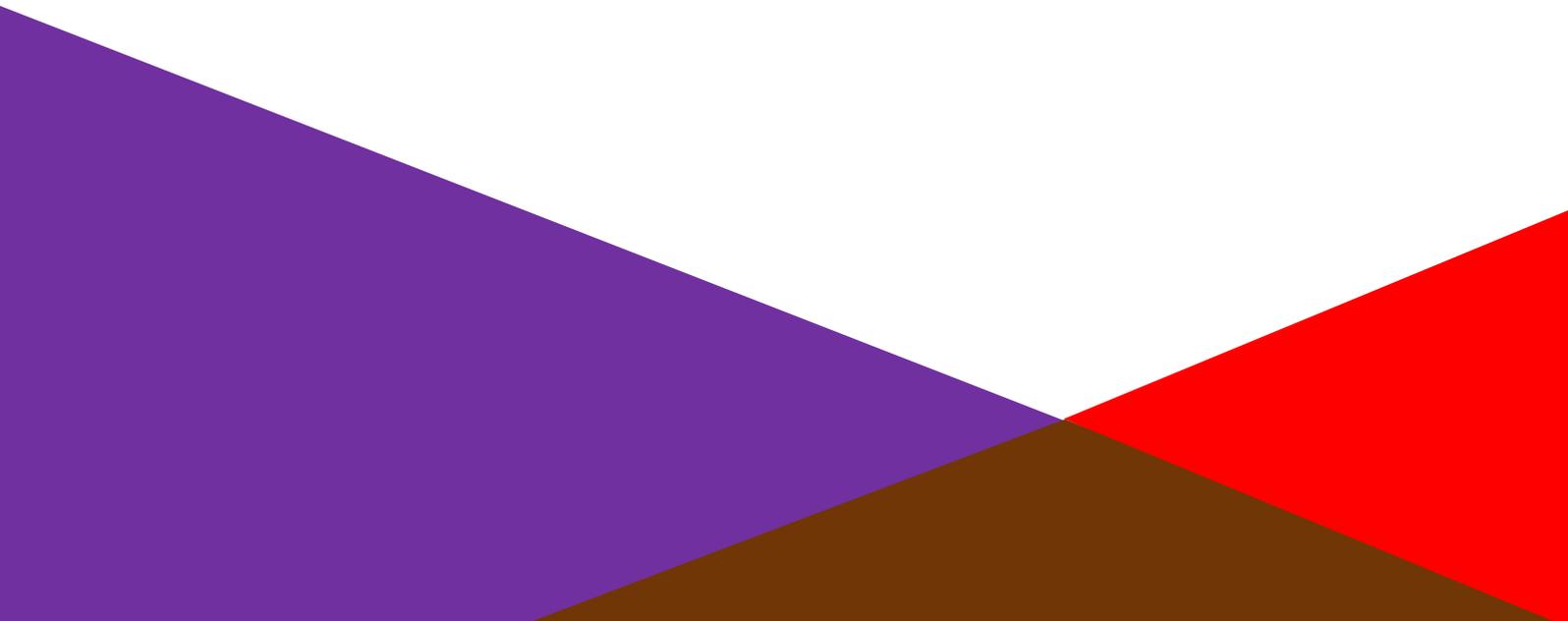


**WATER DAMAGE
FROM WEATHER,
FLOOD AND PIPED-
WATER HAZARDS**



Risk Control Guide

Introduction

Each year there are numerous insurance claims for damage to Buildings, Contents/Stock and Machinery caused by water. This Risk Control Guide is intended to demonstrate the various ways in which this damage may occur and how to reduce the risk and consequential damage.

Items damaged by water contamination or corrosion may be uneconomical to salvage or may require expensive re-packaging and repair. Associated costs can be high, especially when sensitive products are concerned.

The unusual rainfall patterns seen in recent years have caused flooding in areas historically considered to be at low risk. Both the frequency and the size of losses have increased significantly.

Flood can also occur from rivers. If this type of event is not inevitable, it is at least predictable and therefore consequences can be minimized.

Many other losses are caused by failure of some part of the water supply system, or sprinkler systems.

This document sets out various recommendations which will help to alleviate the expense and business interruption that can be caused.

Weather Hazards

The fabric of the building must be well maintained to protect the contents from the natural elements. All buildings need frequent and careful examination to prevent damage to the buildings from water entry. Roof collapse is also a risk in case of heavy-rain or snow accumulation above maximum roof load design. Blocked drains can be an exacerbating factor.

When planning the construction of a new building, calculations should fully cover natural hazard exposures with due reference to relevant local and national codes. Weather hazards include maximum wind speed, tornado exposure, hail hazard, snow load, rainfall density and lightning. The exposure to many of these hazards can be found using a number of online tools and building codes. See the Appendix at the end of this document for some suggestions. RSA Global Consulting may also be consulted at project phase to provide advice on best practices. When high hazard exposures are identified, practical protections and an emergency response plan should be implemented.

The following are typical regular checks that should be carried out. Frequency should be adapted to the risk, and appropriate action should be taken when required, although a minimum annual frequency is recommended:

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- Check roofs and replace any loose or damaged tiles, slates, ridge tiles and any other damaged roof claddings and flashings.
- Check that flat roof coverings are in good condition, not showing evidence of cracks or splits, and are firmly stuck down, particularly at joints. Remember that bitumen felt flat roof coverings may need to be renewed every 10-20 years.
- Check the condition of roof lights for leaks, cracks or breakages.
- When the site is in an area exposed to a high wind speed, additional roof fixings (from standard) should be provided at high exposure points, especially around roof perimeters and corners.
- Check and repair as necessary all cement fillets and brickwork pointing including chimneys, coping stones, lintels and ledges.
- Check that roof gutters and downpipes are clean and unobstructed and kept free from leaves, moss and vegetation. These should be cleaned at least once a year, possibly more often depending on local trees etc.
- Check that if gutters overflow in storm conditions the water will be discharged outside the building. This is particularly relevant to valley gutters and those which run behind parapets. Where overflow gutter-outlets discharge through the parapet to the outside of the building, overflow weirs should be considered if not already fitted.
- Check all internal drainpipe systems with regard to the following:
 - Are they protected from mechanical damage and securely fixed?
 - Are all inspection covers and rodding eyes easily accessible and free from internal obstruction?
 - Are the covers securely fixed to prevent leakage?

Also:

- Check the condition of the underground drains.
 - Lift manhole covers and check that the drains are clean.
 - Make sure that the water runs freely without backing-up inside the manhole.
 - If the pipes are dirty or the water appears to run more slowly than would be expected, have the drainage system cleaned, which may require removal of tree roots.
- Check that all gullies, gratings and drainage channels both inside and outside the building are clean and free from obstruction.
 - If the external yard is large, there may well be an oil interceptor, which will also require routine cleaning.
 - Certain types of pre-formed concrete yard drainage channels are particularly prone to blockage, and must regularly be rodded through.
- It is possible that, despite having done all of the above, there may still be problems with rainwater drainage systems. Typical problems are:

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- Gutters that regularly overflow (even though they are clean and well maintained).
- Constant damp patches on walls.
- Puddles that collect on flat roofs in wet weather.

These indications of inadequate drainage design will need specialist attention and the advice of a qualified building surveyor or engineer is required.

- For buildings located in areas prone to heavy snow falls, calculate maximum snow-loads allowed on the roof depending on the roof load calculations. Additional considerations should be made where Photovoltaic panels are installed. Provide adequate equipment to remove snow from the roof and set up an action plan in case of excessive snow falls, including the maximum snow load at which the emergency plan should be launched.

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Flood

Flooding, although normally associated with inundation from sea, reservoir, river or canal can also be caused by melting snow or intense rainstorms with which drainage systems cannot cope. The risk that premises could be affected by flood water needs to be assessed and appropriate precautions taken.

To define the flood exposure, the following data can be used:

- Government studies.
- National flood maps (often on-line – see Appendix).
- Local studies, local flood history and recent developments which could increase flood hazard.

Also search for ground water flood exposure. This often regards sites located close to areas prone to flood.

If the site is exposed to flood hazard, then an emergency response plan should be put in place as well as appropriate physical protection when needed.

1) Before flood

- Define a warning method and a defined water level at which an emergency plan should be initiated. Alerts can be sent to the site by environmental agencies or very accurate information can be found on the internet on water level evolution. See appendix for more information.
- If the site is not directly exposed to flood, but could be adversely affected by flooding of neighbouring or nearby areas, evaluate the possible impact from disruption (such as failure of electrical supplies and inaccessibility of access roads).
- Evaluate potential damage to storage, buildings and critical equipment.
- Ensure drains are cleaned on a regular basis.
- Prepare appropriate physical protections against flood damage:
 - Provide valves on drainage systems, sewers etc. as well as flood-gates and barriers if and where practical and appropriate.
 - Procure adequate stocks of suitable sandbags, or ensure that these can be readily sourced at short-notice.
 - Elevate/protect critical equipment such as transformers, fire pumps etc. Installation of critical machinery (e.g. electrical cabinets) in flood prone areas should take into account possible flood-water level and ensure that such equipment is elevated appropriately.
 - Install sump pumps in basements which could flood. Pumps should operate automatically on float switch operation. An alarm should signal in a constantly attended location.

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- Check that flammable liquids tanks (including external tanks) are safely anchored.
- Underground tanks should be full; any empty tanks filled with water to reduce / remove buoyancy.
- Relocate or elevate susceptible storage and ensure that damaged stocks can be replaced. At the very least products should not be stored directly on the floor and should be placed on pallets.
- Establish a flood emergency response plan, ensuring that there will be adequate means of communication. Establish a list of emergency actions, typically to include:
 - Closing flood-barriers and deploying sandbags.
 - Move or elevate storage and equipment to avoid flood damage.
 - Dismantle equipment when critical and practical.
 - Shut down electricity and secure electrical equipment parts when possible.
 - Close sewers and drainage system valves.
 - Make-safe flammable liquids storage

2) During flood

Maintain an adequate level of security to prevent theft and burglary. Ensure that fire protection is still in operation. (Fire following flood is a real risk.)

Plan salvage operations: e.g. call for support, e.g. specialist contractors (they will be busy in a flood-emergency, so it is best to call them as soon as possible. If critical, a pre-flood contract can be defined).

3) Salvage operations

- Start salvage operations. Pump-out flood-water and start cleaning operations.
- Check electrical supplies are safe to reinstate using qualified personnel. Thermographic inspection should be considered when electrical installations are impacted. Considered the need for additional power, required during the salvage and drying out process.
- Check safety of flammable liquids, gas storage etc.
- Check fire protection, including fixed and portable systems and alarm systems. Conduct repairs as needed.
- Check production equipment in preparation of restart: Provide a contact list of all contractors that may be useful in assisting recovery.

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Water pipes and tanks

There are four principal causes of water loss from pipes and tanks:

- mechanical damage
- corrosion
- freezing, and
- overflowing (tanks).

Water pipes serve domestic, industrial and fire protection systems and there is a possibility that any part can leak. The following points for minimising leakage and its effect should be considered. A regular maintenance program should be implemented with appropriate action plan:

- Check the age and general state of each water-system, including the support by pipe clips and hangers, and if in poor condition get a professional plumbing contractor to replace or improve it.
- Check that adequate Public Liability insurance is held by any plumber employed.
- Check whether pipes are located in positions vulnerable to mechanical damage e.g. where they are liable to be damaged by fork-lift truck. If so, they must be protected or relocated or the threatening activity moved.
- Ensure water pipes are not installed above critical equipment such as computer-servers and electrical cabinets. Remove it if this is the case.
- Consider the installation of water loss detection alarms and shut-off valves, which for some larger premises may be appropriately linked to a central monitoring station. This should also be considered for computer and communications areas, regardless of size, based on the vulnerability of the business to disruption.
- Metal pipes may be liable to corrosion, internally or externally. Check that closed systems, such as heating pipes, are protected with suitable anti-corrosive additives when needed.
- Check on a regular basis that there are no signs of even minor leakage. If any leaks are found they should be immediately repaired.
- Check that the premises are adequately heated, pipes lagged and water tanks protected against the effects of frost, particularly during winter-holiday shutdown periods. Advice is available in our brochure '*Winter Precautions*'.
- Check that the overflow pipes on water tank cisterns are of adequate size, and have unobstructed discharge to an appropriate place, usually to the outside.
- Make sure that the location of stop-cocks on water-mains are known and accessible to staff. Regularly check that stop-cocks are operational. Also make sure that there are sufficient subsidiary isolating valves, especially for large tanks. Provide these with labels to help ensure correct identification and operation.

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- Flexible connectors are often used for wash basin taps, drinks machines and similar. These can suddenly fail, and release large volumes of water in vulnerable areas. Isolating valves should be fitted in easily accessible positions, and the connectors themselves regularly examined and replaced if necessary.
- Check that all floors have adequate drainage, so that any water damage is localised.
- In places where water spillage could possibly run down a wall, check that electrical switch gear boxes are protected and preferably spaced away from the wall.
- Sprinkler installations need special attention and any specific instructions and maintenance requirements should be followed. Specific advice on their care and maintenance can be obtained from RSA Global Consulting.
- For in-rack sprinklers, ensure that the minimum distance of 150mm from storage is respected. Install specific damage protection if needed (using a sprinkler contractor). Train the forklift truck drivers with regard to the risk of water damage. Change any damaged sprinkler-heads, pipework and other associated equipment as necessary.
- Air conditioning units can produce large volumes of condensed water. For externally mounted units, this is generally not a problem, but the small units often fitted internally to computer/communications areas have caused serious problems, as their drain lines can easily be disconnected.
- Ensure employees are trained to limit damage in case of leakage. For example, they should know the location of the main water valves, be able to shut off the sprinkler system and so on. Adequate training procedures should be in place.

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APPENDIX

Austria

Weather Hazards References

Munich RE website allows the display of natural hazards for a location through the Nathan online tool. Registration is needed:

- <http://www.munichre.com>

RSA Global Consulting has access to the information and can provide this during or after a survey.

Flood Hazards References

The main source of information is the following website:

- <http://hochwasserrisiko.at>
-

Belgium

Weather Hazards References

Munich RE website allows the display of natural hazards for a location through the Nathan online tool. Registration is needed:

- <http://www.munichre.com>

RSA Global Consulting has access to the information and can provide this during or after a survey.

Flood Hazards References

Flood maps are handled at community level. Please note that the maps provided on the public tools take into account the law in urban planning:

- <http://cartographie.wallonie.be/NewPortailCarto/index.jsp?page=subMenuIndations&node=32&snode=322>
 - <http://geovlaanderen.agiv.be/geovlaanderen/watertoets2012/>
 - <http://www.overstromingsvoorspeller.be/>
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France

Weather Hazards References

Munich RE website allows the display of natural hazards for a location through the Nathan online tool. Registration is needed:

- <http://www.munichre.com>

RSA Global Consulting has access to the information and can provide this during or after a survey.

Flood Hazards References

The following website provides a map of worldwide areas prone to flood. For France it defines 100 years and 500 years flood events. Free registration is needed:

- http://www.swissre.com/clients/client_tools/about_catnet.html.

The site <http://cartorisque.prim.net> defines 100 years flood events. Other potential sources of information include:

- <http://www.geoportail.fr>

The existence of a PPRI (*Plan de Prévention des Risques Inondation*) is available for areas prone to flood. Information can be provided from the internet and from the town hall. A flood warning can be arranged with local authorities if your site is listed (contact the town hall in this case for more details). It means that the site is called in case of flood exposure. Water level evolution can be also checked through the following website:

- <http://www.vigicrues.ecologie.gouv.fr/index.php>
-

Italy

Weather Hazards References

Munich RE website allows the display of natural hazards for a location through the Nathan online tool. Registration is needed:

- <http://www.munichre.com>

RSA Global Consulting has access to the information and can provide this during or after a survey.

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Information is also available from Servizio Metereologico Areonautica Militare (www.meteoAM.it)

Flood Hazards References

Autorità di Bacino Locale (i.e. www.adbpo.it, www.adbarno.it, www.adbve.it, etc)

Netherlands

Weather Hazards References

Munich RE website allows the display of natural hazards for a location through the Nathan online tool. Registration is needed:

- <http://www.munichre.com>

RSA Global Consulting has access to the information and can provide this during or after a survey.

Flood Hazards References

The main sources of information are the following websites:

- <http://www.ahn.nl>
 - <http://www.risicokaart.nl>
-

Portugal & Basque Country

Weather Hazards References

Sources of information exist at:

http://www.inag.pt/index.php?option=com_content&view=article&id=39:Planos%20de%20Bacias%20Hidrográficas&catid=5:pbh&Itemid=70

and

http://www.uragentzia.euskadi.net/u810003/es/contenidos/informacion/2011_epri/es_doc/index.html

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Spain

Weather Hazards References

Munich RE website allows a display of natural hazards for Spain through the Nathan online tool.

<https://munichre.com>

Registration is needed. This tool is very basic for Spain and mainly used for coastal flood zones.

Flood Hazards References

The main government flood website is shown below. It provides an interactive map to which information can be added such as 'Cartografía de zonas inundables':

<http://sig.marm.es/snczi>

Sweden

Weather Hazards References

Munich RE website allows the display of natural hazards for a location through the Nathan online tool. Registration is needed:

- <http://www.munichre.com>

RSA Global Consulting has access to the information and can provide this during or after a survey.

Flood Hazards References

The main source of information is the following website:

- <http://msb.se/sv/kunskapsbank/>
-

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UK

Weather Hazards References

Environmental Agency web site:

- www.environment-agency.gov.uk/flood/maps/htm

Munich RE website allows the display of natural hazards for a location through the Nathan online tool. Registration is needed:

- <http://www.munichre.com>

RSA Global Consulting has access to the information and can provide this during or after a survey.

Flood Hazards References

Various sources of information exist as follows:

- The Chartered Institute of Plumbers: Telephone: +44(0) 1708472791, Web: <http://www.iphe.org.uk/>
- The Water Guide Web: <http://www.water-guide.org.uk/index.html>
- British Standards (BSI): Web: <http://www.bsi-global.com/en/>
- BS5422:2009 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment.
- BS 5970:2001 Code of practice for thermal insulation of pipework.
- BS 6351-2: 1983 Electric surface heating: Guide to the design of electric surface heating systems.
- BS 6351 part 3: 1983 Electric surface heating: Code of practice for the installation, testing and maintenance of electric surface heating systems.

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United States of America

Weather Hazards References

Munich RE website allows the display of natural hazards for a location through the Nathan online tool. Registration is needed:

- <http://www.munichre.com>

RSA Global Consulting has access to the information and can provide this during or after a survey.

Flood Hazards References

The main source of information is the following website:

- <http://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1>

Disclaimer

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