

## Technical guide

The winter months can bring with them freezing temperatures, icy conditions and snowfall. This can take a huge toll on every aspect of domestic and business life. In a typical winter the ABI estimates frozen and burst water pipes cost £7million daily to UK businesses and householders. And the 2010 'big freeze' in UK resulted in costs exceeding £1billion for clean-up and repair.

Much of the damage that occurs as a result of freezing conditions is from water damage following the inevitable thaw. This can be due to water ingress to the building after collapse of roofs under the weight of snow and ice. It can also arise from frozen pipes bursting as the ice expands then thaws as temperatures rise again. And as many people know from personal experience, once a building gets wet on the inside it is difficult to restore and recover.

The most effective solutions are to prevent water ingress to buildings via damaged roofs, vents or windows and to prevent water pipes becoming frozen as temperatures fall.

### Emergency Preparations

A winter-freeze prevention plan should be prepared or updated at least a month before the normal arrival time of freezing weather. This will ensure that action can be initiated at short notice to protect buildings from damage. As winter weather approaches, conditions can change very quickly and the ability to react can unexpectedly become hampered. Disturbances in public transport, roads, power supplies, gas supplies and other key services can throw normal emergency response plans off track so there is a need to be ready to cater for unusual situations.

- Review and update severe weather emergency response plans. Make sure the staff who would be involved are familiar with the contents and have copies for their 'grab bag'.
- Establish a weather watching and monitoring function for your building. Set up a rota of nominated responsible persons to make the call when emergency response is needed.
- Ensure emergency materials such as salt, grit, sandbags, fuel, antifreeze, tarpaulins are replenished and made ready in advance of the arrival of freezing weather.
- Ensure emergency tools are checked and replenished including cold weather clothing and boots, snow shovels, buckets and similar.
- Tools and equipment for emergency isolation and drain down of tanks, boilers, water pipes and sprinklers should be checked and prepared for use.
- If specialist equipment is owned make sure it is inspected and tested beforehand. If it needs to be rented, make sure any pre-contracting is up to date or that the local supplier has the equipment available. For essential equipment, get it delivered to site in readiness.
- Make sure employees and contractors know how to thaw frozen pipes safely should they occur. This includes ensuring that they know they MUST NOT use open flame heat guns or heaters.





## Protecting the building

It is essential that the envelope of a building is not breached by collapsing roofs or adjacent trees, equipment or infrastructure. It is also important to keep the interior of the building warm enough to prevent freezing.

- Precautionary measures should start with basic visual checks on the condition of tiles, windows, ledges, openings, walls, doors, gutters, downpipes and roof drains. Also inspect for the potential for collapse of adjacent trees, pipe bridges, cables, towers etc. due to excessive snow load or ice formation. Specialist companies can be contracted to make these checks safely and cost effectively.
- On roof areas where melting snow cannot drain away, do not allow snow to build up excessively. Examples include flat parapet roofs and in valleys of sloped roofs. If the snow melt-waters cannot escape because of drains blocked with ice, the water will build up and overflow its normal containment channels to find a way into the building.
- On multi-level roofs where deep drifting of snow can occur, avoid allowing the drifts to build up excessively. Likewise with flat or shallow sloping roofs, do not allow excessive ice or snow to build up. The dead weight of ice and snow can cause a weak roof to collapse. Once inside the building, ice and snow will melt causing water damage. And once the building envelope has been breached, rain and snow can easily get in to cause yet more damage.
- Train employees or contractors to identify and clear roofs where snow can build up. Be ready to use brooms, snow-shovels, ice-scrapers or snow blowers for large areas.

- Install thermostatically controlled space heating systems to maintain temperatures at 4°C or more. Couple these with remotely monitored thermometers for freeze exposed areas of the buildings. These can also be hooked up to the building management system (BMS) if one is installed. In many cases the BMS can generate automatic alerts to building managers if any systems fail or temperature limits are breached.
- Be careful not to create conditions in the building loft spaces that can cause the formation of ice dams in roof level guttering. (See section on [Prevention of Ice-Dams](#)). If conditions exist for ice-dams to form, the melt-waters from snow settled on the roof can back-up in such a way that water gets into the loft space and onto ceilings below.

## Protecting water systems

One of the most common causes of water damage is the freezing of pipes. As ice forms it expands and often causes pipes to burst. When the pipes thaw, water can escape and flow freely if the system has not been isolated.

- Locate and physically test the main water supply control valves to the site and to each building to ensure they can be closed. Find and test any internal sub-divisional valves as well.
- Ensure all water pipes and tanks in unheated areas are adequately lagged. In severely exposed areas they should be trace heated. If possible, unused or non-essential water systems should be drained down prior to the arrival of freezing weather.
- Test the functionality of all heating systems and ensure fuel is plentiful, especially in relatively remote areas. Severe winter weather will push heating systems to their limit so it is wise to know they are functioning in advance of the winter period.



- Outdoor piping is far more exposed to freezing than indoor piping. Be particularly wary of outdoor piping that runs near openings into buildings or over key equipment sensitive to water damage. If burst pipes thaw and release water directly on to equipment it is likely that some damage and disruption will result. Shield or relocate critical equipment or re-route the piping if the water damage exposure is considered excessive.
- Inspect lagging and test trace-heating on outdoor piping. Verify that any failure alarms on the trace-heating are functioning. Confirm that all pipework, fittings and valves have adequate insulation in place and that the insulation is in good condition and well secured.
- Maintain temperatures at or above 4°C in all freeze exposed areas of the building, whether in the main operational areas or in isolated plant rooms, attics, loftspaces and voids. Look out for indoor equipment in rooms with louvred doors or windows as these can suffer severe wind chill and freeze.
- If a building has sprinkler piping it is imperative that all areas with sprinkler or firewater supply piping are protected against the winter weather. This includes extra lagging, antifreeze, trace-heating or simply just maintaining room or building heating. Also, block up gaps in walls and doors to prevent freezing air reaching sprinkler pipes and valves. As far as possible, the winter proofing should not compromise the fire-fighting capability of the sprinklers, fire pumps and fire hydrants.
- If a normally heated production or warehouse area is to be halted over the winter holiday season, the 'wet' sprinkler systems can become exposed to freezing conditions when they wouldn't normally. Either keep some heating in the building to maintain 4°C from ground level to roof level, or ensure the exposed sections of pipework are lagged and trace-heated.
- In extreme conditions, it may become necessary to temporarily isolate the freeze exposed sprinklers. This must only be done under the strict supervision of a pre-planned fire control impairment permit and reinstatement must be done as soon as possible after the thaw begins.

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## Property Owners

Landlords and managing agents need to be attentive to the premises they own or manage when cold weather threatens. They should make sure that tenants know what to do before and during cold snaps, and then they should check that the relevant safeguards get implemented when the time comes. And give the tenants an emergency contact list to keep handy, including plumbers, heating engineers, roofers, electricians as well as contact details for the landlord, managing agent, caretaker or facilities manager.

Unoccupied premises present an enhanced challenge because of the absence of people to monitor the building condition internally and externally. Most often the water systems are drained down in unoccupied buildings, but if heating is to be left on or the premises are partially occupied then water systems will usually remain in service.

Whether tenanted or unoccupied, buildings should get a thorough inspection before the winter period starts. Any damaged tiles, brickwork, flashings, windows etc. should be repaired. Likewise, all water carrying pipework should be inspected, lagging checked to be undamaged and trace heating verified as working. Water tanks, boilers, heating systems and domestic appliances should also get their pre-winter checks.

Wherever possible, inspections at the premises should be increased in frequency to daily or every 2-3 days instead of weekly. Conduct inspection internally as well as externally wherever possible. This is particularly applicable to unoccupied premises or if a normally tenanted building is to be left unattended over holiday periods when the freezing conditions hit.

When the thaw comes, everyone should be on the lookout for water leaks from broken pipes or damaged equipment or leaking roofs. Consideration should be given to the installation of leak detection either to detect the presence of water inside a building where it would not normally be, or to detect the excess flow of water within a piped system. When remotely monitored, leak detection permits the landlord, managing agent or tenant to respond quickly to the alarm. For piped systems, automatic isolation valves can be installed to close off the system if excess water flow or low pressure is detected.

## Be prepared. Stay vigilant.

Even seemingly innocuous actions can have wide ranging and significant effects during abnormally cold weather. A normally closed door left open can cause pipes to freeze, use of blow torches to thaw frozen pipes have frequently caused buildings to burn down, lack of simple snow removal equipment has caused buildings to collapse. The only effective guard against the myriad of potential causes of freeze damage and disruption is to be prepared and to stay vigilant at all times.



### What To Do if a Water Freeze or a Leak Occurs?

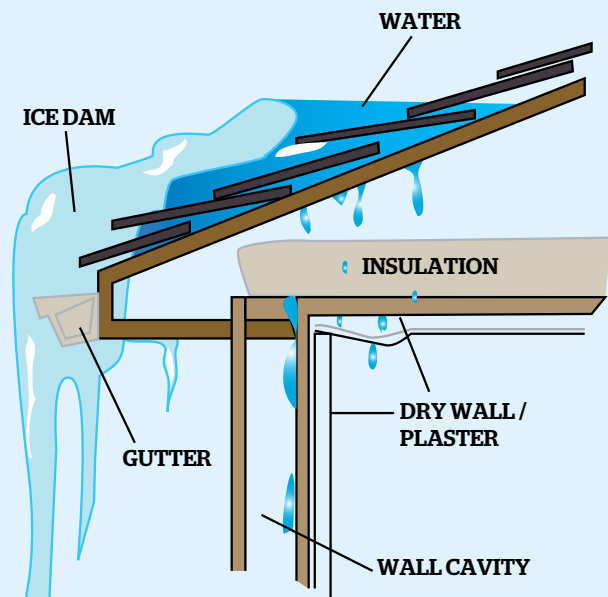
- Turn off the water supply to the building or the part of the building that is involved.
- Isolate the electricity supply to the affected area. Do not touch electrical equipment that has become wet.
- Drain systems of any non-frozen water. Turn on taps to drain storage tanks.
- If pipes have frozen, attempt to defrost them slowly using warm air blowers – do not use naked flames such as blow torches. Open loft hatches and doors to let hot air rise to upper floors and into roof spaces that contain frozen pipework or tanks.
- If water starts to seep through ceilings, place a bucket below the leak. Pierce the ceiling with a broom handle or similar if it starts to bulge.
- Alert occupants of neighbouring properties, especially on floors below.
- Notify the Insurer, Landlord, Managing Agents or anyone else who is responsible for the building.

## Preventing the formation of ice-dams

The presence of large icicles hanging from the eaves of your building is a sure sign that ice dams are being formed.

Ice dams are created by continual thawing and refreezing of melting snow on the roof at the point where the roof tiles meet the guttering. The melt-water runs under the snow and refreezes where it meets the frozen water in the gutter. This begins to form a dam that grows as additional snow melts. The water collects beneath the tiles, eventually leaking into the loft space and spreading to other parts of the building structure.

Ice dams will also form at the bottom of roof valleys where water is unable to escape. Here the water can accumulate and freeze to form a dam in the drainage channels causing any further melt-waters to overspill the drains and enter the building below.



## What can be done?

**If ice dams are known to form on a building, the following should be considered:**

- Maintain the loft space at a temperature as close as possible to the outside temperature so the ice and snow on the roof doesn't melt. This can be achieved by adequate insulation of the loft space and by increasing the flow of cold air passing through.
- Keep water pipes and heating equipment in separated areas of the loft space. If they have to be in the same area, maintain a cold loft space but lag and trace heat individual water carrying pipes. Also, enclose the heating equipment if possible and insulate the underside of the roof to reduce the heating effect on any snow above. Large heating equipment such as boilers should be relocated out of the affected roof space to enable a cold loft space to be maintained.
- Infra-red thermographic scanning of the loft space can help identify temperature profiles and detect warm or cold air leaks into the loft space.

## Guidance and useful information

**A range of information is available in QBE Risk Solutions Property Technical Guides, including:**

- Winter Freeze Checklist
- Escape of Water

### Other references:

- Association of British Insurers - Avoid the big freeze - November 2014 - [www.abi.org.uk](http://www.abi.org.uk)
- FPA/RISCAuthority - RC38 - Recommendations for frost protection measures for sprinklers - Nov 2004

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