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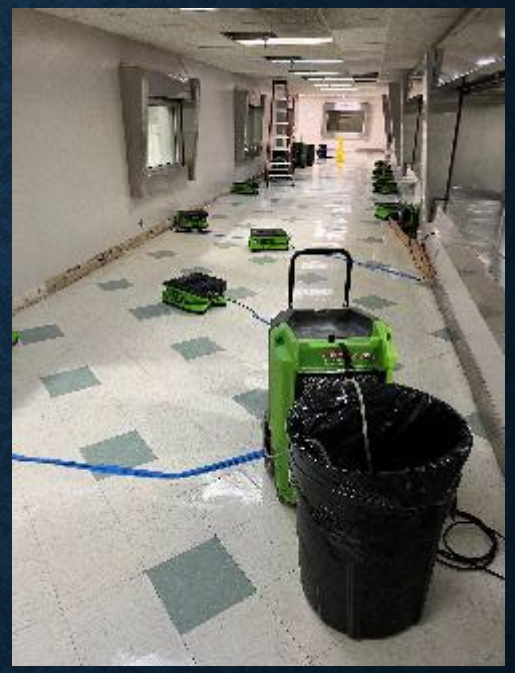
WINTERIZATION PREPARATIONS AND WATER DAMAGE MITIGATION

WHY UNDERSTANDING WATER DAMAGE MATTERS

- Water damage represents ~24% of all commercial property claims, making it one of the most frequent and costly categories of property loss.
- Impacts extend well beyond repair costs:
  - Business interruption: Closed floors, downtime, no public services.
  - Insurance consequences for repeated losses: Can lead to higher premiums, exclusions, or even future non-renewal.
- FEMA identifies water infiltration as a core resilience issue, particularly in hurricane-prone and high-rainfall regions, both wind driven rain (windows, siding and sliding glass doors) and typical rain fall events (roof areas).



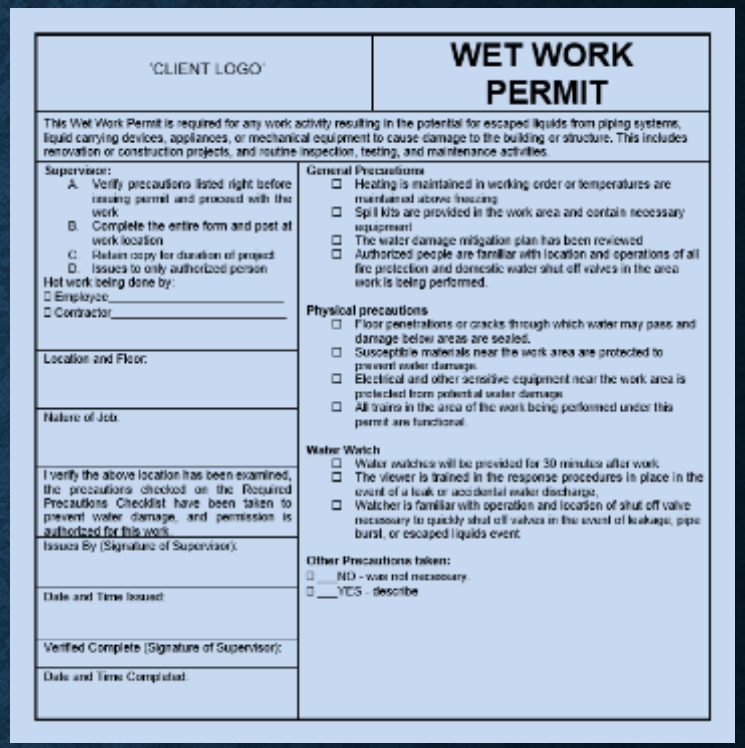
TYPES OF WATER LOSSES

- Interior Sources
  - Mechanical rooms: Water heaters, boilers, pumps, chillers.
  - Condensation lines from A/C units.
  - Bathtub/shower overflows, dishwashers, washing machines.
  - Unsealed penetrations around piping or cabling.

- Exterior Sources
  - Roof leaks or water ponding due to clogged drains and gutters.
  - Rooftop HVAC/satellite equipment failures.
  - Window and sliding glass door leaks from poor installation or age.
  - Weaknesses in the building envelope, especially in older structures.

HIERARCHY OF MITIGATION SOLUTIONS

- **Low-Cost Procedural Controls:**
  - Weekly inspections of roofs, exterior walls, and mechanical spaces.
  - Use of Wet Work Permits for plumbing or contractor activity.
  - Contractor oversight to verify workmanship and code compliance.



'CLIENT LOGO'

WET WORK PERMIT

This Wet Work Permit is required for any work activity resulting in the potential for escaped liquids from piping systems, liquid carrying devices, appliances, or mechanical equipment to cause damage to the building or structure. This includes renovation or construction projects, and routine inspection, testing, and maintenance activities.

Supervisor:
A. Verify precautions listed right before issuing permit and proceed with the work
B. Complete the entire form and post at work location
C. Return copy for duration of project
D. Issues to only authorized person

Hot work being done by:
☐ Employee_____
☐ Contractor_____

Location and Floor:

Nature of Job:

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent water damage, and permission is authorized for this work.

Issued By (Signature of Supervisor):

Date and Time Issued:

Verified Complete (Signature of Supervisor):

Date and Time Completed:

General Precautions
- ☐ Heating is maintained in working order or temperatures are maintained above freezing
- ☐ Spill kits are provided in the work area and contain necessary equipment
- ☐ The water damage mitigation plan has been reviewed
- ☐ Authorized people are familiar with location and operations of all fire protection and domestic water shut off valves in the area work is being performed.

Physical precautions
- ☐ Floor penetrations or cracks through which water may pass and damage below areas are sealed.
- ☐ Susceptible materials near the work area are protected to prevent water damage.
- ☐ Electrical and other sensitive equipment near the work area is protected from potential water damage
- ☐ All trains in the area of the work being performed under this permit are functional

Water Watch
- ☐ Water watches will be provided for 30 minutes after work
- ☐ The viewer is trained in the response procedures in place in the event of a leak or accidental water discharge.
- ☐ Watcher is familiar with operation and location of shut off valve necessary to quickly shut off valves in the event of leakage, pipe burst, or escaped liquids event.

Other Precautions taken:
☐ ___NO - was not necessary
☐ ___YES - describe

- **Mid-Level Physical Controls**
  - Plastic catch pans beneath small appliances or water heaters.
  - Interior: Proper sealing of penetrations in walls, floors, and mechanical spaces
  - Exterior: Routine resealing of building envelope components (roofs, windows, flashing)

- **High-Level Technology Controls**
  - Sensor networks to detect leaks and moisture (Aqualeak, Wasens, Detection Group).
  - Remote and app-based shutoff valves for rapid isolation of leaks.
  - Enterprise-level monitoring platforms to oversee multiple properties.

TECHNOLOGY OVERVIEW

Most commercial water mitigation systems rely on the same core technology: Moisture/ leak detection sensors.

Vendor differences are primarily in platform design, user dashboards, and integration:

- Aqualeak, WaterAlert, Detection Group, Wasens.

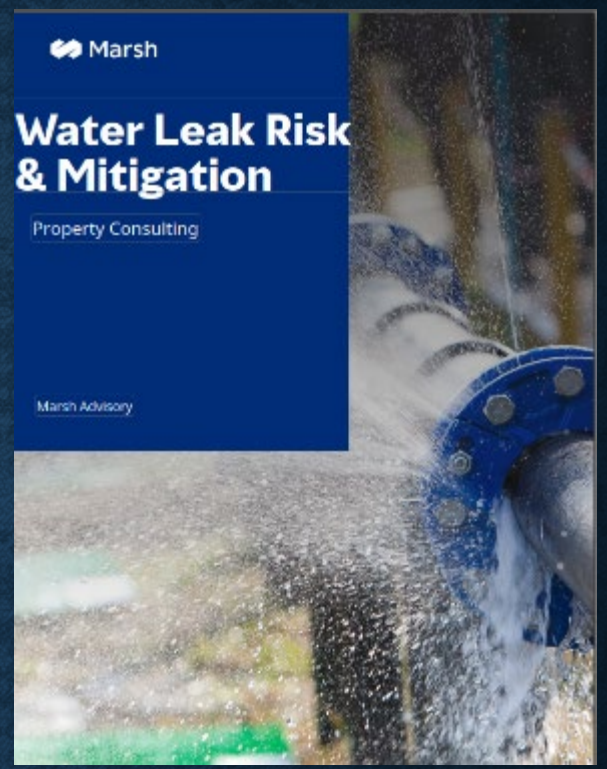
Critical factors for success:

- Reliable power supply (hardwired vs. battery backup).
- Wi-Fi or cellular connectivity to ensure continuous monitoring.
- Capability for portfolios with multiple sites or hundreds of devices.

- ***Insurance Carrier data shows that early detection can reduce claim severity by more than 50%.***

RESTORATION & EMERGENCY RESPONSE

- Containment: Water shut off, and containment - **spill kits OR cart** to limit spread of water.
- Immediate Remedy: Water extraction and drying to prevent mold.
- Vendor Partnerships: pre-contract restoration companies as part of the Emergency Action Plan (EAP).



Training all staff on emergency procedures. Majority of leaks happen after hours/ non-normal operation hours. Staff members with the least experience/ time on work the 2nd and 3rd shifts.

Quick response reduces claim severity and supports faster business recovery.

SUMMARY

- Water intrusion is one of the leading causes of property loss across all occupancies.
- Two major risk categories:
  - Interior sources (plumbing, mechanical, overflows)
  - Exterior sources (roofing, windows, envelope failures).
- Layered mitigation is essential:
  - ➢ Procedural (permits, inspections, training).
  - ➢ Physical (catch pans, sealing, drainage maintenance).
  - ➢ Technological (sensors, shutoffs, monitoring).
- Industry lessons learned from FEMA, NFPA, and insurers confirm early detection and proactive maintenance are critical to reducing both frequency and severity.

Winterization Preparations

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 costliest 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.

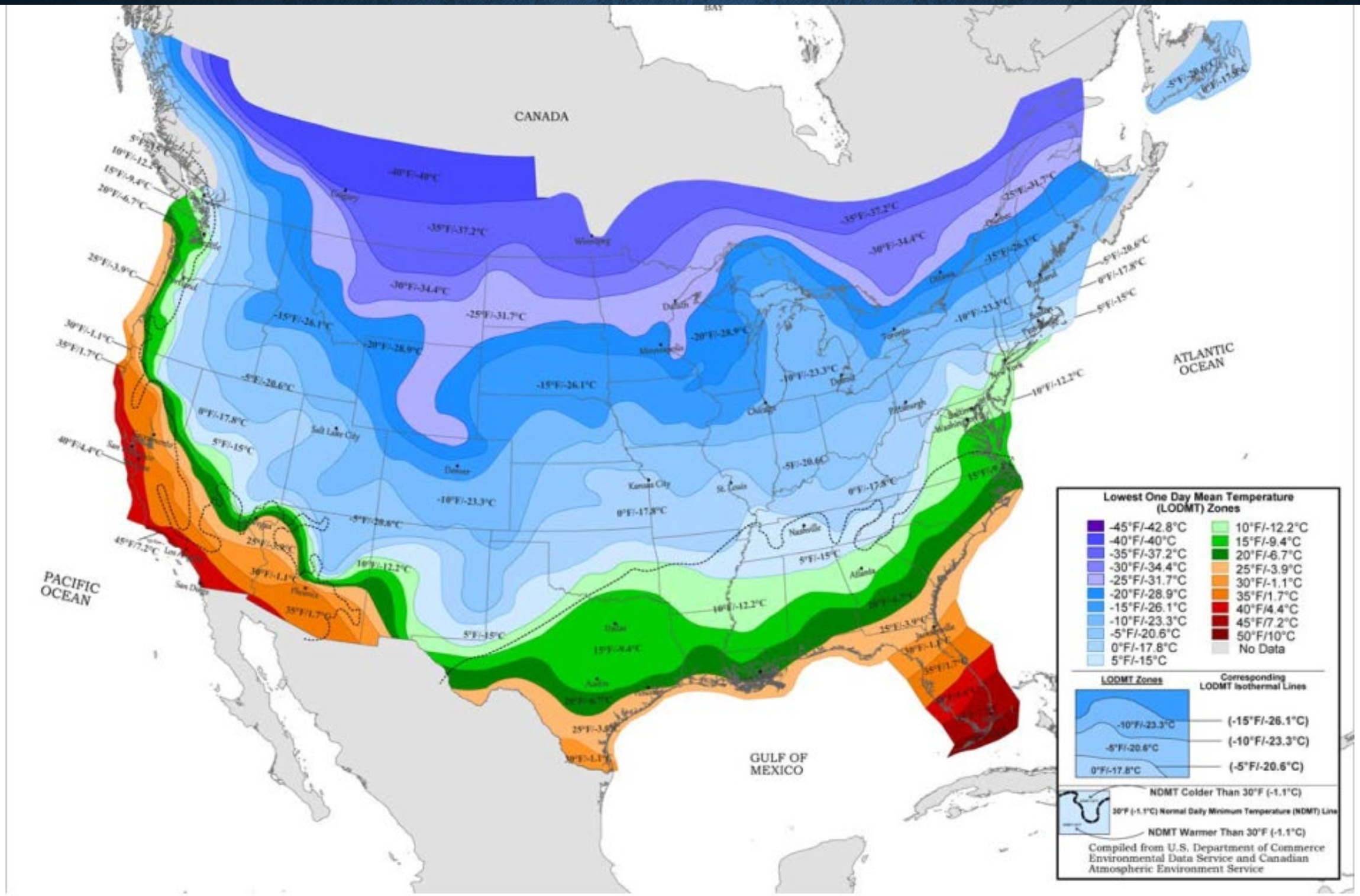


Fig. D-1. Lowest one-day mean temperature for the United States and Canada

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.

Emergency contacts

Insurance Agent/Broker	*Building Owner*
HVAC Contractor	*Electrician*
Plumber	*Other*

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 approved 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

BUILDINGS AND STRUCTURES

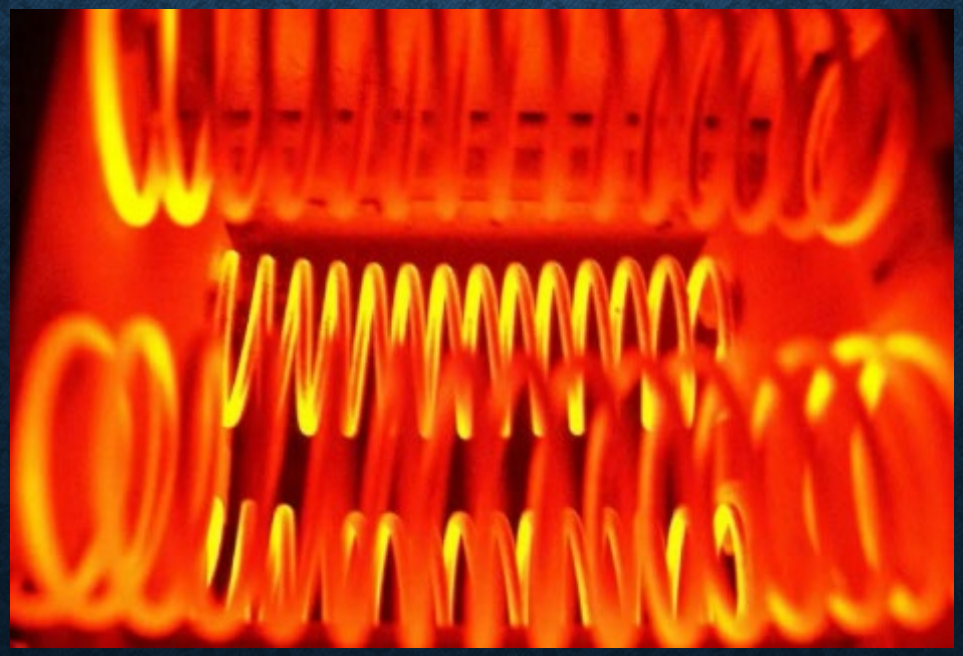
Accumulations of snow on the roofs of buildings and/or structures, may result in structural and/ or roof-covering damage, as well as resulting damage to the contents below. Damage may result from inadequate structural design, drifting of snow in areas of differing roof elevations and/ or excessive weight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

- ❑ Maintain an indoor temperature above 40˚F.
- ❑ 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.

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 heating units.
- ❑ **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 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 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.

NFPA ON SPRINKLER PIPING

NFPA 13, 2025 - 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**, 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, 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.**

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 when heat loss calculations performed by a professional engineer verify that the system will not freeze.

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

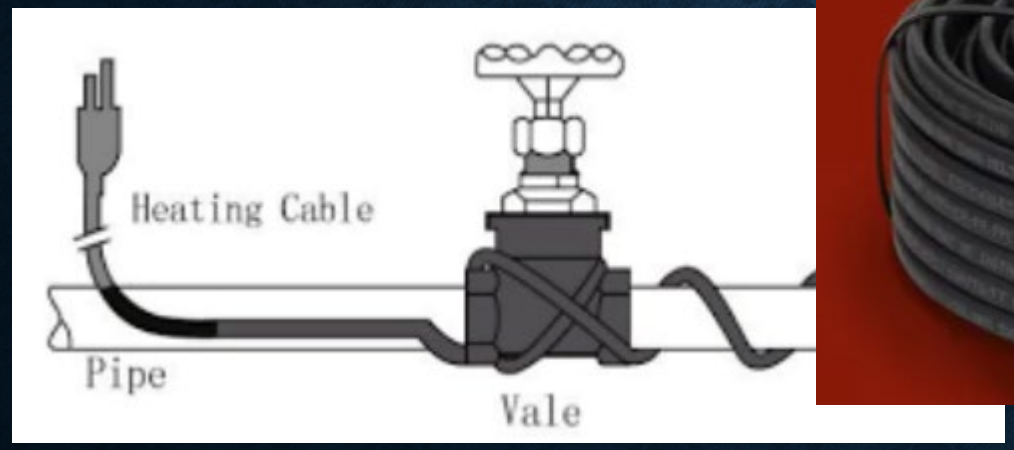
- ❑ low corrosiveness
- ❑ high flammability (if pure)
- ❑ high toxicity
- ❑ high heat transfer capacity
- ❑ low pumping requirements due to viscosity
- ❑ low cost

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 and closes completely when the water climbs back to 42° F
- **Pipe-trace heat tape**
- **Fixed space heaters**



'CLIENT LOGO'	**WET WORK PERMIT**

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Supervisor:

A. Verify precautions listed right before issuing permit and proceed with the work
B. Complete the entire form and post at work location
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Hot work being done by:

☐ Employee_____

☐ Contractor_____

Location and Floor:

Nature of Job:

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent water damage, and permission is authorized for this work.

Issues By (Signature of Supervisor):

Date and Time Issued:

Verified Complete (Signature of Supervisor):

Date and Time Completed:

General Precautions

- ☐ Heating is maintained in working order or temperatures are maintained above freezing
- ☐ Spill kits are provided in the work area and contain necessary equipment
- ☐ The water damage mitigation plan has been reviewed
- ☐ Authorized people are familiar with location and operations of all fire protection and domestic water shut off valves in the area work is being performed.

Physical precautions

- ☐ Floor penetrations or cracks through which water may pass and damage below areas are sealed.
- ☐ Susceptible materials near the work area are protected to prevent water damage.
- ☐ Electrical and other sensitive equipment near the work area is protected from potential water damage.
- ☐ All trains in the area of the work being performed under this permit are functional.

Water Watch

- ☐ Water watches will be provided for 30 minutes after work
- ☐ The viewer is trained in the response procedures in place in the event of a leak or accidental water discharge,
- ☐ Watcher is familiar with operation and location of shut off valve necessary to quickly shut off valves in the event of leakage, pipe burst, or escaped liquids event

Other Precautions taken:

☐ ___NO - was not necessary.

☐ ___YES - describe

Spill Kit List

Stock a mobile spill cart in multiple locations of your facility for use in the first hours of a loss. The list below suggests a sample of tools that may be useful to stock on the accessible carts. Additional materials to absorb and/or contain spills could be added.

a. Plastic tarps
b. Wet/dry vaccum
c. Portable sump pump
d. Dehumidifier
e. Fan
f. Pipe leak diverters
g. Hoses
h. Latex gloves
i. Caution tape
j. Duct tape
k. Face mask
l. Safety glasses
m. Hose clamp
n. 5-gallon buckets
o. Squeeges
p. Sponges

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