
AXA
XL Risk Consulting
WaterWorks

WaterWorks

Introduction

AXA XL Risk Consulting has a proud heritage of loss prevention dating back to 1890. As a significant pioneer in this field, we've earned our distinguished reputation for our technical expertise, consultative approach, active industry involvement, and focus on continuous improvement.

Our risk consultants have in-depth knowledge of industry-specific hazards and expertise related to water damage loss prevention measures. Through our WaterWorks program, we've developed loss prevention resources related to mitigating water damage, preventing water ingress damage, loss prevention measures for fire sprinklers, and preventing water damage during construction projects.

We also offer tools to support loss prevention planning: Permission to Act Instruction Card and Wet Work Permit. Use these resources to minimize your water damage risks across your company's operations.

How to mitigate water damage

Water. It's a vital firefighting weapon.

It's also a critical domestic and industrial utility. For easy access, every facility has piped water for any one of these uses. However, even though it's an important resource, water that escapes from a piping system can be very destructive and result in tremendous property damage and costly disruption in operations.

Fortunately, with a little attention, most water damage losses can be prevented. And losses that do occur can be significantly minimized when the right precautions are taken.

The basic measures to prevent these losses are Design and Engineering, Prevention and Preventative Maintenance, and Pre and Post Emergency Planning. These loss prevention measures not only apply to water leakage, they can also be applied to many kinds of liquids found at facilities, as well as help to prevent water damage from floods.

Design and Engineering

When designing and building a new facility:

- Domestic water lines should not be installed above critical services. For example, in a hospital, a water line for an icemaker should not be located on the floor directly above an MRI machine.
- Stock materials, supplies, products on pallets or store on skids.
- Locate important processes or storage above sub-grade areas.
- Design roof drainage to anticipate a 100 year event rainfall intensity for a one hour duration.
- Locate heating system thermostats to effectively monitor or control heat in areas where piping systems are located.
- Look at water leakage detection options. There are several types available.
- Invest in backup generators, fuel gas, and/or boilers to maintain heating systems during utility failures.
- Brace piping systems properly to withstand earthquakes.

Prevention and Preventive Maintenance

As part of a facility's regular maintenance procedures, it's important to:

- Establish freeze protection protocols
  - Ensure that windows, doors or skylights are not left open causing temperatures to drop in parts of a heated building.
  - Ensure that the heating system is serviced long before cold weather is expected and that maintenance is ongoing during the cold season.
  - Low temperature alarms should be regularly tested.
- Conduct visual inspections of water pipes for signs of leakage, deterioration, and fitting integrity.
- Make sure roof drains are clear of debris.

Pre- and Post-Emergency Planning

Mishaps happen. Successfully handling incidents like leaks and flooding require advance preparation and planning, such as:

- Know where the valves are and what they control. The loss associated with leaks can be increased multifold if no one knows how to shut off the water. Provide readily accessible diagrams showing what valves control which systems. Clearly label all valves. Valves that are concealed should have their location well-marked.
- Have blanket order contracts for critical suppliers and contractors. This ensures a priority response during times of increased demand and also avoids haggling over contract terms and conditions in the middle of an emergency.
- Give second and third shift plant managers predefined spending authority to request emergency contractor services.
- Maintain basic salvage supplies such as plastic sheeting, wet-vacuum cleaners and squeegees.

How to prevent water ingress damage

Water comes from many natural and manmade sources. Direct rain, flood water, surface water runoff, municipal infrastructure (eg drains, sewers, and water pipes), snowmelt, and ice are just a few.

But when there's too much water, it can be a force to be reckoned with. It can cause water ingress damage. Routes of entry include the roof, perimeter building envelope, connections to municipal drainage (eg sewers) and normal building openings.

Preventing Water Ingress Damage

Use this checklist to help prevent water from natural or manmade external sources from entering a facility's envelope. It includes basic measures to prevent water ingress damage in three areas:

- Design and Engineering;
- Prevention and Preventative Maintenance; and
- Pre- and Post-Emergency Planning.

Design and Engineering

When designing and building a new facility:

- ☐ Locate new facilities with due consideration to exposure to natural catastrophes. Even if a facility is above a flood plain or engineered against wind damage, a site can still have ingress/egress issues and loss of utilities.
- ☐ Snow and wind load design should be based on ASCE 7 for Risk Category IV buildings or other recognized insurance industry guidelines.
- ☐ Particular attention should be paid to perimeter fastening at the roof and reinforcement at changes in roof elevation where snow can accumulate.
- ☐ Design sloped roofs with overhangs to prevent ice dams.
- ☐ Protect windows of buildings located in hurricane and typhoon prone areas (basic wind speed of 130 mph (58 m/s)) with impact -protective system or impact-resistant glazing.
- ☐ Design roof drain systems based on a 1 hour rainfall intensity with a 1% chance of occurrence.
- ☐ Design flat roofs with a secondary drainage system
- ☐ Important processes or storage should not be located in sub-grade areas.
- ☐ Hastily prepared flood barriers such as sandbags or temporary earthen levees are only suitable for small scale blocking such as individual doors or drains. For full building protection, purpose-built commercial barriers are needed
- ☐ Sewer backflow prevention valves should be used.

Prevention and Preventative Maintenance

As part of a facility's regular maintenance procedures, it's important to consider:

Rain entry

- ☐ Ensure that windows, doors or skylights are not left open causing temperatures to drop in parts of a heated building.
- ☐ Ensure that the heating system is serviced long before cold weather is expected and that maintenance is ongoing during the cold season.
- ☐ Low temperature alarms should be regularly tested.
- ☐ Inspect roof drains, to make sure they are clear, on a frequent basis. Increase the inspection frequency just before and during rainy and snow seasons.
- ☐ Inspect building walls constructed of Exterior Insulation Finishing Systems (EFIS) panels for cracks, repair them if found
- ☐ On flat roofs, inspect the integrity of the roof cover to ensure there are no holes, tears or seams separating.
- ☐ Remove any tools and movable equipment from roofs prior to any wind storm so it would not blow around during a storm and tear the roof covering.
- ☐ Inspect all roof top equipment to make sure the equipment is properly secured so it would not come loose during a storm and tear the roof covering.
- ☐ Remove excessive snow from roofs. Remove snow from the perimeter of the high sloped roofs to minimize ice damming.

Flood barriers

- ☐ Many purpose-built commercial flood barriers require maintenance of mounting equipment and flood gates. Large flood gates can be motor driven and those motors need maintenance.

Pre and Post Emergency Planning

Water damage happens. When it occurs, you need to be able to react quickly to the situation. Reponse time can be the difference between a minor loss versus a major one. Advance planning is essential so that when disaster strikes, you are prepared to act. For getting prepared, you should:

- ☐ Have blanket order contracts for critical suppliers and contractors. This ensures a priority response during times of increased demand and also avoids haggling over contract terms and conditions in the middle of an emergency.
- ☐ Water removal contractors are important emergency response contractors. Examples include:
- ☐ Flood barriers that are already identified in the plan, along with the means to move them such as flatbed trucks, all terrain forklifts, and cranes
- ☐ Repair contractors
- ☐ Emergency snow removal contractors
- ☐ Second and third shift plant managers should have predefined spending authority to request emergency contractor services.
- ☐ Maintain basic supplies such as sandbag supplies if needed for flooding, plastic sheeting, wet-vacuum cleaners and squeegees.

By using this checklist of loss prevention measures, you can help to prevent water ingress damage at your properties.

Loss prevention measures for fire sprinklers

Study after study proves conclusively that sprinklers are the most effective form of fire protection for most facilities.

However, since the very beginning of their use, there has been concern about water damage during a fire or an accidental discharge or pipe break. Although these fears are exaggerated, sprinkler system leaks do occur and have caused significant damage. As with other water piping systems, some basic measures can eliminate or mitigate sprinkler leakage losses.

Sprinklers are among the most highly regulated of piping systems. If sprinklers, along with associated underground water mains, water tanks, and pumps, are installed, tested, and maintained in accordance with industry standards, the chance of an incident is vastly reduced.

Here are some loss prevention measures related to sprinklers:

- ☐ Leaks due to corrosion are an area of increasing concern. This is a highly complex topic and your AXA XL property risk engineer can advise you on the most appropriate measure for your situation.
- ☐ Water hammers have caused major sections of pipe to blow apart, even during a fire. Many water hammers can be prevented simply by setting fire pump start pressures in accordance with NFPA 20, Fire Pumps.
- ☐ Hotel room fire sprinklers have been activated by guests mistaking them for a place to hang clothing. The industry has addressed this by placing "no hangers" signs by the sprinklers.
- ☐ Thrust blocks (which hold underground main fittings in place at changes of water flow direction) tend to be installed in a haphazard manner. Simply following industry guidelines can eliminate most failures.
- ☐ Properly tested and maintained sprinkler system waterflow alarms will provide quick notification of water flow. Relying on security services to discover sprinkler water flow has resulted in very long discharges; sometimes over an entire weekend.
- ☐ Sprinkler system leaks associated with earthquakes can be mitigated with proper bracing.
- ☐ Perhaps most importantly, during a fire, sprinklers should only be shut down on the advice of the fire service incident commander after the fire is clearly controlled. Someone with a radio should stand by at the valve to re-open it immediately if the fire redevelops.

Insurance loss data over the past 10 years show that water damage has become a leading cause of Builder's Risk claims. Whether from external sources (rain, ground water, flash flooding, etc.) or internal sources (water escape or fluid release), water damage has a significant impact on a construction project.

In addition to the physical loss, water damage usually impacts the project schedule. In this era of increasing deductibles, accelerated schedules, and contract penalties, even small water incidents can result in large losses. Although higher deductibles generally reduce insurance premiums, contractors may face an unexpected expense when water damage occurs.

So, what can you do about it? It's all about prevention. The best protection from water losses is through taking proactive measures to avoid water damage.

Prevention is the best protection

Ground water and weather related events are typically a concern early in the construction project during excavation and foundation activities. Preventing these types of losses requires analysis of the unique exposures presented by each project site. Increased attention to early site grading and provision of storm water drains to divert water away from the building can help prevent flash flood, erosion and subsidence claims. Ensuring redundant capacity for dewatering systems (i.e. generators, pumps, etc.) can prevent losses caused by equipment failure.

Water intrusion and water escape become primary concerns once the building structure is complete and the MEP systems and finish materials are being installed. After the building is dried-in, almost every water event will result in a significant loss because of the accumulation of value and schedule impact. At the same time, preventing water damage becomes more difficult because work inside the building is not readily visible, more trades and workers are involved, and there are multiple sources of water.

Water intrusion usually results from weather or external sources of water entering through the building envelope. In high rise buildings, building envelopes may have required openings for hoists and cranes that can be difficult to seal. Before the envelope is complete, and where exterior openings are unavoidable, installing temporary closures (i.e. tarps, panels, etc.) and temporary flashing or curbs, such as water dams, around all interior floor openings will help keep water from migrating to other floors via gravity.

Sources of water escape

Water escape usually results from the processes used to install, test, and fill internal building systems. Some potential sources of water escape are:

- Domestic water distribution system and fixtures
- Roof drains and storm drain leaders (piping)
- Sanitary sewer system
- HVAC fluid systems (Chilled Water or Refrigerant piping)
- Fire suppression risers and piping

In addition to the "system" sources of water above, the following trades may also create potential sources of water escape:

- Spray Fireproofing (water for mixing)
- Interior Masonry (water for mortar mixing and wet saw)
- Flooring and Tile (water for wet saw and mixing grout)
- Painting and Wallcovering (paint, water for mixing and application)
- Swimming Pool, Spa, and Stucco (water for mixing materials and filling the pool)

One method for preventing water escape is controlling access to water sources. This can be accomplished through the inclusion of isolation valves allowing water to be shut off to specific areas within the building or a master shut off for the whole building. Automated valves and flow switches are also available to control and monitor water flow in a structure. Adding control valves may incur additional cost, particularly if the building design is already complete, which must be weighed against the potential costs of a loss.

Preventing water damage during construction projects

Water damage prevention tools

The most effective and least cost methods to prevent water losses once a building is enclosed are enhanced vigilance (inspections) and subcontractor management that focus on water exposures. We suggest using two complementary tools, shut down inspections and wet work permits, to help project teams prevent water losses.

Shut Down Inspection

To maintain awareness and provide a structured system for inspection of water hazards, we suggest project teams create a project specific "shut down" inspection checklist and implement shut down inspections once the structure is complete and interior work begins. The items on the checklist may need to be revised as the project progresses toward completion. Project staff should be assigned the responsibility for walking the building and completing the checklist before leaving the site (after all trades have completed work). The responsibility can be rotated among the staff as necessary. Depending on the exposure level and progress of the work, the "shut down" inspections should be performed daily, but not less than weekly and whenever storms are forecast. Multiple staff members may be assigned discrete segments of the building on larger projects.

Here are some suggested items to include in a "shut down" inspection checklist:

- ☐ Dewatering or sump pumps are "on line" (generators fueled, if applicable) discharge hoses are connected
- ☐ Verify that roof drains are clear with strainers in place
- ☐ Verify roof drains are connected to temporary or permanent drain piping
- ☐ Ensure any material stored on the roof is secure and tied down
- ☐ Verify that roof hatches and doors are shut and secured
- ☐ On each floor, verify exterior openings are sealed and temporary protection is secure
- ☐ Moisture sensitive building materials are covered and elevated (on dunnage) off the floor
- ☐ Check all wet work permit locations (see below) to make sure hoses are disconnected and drained, water supply is shut off at the riser or nearest control valve, and all waste water has been removed from the building
- ☐ Last look at Hot Work locations (no fire exposures)
- ☐ Check bathrooms and riser closets, make sure no water is running
- ☐ Notification protocols should be established so the "inspector" knows who to call if there are any issues that require immediate correction. Valve locations should be marked (i.e. wayfinding placards, signs or visual markings) on each floor so they are easy to find.

Wet Work Permit
To maintain project team awareness of the trades working with water inside the building, we suggest implementing a “Wet Work” permit system once the building is enclosed to track water exposures and focus attention on the systems and trades that may require more diligent supervision to prevent losses.

Similar to a “Hot Work” permit system, a “Wet Work” permit system requires subcontractors to submit a simple form advising the controlling contractor whenever their work involves water or other fluids. The permit lists the scope of work, location of work, the amount of water involved and mitigation if water escapes. The sample Wet Work Permit (page 11) provides a simple, yet effective way to track water use, ensure that subcontractors are implementing adequate risk mitigation techniques, and facilitate inspections to minimize the risks of water damage.

We suggest that a single individual (Superintendent, Project Engineer, MEP Coordinator, Quality/Safety Manager) be given responsibility for reviewing, approving, and tracking all permits issued. Permits should be completed electronically or in duplicate with the subcontractor, posting one copy in the field (if printed documents are used). The original copy should be maintained in the contractor’s office and closed after the final inspection is completed. We suggest limiting permit duration to one day or, at most, one week but limited to a specified area of the project. The idea is to limit the scope of the permit so the location of work is known and there is more control of the exposure to water damage.

The responsible person should let all project staff know each day which trades have active permits and the work locations so more frequent inspections take place. Closing inspections should be completed before leaving the site each day (see “Shut Down Inspection” section) to verify that all water sources are shut off at the riser or source, hoses are disconnected and drained, no leaks are occurring, waste water has been removed, and the work area is secure.

For permit applications related to filling or pressurizing fluid distribution systems (sprinkler piping, chilled water, domestic water), we also recommend:

- ☐ Require a visual inspection for open ports or missing heads.
- ☐ Require air pressure testing before introducing fluid, even if there have been previous tests
- ☐ Require the subcontractor provide a “water watch” for at least two hours after the system or zone is under pressure to make sure there are no leaks.

By incorporating the Shut Down Inspection and Wet Work Permit tools into their standard practices, companies can reduce the potential for water damage losses. However, even when these preventive measures are implemented and executed, water intrusion and water escape incidents can still happen. When they do, companies should be prepared with response and mitigation protocols that will minimize the impact of such incidents.

Contact:

For more information on WaterWorks and how our risk management solutions can fit your needs, contact your AXA XL Risk Consultant, or call+1 866-866-8965.

WaterWorks
Permission to Act Instruction Card

INSTRUCTION ON HOW TO USE THIS CARD-- CUT THIS OUT AND POST N PROMINENT LOCATION

You have permission to act if water is flowing!

If an event occurs where water is entering the facility unwantedly, response needs to happen quickly. If someone reports a water line break, the water line must be shut-off immediately and repairs made. If a window shatters during a windstorm and rain is coming into the building, temporary repairs need to be made and arrangements to have a contractor repair the window need to be made.

If any of these events occur, local facility’s personnel must have the authority to react and arrange for repairs. If needed, they should be authorized to purchase material immediately to minimize further damage -- without permission from senior management.

The senior person who can be immediately reached is authorized to call the following preapproved contractors, pay expediting fees, and authorize overtime up to an amount of $_____. Emergency estimates from the contractor are acceptable. The senior person may also authorize production to be shut down.

Contractor	Specialty	Emergency Contact 1	Emergency Contact 2
	General water leaks		
	Fire sprinkler related		
	Roofer		
	Glazer (glass)		
	Water damage cleanup		
	Emergency lighting to accomplish the other tasks		

Additional Notes/Instructions:

_____
_____
_____
_____
_____
_____

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Wet Work Permit

This permit is intended to be used for non-typical fluid use applications. Examples include repairs or modifications plumbing systems, connecting new equipment, non-routine filling of tanks, system commissioning, etc. It is especially intended where work could cause pipe, hose, tank, or valve failure.

It is not intended for day-to-day operations, wash downs, etc. It is also not intended for minor operations with little or no damage potential. This will frequently be a judgement call.

Details on preventing water or other liquid damage, as well as building/system design and preparedness to mitigate damage is found in this brochure, WaterWorks.

For changes to the building envelope that could allow water ingress, please see the AXA XL RISK CONSULTING OVERVIEW Manual section on Management of Change.

Project Name:_____

Subcontractor: _____

Effective Date:_____

Expiration Date: _____

Work Schedule (hours when fluid is in use): _____

_____

Location of Work (specify floor and area): _____
_____

Building Systems Affected: _____
_____

Type of Fluid being used: (water, ammonia, glycol, refrigerant, etc.) _____

Fluid being used for: (filling, mixing, lubricating, etc.)

_____

Quantity of fluid involved: (approx. capacity of system or qty.)

_____

Will hoses be used to convey water/fluid? ..... ☐ Yes ☐ No
If so, have hoses been inspected for damage and pressure rating? ..... ☐ Yes ☐ No
NOTE: Hoses must be disconnected and drained at the end of each shift/day

Will the work generate waste water?..... ☐Yes ☐ No
How will waste water be collected and removed? _____

_____

NOTE: Waste water must be removed as needed and at the end of each shift/day

Are spill kits provided?..... ☐ Yes ☐ No
Are kits stocked\in place? ..... ☐ Yes ☐ No
Are all valves for the affected system identified and clearly marked in work area? ..... ☐ Yes ☐ No
NOTE: if for any valve that is to be operated, the next valve upstream should be identified in case the primary valve breaks or fails.

Are all crew members trained to locate and operate valves to stop fluid release? ..... ☐ Yes ☐ No
Are floor/area drains in the work area connected and functioning? ..... ☐ Yes ☐ No
Are there ways to contain capture and remove fluid leak(s)?..... ☐ Yes ☐ No
Is leak detection provided?..... ☐ Yes ☐ No
Are auto shutoffs provided?..... ☐ Yes ☐ No

Periodic leak inspections are ☐ Required ☐ Not Required
(Frequency: _____)

WATER WATCH is ☐ Required ☐ Not Required
for _____ hours following completion

AUTHORIZATION
Subcontractor Superintendent:

_____

GC Superintendent (or delegate):

_____

RECORD OF PERIODIC INSPECTIONS
Inspector: _____
Date_____Time _____

Inspector: _____
Date_____Time _____

Inspector: _____
Date_____Time _____

Inspector: _____
Date_____Time _____

PERMIT COMPLETION AND CLOSURE
Date and Time work ended:_____

Final Inspection of work area(s) with no signs of leaking (Sub):

_____

Final Inspection of work area(s) with no signs of leaking (GC):

_____

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