

Freeze-Ups Prevention Plan For Location:

Scope

The following document highlights the preventative measures that are needed to avoid-weather related freezing of equipment and property.

Contingency Plan

Winterizing Inspections – Before cold spells

General

- Designate a “weather watcher” () to monitor conditions (using National Weather Service or equivalent), implement procedures and organize a well-trained emergency response team (ERT). The “weather watcher” should check the weather daily and keep the ERT informed of cold weather conditions.
- Arrange guards and maintenance personnel to be available during expected cold spells.
- ERT personnel patrol the building(s) in search for cold spots structural damage, large leaks or sprinkler piping breaks.
- Emergency supplies available:
 - Extra tarpaulins for windbreaks for buildings and outdoor equipment.
 - Steam hoses for thawing frozen lines
 - Portable heaters for keeping maintenance crews warm, or instrument houses from freezing.
 - Anti-freeze supplies for cooling systems
 - Shovels, wheelbarrows and snow blowers.
 - Warm clothing and hand protection for maintenance and operating crews.
- Snow removal equipment is prepared.
- Portable heaters have appropriate safety interlocks and are fueled and operational.
- Thermometers located in hard to heat areas housing vulnerable equipment.
- The building envelope is in good conditions and close unnecessary openings, especially doors and windows.
- Key process bottlenecks identified to operations that would occur in the event of a freeze-up. Includes equipment as well as process lines that run outdoors or through unheated/unattended buildings, service or process-water lines, non-self-draining steam traps or liquid drains, and high pour-point fuel oil lines.
- Automatic sprinkler risers are checked for frozen piping daily by opening 2 in. (50 mm) drains (if safe to do so) and observing the drop in pressure.
- All roof drains checked that they are clear and ice free.
- Concealed space identified, 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.



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Fire Protection Equipment

- For **dry-pipe systems**:
 - Check piping pitch for drainage of condensate to low point drains and install more drains, if necessary.
 - Drain low points frequently and install more drains if necessary.
 - Make sure systems are thoroughly drained annually after annual trip test.
 - 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.
- For **Fire Pumps**:
 - Refer to “Temperature Monitoring” section on temperature requirements.
 - If pump suction is from an open reservoir, make sure the intake and pipe are below the first level underground and deep enough in water to prevent ice obstructions.
- For **gravity and suction tanks**:
 - Refer to “Temperature Monitoring” section on temperature requirements.
 - Flush circulating heaters and piping.
 - Make sure heaters circulation pumps are operating.
 - Overhaul and steam traps and strainers.
 - Check hydrants for tightness and repair any leaks; also check buried valves and repair any leakage.

Temperature Monitoring

- Place thermometers inside building at strategic locations – near sprinkler systems, for example to monitor building temperature.
- Increase building temperature(s). Include when the supply of heating fuel or electricity may be interrupted.
- Monitor and record temperature in hard to heat areas that contain vulnerable equipment; repeat every few hours during particularly cold weather.
- Maintain a temperature of above 40 °F in rooms with dry-pipe sprinkler system valves and fire pumps, and a 70°F minimum temperature in rooms with diesel engine-driven pumps.
- For gravity and suction tanks, maintain water temperature above 40°F.

Safe Shutdown of Equipment

General

- Do not shut down operations during unusually cold weather.
- Areas which need to be left 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 (if applicable).
- Fuel all mobile equipment and review/confirm sources for obtaining additional fuel supplies for mobile equipment.
- Use lubricant for low temperature applications in equipment (e.g. pumps, blowers and compressors), especially in outdoor and unheated equipment
- Trace heat tracing systems to make sure they are working properly.
- If the facility should completely lose heat, drain the equipment listed below:
 - Condensate piping
 - Compressors
 - Boilers
 - Hydraulically operated devices
 - Air-Conditioning Systems



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Boilers

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 feed water regulator.
7. Provide alarms for important piping systems.

Idle Air Conditioning Equipment

- Remove water from oil coolers and water jackets, and drain condensers of chilling units.

Snow and Ice Removal

- Training provided to ERT on how to properly remove snow from roofs, roads and equipment.
- Monitor the amount of snow on the roof and clear it before accumulations reach unsafe levels.
- Inspect roof structures for weaknesses and snow-loading capacity, especially in areas where drifting snow can accumulate, such as changes in roof elevation (older building codes did not require heavier design loads for these areas).
- Buildings with metal roof systems need to ensure that its purlins are adequately braced or otherwise designed according to the 1996 (or later) edition of the American Iron and Steel Institute Specification for the Design of Cold Formed Steel Structural Member.
- Shovels, wheelbarrows and snow blowers are readily available for crews to remove snow from the roof to prevent overloading. Adjust the height of the snow blower's blade so it does not damage roof structures. Avoid creating drifts with the snow blower. Avoid using ice choppers on the roof, as they may

Removal of Snow from Roof

1) When to Initiate Snow Removal

A number of factors influence when snow removal should begin including, but not limited to, the pre-snow condition of the building structure, snow from a previous snow event still on the roof, the rate of snowfall, and/or the need to keep ahead of additional snow if there is a valid concern of a snow-induced structural failure.

Knowing the design snow load of the structure is key in determining when to begin removal. Design snow load can be determined from construction drawings. If there are no drawings, retain the services of a licensed design professional before the snow season to determine structural capacity. A local Professional Engineer will be familiar with the snow conditions of the region. Their knowledge of the pervasive snow type can help the stakeholder formulate some benchmarks to when snow accumulation at the building is approaching the snow load capacity. As noted earlier, roof snow loads vary from ground snow based on multiple factors. Therefore, attempting to measure ground snow weight and assuming that it is the same as the roof snow load is incorrect.

If the existing snow load is close to the capacity of the roof structure, snow removal is prudent. If the existing snow load is somewhat close to capacity and additional snow is forecast that could come close or exceed the capacity, snow removal is also prudent.

Snow removal should be performed by a licensed, insured professional roofing contractor who has

experience in removing snow from roofs. Using a professional roofing contractor is highly recommended because of the contractor's familiarity with safety protocols.

2) Safety Measures for Snow Removal

- Any roof snow removal should be conducted following proper OSHA protocol for work on rooftops. Use roof fall arrest harnesses where applicable.
- Always have someone below the roof to keep foot traffic away from locations where falling snow or ice could cause injuries.
- Ensure someone confirms that the area below removal site is free of equipment that could be damaged by falling snow or ice.
- Whenever snow is being removed from a roof, be careful of dislodged icicles. An icicle falling from a short height can still cause damage or injury.
- When using a non-metallic snow rake, be aware that roof snow can slide at any moment. Keep a safe distance away from the eave to remain outside of the sliding range.
- Buried skylights pose a high risk to workers on a roof removing snow. Properly mark this hazard as well as other rooftop hazards prior to snow events.

Method of Snow Removal

- Removing snow completely from a roof surface can result in serious damage to the roof covering and possibly lead to leaks and additional damage. At least 2 inches of snow should be left on the roof.
- Do not use mechanical snow removal equipment. The risk of damaging the roof membrane or other rooftop items outweighs the advantage of speed.
- Do not use sharp tools, such as picks, to remove snow. Use plastic rather than metal shovels.
- Remove drifted snow first at building elevation changes, parapets, and around equipment.
- Once drifted snow has been removed, start remaining snow removal from the center portion of the roof.
- Remove snow in the direction of primary structural members. This will prevent unbalanced snow loading.
- Do not stockpile snow on the roof.
- Dispose of removed snow in designated areas on the ground.
- Keep snow away from building exits, fire escapes, drain downspouts, ventilation openings, and equipment.
- If possible, remove snow starting at the ridge and moving toward the eave for gable and sloped roofs.
- Use a non-metallic snow rake for steep roof slopes if possible. Metal snow rakes can damage roofing material and should be avoided. Snow removal can be conducted from the ground, removing the risk to people on a hazardous roof.
- Upon completion of snow removal, the roofing material should be inspected for any signs of damage. Additionally, a quick inspection of the structural system may be prudent after particularly large snow events.



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Emergency Response Team

Name:
Phone Number:
Shift:
Position:

Name:
Phone Number:
Shift:
Position:

Name:
Phone Number:
Shift:
Position: