

COUNTY REINSURANCE, LIMITED



Property Risk Control Quarterly Webinars – Preventing Property Freeze

Introduction

The gusting winds, heavy snow, and freezing temperatures associated with winter are normal and often anticipated occurrences throughout most of the world's cold weather climates.

However, not only cold weather locales are vulnerable to extreme winter weather losses. In fact, moderate climate regions not normally associated with harsh winter weather tend to suffer the most costly losses as they are typically unprepared to endure such conditions.

Winter weather events mixed with a lack of preparation can lead to building damage, freeze-up, water damage, and business interruption losses. Advance preparation can help to mitigate winter weather impacts on your operations and business continuity.

The guidance that follows, though not all-inclusive, can be an effective part of your organization's loss control program.

The issues highlighted herein should be addressed by appropriate personnel within your organization so that severe winter weather impacts may be proactively managed and potentially minimized.

Looking at CRL

Freeze claims in 2011, 2015, 2021, 2022 and possible 2023. With a total loss of nearly \$40,000,000.

Snow claims in 2014, 2015, 2017, 2020 and 2022. With a total loss of over \$5,000,000



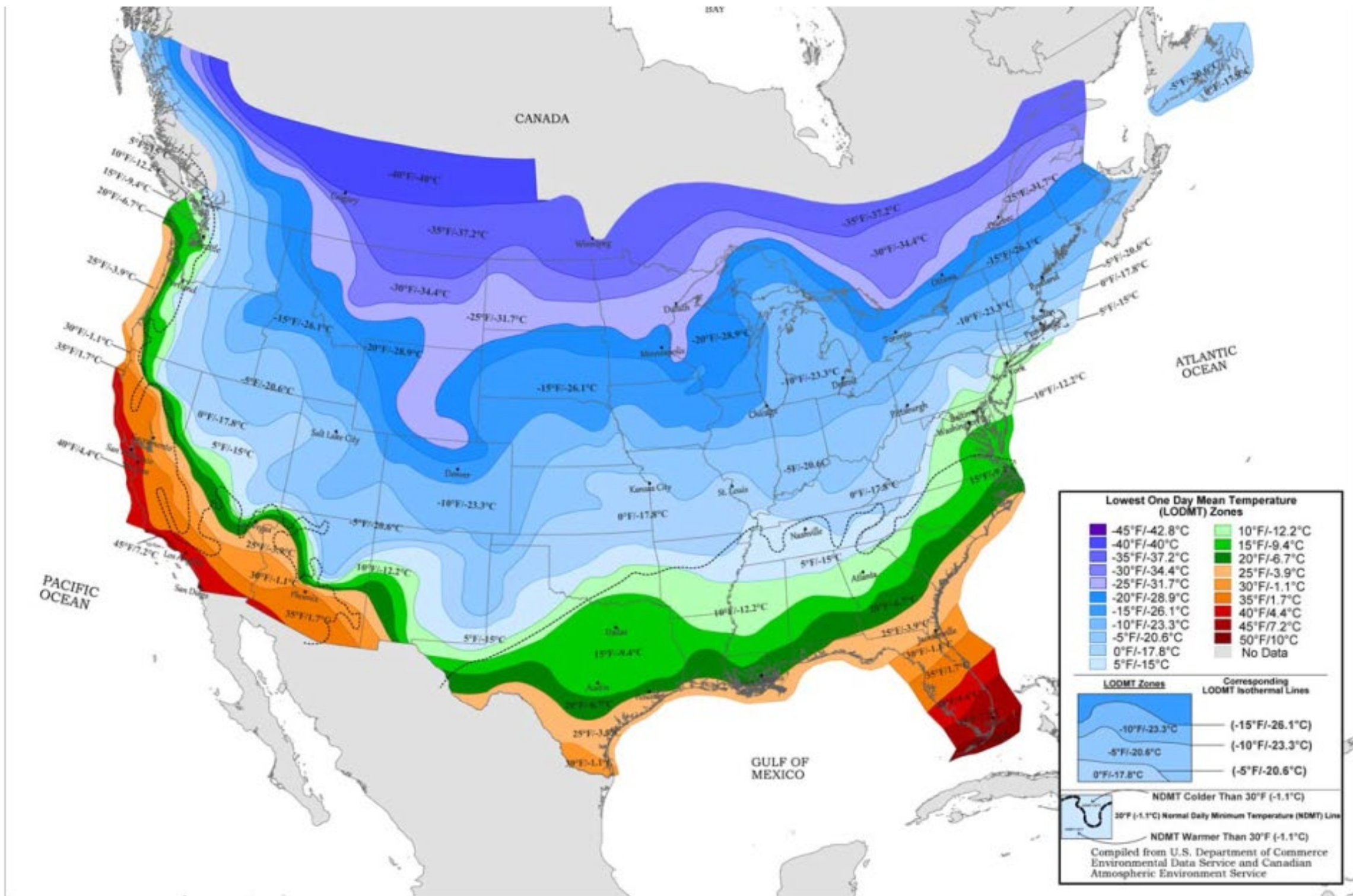


Fig. D-1. Lowest one-day mean temperature for the United States and Canada

LOOKING AT THE RISK

Expanding volume of ice: Force exerted as water, freezing to solid ice, expands by about **9%**.

Freezing force of water: as the water-ice temperature continues to drop to 0°F the forces involved range **between 25,000 psi and can continue to reach 114,000 psi.**

Compare freezing water pressure with burst pressure resistance of copper pipes

Burst resistance of copper water pipes: the working pressure of 1-inch L-copper piping is 420 psi, and the actual burst pressure is around 2650 psi.



MANAGING THE RISK

Pre-Emergency Planning

Advance preparation can help to mitigate winter weather impacts on your operations and business continuity

Emergency plans should address the impact of severe winter weather, abnormal snowfall, or extended periods of subfreezing temperatures on your operations.

Pre-plans should include steps for early building closures during severe weather, notification of all employees during such events, and managing operations if temperatures inside your facility drop towards freezing.



GENERAL PRECAUTIONS

- ☐ Update pre-emergency plans to reflect changes in operations, physical plant, or personnel.
- ☐ Review (at least annually) the emergency plan with management, maintenance, key employees, emergency response teams, and public emergency services (fire, police, and emergency medical services).
- ☐ Ensure backup communications are in place in the event of a loss to normal communications systems.
- ☐ Ensure emergency power supply is readily available and in service.
- ☐ Maintain adequate fuel supplies for building heat and emergency generators.
- ☐ Establish a weather watch with procedures to monitor conditions and alert management and maintenance personnel.
- ☐ Keep battery-operated and weather-alert radios in constantly attended locations for monitoring weather reports.
- ☐ Keep a list of emergency phone numbers specified within the emergency plan, and post the list at all telephones and/ or meeting rooms. Ensure that all employees have these emergency phone numbers at home or somewhere off-site.
- ☐ Provide adequate emergency and first-aid supplies.
- ☐ Ensure space heaters have appropriate safety interlocks, are fueled, functional, and properly vented.
- ☐ Contract for snow removal or have a snow removal contractor on call to assist your staff if they cannot handle snow removal.
- ☐ Designate snow deposit areas. These areas should not obstruct access to fire hydrants, post-indicator valves, emergency exit doors, or fire-pump house doors.
- ☐ Create a plan that allows your staff or contractor to safely remove snow, ice, and/or water accumulation from rooftops.
- ☐ Identify snowplow obstructions and emergency equipment so they are visible under heavy snow. Obstructions include fire hydrants, post indicator valves, and speed bumps.
- ☐ Maintain adequate supplies of sand and snow-melting chemicals on-site.
- ☐ Ensure that fire protection equipment access roads are included in snow removal plans.

BUILDINGS AND STRUCTURES

Building maintenance is critical when preparing for winter. Look for any evidence of past damage to your building's structure, pay special attention to damaged roof equipment that may need replacement, and take note of any areas of likely instability during severe winter weather.

- ❑ Review building additions or new roof equipment that may increase snow drifting versus the original building design. Areas where snowdrifts are likely to occur include: intersections of low and high roofs; valleys between two peaked roofs; and intersections of roof and roof-mounted equipment. Excessive snowdrifts increase the weight applied to roof structures and may cause collapse.
- ❑ All building openings should be weather-tight so they will not admit cold air that could cause fire protection systems to freeze.
- ❑ Schedule routine inspections of heating equipment.
- ❑ Check that gutters and downspouts are secured to buildings and clear of leaves and debris.
- ❑ Check that all roof equipment (air conditioners, fan housing, antennas, signage, etc.) mounts are secure against damage during heavy winds.
- ❑ Clear yard drains.
- ❑ Test low building temperature alarms.
- ❑ Check emergency lights for proper working condition.
- ❑ Maintain roofs in good condition, including repairing leaks and securing flashing



HEATING EQUIPMENT

Boilers, furnaces, and other heating equipment should be inspected and maintained in accordance with local regulatory and manufacturers' guidelines. Winter storms frequently cause electrical power failure, which may deactivate your heating system. If this occurs, water-filled piping (i.e., sprinklers, domestic water pipes, and air conditioning systems) may freeze and rupture.

- ☐ Inspect heating coils, air-handling units, and space heaters.
- ☐ **Store combustibles safely away from heating equipment.**
- ☐ Inspect and test safety shutoff valves and cutoff switches on combustion equipment



MECHANICAL AND PROCESS EQUIPMENT

Equipment located outside or near exterior walls is vulnerable in cold weather. Check all outside tanks and indoor pipes for moisture or condensate and proper operating condition. Remember to secure outdoor equipment against strong winds.

- ☐ For **water-cooled equipment**, provide adequate heat, locate in heated enclosure, or provide the proper antifreeze solution.
- ☐ **Remove low points and dead ends from piping** where possible; otherwise, elevate low points and provide drain valves.
- ☐ **Provide heat tracing and insulation on water-filled instrumentation and control lines**, and inspect this equipment.
- ☐ **Drain and close all exposed water pipes and valves.**



FIRE PROTECTION WATER SUPPLIES

As with other equipment, fire protection equipment can be highly vulnerable to drops in temperature during a severe weather situation.

- ☐ Ensure that **fire hydrants are drained** and properly working.
- ☐ Ensure that hydrants are properly marked for easy locating and clearing after a heavy snowstorm.
- ☐ **Drain connections to water motor gongs and fire department connections properly.**
- ☐ **Drain** wall hydrants and fire pump test connections of **water that may be exposed to freezing**. Check the packing on post indicator control valves for leaking, and repair as necessary.
- ☐ Check hydrants for tightness, and repair any leaks; also check buried valves and repair leakage.
- ☐ Check that portable and wheeled fire extinguishers located in areas subject to freezing are suitable for such locations.
- ☐ **Ensure that underground water mains have adequate depth of cover. (Frost level)**
- ☐ There should be plans in place to isolate mains that are not properly buried.
- ☐ If the fire pump suction is from an open reservoir, make sure the intake and pipes are below the frost level underground and deep enough in the water to prevent ice obstructions.



AUTOMATIC SPRINKLER SYSTEMS

Sprinkler systems are a vital part of fire protection, and can be the best means of containing an outbreak. As such, it is important to make sure that all systems are functioning properly in advance of a severe winter weather event.

- ☐ **Inspect and maintain all sprinkler systems** in accordance with National Fire Protection Association (NFPA) 13 or equivalent local codes. Maintain air pressure, and set dry-pipe valves.
- ☐ Provide heat for dry-pipe and deluge-valve enclosures. Make sure the heaters are in good operating condition.
- ☐ Drain dry-pipe low points and condensate collection points. Continue your check weekly until no water will drain.
- ☐ **Test solutions in all antifreeze sprinkler systems and add antifreeze as necessary.**
- ☐ **Ensure correct temperature rating for sprinklers located near steam pipes, unit heaters, or other heat-producing equipment.**



MECHANICAL AND PROCESS EQUIPMENT

- ☐ For idle air conditioning systems, remove water from oil coolers and water jackets, and drain condensers of chilling units.
- ☐ Check pressure vessel vents, relief valves, and safety valves to assure that moving parts are protected from water accumulation or freezing of vapor.

FIRE PROTECTION EQUIPMENT

- ☐ Maintain proper heat above 40° F (5° C) for dry-pipe valve, deluge-valve and pump enclosures. Maintain air pressure within normal range.
- ☐ Keep outdoor sprinkler valves clear of snow.
- ☐ Check the water temperature of the fire pump's suction tank daily, if provided. Tank vents should be kept clear of ice.

Emergency contacts

Insurance Agent/Broker

Building Owner

HVAC Contractor

Electrician

Plumber

Other

NFPA ON SPRINKLER PIPING

NFPA 13, 2022 - 16.4 Protection of Piping.

16.4.1 Protection of Piping Against Freezing.

16.4.1.1* Where any portion of a system is subject to freezing and the temperatures cannot be reliably **maintained at or above 40°F (4°C)**, the system shall be installed as a dry pipe or pre-action system.

16.4.1.1.1 The weather temperature used to determine if an unheated portion of a system is subject to freezing and required to be protected in accordance with 16.4.1.1 shall be the lowest mean temperature for one day, obtained from an approved source.

16.4.1.1.2 The requirements of 16.4.1.1 shall not apply where alternate methods of freeze prevention are provided in accordance with one of the methods described in 16.4.1.2 through 16.4.1.4.2.

16.4.1.2 **Unheated areas shall be permitted to be protected by antifreeze systems or by other systems specifically listed for the purpose.**

16.4.1.3 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°F (4°C)**, the pipe shall be permitted to be protected against freezing **by insulating coverings, frostproof casings, or other means of maintaining a minimum temperature between 40°F and 120°F (4°C and 49°C).**

16.4.1.4* **Listed heat-tracing systems** shall be permitted in accordance with 16.4.1.4.1 and 16.4.1.4.2.

16.4.1.4.1 Where used to protect branch lines, the heat-tracing system shall be specifically listed for use on branch lines.

16.4.1.4.2 Electric supervision of the heat-tracing system shall provide positive confirmation that the circuit is energized.

16.4.1.5 Water-filled piping shall be permitted to be installed in areas where the temperature is less than 40°F (4°C) when heat loss calculations performed by a professional engineer verify that the system will not freeze.

BUILDINGS AND STRUCTURES

Accumulations of snow on the roofs of buildings and/ or structures, may result in structural and/ or roof-covering damage, as well as resulting damage to the contents below. Damage may result from inadequate structural design, drifting of snow in areas of differing roof elevations and/ or excessive weight of rain following snow.

- ☐ Maintain an indoor temperature above 40° F (5° C).
- ☐ Circulate indoor air so temperatures near outer walls do not drop.
- ☐ Check indoor temperatures regularly, or install building temperature supervision alarms.
- ☐ Monitor snow, ice, and water accumulations on rooftops (especially those vulnerable to snow drifting), and remove excessive accumulations if safe to do so.
- ☐ Keep roof drains clear of ice and snow, and clear paths to the drains.
- ☐ If necessary, turn on faucets and allow them drip slowly. This is especially true for pipes located on outside walls.

FREEZE PROTECTION OF WATER BASED HEAT TRANSFER FLUIDS

Different types and concentrations of antifreezes like

- Ethanol
- Methanol
- Propylene glycol
- Ethylene glycol

Ethanol

- ☐ low corrosiveness
- ☐ high flammability (if pure)
- ☐ low toxicity
- ☐ high heat transfer capacity
- ☐ low pumping requirements due to viscosity
- ☐ moderate cost

Ethylene Glycol

- ☐ low corrosiveness
- ☐ low flammability
- ☐ high toxicity
- ☐ low heat transfer capacity
- ☐ high pumping requirements due to viscosity
- ☐ high cost

Methanol

- ☐ low corrosiveness
- ☐ high flammability (if pure)
- ☐ high toxicity
- ☐ high heat transfer capacity
- ☐ low pumping requirements due to viscosity
- ☐ low cost

Propylene Glycol

- ☐ low corrosiveness
- ☐ low flammability
- ☐ low toxicity
- ☐ low heat transfer capacity
- ☐ high pumping requirements due to viscosity
- ☐ high cost

PROTECTION DEVICES

Freeze Protection Control – FPC - Freeze Protection Control (FPC) is a low cost control designed to keep the air conditioning coil from freezing. When the FPC senses temperature at 38°F, it breaks the circuit to the compressor relay, preventing a freeze-up. The FPC then remakes the compressor circuit at 48°F allowing ample time for the compressor to be off. This differential prevents short-cycling. During the period the compressor is off the indoor fan is still running using the cold coil to provide air conditioning.

Freeze Protection Control Center with 2 Timers and Thermostat

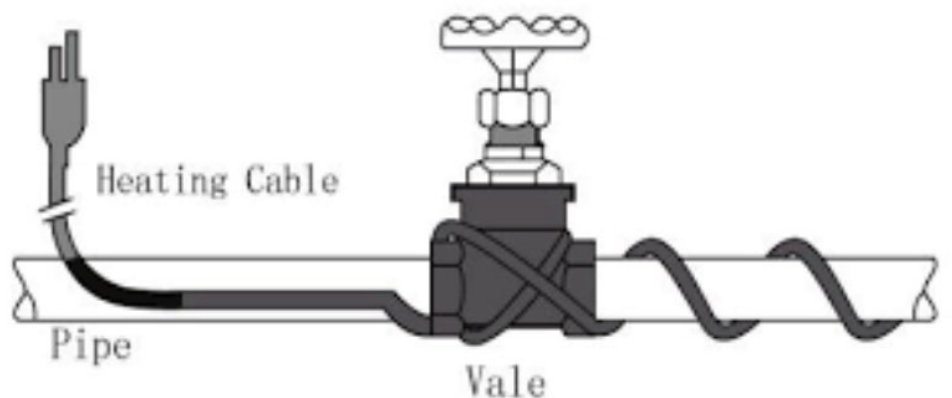
Freeze control tank - silicone heating blankets

Insulation on pipes and water tanks

Freeze Protection Bleed Valve - Automatic thermal actuator bleed valve opens when internal water temperature falls below 35° F (1.7° C) and closes completely when the water climbs back to 42° F

Pipe-trace heat tape

Fixed space heaters



Any questions or queries contact

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