

Loss Prevention Standards

Escape of Water on Construction Sites

Introduction

The number and severity of water (fluid) escape incidents has increased in recent years and they are now the most likely cause of a loss from construction sites. An escape of water/fluid incident near to completion of a construction or fit-out project can result in significant disruption to the contract, resulting in delays and additional costs. There are a number of factors which are involved in such incidents including:

- Inadequate risk assessment(s)
- Insufficient awareness of potential problems at the design and installation stages
- Sub-standard installation through to commissioning
- Deficient training
- Inadequate security and supervision
- Lack of emergency response
- Insufficient consideration of the impact of a leak



Escape of water/fluid can arise from issues with the following systems:

- Temporary
- Permanent
- Drainage
- Waste/effluent
- Heating/cooling
- Sprinkler

Ensuring that the escape of water exposure is addressed involves allocating resources to identify and understand what the potential problems will be and implementing procedures and controls to reduce or mitigate them.

Risk Assessments and Water (Fluid) Management Plan

The Principal Contractor should be the Responsible Person for managing the exposure to water damage and they should ensure that a Water (Fluid) Management Plan is produced. The Responsible Person will have overall control and responsibility, but in practice they may appoint an experienced person employed by the Mechanical & Electrical (M&E) Contractor to undertake day-to-day responsibilities of the water/fluid damage risk. Measures which remain with the Responsible Person are:

- Selection of sub-contractors
- Design and installation of a risk assessed plumbing system
- Using contract terms that specify the standards for the installation works
- Commissioning procedures
- Systems testing

The construction/fit-out Water (Fluid) Management Plan should detail the following information:

- Responsible Person to manage exposure to water/fluid risk
- Responsibilities
- Selection of competent contractors
- Procedures and controls for mitigating risks
- Emergency response plan
- Quality controls throughout the project
- Factors unique to the project, e.g. high-rise buildings/high value equipment/construction methods and materials used

The methodology to allow all of these to be understood, enabling correct decisions and procedures to be in place throughout the construction phase/fit-out, and possibly beyond, is to undertake a Water (Fluid) Risk Assessment. All construction site hazards evolve and change during the course of the works so this assessment will need to be regularly monitored and reviewed, ensuring it remains valid from the design stage to handover of the project.

The Water (Fluid) Management Plan should be developed from the information provided by the Water (Fluid) Risk Assessment(s).

The assessment should consider factors such as the:

- Future maintenance of the system
- Intended use of the building
- Building height
- Building contents including equipment or arrangements that could easily be affected by water
- Building services

Other considerations should be to avoid features that would increase the extent of any damage such as: combined service-risers; concealed pipework; the location of water carrying services (including joint locations) and water tanks in relation to key/critical assets. Weather-related issues such as freezing temperatures, cold winds, heavy rain, flooding, groundwater etc., require to be considered.

To ensure suitable standards are met, there should be verification procedures in conjunction with independent quality control, to check the standards of the design, the installation works plus adherence to codes, including site checks with full certification and auditable records.

Note: Inadequate security and supervision of construction sites and subsequent theft of metal/malicious damage of fluid filled systems is an increasing cause of fluid escape, especially when a site is unoccupied.

Further information on water damage including the development of a Water Management Plan is produced by the [Construction Insurance Risk Engineers Group](#) (CIREG) entitled '*Best Practice Guidance – The Avoidance of Water Damage on Construction Sites*'.

Quality Control and Installation Standards

Only competent and qualified contractors should be used, with apprentices and trainees supervised by appropriately trained individuals. Where necessary, contractors should be trained by the manufacturer supplying the system if bespoke machinery or different techniques are required.

Plumbing, ventilation, heating and sprinkler companies should be members of recognised industry associations. Evidence of professional affiliations, membership of approved contractor schemes and staff training records should be investigated as part of the tender process.



Industry recognised codes, which are to be included in all work specifications and contract documents, include:

- The Water Supply (Water Fittings) Regulations 1999
- BS EN 806 Pts. 1-5 '*Specifications for installations inside buildings conveying water for human consumption*'
- BS 8558: 2015 '*Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages: Complementary guidance to BS EN 806*'
- Building & Engineering Services Association (B&ES) Good Practice Guides
- Building & Engineering Services Association (B&ES) '*Guide to good practice: Site Pressure Testing of Pipework TR/6*'
- Chartered Institution of Building Services Engineers (CIBSE) standards

As part of any installation, all pipework should be pressure tested in accordance with the manufacturer's guidelines and to a pressure and duration defined by the System Designer. The results should be recorded with independent witnessing included in the process. As part of any testing procedure there should be appropriate supervision along the entire length of the network under test, both during the test and for a number of hours after the test. This should include appropriate communication channels and means for raising an alarm if a loss of containment is sustained. The number of people involved in the supervision of the test should be based on a risk assessment, the location and number of joints, the vulnerability of the occupancy, etc.

Note: This could be compared to a 'fire-watch' for management of hot work and classed as a 'leak-watch' for the management of water networks.

If an occupancy is particularly vulnerable then a pneumatic pressure test should be completed prior to any hydrostatic or hydrodynamic testing.

Due to an increased likelihood of failure, a permanent water supply should always be installed in preference to a temporary main, e.g. for fire-fighting, temporary discharge pipes should not be placed in electric-risers.

Mitigation

Automatic Leak Detection

In every installation there should be a way to detect that water is flowing when it should not be, and a means to rapidly shut down the affected systems. There are a number of ways to detect flow including water management devices, early connection of the Building Management System (BMS) and physically monitoring the system.

The two main types of automatic water management devices are:

- A device which detects water flow in the pipework when none is expected or at higher volumes than normal
- A device which detects actual water leaks

Each operates to automatically shut down the water to the whole building or to an individual compartment depending on the installation design. Consideration should be given to installing leak detection in areas such as: bunds; bottoms of risers; in the vicinity of or on floors above high value, sensitive or critical equipment; cable trays; within air conditioning units; floor/ceiling voids; basements; etc.

Cold Weather

If severe or freezing weather conditions are forecast, exposed and vulnerable fluid filled systems should be drained down to prevent freezing-up of the pipework. Alternatively, electrical trace heating and/or lagging should be installed for exposed pipework.

Temporary Systems

Outside of working hours, any temporary fluid filled systems should be isolated at the master stop valve and be easily visible as being closed or formally labelled as such. Ideally, or in long periods of unoccupancy, the system should be drained down.



Emergency Measures

Emergency response procedures should be documented as part of the Water (Fluid) Management Plan to include:

- Identification of key and important individuals
- Simple clear instructions
- An accurate and up to date contact list
- Formal identification and location of all isolation valves and drain lines on:
 - Drawings
 - The actual physical systems themselves

The management team and any security personnel on site should have easy access to the plan, and regular drills should be undertaken of the emergency procedures throughout the construction project.

If any leaks occur (no matter how small) then:

- The incident should be formally investigated
- The root causes clearly identified
- Suitable remedial works undertaken:
 - Extrapolate to similar areas across the rest of the site
 - Update the project scope to ensure remedial measures are included in the remainder of the works
- Any learnings should be shared with the rest of the Group

Specialist Partners

The Aviva Specialist Partners listed below are well established and proven companies, who Aviva believe will give you great quality and value:

LeakSafe is a UK based company specialising in the supply of tailored leak detection and prevention systems. They manufacture their products in the UK and key elements of its range have been tested by BRE (Building Research Establishment) for performance and durability to ensure that they can be introduced to clients without reputational risk. LeakSafe valves are WRAS approved for use in the UK. LeakSafe are able to offer tailored products and advice based on the customers property and provide a solution which will identify leaks in all major risk areas. The LeakSafe solution is suitable for all commercial and residential properties looking for a bespoke solution to meet their needs.



[LeakSafe](#)



0344 848 0487

Waterguard Services Limited is a privately owned company based in South Yorkshire, UK. They use flow meter technology to identify leaks, monitoring the way water flows around a building. Specified by leading Building Service Engineers, they are proud of the quality of their products and service. With over 16 years' experience they know what matters to customers. Waterguard products can be quickly implemented into the majority of residential or commercial properties, offering quick identification of leaks which automatically shuts off the water supply, thereby preventing damage. The Waterguard solution is ideal for multi occupancy properties where escape of water occurs frequently.



[Waterguard](#)



01226 244200

For more information on any of the above solutions or to contact our Specialist Partners, please call the Aviva Risk Helpline on **0345 366 6666** - available 9am-5pm Monday - Friday.

Checklist

A generic Escape of Water on Construction Sites Checklist is presented in Appendix 1 which can be tailored to your own organisation.

Further risk management information can be obtained from [Aviva Risk Management Solutions](#)

Please Note

This document contains general information and guidance and is not and should not be relied on as specific advice. The document may not cover every risk, exposure or hazard that may arise and Aviva recommend that you obtain specific advice relevant to the circumstances. AVIVA accepts no responsibility or liability towards any person who may rely upon this document.



Appendix 1 – Escape of Water on Construction Sites Checklist

Location	
Date	
Completed by (name and signature)	

	Escape of Water on Construction Sites	Y/N	Comments
1.	Is an appropriately trained and qualified person identified to act as the Responsible Person for the Management of Water (Fluids) Damage risk on site?		
2.	Is a formal Water (Fluid) Management Plan in place?		
3.	Are appropriately trained and qualified person(s) identified to act as the Competent Person in the Water (Fluid) Management Plan?		
4.	<p>Have formal Water (Fluid) Risk Assessments been completed for the project?</p> <ul style="list-style-type: none"> ➤ Are there plans in place to formally review this as the project continues? ➤ Does this include the design concepts/drawings and then as they develop? ➤ Does this include physically reviewing the construction as it is being built? ➤ Do these consider what would happen if a leak/release occurred? ➤ Do these consider supply and waste? ➤ Do these consider weather-related conditions such as: <ul style="list-style-type: none"> ○ Heavy rain? ○ Flooding? ○ Ground water accumulation? ○ High or cold winds? ○ Sub-zero temperatures? ○ Snow and ice accumulations? 		
5.	<p>Have important or sensitive areas of the site been identified for their exposure to water damage?</p> <ul style="list-style-type: none"> ➤ Are there plans in place to formally review this as the project continues? ➤ Does this include the design concepts/drawings as they develop? ➤ Does this include physically reviewing the construction as it is being built? 		



	Escape of Water on Construction Sites Contd.	Y/N	Comments
6.	Is the Water Management Plan regularly and periodically reviewed and updated?		
7.	Is there a formal Water/Fluid Emergency Response Plan in place? <ul style="list-style-type: none"> ➤ Does this include key individuals on site and their expected response? ➤ Does this include an emergency response team? ➤ Does this include the role of any on-site security or similar in responding to an emergency? ➤ Does this cover the expected response 24 hours per day? 		
8.	Are all fluid carrying services, including waste, isolation valve locations and drain valve/drain line locations identified on accurate and formal drawings? Are these fluid carrying services, the isolation valves and drain line valves clearly labelled and readily accessible? Do these form part of the Emergency Response Plan? – See item 7 above.		
9.	Are only companies confirmed as being competent appointed to undertake plumbing, heating and sprinkler protection services?		
10.	Has the competency of individuals working on site been checked with qualifications and training verified?		
11.	Are 'STOP Audits' completed on the installation works, at all stages of the project, to ensure all activities and installations are being completed in line with expectations?		
12.	Are all water carrying installations and networks considered permanent?		
13.	Are temporary water carrying systems isolated at night?		
14.	Are there appropriate drain points on systems? Are these clearly labelled and readily accessible?		
15.	Are water carrying pipes prohibited from service-risers or within important rooms housing electrical systems, data cabling or other important, critical or sensitive operations? This includes pipes carrying waste or drains.		

	Escape of Water on Construction Sites Contd.	Y/N	Comments
16.	Are water tanks prohibited from being located above electrical equipment, other sensitive or susceptible equipment or occupancy?		
17.	Similar to (15) and (16) are water carrying pipes prohibited from above such areas?		
18.	Are electrical cables located in trays and risers located off the floor slab?		
19.	Are vertical and horizontal wall, floor or ceiling penetrations, wall perimeters, etc. sealed, curbed etc. to prevent water leakage spreading horizontally and vertically?		
20.	Has an automated method of detecting water flow or escape of water been included in the design of the system?		
21.	<p>Is a 'leak-watch' or are a number of 'leak-watches' employed during the installation, pressure testing and charging of water/fluid carrying networks?</p> <p>These individuals would be in place to spot leaks and communicate that leaks were occurring and to invoke the emergency response plan, i.e. similar to a fire-watch for hot work.</p>		
22.	<p>Prior to charging any system with water, have initial air tests, at a pressure minimum of 1.5 times the maximum expected working pressure, been completed and held for at least 2 hours?</p> <p>Only once this has been passed should any system be charged with water.</p>		
23.	Following (22) above have full pressure tests, for a minimum of 8 hours, been completed?		
24.	Is there a formal Quality Control system in place for the commissioning and testing the system?		
25.	Is there independent verification of the commissioning and testing activities?		
26.	Is a thermographic camera used to help identify any leaks or problems with condensation or damp?		



	Escape of Water on Construction Sites Contd.	Y/N	Comments
27.	<p>Are all incidents or near misses recorded and the root causes formally investigated?</p> <p>Are these findings widely shared, fed back into the project and the learnings incorporated elsewhere?</p>		
28.	Additional comments:		

