

Risk Control Guide

# Winter Precautions

## Introduction

Cold weather is a significant cause of property damage and business interruption. Very low temperatures cause water to freeze and expand, which can result in direct physical damage to equipment or piping. Water damage can also occur after the thaw. Water-based fire protection systems are particularly susceptible due to large coverage areas. Impaired fire protection systems can leave sites unprotected for extended periods. Other common wintertime exposures include roof collapse and extended power outages occurring because of heavy snow and ice accumulation on roofs, trees, and power lines and their support structures.

This guide is designed to suggest methods of preventing or reducing property damage and business interruption caused by winter weather. The potential impact should be considered and minimised during initial plant design stages whenever possible. Current exposures need to be understood, planned for and mitigated as part of a site's Emergency Organisation development process.

## Loss Examples

A (wet-system) sprinkler pipe ruptured above a suspended ceiling at an electrical supply showroom/warehouse. The cause was extreme cold weather. Water flowed for 20 minutes due to difficulty shutting the sprinkler control valve, which resulted in extensive damage.

This loss illustrates the need to provide heat to all areas where water filled piping exists. It also demonstrates the need to have trained members of the emergency organisation available to shut-off water supplies.

The roof of a warehouse storing munitions equipment partially collapsed due to ice and snow accumulation. One week of snow and continuous cold temperatures resulted in the formation of ice below the snow on the roof. The ice was estimated to be 75–150mm thick at the time of the collapse and roof loading was estimated to be 590 kg/m<sup>2</sup>. Inspection and snow removal procedures could have prevented this loss.

## Exposures

The list below represents the most common losses resulting from winter weather. Consider each in the planning process.

- Business Interruption loss resulting from a power disruption (e.g. ice storms).
- Direct damage to equipment or piping containing water.
- Indirect water damage to building contents (worst damage usually occurs after a thaw).
- Fire loss due to impaired fire protection systems (automatic sprinklers, pumps, tanks, etc.).
- Roof collapse (e.g. excessive snow or blocked roof drains preventing thaw water drainage).
- Shattered roof membranes (non-reinforced PVC ~ 10 years old).
- Cold start damage to internal combustion engine or reciprocating compressor.
- Cooling tower damage due to excessive ice build-up.

## Planning

The recommendations below require thought and planning. Consider each in the planning process.

- Develop prudent inspection, testing and maintenance procedures prior to the onset of cold weather.
- Develop monitoring procedures to be implemented during cold weather.
- Develop Emergency Organisation roles & responsibilities and provide adequate training. Make arrangements for assistance from outside contractors. Consider manpower limitations during extremely cold weather and extended power outages.
- Develop communication & notification strategies.
- Develop salvage & recovery plans.
- Obtain all required emergency equipment and supplies (steam hoses for thawing, snow/ice removal equipment, etc.)
- Arrange for backup power.
- Ensure availability of fuel supplies.

## Mitigation Techniques

The mitigation techniques listed below will eliminate or reduce the potential for winter weather losses. Consider each in the planning process.

- Provide heat (building or heat trace)
- Drain water from systems
- Install antifreeze solution
- Maintain water circulation
- Provide ventilation
- Dehumidify compressed air
- Remove snow/ice
- Open electrical breakers prior to power restoration
- Inspection, testing and maintenance for winterisation
- Control ignition sources
- Monitor temperature
- Impairment management of fire protection

## Automatic Sprinkler Checklist

This checklist should be used at sites in cold weather climates that have water-based fire protection equipment, to prevent or reduce the potential for freezing of water piping, resultant water damage and extended impairments.

### Prior to the onset of cold weather

- Inspect building areas provided with automatic sprinklers, pump rooms and dry valve houses for tightness and adequate heat (min. 5°C).
- Convert wet sprinkler systems to dry in unheated areas
- Provide heat tracing where required.
- Install low temperature monitoring in critical areas (e.g. pump rooms).
- Check specific gravity of anti-freeze for non-freeze systems.
- Inspect dry system piping for proper pitch and empty drum-drips at low points.
- Inspect and service any water supply tank heating systems for functionality and reliability.
- Test temperature monitoring equipment and alarms.

### During cold weather

- Inspect/monitor fire pump rooms.
- Inspect/monitor tank heating systems.
- Inspect/monitor dry valve enclosures
- Inspect/monitor building areas.
- Conduct main drain tests to prevent and check for frozen mains in extremely cold weather (subject to safe water disposal).
- Break top surface of ice on suction sources if not heated to prevent vacuum.
- Minimum daily inspections (for the above) recommended during freezing spells.

### After a fire protection pipe freeze-up

- Shut off the affected system to prevent water damage.
- Relocate any equipment or materials that could be further damaged.
- Cease all hazardous operations to reduce the potential for fire.
- Initiate a fire watch.
- Determine the extent of damage to the system, search for cracked fittings, split piping, damaged sprinkler heads, etc.
- Remove damaged piping and expedite replacement and restoration of unaffected sprinkler protection.
- Provide temporary building heat and take proper precautions (e.g. hot work controls).

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