basis until repairs are completed and all valves have been reopened. In the event of a fire, the watchman should be instructed to first notify the public fire department and then reopen any closed valves.
9. If temporary heat is necessary, use only portable units listed by Underwriter's Laboratories or approved by Factory Mutual. Additionally these units should have constant supervision.
10. Electrical resistance heating should not be directly attached to overhead piping. If it is used to thaw underground piping, it should only be used by well-trained personnel.
11. Before the sprinkler system is restored to service, examine the system for cracked fittings, split pipes or leaking sprinkler heads.

Finally, open all control valves and notify the local fire department and CNA Risk Control that the system is back in service.

# Risk Control Bulletin

## Dry-Pipe Sprinkler Valve Heated Enclosure

RISK CONTROL



IF CONCEALED OR CRAWL SPACES EXIST BELOW FLOOR LEVEL,  
ADDITIONAL PROVISIONS ARE NEEDED TO PROTECT THESE AREAS  
FROM FREEZING TEMPERATURES

Data Sources: National Fire Protection Association (NFPA)  
Codes and Standards:

NFPA 13 – Installation of Sprinkler Systems  
NFPA 25 – Inspection, Testing and Maintenance of Water-Based Fire Protection Systems

Dry pipe sprinkler systems are designed for use inside buildings that are unheated, inadequately heated, or that must be open to outside cold temperatures for appreciable time periods. Under these conditions, it is clear that wet-pipe systems are likely to freeze up and burst their piping.

It is mandatory that water always be present in supply piping up to the clapper of the dry pipe valve - compressed air then fills the piping from the clapper on to the outermost sprinkler head. Therefore, arrangements must be made to prevent the water in the supply piping to the dry-pipe valve from freezing. The following guidelines should help you design and install a system to accomplish this.

### Enclosure

The best arrangement is a dry-pipe valve enclosure, suitably heated at all times to at least 40°F. Such an enclosure is depicted but its size has been exaggerated for clarity of constructional detail. Actually, the enclosure need merely provide working room on all sides of the dry-pipe valve, such as 30 inches to all walls from the valve. This would provide an enclosure that is 6' x 6' x 6' in size.

The water supply pipe should come up through the floor in the center of the enclosure, if possible. If the floor is concrete laid directly on earth, without air-space, the supply pipe will be adequately protected by ground cover until it emerges in the valve enclosure. But if the floor of the enclosure is wood or any other material having appreciable air space beneath it, then the supply pipe must be enclosed beneath the floor and protected with insulation, sand or earth over its entire exposed portion until it enters the valve enclosure.

Wall studding should be sheathed on both sides with noncombustible material and the space between filled with insulation. The door to the room should be of equivalent construction and fit tightly so as to conserve room heat. Outer corners of the enclosure should be protected with 2" angle iron. Masonry construction of these enclosures makes for better closure and minimal heat loss. A small screened ventilator allows the room to "breathe" and thus minimize condensation.

Automatic sprinkler protection should be provided in the enclosure.

### Drainage

Since water spillage (or occasional leakage) may occur during valve maintenance work, it is desirable to have a small floor drain connected to the sewer. The floor should be sloped toward the drain.

### Heating

Lighting can be ordinary electric. Heating can be electric from strip heater under thermostatic control (so that 40°F is always maintained). If steam is available on 24-hour basis from plant boilers, steam heat can be used. If central station alarm service is used on the property, the temperature within the valve enclosure can be supervised by it.



We can show you more.®

RISK CONTROL

## Roof Inspection

Account Name	Account Number	Prod Branch	Surveyed By
Location Address	Program/Class	Survey Date	
Location Contact Name and Title	Contact Phone	Agency/Producer Name	
Web site and/or Email Address:		Underwriter:	

**GENERAL INFORMATION**  
(All boxes in document will expand as needed)

Age of Roof:      Construction of Roof:      Roof Installer:  
Warranty in force on roof:  
Comments:

<b>SURFACE</b>	<b>YES</b>	<b>NO</b>
Dry or cracked roof surface?	<input type="checkbox"/>	<input type="checkbox"/>
Cracked or loose roof seams?	<input type="checkbox"/>	<input type="checkbox"/>
Blisters or depressions?	<input type="checkbox"/>	<input type="checkbox"/>
Broken/Missing shingles?	<input type="checkbox"/>	<input type="checkbox"/>
Poor drainage or standing water?	<input type="checkbox"/>	<input type="checkbox"/>
Bare spots in gravel covering?	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		

<b>DRAIN</b>	<b>YES</b>	<b>NO</b>
Adequate maintenance of drain? (Is the drain clogged?)	<input type="checkbox"/>	<input type="checkbox"/>
Obstructions present to prevent the flow of water to a drain?	<input type="checkbox"/>	<input type="checkbox"/>
Roof strainers clear and functional?	<input type="checkbox"/>	<input type="checkbox"/>
Gutters and downspouts damaged or clogged?	<input type="checkbox"/>	<input type="checkbox"/>
Is the drain capacity adequate?	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		

<b>FLASHING AND COPING</b>	<b>YES</b>	<b>NO</b>
Loose, separated or missing flashing?	<input type="checkbox"/>	<input type="checkbox"/>
Signs of rust or deterioration of flashing?	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		

<b>INTERIOR</b>	<b>YES</b>	<b>NO</b>
Stained ceiling tiles?	<input type="checkbox"/>	<input type="checkbox"/>
Signs of rust or discoloration on underside of roof deck?	<input type="checkbox"/>	<input type="checkbox"/>
Insulation wet or mildewed?	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		

<b>MOUNTED EQUIPMENT:</b>	<b>YES</b>	<b>NO</b>
Signs or antennas not properly secured?	<input type="checkbox"/>	<input type="checkbox"/>
Vents, chimneys and skylights unstable?	<input type="checkbox"/>	<input type="checkbox"/>
Penthouses, cooling towers, air conditioner or other equipment allowing leaks?	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		