Published by:
Fire Protection Association

Escape of Water Prevention and Management on Construction Sites

The Joint Code of Practice on the Prevention and Management of Escape of Water on Construction Sites and Buildings Undergoing Renovation

With the support and endorsement of:
Construction Insurance Risk Engineers Group (CIREG)
London Engineering Group (LEG)
Chartered Institute of Plumbing and Heating Engineering (CIPHE)

First Edition: August 2024

ACKNOWLEDGEMENTS

Acknowledgement is made for the significant reliance on existing guidance documents of both the CIREG *Best Practice Guidance: Managing Escape of Water Risk on Construction Sites* (5th ed.) and the Chubb *Technical Lines Guidance Document: Construction Projects – Water Service Systems Risk Management* (2nd ed.) in producing this guide. Thanks also go to Adrian Butler of RISCAuthority, Alan Patrick of Chubb, and Oliver Wright of Aviva for the development of this JCoP.

RISCAUTHORITY

This publication has been one of the projects undertaken by RISCAuthority, an insurer-funded research scheme administered by the Fire Protection Association (FPA). The UK's leading insurers are members of RISCAuthority, which actively supports a number of expert working groups to develop and promulgate best practice for the protection of property and business from loss due to fire and other risks. The writing of the Joint Code was undertaken by the FPA Technical Division and experts from the insurance industry who report to the RISCAuthority Risk Control Steering Group. Other guidance documents produced by RISCAuthority on risk control are available at www.thefpa.co.uk.

The FPA is the UK's national fire safety organisation. Further details about our range of products and services are available on our website: www.thefpa.co.uk.

THIS DOCUMENT IS ENDORSED BY:

THE CONSTRUCTION INSURANCE RISK ENGINEERS GROUP (CIREG)

Comprises risk management professionals working in the United Kingdom and globally within the insurance industry who specialise in risk management of buildings and civil engineering construction. CIREG members are employed by insurance companies, insurance brokers and risk management consultants who work predominantly within the construction insurance market. CIREG members give professional risk management advice to insurers, clients, and contractors. We also liaise with professional and statutory organisations to develop effective controls, guidelines, and Codes of Practice for risk management of construction works. Further information is available at www.cireg.org.

LONDON ENGINEERING GROUP (LEG)

A consultative body for insurers of engineering class risks, providing a forum for discussion and education. Membership is drawn from the various insurance and reinsurance companies plus Lloyd's syndicates that are actively involved in underwriting risks within the engineering classes. The group produces various industry-recognised papers, coverage clauses, and guidance notes, and provides training for its members, plus junior and developing staff, through various presentations. Further information is available at www.londonengineeringgroup.com.

CHARTERED INSTITUTE OF PLUMBING AND HEATING ENGINEERING (CIPHE)

Founded in 1906, the CIPHE is the professional body for the UK plumbing and heating industry. Membership is made up of practitioners, consultants, specifiers, designers, public health engineers, lecturers, trainers, and trainees. The CIPHE has a membership of 7,500, including over 150 manufacturers and distributors. The CIPHE is a professional engineering institute (PEI), licensed to the Engineering Council and able to assess and award professionally registered status. The CIPHE is also a registered charity (charity number: 1124517) with the purpose to protect the health and safety of the public through a strong qualified membership that is reinforced by their competency and technical expertise. Further information is available at www.ciphe.org.uk.

CONTENTS

Note on drafting:

Where this *Joint Code of Practice* uses the word **'must'**, the procedure to which it applies is compulsory.

Where the word **'shall'** is used, this indicates a mandatory requirement, except where compliance is not considered practicable, in which case a suitable alternative method supported by risk assessment is required.

Where the word **'should'** is used, the procedure is recommended best practice.

First published August 2024

Fire Protection Association
London Road, Moreton in Marsh
Gloucestershire GL56 0RH
Tel: 01608 812 500
Email: sales@thefpa.co.uk; Web: www.thefpa.co.uk

1 OBJECTIVE AND SCOPE OF THE CODE

1.1 Insurers' experience shows that occurrences of water damage, especially from water systems, continues to increase substantially, both in frequency and severity, and is currently one of the most prevalent causes of claims on construction sites.

Such incidents can also impact on a project's environmental and sustainability goals to monitor and reduce water consumption during construction, especially when looking to achieve specific impact assessment benchmarks and standards under environmental assessment methods such as BREEAM and SKA. Ratings via these schemes are unlikely to demonstrate escape of water (EoW) mitigation strategies acceptable to construction insurers.

Lack of attention to the risks posed by escape of water and the failure to introduce prudent controls for construction projects increases the prospect of damage and subsequent higher insurance costs, insurers' stipulations for controls to be implemented during the construction period, and increasing insurance excesses in the event of a loss

1.2 The objective of this Code is to help reduce losses associated with EoW events and subsequent project delays during both the pre-construction (design, tender, and procurement) and construction phases. It outlines ways in which the industry can tackle the root causes of the EoW problem, and ways to mitigate the effects, should an incident occur.

1.3 The scope of the guidance is focused on permanent and temporary water systems within buildings, e.g. various hot and cold plumbing systems, mains water, waste/effluent, sprinkler systems, mechanical systems, and associated water storage tanks.

1.4 The scope applies to all construction projects of any nature with an original contract value of any single building (or connected group of buildings) of £2.5 million or above, but smaller value contracts will benefit from the proportionate application of the guidance provided.

1.5 Mid- and high-rise projects where EoW losses are more frequent and of greater severity have an additional applicable section: see Section 11.

1.6 The guidelines contained in this document represent good industry practice for a broad range of construction, renovation, and refurbishment projects. Compliance can minimise the risk of water-system-related damage, losses, and delays. The application is targeted at all parties in the supply chain, including those who specify and design, as well as all contractors during the construction phase, taking a collaborative risk-based approach.

1.7 Water damage hazards from external factors, such as from inundations following flooding and storms or from unpressurised piping systems, are briefly covered in Section 10. General flood inundation and direct storm damage is outside the scope of this guide. Health and safety issues are outside the scope of this document.

1.8 While this Code of Practice is concerned primarily with mitigating risks from EoW during the construction phase of a project, it is also essential that associated risks in relation to the premises, once occupied, form a fundamental aspect of all considerations and assessments. Consideration should always be given to design for water management in the operational phase of the building cycle. Early adoption of leak detection and automatic shutoff devices are inevitably cheaper than retrofitting into a completed structure, and could be considered favourably by property insurers. Such devices can assist towards BREEAM points for the completed building.

2 COMPLIANCE WITH THE CODE

2.1 Where this Joint Code of Practice uses the word **'must'**, the procedure to which it applies is mandatory.

Where the word **'shall'** is used, this indicates a mandatory requirement, except where compliance is not considered practicable, in which case a suitable alternative method supported by risk assessment is required.

Where the word **'should'** is used, the procedure is recommended best practice.

2.2 If compliance with this Code forms part of the insurance contract, non-compliance with this Code could result in insurance ceasing to be available or being withdrawn, resulting in a possible breach of a construction contract which requires the provision of such insurance.

2.3 In cases where the construction contract or the insurance contract does not require this Code to apply, this Code shall serve as 'best practice'. All parties shall always check with their insurance providers on each project.

3 DEFINITIONS OF TERMS USED

3.1 **AAFMS (Active Automatic Flow Monitoring Shutoff) device:** A device which actively monitors flow on a system and automatically isolates the system in the event of any abnormal flow rate.

3.2 **Attenuation tank:** A tank for temporarily storing excess rain or flood water, which is then released at a controlled rate into the local sewer system or watercourse to minimise the risk of localised flooding. These tanks are usually a permanent feature to slow down runoff to public sewers or a watercourse. But due to their expense, they may be omitted. They are used in conjunction with flow control devices such as orifice plates or vortex flow controls. Ideally these devices should be installed early during the construction process to manage excess water flows, but they are often not installed until near the end of a contract so that they are not damaged.

3.3 **Contractors:** Those who do the actual construction work. They can be either an individual or a company (see also 'Principal Contractor' and 'Mechanical and Electrical (M&E) Contractor').

3.4 **Designers:** Those who, as part of a business, prepare or modify designs for a building, product, or system relating to construction work (see also 'Principal Designer'). However, some detailed design may be undertaken by specialist subcontractors.

3.5 **Employer/client:** The organisation or person for whom the project is being carried out, or the person named as the employer in the contract and/or Articles of Agreement.

3.6 **Environmental Assessment Methods:** Green building rating systems, developed to demonstrate and document efforts to create sustainable workplaces. The main UK schemes are BREEAM and SKA. The BRE Environmental Assessment Method (BREEAM) is a voluntary assessment method used to describe both new and existing buildings' environmental performance. The SKA rating is an environmental assessment method, benchmark, and standard for non-domestic fit-outs, developed by RICS (Royal Institution of Chartered Surveyors) and run by SKA Rating Ltd.

3.7 **Escape of Water (EoW):** An unplanned/unwanted discharge of water or other liquid that may occur due to a burst pipe, tank, or leaking apparatus, incorrectly fitted pipe connection, blocked drainage systems, sewer backflow, or attenuation systems.

3.8 **Mechanical and Electrical (M&E) Contractor:** M&E contractors install and maintain the mechanical and electrical systems within a building. They are typically responsible for piped systems, and often work as subcontractors on a project. However, the Principal Contractor has overall control of the project site and is responsible for project and site coordination, including water damage prevention (see also 'Principal Contractor').

3.9 **Mid- and high-rise buildings:** For the purposes of this document, mid-rise and above is classed as any multi-storey building of 5 storeys (or greater) or 11+ metres in height from ground level to roof level.

3.10 **Modern Methods of Construction (MMC):** A wide term, embracing a range of off-site manufacturing and on-site techniques that provide alternatives to traditional building materials and methods. With specific reference to this document, MMC can include:

- 2-D primary structural systems: Floor, wall, and roof flat panel or frame units factory produced and then transported to site where they are assembled to produce a final three-dimensional structure. These can be open panels or frames, which consist of a skeletal structure only, or closed panels including lining materials, insulation, services, windows, doors, internal wall finishes, and external claddings.
- 3-D primary structural systems: Volumetric or modular construction units factory produced and then transported to site where they are bolted/fixed together to form the structure. These can be a basic skeletal structure only through to having all internal and external finishes and services installed. Mini-volumetric structural units can include stacked bathroom pods.
- Use of pre-manufactured structural members not part of a systemised design, such as integrated columns, beams, floor slabs, and staircases.
- Use of pre-manufactured members, including materials that are more susceptible to water damage, such as Mass Engineered Timber (timber components fabricated into mass blocks by bonding with adhesives such as cross-laminated timber (CLT) and glued laminated timber (Glulam)).
- Non-structural assemblies and sub-assemblies that can be incorporated within load-bearing structures, e.g. non-load-bearing mini-volumetric units (sometimes referred to as 'pods') used for highly serviced and more repeatable areas, such as kitchens and bathrooms, utility cupboards, risers, and MEP (mechanical electrical and plumbing) sub-assemblies and modular skids, including fully fitted out modularised plant rooms.

3.11 **Passive Leak Detection:** Devices that monitor and provide an alert when wetted.

3.12 **Principal Contractor:** Contractor appointed by the client to coordinate the construction phase of a project where it involves more than one contractor. The Principal Contractor has overall control of the project site and is responsible for project and site coordination, including water damage prevention. The Principal Contractor may delegate tasks to subcontractors within the project, but overall responsibility remains with the Principal Contractor. Also known as the Main Contractor.

3.13 **Principal Designer:** Designer appointed by the client in projects involving more than one designer. They can be an organisation or an individual with sufficient knowledge, experience, and ability to carry out the role.

3.14 **Refurbishment:** Alterations, renovations, or repairs of an existing building or structure.

3.15 **Responsible Person:** In the context of this guide, the 'Responsible Person' is responsible for ensuring that procedures are in place for the management of risks, that competent people are appointed, and that duties are carried out.

This will normally be a senior member of the Principal Contractor's staff. The Responsible Person should normally be someone from the Building Services Contractor. The Responsible Person should be nominated by the Principal Contractor for the management of the escape of water risk, and should be overseen by the Principal Contractor.

3.16 **Tank:** A storage vessel (hot water) or cistern (cold water), being a fixed container for holding water.

3.17 **Water Emergency Response Plan (WERP):** A document detailing how to respond to any EoW events during construction and handover of the building. The plan will describe the necessary actions and associated responsibilities.

3.18 **Water Systems Management Plan (WSMP):** A standalone document clearly defining responsibilities, procedures, and specific actions required to prevent, manage, and mitigate EoW events.

3.19 **Water Management Device:** A system that autonomously monitors water or other liquids and provides some form of response in the event of an abnormality being detected, or a device that is pre-programmed to isolate at defined time periods.

See also **'AAFMS device'** and **'Passive Leak Detection'**.

3.20 **Sewer Backflow Preventers (NRVs, non-return valves):** A range of manual and automated devices designed to prevent foul water flowing back from a sewer into a building during flooding events. NRVs are also used to prevent water ingress from surface water hazards and at watercourses.

3.21 **Temporary buildings:** These include prefabricated cabins, site huts, cargo containers, caravans, portable buildings, and sectional buildings brought on-site for use as offices, stores, workshops, welfare facilities, etc. during the course of the works.

3.22 **Temporary water supply:** Any water supply that is not permanent. It will not always comply with building regulations.

4 INTRODUCTION

4.1 A significant number of avoidable and mitigatable losses have occurred during construction works, often in the final weeks of construction projects, after susceptible fit-out elements have been installed. An escape of water (EoW) incident near to completion of a construction or fit-out project can result in very significant damage and disruption to the contract, resulting in delays and additional costs. This can be exacerbated when leaks occur outside project working hours, such as overnight or at weekends, on charged systems with limited or no site presence. Failures resulting from defective materials and/or workmanship can manifest during construction, although they can also occur after the asset is handed over and operational.

4.2 The consideration of EoW risks is relevant to all projects where permanent water systems are installed and commissioned during the build, and/or where temporary water systems are used. Often risks associated with EoW are an afterthought during the construction stage. It is more effective when designers, Principal Contractors, and clients consider EoW risks from the outset to design out and mitigate the risk wherever possible.

4.3 Historic evidence shows that solely relying on visual leak detection and manual intervention following an EoW can be inadequate, due to slow detection and isolation times; this is especially aggravated during out-of-hours periods or times when the site is unoccupied. Active Automatic Flow Monitoring Shutoff (AAFMS) devices that constantly monitor water flow and can automatically detect abnormal flow, shut off systems, and raise a remote alarm for emergency response are widely available. The use of such automated systems on both temporary and permanent water systems to detect and isolate charged pipework at an early stage of a leak has proven very successful at minimising and even avoiding losses. Specification of such systems at the design stage and including them as part of the contractor tender and bid process can minimise associated cost of design and installation. Manual monitoring and intervention are regarded as a complementary second line of defence.

4.4 The development of a formal Water Systems Management Plan (WSMP) and a Water Emergency Response Plan (WERP) to cover the initial design and for the duration of the project through to completion and handover of the building provides a structured, clear, and logical approach to the management and mitigation of the EoW risk.

5 WATER SYSTEMS MANAGEMENT PLAN (WSMP)

5.1 To help provide a structured approach to the risk management of water systems during the building's design and construction, a formal WSMP must be developed. This shall be incorporated into the Principal Contractor's management systems at the outset of the project.

5.2 The purpose of the plan is to provide a clear and logical approach to the management and mitigation of the risk of EoW and consequential damage.

5.3 The plan shall encompass all aspects of the project, including the design, construction, testing, and commissioning of the water supply system, through to completion and handover of the building.

5.4 The plan shall be based on a risk-assessed approach for both temporary and permanent water systems, considering the potential impact of failure and corresponding mitigation measures.

5.5 The plan shall be used as a procedural document by all contractors involved in the design, installation, and commissioning of water systems, both temporary and permanent, and by those responsible for emergency response in the event that an escape of water occurs.

5.6 The plan shall provide evidence that suitable and sufficient measures have been considered and are in place to manage the risk of water damage throughout the construction period. It is likely to be audited by the Insurer.

5.7 The Principal Contractor has the overall responsibility to ensure the measures stated within the Water Systems Management Plan are incorporated. Although tasks may be delegated to the supply chain, overall responsibility and accountability remains with the Principal Contractor.

5.8 Relevant appointments must be made for the Responsible Person, Competent Persons, and Duty Holders.

5.9 While the specific format and content of the plan will likely vary between projects, it shall always include the following general areas as a minimum:

- Document control
- Defined roles and responsibilities
- Individual system design and installation overview
- Design mitigation features
- Selection, management, and list of installation contractors
- Quality Assurance management
- Risk management and mitigation controls during construction and installation phase
- Testing and commissioning
- Emergency response planning with emergency contact details.

5.10 The plan must identify and nominate clear roles and responsibilities, with a list of named individuals and contact phone numbers with a clear definition of their role, actions, and responsibilities. This is to include:

5.10.1 A designated Responsible Person from the Principal Contractor with responsibility for the overall control, implementation, and monitoring of the Water Management Plan.

5.10.2 Other designated competent individuals with defined roles in the design, quality, and execution of the installation, testing, inspection and commissioning, and emergency response.

5.10.3 Daily routines such as end-of-day and start-of-day checks.

5.10.4 Details of all AAFMS and Passive Leak Detection devices, confirmation of how these will be set up and shut off, and details of how to alert the Water Emergency Response Team.

5.10.5 Additional means of manual isolation of supplies outside project working hours.

5.11 Due to the changing nature of projects, the plan shall be regularly reviewed and updated to ensure that it remains relevant and effective as designs and works progress. For example, the initial WSMP may only include the high-level details and intended mitigation measures of the proposed water systems. Further details will be added and updated as the design and procurement progress. This must be reviewed and updated prior to any commissioning or flushing of systems when water usage is likely to be higher than previously experienced. The WSMP shall also be reviewed and updated regularly at not more than 6-monthly intervals.

5.12 There must be a 'document control' section that includes the project name, author, review checker, approved sign-off, distribution lists, issue and revision dates, and numbers to provide clear records and ownership.

5.13 Although primarily relevant to water systems within the building, the plan may also incorporate provisions for other water damage exposures such as flood inundation and direct storm damage hazards.

5.14 Water Emergency Response Plan (WERP)

5.14.1 A Water Emergency Response Plan (WERP) must be developed prior to commencement of the construction phase, and it must be clearly defined within the Water Systems Management Plan.

5.14.2 The WERP must include a nominated Water Emergency Response Team (WERT) supported by a set of detailed emergency response procedures that includes simple, clear instructions for what to do in the event of a leak incident, both during and outside project hours.

5.15 Water Emergency Response Team (WERT)

5.15.1 A WERT must be nominated by the Responsible Person/Principal Contractor, and must be given a clear definition of the roles and responsibilities of each team member.

5.15.2 There must be an emergency responder contact list with contact details regularly reviewed, updated, and displayed on noticeboards on-site. Emergency responders responsible for EoW control may be a mixture of WERT members and personnel from water system plumbing and building services specialist contractor teams.

The WERT and emergency contact support must include sufficient personnel to provide coverage both during and outside site working hours, and to cover for absences such as holiday and illness.

5.15.3 Appropriate documentation, training, and instruction must be provided to support the WERT roles and responsibilities. This can be in the form of toolbox talks. As a minimum this must include:

5.15.3.1 Isolation valves clearly labelled on-site with clear signage of the isolation points.

5.15.3.2 How to manually shut down systems, both temporary and permanent, supported with written method statements so that it is clear how isolation is to be achieved.

5.15.3.3 Schematic site plans identifying the locations of isolation valves (with the areas that they isolate) and drain lines.

5.15.3.4 Response procedures upon the activation of any AAFMS device, Passive Leak Detection device, sump pump, or sprinkler alarms (including on-site and out-of-hours remote alerts).

5.15.3.5 The location and use of spill kits, emergency pumps, etc.

5.15.4 The duties of security guards must be extended to include routine patrols to check for EoW events outside site working hours whenever wet systems are live. Specific instructions and training must be provided to any security guards (and any temporary cover replacement guards) as part of their formal assignment instructions. This must include:

5.15.4.1 How to respond when discovering an incident.

5.15.4.2 Information on the location of, and training in the operation of, shutoff valves and booster pump isolation, and information on the notification procedure of any alarms monitoring flows, high levels, and leaks.

5.15.4.3 Emergency response site management contact list and process.

5.15.4.4 The use of spill kits.

5.16 Emergency response procedures

5.16.1 These procedures must include simple, clear instructions to support schematic site plans showing the position of tagged isolation valves and the areas they isolate; this shall include photographs for ease of identification.

5.16.2 The plan must provide a list of emergency procedures for events occurring both during and outside site working hours. This must include:

5.16.2.1 Emergency notification of the WERT and emergency responders upon the visual identification of a leak.

5.16.2.2 How to manually isolate and shut down temporary and permanent water systems in situ and remotely, supported with written method statements.

5.16.2.3 Response procedures to ensure isolation in the event of on-site identification and/or remote notification, and activation, of an AAFMS device, Passive Leak Detection device, sump pump, or sprinkler alarms (including on-site and out-of-hours remote alerts), supported with written method statements.

5.16.2.4 How to deal with the immediate effects of the incident, including methods of removing water from the building and emergency spill kits and emergency pumps, i.e. how to use them and their locations on-site. Spill kits shall contain materials such as leak-sealing putty, drain seals, a stock of absorbent materials (such as sandbags or booms), and emergency pumps. Such equipment must be readily accessible and located in strategic areas, most likely to be at risk, with periodic checks to ensure availability and good condition.

5.16.2.5 Details of the recovery/restoration process, including details of priority contracts with specialist contractors to provide additional salvage and restoration services and equipment, such as pumps, dehumidifiers, wet-dry vacuums, etc.

5.17 Reinstatement of water supply

5.17.1 The Principal Contractor shall ensure that an appropriate Method Statement is produced and followed for safe reinstatement of the water supply, and that this is communicated to all trade contractors.

5.17.2 This shall include a pre-start-up procedure to ensure the system has been inspected and is in a safe condition and that any outlets, such as taps, hose bibs, and other end-of-line outlets, are closed. A safe-start and system-fill procedure shall be in place to ensure, when the pumps are re-engaged, that the isolation valves are opened slowly to fill at a reduced rate to avoid water hammer effect or sudden surges within the system resulting in hydraulic shock.

5.17.3 Once the system has been refilled and reinstated, a visual inspection of the main pipework runs must be carried out to identify and respond to any leaks.

5.17.4 AAFMS and Passive Leak Detection devices that have been isolated must be reinstated.

5.18 Post-incident investigation

The Responsible Person must investigate and document all EoW events to determine the root cause of the incident, the effectiveness of any emergency response, and the suitability of the existing control measures and emergency response plans. Additional measures required to mitigate the risk of reoccurrence shall be put in place for both the specific incident and for similar systems and applications across the project. Details of any incidents and lessons learned must be shared with the project team, and should also be shared with the relevant Insurer.

5.19 WERP Testing

The WERP and the ability of the WERT and emergency responders to respond shall be tested, including response to and isolation of simulated leak events, at defined intervals throughout the construction project, not less than every 6 months, to ensure the WERP remains relevant, up to date, and effective.

An example WSMP is provided in Annex A.

6 DESIGN AND PLANNING PHASE

6.1 Engagement – all stakeholders

6.1.1 At the earliest possible opportunity during the design phase, engagement between the client, Principal Contractor, and other key project participants, with the construction insurers and the insurer of the finished and occupied premises, where known, shall be sought.

6.1.2 In the concept and design phases, appointed parties shall cooperate with the designer to identify and eliminate hazards and mitigate risk where elimination is not reasonably practicable.

6.1.3 Proper planning for all potential EoW incidents must be an integral part of overall preparation and budgeting for the efficient running of construction projects. Clear procedures and standards must be laid down, and adequate resources, in terms of time, materials, and money, must be committed to the prevention of such incidents by all concerned with the project.

6.1.4 Client-appointed parties (Principal Designers, designers, Principal Contractors, and contractors) must cooperate and coordinate their activities during all phases of the contract.

6.2 Consideration of hazards and risks – Water Systems Risk Assessment

6.2.1 The selection and design of the water distribution system(s) shall be based on a comprehensive Water Systems Risk Assessment to address the prevention and protection measures that must be taken. Assessments shall seek to mitigate exposures during the design phase of the project and shall consider in detail specific facets of the work, such as the selection and design of the water distribution system

and specified plumbing system. The use of generic assessments must be avoided; each site must be assessed independently. This shall be conducted at an early stage of the project in support of the WSMP.

6.2.2 Designers shall implement a formal Quality Assessment and Quality Control (QA/QC) design programme, including a constructability review, to help eliminate design problems that could lead to water damage.

6.2.3 The design shall be assessed using the Hierarchy of Control to ensure that the risks of EoW and potential for damage have been fully considered to keep to a minimum not only during construction but also in future use. This shall include factors such as:

- The building height (for mid- and high-rise, see Section 11) and susceptibility of its contents to water damage.
- Installation standards of the supplier and training requirements, including benchmarking exercises, such as sample joints/fittings by each installer.
- Competence and experience of contractors and their operatives.
- Methods of ensuring that suitable standards are met, through verification of procedures in conjunction with independent quality control, to check the standards of the design, the installation works, and adherence to codes, including site checks, with full certification and auditable records.
- Weather-related issues, such as freezing temperatures, during construction.
- Temporary and permanent water drainage, to ensure that water runoff can be directed away from any planned excavations and structures.
- Future maintenance and accessibility requirements of the system.

Additional risk factors that should also be taken into consideration are covered in Section 10.

6.2.4 The risk assessments in respect of all construction sites must be reviewed and maintained periodically throughout the project to ensure that they remain suitable, given the rapidly changing status of the site. This review must remain the responsibility and ownership of the Principal Designer and Principal Contractor throughout, and must not be passed down to any individual contractor.

6.3 Specific design considerations

6.3.1 The design team shall be tasked with designing out features that are known to exacerbate EoW losses and include those that may mitigate a loss should an EoW occur. Unfavourable features which shall be avoided include, but are not limited to:

- combined service risers (electrical/data cabling and water systems together)
- combined single pipework for domestic and sprinkler systems
- excessive elbow joints
- inappropriate or concealed pipework routes
- lack of hanger supports, thrust blocks, and free-supporting pipework
- positioning of tanks in upper storeys and roof level
- positioning of pipework above electrical equipment and plant
- electrical cables laid directly onto floor slabs
- incompatibility of mastics with pipe materials.

6.3.2 The design team shall be tasked with designing in favourable features that may mitigate a loss should an EoW occur.

6.3.2.1 Rapid detection and swift isolation are key to the mitigation of water damage from pipework and associated systems during the construction works. To accomplish this, there shall be both a means for detecting abnormal water flow and a way of rapidly shutting down the system if this is detected. To achieve this, AAFMS devices (see Section 8.6.2) shall be included in the design for installation during the construction phase to both temporary and all permanent water systems. The location of all such devices shall be defined in the system design.

Specification of AAFMS devices shall form part of the project contractor tender and bid process.

The above relates to devices for temporary supply mains that will be removed at the end of the construction project, and Water Management Devices that will form part of ongoing building protection after handover. Provision of these devices should be discussed and agreed with both the construction insurer and the insurer of the finished building (if known).

6.3.2.2 In respect to live sprinkler systems, the sprinkler design shall include alarm devices, consisting of electrically operated flow switches, initiated by the flow of water to a single head with the lowest flow rate and pump running alarms, in accordance with the relevant sprinkler standards being applied in the design. The alarm device shall initiate a sprinkler alarm signal that can be monitored on-site. It shall also have remote signalling to allow for an appropriate response as part of the emergency planning procedures.

Through the integration of Priority Demand Valves, an AAFMS device can be safely integrated within a residential sprinkler system. If it is designed to receive the sprinkler alarm signal, this must trigger a hardware-driven override, forcing the AAFMS valve open and allowing the sprinkler system to operate without interference.

6.3.2.3 Other favourable design features shall include:

- limiting the extent to which wet trades are required in the build, such as traditional plastering, by using tape and joint finishes, dry lining or spray-applied plaster;
- temporary supplies being minimised and kept to external taps only or externally routed with self-closing push-down taps and lockable discharge points;
- permanent and temporary outlets and taps installed with suitable backflow protection;
- inclusion of pressure-reducing valves;
- inclusion of CAVSA (Combined Air Vent and Surge Arrestor) valves or equivalent combined anti-vacuum and surge arrestor devices at the top of each riser to control the release of the air from the system when it starts to refill, therefore slowing down the rate the water enters the system, preventing a vacuum and reducing the risk of hydraulic shock;
- multi-pump Controlled Fill System (CFS) sets, which limit the starting sequence after a forced shutdown, reducing the rate at which the system is filled;
- stop valves and shutoff devices easily accessible, clearly labelled, and their location recorded;

- relevant valves and devices, including stop valves, shutoff devices, terminal fittings, and hoses, readily accessible, inspected, and regularly maintained;
- drainage points designed into the floor slabs with risers for temporary and permanent water systems having temporary outlets connected to the drainage system;
- additional isolation valves;
- nominal 100mm upstands around risers or other service openings to prevent water entering;
- plant installed on plinths;
- ensuring pipework design avoids routing above electrical, data, and server rooms;
- easy access to pipes (hatches, etc.);
- riser and other floor slab protection to openings designed to prevent vertical flow of water installed early in the works e.g. waterproof covers, seals and 100mm upstands;
- the presence of in-built jointing system safeguards;
- leaving plasterboard walls and water-susceptible elements 25mm off the floor slab;
- avoidance of combined single pipework and supply for domestic water and sprinkler systems, to allow separate isolation;
- specifying the addition of ferrous tape behind enclosed ceiling, wall, and floor panels to support future identification of non-ferrous pipework.

6.4 The construction programme shall be designed to ensure that measures to help mitigate EoW events are able to be sequenced and incorporated at the earliest possible stage of the building construction. See Section 8.2.

7 SELECTION AND MANAGEMENT OF CONTRACTORS

7.1 The chosen installation contractor(s) shall be required to provide a contract-specific document detailing their own management and quality controls to cover both pre-construction and construction activities, to be reviewed and approved by the Principal Contractor prior to the commencement of the installation. This document should be maintained for the duration of the installation and immediately updated with details of any changes or additions as the work progresses; this should include evidence of approval from the Principal Contractor.

7.2 A competent Responsible Person must be nominated by the Principal Contractor for the management of the EoW risk. This Responsible Person must be employed by the Principal Contractor. While the day-to-day management of the EoW risk may often be delegated to the M&E Contractor during their works, it remains the responsibility of the Responsible Person, employed by the Principal Contractor, to ensure:

- the appropriate selection and appointment of skilled contractors and labour;
- incorporation of written procedures (with respect to installation, testing, and commissioning) into contractual terms;
- verification of installation standards and adherence to codes.

7.3 The contractor procurement strategy and invitation to tender shall specifically identify the required levels of competency and quality. This shall include compliance with this Code. Any areas where compliance may not be achieved shall be notified and suitable alternative

measures provided for review with the Responsible Person and Insurer. These should be included in the Contractor's proposals, as they may need to be factored into the tender cost and programme, such as installation of design features, especially capex items such as AAFMS and Passive Leak Detection devices installed for use during construction stages.

7.4 As part of the pre-qualification tender process, all companies shall be required to submit details of their formal membership or professional affiliation with relevant professional bodies, trade associations, and 'approved contractor schemes', along with records to demonstrate staff training.

7.5 All plumbing, heating, and ventilation companies selected for the project should be members of recognised industry associations, such as (for UK);

- Building Engineering Services Association (BESA) (formerly the Heating Ventilation Contractors Association HVCA)
- WaterSafe Approved Contractor scheme
- Chartered Institute of Plumbing and Heating Engineering (CIPHE)
- The Water Industry Approved Plumbers' Scheme (WIAPS)
- Association of Plumbing and Heating Contractors (APHC)
- Scottish and Northern Ireland Plumbing Employers' Federation (SNIPEF).

Similar/equivalent associations should be referenced outside the UK.

7.6 For fire protection systems, only companies authorised and appropriately certificated to relevant installation schemes, such as the Loss Prevention Certification Board (LPCB) LPS 1048-1 Sprinkler Contractors' scheme, shall be used.

7.7 Water system design reviews and sign-off must only be undertaken by qualified plumbing engineers holding a relevant Level 4 NVQ qualification or higher-level qualification.

7.8 Only qualified, competent plumbers with appropriate skill sets shall be permitted to work on the installation of water distribution systems. The following minimum qualifications are:

- a Level 3 NVQ; or
- a Level 2 NVQ with a minimum of 5 years' experience and evidence of Continuing Professional Development (CPD); or
- an Advanced Craft CSCS (Construction Skills Certification Scheme) card, as issued by the Joint Industry Board for Plumbing and Mechanical Engineering Services (JIB-PMES); or
- Associate, Member, or Fellow membership to a professional engineering institute such as the CIPHE.

7.9 Equivalency of international qualifications shall be checked. UK ENIC (formerly UK NARIC) is an organisation that maps equivalent worldwide qualifications. While this allows a comparison of qualifications, it does not ensure that overseas workers have sufficient knowledge of UK regulations and standards.

7.10 At induction, all operatives involved in the installation, testing, and commissioning of any plumbing work shall be required to produce evidence of:

- professional association membership
- professional qualifications
- training received in specific plumbing systems.

7.11 Inexperienced operatives (those who do not meet the requirements of Sections 7.8-7.10) must be under the direct supervision of, and have all work verified by, a competent, qualified plumber or plumbing engineer (who has met the requirements of Sections 7.8-7.10).

7.12 All contractors must be able and required to work to current recognised industry regulations, codes, and standards, which shall be clearly defined in all work specifications and contractual documents. The main applicable codes include (refer to latest versions):

- The Water Supply (Water Fittings) Regulations and The Water Supply (Water Fittings) Scotland Byelaws
- BS EN 806 Parts 1-5: *Specifications for installations inside buildings conveying water for human consumption*
- BS EN 14336 *Heating systems in buildings. Installation and commissioning of water-based heating systems*
- BS 8558 *Guide to design, installation and maintenance of services supplying water for domestic use within buildings and their curtilages: Complementary guidance to BS EN 806*
- BESA Good Practice Guides – including the *BESA Guide to Good Practice: Site Pressure Testing of Pipework* (TR/6)
- CIBSE (Chartered Institute of Building Services Engineers) standards
- CIPHE plumbing engineering services design guide.

7.13 Any contractors used for the design and installation of sprinkler systems and fire main riser systems shall be required to design and install such systems in accordance with the latest version of the relevant standards being applied in the design, i.e. *LPC Rules for Automatic Sprinkler Installations, Incorporating BS EN 12845*; BS 9251 *Fire sprinkler systems for domestic and residential occupancies*; NFPA 13 *Standard for the installation of sprinkler systems; FM Global DS 2-0 Installation guidelines for automatic sprinklers*; and BS 9990 *Non-automatic fire-fighting systems in buildings*.

7.14 Suppliers of any element of a plumbing system shall be contacted to determine any specific storage or installation requirements. Where any training is offered by the supplier of that system, the subcontractor must provide evidence to the Responsible Person that their installation personnel have completed that training, and hold evidence of that training. This shall be held on file by the Principal Contractor.

7.15 Where any materials are deemed sacrificial or single-use, these shall be made clear to all installers and adequate spares provided to prevent the reuse of items, such as O-rings, gripper rings, etc., which may be weakened after their initial use.

7.16 Critical installation aspects, such as insertion depths, torque, and crimping requirements must be outlined by the designer and supplier, and incorporated into the installer's Method Statement.

7.17 Where plumbing systems require bespoke tools such as torque wrenches and crimping tools, these must be sourced from the appropriate supplier and routinely calibrated to manufacturers' specifications or the relevant British Standard, whichever is more stringent e.g. torque wrenches shall be changed/serviced every 5,000 cycles or every 12 months, whichever is soonest (BS EN 6789:2017) and crimping tools shall be changed/serviced every 10,000 cycles or every 12 months, whichever is soonest (BS EN 60352-2:2006+A1:2013). All such tools should have a new calibration certificate on Day 1 of their use on-site, and a copy held on record.

7.18 Before commencing work, all plumbers must provide an initial 'test joint' for each type of plumbing system and joint being installed. These 'test joints' must be conducted in the presence of an independent and qualified senior plumber or qualified plumbing engineer (satisfying Sections 7.8-7.10). This independent plumber or plumbing engineer must also visually inspect and verify the test joint and sign off the plumber's work for that test joint prior to any additional joints of that type being installed by that plumber. Verification of installation techniques must ensure the correct insertion depth, use of materials and tools, and appropriate torquing wherever required.

7.19 Subcontracting by the installation contractor shall be avoided wherever possible, or at least kept to a minimum. The same issues will be relevant to any subcontractors the installation contractor uses. Long subcontract chains are generally associated with higher levels of risk, as control and standards are more difficult to maintain. Pre-contract checks (as outlined elsewhere in this section) must extend to all subcontractors in the subcontract chain.

8 CONSTRUCTION PHASE MANAGEMENT AND RISK MITIGATION

8.1 Water Systems Management Plan

At the start of site set-up, the Principal Contractor must review the proposed design and temporary and permanent risk management controls, implement these features, and review and update the WSMP for the project. See Sections 5 and 6.

8.2 Early sequencing of mitigation measures

8.2.1 During site planning and preparation evaluation, measures to help mitigate EoW events shall be sequenced and incorporated at the earliest possible stage of the building works programme, including the following:

8.2.1.1 Fitting of Water Management Devices (see 8.6) to any water systems prior to these being filled.

8.2.1.2 Manual isolation and shutoff valves installed in readily accessible locations and tagged/labelled throughout the works, not just at completion of the project.

8.2.1.3 Temporary and permanent water drainage to ensure that water runoff can be directed away from any planned excavations and structures.

8.2.1.4 Permanent drainage with full functionality installed early in the construction phase, with drainage points strategically located on all the floor slabs. Prior to this, specific temporary drainage measures sequenced shall be installed to temporarily manage the discharge of water from the building.

8.2.1.5 Bunds completed and permanent drainage from plant rooms connected and operational before any tanks are filled.

8.2.1.6 Early installation of permanent or temporary upstand battens and waterproof sealing of risers and penetrations, with a particular focus on electrical and mechanical risers more exposed to water damage.

8.2.1.7 Contractors' pipework installation and testing sequencing coordinated with other trades to ensure systems are not exposed to excessive temperatures during installation, or charged until final adjacent works by other contractors are completed.

8.2.1.8 The sequencing of works incorporates Void Closure Certificates and permits to drill/permits to break (for wall or floor surfaces), to take into consideration the location, testing, and accessibility of all pipework and to avoid damage to hidden pipework.

8.2.2 Where any other favourable features are to be installed (Section 6.3.2.3) temporarily or as part of the permanent fixtures, these shall be installed as soon as practicable.

8.3 Quality Assurance management

All work must be done in accordance with a project Quality Assurance Plan (QAP) and any specific water systems Quality Assurance Plan. There must be a formal and auditable process in place to ensure that this is adhered to.

8.3.1 The Principal Contractor is responsible for monitoring and reviewing the installation contractor(s) to ensure that they are working to the agreed contractual management and quality controls, as well as reviewing and approving formal Method Statements, inspection checklists, certificates of compliance, and QA audit reports.

8.3.2 Only suitably trained and competent plumbers, plumbing engineers, supervisors, and managers shall be allowed to work on water distribution systems, with work carried out to industry standards and codes and manufacturers' guidelines (see Section 7).

8.3.3 All contractors appointed for the project shall be demonstrably competent, with approved memberships or professional affiliations of professional bodies or trade associations, working to agreed contract management and quality controls. The QAP shall document the on-site training requirements of contractors, including induction, refresher, and system supplier/manufacturer training and competency tests. See Section 7 for full details of contractor requirements. A list of all such contractors shall be maintained within the WSMP.

8.3.4 Regular meetings and briefings shall be held throughout the project between office-based design teams, site supervisors, and trades operatives to maintain an effective line of communication. This should include (as generally set out in the Construction, Design and Management (CDM) Regulations):

8.3.4.1 Pre-construction meetings: these should be formal, minuted meetings with all relevant subcontractors, manufacturers, and design team members present to verify design intent, materials and equipment specifications, installation means and methods, and sequencing.

8.3.4.2 Face-to-face meetings: to be held with the proposed installation contractors' supervisors to determine their previous experience on similar projects and specific works that they are to oversee, and to ensure that they are a competent person for the role. The standard of quality expected and what is not acceptable should be made clear.

8.3.4.3 Weekly toolbox talks and daily Method Statement briefings: related to the water systems installation and held by the installation contractor with their own staff and any associated direct subcontracted trades, or trades affected by their works, with attendance and content recorded. Regular site audits should be undertaken by the Principal Contractor to ensure that these briefings and toolbox talks are taking place.

8.3.4.4 Pre-start daily coordination briefings: led by the Principal Contractor with the water system installation contractors to verify adherence to agreed materials and equipment specifications, installation means and methods, and sequencing. The Principal Contractor is to then coordinate and agree times for inspections with the installation contractors

8.3.5 A formal quality audit and control system must be maintained, with document checks on all delivered materials and installation tools, including any tool calibration, materials factory fabrication, and testing certificates. Materials and tools shall always be sourced from the appropriate manufacturer or supplier, routinely calibrated, and used in accordance with the manufacturer's recommendations.

8.3.6 All pipe joints shall be marked with the installation date and installer identification (using an indelible marker, stamp, or bar code) to provide a quick visual check that all joints on a pipe run have been fully formed and to enable traceability to the specific installer and the machine/tools used for prompt identification of any repeated installation defects.

8.3.7 Formal Inspection and Test Plans (ITPs) must be compiled and documented as part of the Quality Assurance system. These shall include:

8.3.7.1 Procedures by the Principal Contractor for recorded QC inspections, testing, and certification of work throughout the installation, to verify that all items at the point of installation have been set out and fixed in accordance with the current design information, Quality Assurance Plans, the relevant standards, and manufacturers' instructions.

8.3.7.2 Specified mandatory hold points for quality control inspections and mandatory witness points for testing during the installation, which require the installation contractor to stop progressing the works until the work has been checked, inspected, or tested as appropriate, and approved by the Principal Contractor. This shall include a formal 'Requests for Inspection' system and Void Closure Certificates.

8.3.7.3 Targeting of specific zones, phases, and sections prior to the element of work being covered up, enclosed, or lagged and shall be carried out across various stages of the work, including first fix, second fix, final fix, interim testing, pre-commissioning checks, functionality tests, final commissioning and certification, and final completion. Pressure test certificates are to be maintained and accessible for inspection.

8.3.7.4 Sufficient inspections carried out by the Principal Contractor, installation contractor, and other relevant third parties, such as client project management, together with formal acceptance sign-off procedures. The manufacturer/supplier shall also witness a number of the tests and look to randomly test joints themselves within sections of networks, to ensure satisfactory installation and implementation of testing procedures.

8.3.8 A formal process must be agreed with the installation contractor for ongoing sequential checking and reporting of faults that need to be rectified. Faults must be identified, resolved, and completed as the installation work proceeds. This shall ensure that systematic problems are identified and dealt with early, and make the final snagging process more manageable, reducing the time spent on snags at the end of the project.

8.3.8.1 A regular defect list shall be produced and reviewed as part of relevant project meetings to identify any potential water system problems, to ensure they are addressed and tracked toward resolution within specified time frames and sign-off procedures. This shall include trends of common issues and any work and/or materials not conforming to contract or manufacturer specifications or design requirements. Where necessary, these may need to constitute mandatory hold points until the issue is satisfactorily resolved.

8.3.8.2 All water system leaks, damage, or defect incidents must be recorded and reported to the Principal Contractor for further investigation and any actions needed to prevent reoccurrence. A formal incident reporting procedure shall be in place and include project management, site security, and all necessary trades, with formal training and documentation provided.

8.4 Management and mitigation controls of temporary water supplies

8.4.1 The use of temporary water supplies shall be minimised as far as practicable; supplies shall be restricted externally to the buildings under construction.

8.4.2 If a supply is needed within the building, this shall be externally routed with self-closing push-down taps and lockable discharge points. If this is not practicable, routing must be away from susceptible building materials (high-value fixtures, fittings, and decorative finishes) and electrical services and equipment (including risers and temporary transformers), such as through mechanical risers.

8.4.3 All temporary systems must be installed and tested by suitably qualified and trained plumbers (see Sections 7.8-7.10) in accordance with the manufacturers' recommendations (see Section 8).

8.4.4 24/7-operating Active Automatic Flow Monitoring Shutoff (AAFMS) devices shall be fitted when installing temporary water supplies, as agreed with building developers, owners, and insurers. This shall, at a minimum, include an automatic shutoff device at the mains incoming supply to the project, downstream of any temporary water storage tank and/or any temporary boosted water system. These devices shall remain until the temporary system has been drained down and removed from the project. See Section 8.6.2.

This also applies to temporary buildings and welfare.

8.4.5 Outside site working hours, temporary water supplies must be isolated at the mains perimeter intake valve. Any booster pumps and water tank supply must also be isolated, and remain isolated until a pre-start water watch has been conducted by the Principal Contractor. Any automatic shutoff device must be programmed to isolate the temporary water supply at the end of agreed working hours until the start of the following working shift. The preset parameter hours set on the devices must also ensure that the systems are fully isolated during public holidays and extended holidays.

8.4.6 Where automatic timed shutoff devices are not present, isolation must be done manually. These tasks shall be done by a designated and suitably trained person. They shall also be recorded and form part of an auditable formal end-of-day checklist. Once water systems/booster pumps are reconnected, this shall be followed by an immediate water watch tour of the pipework, connections, and any outlets.

8.4.7 Sections 8.4.1–8.4.6 shall also apply to temporary buildings and welfare (i.e. accommodation, offices, WCs, canteens, drying rooms etc.).

8.4.8 If it is necessary for temporary water supplies to be left connected (i.e. not isolated) outside site working hours, such as for flushing purposes, then a constant water watch shall be maintained on-site in the area of the work by designated and suitably trained persons. These individuals shall be given an up-to-date WSMP with emergency response and emergency contact information. Branch pipes shall be isolated wherever possible.

8.4.9 Lagging insulation and trace heating must be installed to protect all pipework that could be vulnerable to freezing. The scope of such pipework shall be reviewed periodically.

8.4.10 Temporary water supplies shall be removed as soon as practicable during the project, especially before the project enters into the second fix phase or any furniture, fixtures, and equipment (FF&E) fit-out stages.

8.5 Management and mitigation controls of permanent water supplies

8.5.1 Isolation

8.5.1.1 Isolation and shutoff valves shall be installed at the earliest possible stage and positioned so as to be readily accessible throughout the project. These valves shall be tagged/labelled as part of installation and shall remain in place throughout the works.

8.5.1.2 Schematic plans of the permanent water supplies shall be prominently displayed on-site. These should clearly identify the location of tagged isolation valves and the areas that they isolate.

8.5.2 24/7-operating Active Automatic Flow Monitoring Shutoff (AAFMS) devices shall be fitted when installing permanent water supplies, as agreed with building developers, owners, and insurers.

8.5.2.1 These devices shall, at a minimum, be located at all mains incoming supplies, downstream of any water storage tank which has a capacity of 1,000 litres or greater, and any boosted water system, including those located on any intermediary plant rooms. These devices shall remain in place and operational throughout the testing and commissioning period, and shall be integrated into the occupied Building Management System (BMS). See Section 8.6.2.

8.5.2.2 When compatibility of such an AAFMS device with a residential dual-fed sprinkler system is not possible due to life safety protection in the occupied state, the AAFMS device shall be maintained in automatic shutoff mode during construction until the point of partial occupancy or handover, at which point the automatic shutoff element can revert to a flow-only alarm.

8.5.3 Outside site working hours, any permanent water supplies must be isolated at the main incoming supply valve. Any booster pumps and water tank supply must also be isolated, and must remain isolated until a pre-start water watch has been conducted by the Principal Contractor. Any AAFMS device must be programmed to isolate the permanent water supply at the end of agreed working hours and to remain isolated until the start of the following working shift. The preset parameter hours set on the devices must also ensure that the systems are fully isolated during public holidays and extended holidays.

Where automatic timed shutoff devices are not present, isolation must be done manually. These tasks shall be done by a designated and suitably trained person. They shall also be recorded and form part of an auditable formal end-of-day checklist. Manual isolation shall be at the main intake and water tank isolation valve (to take account of tank supplies); and/or booster and pressurisation pumps; and/or at the base of the risers. Once water systems/booster pumps are reconnected, this is to be followed by an immediate water watch tour of the pipework. These procedures shall be in place until project completion and handover.

8.5.4 Isolation measures must not rely on the future BMS unless the BMS is fully commissioned and operational, and meets all the provisions under 8.6.2.

8.5.5 For residential/student accommodation and hotel buildings, individual apartment/bedroom connections shall be manually isolated once filled, with opening only as required (such as to allow running of taps for flushing and testing, then closing again once complete), with this managed through a permit system such as a lock-out/tag-out procedure.

8.5.6 The supply of closed circulating systems, such as chilled-water (CHW)/low-pressure-hot-water (LPHW), shall be limited outside project hours to the top-up supply water tanks only, i.e. the CHW cold-feed supply to the pressurisation unit tanks shall be isolated as part of an end-of-each-shift daily isolation process.

8.5.7 When permanent systems are charged during project hours, daily water watch tours and inspections shall be carried out, with active monitoring of the systems remaining part of management procedures. Domestic systems flushing/drawing through arrangements shall be carried out under Wet Work Permit conditions, during project working hours, and systems isolated again before the end of the day shift.

8.5.8 If it is necessary for permanent water supplies to be left connected (i.e. not isolated) outside site working hours, such as for flushing purposes, testing, and commissioning, then a constant water watch shall be maintained on-site in the area of the work by

designated and suitably trained persons. These individuals shall be provided with an up-to-date WSMP with emergency response and emergency contact information. Branch pipes shall be isolated wherever possible.

8.6 Water Management Devices

8.6.1 Water Management Devices, including AAFMS and Passive Leak Detection devices, shall be installed and commissioned prior to the water systems being connected and becoming filled and pressurised. They shall remain in place and operational until project completion and handover. Where these devices are to be incorporated into the occupied building, these shall remain in place and operational after handover. All such devices should be approved as meeting the national water regulations under the Water Regulations Advisory Scheme (WRAS).

8.6.2 **Active Automatic Flow Monitoring Shutoff (AAFMS) devices must:**

8.6.2.1 Have a means of monitoring and detecting flow rates by volume over time, provide audible and visual alerts on-site in the event of abnormal water flows being detected, and immediately issue remote alerts to the designated Water Emergency Response Team, to allow authorised personnel to remotely shut off the water flow, raise the alarm, and start the emergency response.

8.6.2.2 Monitor water flows to the building water systems (not just environmental assessment scheme requirements, such as BREEAM and SKA, for mains water supply between the site boundary external water meter and the internal cold water storage tank) and automatically shut off the water supply when an abnormal water flow is detected.

8.6.2.3 Incorporate automatic shutoff valves connected to or incorporated within these devices. These are to be installed, at a minimum, to the mains incoming supply to the project, immediately downstream of any water storage tank, including in any intermediary plant rooms providing a gravity feed, and to boosted water pump sets.

8.6.2.4 Have operating programmable parameter setting limits, including maximum volumes and flow usage per time period before automatic isolation, which must be low enough to significantly mitigate any escape of water damage, and high enough to stop constant shut-offs making it impractical to use. This can be managed by using different set point time periods, e.g. daytime no flushing/post-commissioning, daytime flushing, and outside project hours. This shall need to include periodic reviews on volume/flow requirements as the works progress.

8.6.2.5 Be suitable for the conditions in which they are used. Where systems use analytic trend monitoring, consideration shall be made that, during the construction phase, discernible patterns may not be available over a long enough period to identify a trend, given the inconsistent usage. This can result in random automated trend analysis settings, which potentially result in very high volumes flowing prior to shutoff or very low volumes constantly isolating the systems. These trend settings are designed more for the occupancy stage with analysis over several months when there are more consistent flows/use.

8.6.2.6 Be mains operated with an integral battery backup which, in the event of power failure and backup failure, automatically isolates the water supply.

8.6.2.7 Have a tamper-proof design to prevent unauthorised persons overriding the system.

8.6.2.8 Automatically isolate connected water supplies outside normal site working hours, regardless of flow volumes, and remain isolated until the following working shift commences. Special provision for extended site shutdowns, such as holiday periods, must also be accounted for.

8.6.2.9 Take account of where a nominal volume of water is required outside site hours, such as for the provision of sanitary facilities to site security. The water supply requirements must be agreed by the Responsible Person and a reasonable nominal water flow allowance by total volume agreed for a single shift, i.e. a night shift. This must be as low as reasonably practicable and shall not exceed 200 litres in any given shift.

8.6.2.10 Incorporate manual shutoff control button(s) or devices on-site adjacent to the automatic monitoring and automatic shutoff devices.

8.6.2.11 Include weekly audits of the systems, to ensure they are in good working order, and maintenance schedules as recommended by the supplier/ manufacturer.

8.6.2.12 Include initial training and regular retraining as recommended by the supplier/manufacturer.

8.6.3 **Passive Leak Detection shall:**

8.6.3.1 Have a means of detecting a water or fluid leak, and provide audible and visual alerts on-site in the event of a leak being detected. Remote alerts shall be issued immediately to the designated Water Emergency Response Team to raise the alarm and begin the emergency response.

8.6.3.2 Leak detection devices using sensing cable or tape shall be installed in higher risk areas, including but not limited to, the base of mechanical risers (and any vertically fire-stopped points within), water tank rooms, bunds, plant rooms, utility rooms, and around AC units and in cable drip trays.

8.6.3.3 Be linked to an AAFMS device and supplies isolated in the event of a leak being detected.

8.6.4 **Other water system control measures**

8.6.4.1 High- and low-level sensors and alarms shall be fitted to temporary and permanent water storage tanks prior to filling, and should raise any alert remotely to the Water Emergency Response Team.

8.6.4.2 In closed circulating systems, there shall be early commissioning of BMS controls to monitor drops in pressure or prolonged demand caused by leaks resulting in systems going into fail-safe mode and shutting down circulation pumps. As soon as such systems are charged and linked to the BMS, any alarms raised on the system shall be transmitted remotely to the Water Emergency Response Team.

8.6.4.3 Flow monitoring for all other water-bearing systems, including underfloor heating, auto-refill systems, etc., shall be incorporated as part of BMS as soon as such systems are charged. Any alarms raised on the system shall be transmitted remotely to the Water Emergency Response Team.

9 TESTING AND COMMISSIONING

The process of testing and commissioning of all water systems must be undertaken in accordance with the relevant industry-recognised standards, codes, and guidance documents, in conjunction with manufacturers' recommendations and, where necessary, the requirements of the local water supply provider. It is critical that guidance from the pipe and fittings manufacturers must be followed to ensure that test pressures do not exceed the maximum allowable pressure for each section of the system. In addition to this, the guidance below must also be followed.

9.1 Testing

9.1.1 Pressure Test Plan

All pipework must be subject to a clearly defined and fully documented Pressure Test Plan in accordance with industry-recognised standards and the manufacturer's guidelines specific to the system. The Pressure Test Plan must be produced by a competent person, normally a professionally qualified plumbing engineer, mechanical engineer, or building services engineer. It must detail the roles and responsibilities of all personnel involved, the full test procedure, test pressures, hold periods, any exclusion zones or subdivisions, and the test and safety equipment required, for all the different types of pipework systems installed.

9.1.2 Pneumatic leak test

9.1.2.1 Prior to filling the system, a pneumatic leak test shall be conducted. A pneumatic leak test must be carried out at low pressures, not exceeding the manufacturer's recommendations or levels that would cause a safety concern, with a visual examination of all joints during the test, to confirm the integrity of the pressure envelope and as a means of detecting potential leaks before a full hydraulic pressure test is conducted. Ref. HSE Guidance Note GS4 Safety requirements for pressure testing.

9.1.2.2 A final inspection and (low-pressure) pneumatic pressure test shall be performed immediately before charging piping systems with water, even if the system has previously passed a hydraulic test (depending on the duration between the first test and the time for filling, and if any further work/alterations have been made), to allow for any subsequent works to the systems after the initial tests.

9.1.3 Wet Work Permit

9.1.3.1 The Principal Contractor shall implement a Wet Work Permit system to formally control work on all temporary and permanent live plumbing systems, including filling, testing, commissioning, snagging, and maintenance. The permit system shall require subcontractors to submit a permit form advising the Principal Contractor whenever their work involves piping, water, or other fluids.

To maintain awareness, the Principal Contractor shall inform all trades working on and around water systems which systems will be live during daily pre-start meetings.

9.1.3.2 The Principal Contractor's Responsible Person must have responsibility for reviewing, approving, and tracking all permits issued. Permits must be limited in duration to a single working shift, and limited to a specified area of the project. This will limit the scope and the location of work, and provide control of the exposure to water damage.

9.1.3.3 In addition to water watch periods, closing inspections must be completed and documented before leaving the site each day to verify that there are no leaks and the work area is secure.

9.1.3.4 This permit system must incorporate, as a minimum:

- Date and time of permit issue and expiry; duration not to exceed a single working shift.
- Exact location and nature of the work to be undertaken.
- Confirmation that the area is isolated (if applicable).
- Appropriate mitigation, such as wet vacuums and bunding, is in place in the working area.
- Detailed information on emergency contacts in the event of damage; isolation valve locations; and accompanying location plan.
- A person trained in the water damage response procedures and valve shutdown procedures not directly involved with the work will provide a continuous watch for signs of water or leakage during the period of work that includes areas adjacent to and below wet work areas. This must be maintained throughout lunch, breaks and all shifts.
- Confirmation that any AAFMS devices have been reinstated.
- Closure by the permit issuer (appointed person of the Principal Contractor) of the Wet Work Permit, countersigned by the permitted individual.

9.1.4 **Hydraulic pressure test**

Hydraulic pressure testing with water must be carried out to confirm the integrity of pressurised water systems, to provide a physical test of both integrity of material and construction quality. Pressure testing must not be conducted if there is a reasonable risk of freezing. Account must be taken of the daily variation, including thermal effects and surges in pressure, when determining the normal working pressures.

9.1.4.1 All components and fittings within the system being tested must be confirmed as being designed to withstand the proposed test pressure. Any items identified as not meeting this criterion must be removed or isolated prior to testing and, where necessary, replaced by a temporary device for the purposes of testing. Retesting with permanent devices must subsequently be undertaken.

9.1.4.2 **Risk evaluation and mitigation review**

A review and assessment must be made to identify any areas or equipment that are considered at high risk due to location and/or susceptibility to water damage, and specific protection provided as necessary together with water watch periods established within the Wet Work Permit (see Section 9.1.3). Emergency procedures and equipment must be made available in the working area. All other contractors on-site must be made aware that pressure testing of pipework is scheduled, with warning signs displayed. Drainage connections must be checked for adequacy for the expected discharge volumes and flows. Accommodation shall be made for potential pressure head build-up in the event of blockage of low-level down pipes in buildings where only gravity flow is anticipated. Drain-off taps must be accessible and have hoses that run to a drain so that the system can be emptied immediately if necessary.

9.1.4.3 **Visual inspection**

A visual inspection shall be carried out for all parts of the system to ensure they are complete and watertight. A specific inspection must be made of all the joints, particularly where the depth of insertion is critical to the

integrity. Any jointing methods that are not able to be visually checked as made shall be tested with additional caution; Void Closure Certificates must be used to confirm that any such joint has been previously inspected before becoming inaccessible. Pipework anchors and guides must be checked, as the increased expansion may cause joint failure during the fill. Any expansion devices must also be checked to ensure they are correctly guided and anchored. Checks must be made to ensure that all valves at the limits of the test section of pipes are closed.

9.1.4.4 Systems must be hydraulically tested in stages at the pressures and durations specified in the Pressure Test Plan, working up to the maximum working/test pressure in accordance with regulations and the manufacturer's instructions/performance specification. Systems must then be tested in accordance with the Water Supply (Water Fittings) Regulations or local country equivalent, BS EN 806 for water for human consumption or BS EN 14336 for heating services, and BESA TR6, taking account of specific pipe manufacturers' requirements for the relevant pipework material, with a visual examination of all joints during the test.

9.1.4.5 Sectional pressure testing, such as on a floor, then floor and riser, working up the building until the entire system has been tested, must be carried out and recorded on a Pressure Test Certificate. Only those parts of the system that are to be tested imminently must be filled, with other parts of the system blanked off or isolated.

9.1.5 **Conduct of testing**

At least two competent people shall be available to carry out the pressure test. All personnel involved in pressure testing activities must be suitably trained and shall continuously walk the system and check for leaks progressively as it is filled. All testing shall be conducted under a Wet Work Permit.

9.2 Commissioning

9.2.1 The commissioning process must be in accordance with the equipment manufacturer's guidelines and relevant industry standards, i.e. CIBSE Commissioning Code W and BSRIA Guide BG2: Commissioning water systems. A Commissioning Specification Document must be produced to detail the commissioning objectives and requirements.

9.2.2 Pre-commissioning checks must be made to ensure that the system is in a satisfactory and safe condition before final filling and setting to work. Pre-filling checks are to be undertaken before filling to ensure that the system is complete, correctly installed, and ready for the commencement of commissioning.

9.2.3 A final commission test must be carried out with full hydraulic pressure tests on systems in their entirety, including all equipment and fittings at their working pressure. The system must be filled with water (treated, where specified) in accordance with an agreed Method Statement, prepared by the Principal Contractor or installation contractor, and shall be verified by a commissioning consultant.

9.2.4 Post-commissioning: Since leaks can still occur after commissioning has been completed, all management and mitigation controls (see Section 7). These controls must remain in place until Practical Completion and formal project handover and include isolation of supply outside site working hours, active visual monitoring of the system, AAFMS devices, and emergency response organisation (WERT) and procedures.

9.3 Fire protection water systems

For sprinkler installation systems, testing and commissioning shall be in accordance with the latest version of the relevant standards that are applied in the design. This must include material compatibility checks between fire mastics and CPVC (chlorinated polyvinyl chloride) pipe (where installed). For wet fire main riser systems, testing shall be in accordance with the latest version of BS 9990 Non-automatic fire-fighting systems in buildings. Only authorised and appropriately certificated sprinkler contractors should be used, e.g. those certificated to LPS 1048-1 Sprinkler Contractor's scheme.

Sprinkler pumps and their water supply systems shall remain isolated after testing and commissioning until the point of project handover, to minimise the risk of accidental discharge during any snagging works.

Where it is necessary for these systems to remain charged outside working hours, these shall be installed with control measures as per Section 6.3.2.2.

9.4 Monitoring and record-keeping

9.4.1 Specific personnel with appropriate training and experience must be assigned to inspect the entire piping system and sign off on the inspection immediately prior to charging the system with water. Testing and commissioning must always be attended by a competent person with the capacity to identify problems and isolate the system, and the commissioning consultant or Principal Contractor.

9.4.2 Water systems being commissioned must be patrolled continuously to check on system integrity. After final commissioning, the system shall be monitored continuously for at least 24 hours by trained, experienced personnel who can react immediately in the event of a release, in accordance with the Water Emergency Response Plan. Installation of an AAFMS device (see Section 8.6.2) is an appropriate alternative to a full-time presence.

9.4.3 Pressure test and commissioning certificates must be issued for all sections of pipework, with the certificates recording the details of the test conducted and confirming that the test has been completed successfully. The Principal Contractor must implement a procedure for a full documented audit trail of all components used, the testing regime, commissioning procedures, and independent third-party certification. Self-certification by the installing contractor shall not be accepted. There shall be a professional third party responsible for auditing this paperwork, e.g. the commissioning consultant.

9.4.4 A full audit trail must be maintained of all components used in the system, the installation process, the testing regime, commissioning procedures, and approval certificates.

10 OTHER RISK FACTORS

10.1 Modern Methods of Construction (MMC)

10.1.1 Modular construction

Modular construction is particularly susceptible to water damage due to inaccessible voids and spaces, both before installation and post-installation, before completion of the building envelope. Water can penetrate between modules and progress through different building levels, often going unnoticed until significant damage has occurred.

Basic precautions such as controlling the timely supply to site, keeping these materials and modules inside enclosed structures, keeping them suitably covered when stored outside, and elevating them from the ground (typically on pallets for storage), can significantly reduce exposure to water ingress.

10.1.2 **Bathroom pods**

10.1.2.1 Such systems can benefit projects by reducing programme times and providing quality consistency through the building. Losses relating to EoW events have been caused by inadequate Quality Assurance and Quality Control procedures.

10.1.2.2 Pod design, fabrication, and testing, as well as integration into the project site, must be included within the project WSMP.

10.1.2.3 The design of any pods must consider the capability of on-site hydraulic pressure testing of all pod pipework connections as part of the commissioning procedures.

10.1.2.4 Where pods are to be installed on construction projects, the Principal Contractor must take a direct interest in the design, fabrication, delivery, installation, and testing of these products. Factory Acceptance Tests shall be overseen by the Principal Contractor and contractors involved in the delivery, storage, installation, and final connections.

10.1.2.5 A mock-up pod with all utility connections shall be installed on-site to verify the integrity of the pod and connections prior to the connection of any in-situ pipework. This should be used as a training tool for any installer.

10.1.2.6 Often pods are delivered to site without a Site Acceptance Test, relying on the supplier's test at the factory. As there is a risk of damage during transit and installation, each pod must be assessed on-site by the installation contractor to verify that no damage has occurred. Any damaged pod must be rejected until a remediation strategy has been agreed with relevant designers, suppliers, and installers.

10.1.2.7 Site Acceptance Tests shall include hydraulic pressure testing of all pod pipework connections.

10.1.2.8 Individual pods must be hydraulically tested as part of the testing and commissioning programme.

10.2 Mass Engineered Timber

10.2.1 Moisture content is a key factor affecting the performance properties of timber construction elements, i.e. weight, strength, stability, and susceptibility to biological attack. If the timber is exposed to water, such as from undetected leaking pipes, especially for longer periods, and moisture is allowed to become trapped inside without being able to escape or dry out, this can result in issues such as mould and decay. Where timber is left exposed for the final design then the aesthetics can also be adversely affected, through delamination, swelling and staining.

10.2.2 Where Mass Engineered Timber construction materials are used, the WSMP and WERP must include procedures for drying out timber materials in the event that they are wetted, together with moisture content measurement and monitoring processes to ensure that manufacturer-recommended moisture content levels are reached before closing up and handing over.

10.3 Irrigation systems

Green walls, green roofs, and planters installed within the structure present an additional risk. Pipework routing and leak detection must be factored into the design in order to minimise the risk of escape of water from these systems.

Any irrigation system shall have an installed and operational AAFMS device compliant to 8.6.2.

10.4 Attenuation systems

10.4.1 Systems designed for the attenuation and transportation of rainwater, such as blue roofs and the associated drainage pipework, presents a risk of escape of water through the building. These shall be designed to transport water externally rather than through the building.

10.4.2 Consideration of pipe routing and the potential impact in the event of an escape of water must be factored into the design and procurement of such systems.

10.4.3 The pressure capacity of drainage pipework shall be adequate for the potential pressure that could build up in the event of a blockage or inundation of the drainage system.

10.4.4 Any attenuation system shall have a Passive Leak Detection device fitted and operational compliant to Section 8.6.3 once installed, and prior to being connected.

10.5 Unpressurised piping systems and sumps

10.5.1 Planning for installation of water inundation protection systems throughout the development of a construction project can reduce the water damage risks associated with storm water inundation and backflow from sewage systems to susceptible areas of the construction site, especially basements.

10.5.2 Installation programmes for unpressurised piping systems and sumps, e.g. attenuation tanks, backflow preventers, permanent drains, etc., must be well planned and well conducted.

10.5.3 Non-return valves shall be installed to any temporary drainage system throughout the construction project. Where these devices are installed, they must be inspected and maintained on a regular basis not exceeding 3-monthly intervals.

10.5.4 As soon as permanent connections are made into any existing storm water and sewage outfall systems these must be sealed, and non-return valves shall be fitted to reduce the risk of backflow. Where these devices are installed, they must be inspected and maintained on a regular basis, not exceeding 6-monthly intervals.

10.6 Cold weather

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

10.7 On-site construction materials

10.7.1 Ensure that materials and assemblies susceptible to water damage are protected from internal standing water. This relates to stored and in-situ materials, timber building elements, mineral wool and other porous insulating materials, plaster and cement, plasterboard, and susceptible finishing materials such as decorative wall-linings and carpets/flooring systems.

10.7.2 During flushing and testing of elevated pipework, any adjacent stored materials shall be removed or protected from accidental discharge.

10.8 Basements

10.8.1 Basements are particularly susceptible to damage from escaped water, especially contaminated/foul water. Basements are the lowest floors in buildings, so escaped water will typically eventually end up here and accumulate, often to a high level. Contaminants in the water will typically wash down into the basement, collecting to high concentrations.

As basements are typically not on thoroughfares, water leaks/ingress can go unnoticed for extended periods before discovery, exacerbating the damage caused.

10.8.2 Temporary storage of materials shall be minimised within below grade (below ground) levels and any water-susceptible materials shall be raised at least 100mm off the floor.

10.8.3 Daily visual assessments of basements, water detection systems, and basement drainage/sump pumps shall be undertaken.

10.8.4 Temporary sumps must be installed and operational through the construction period to minimise any standing water. These shall be checked on a monthly basis to ensure they remain free of debris.

10.8.5 Permanent sump systems shall be tested and made operational as soon as practicable. Permanent drainage systems within basements and basement plant rooms must be connected and fully operational prior to any permanent tanks or pipes being filled.

10.8.6 Upstands of nominal 100mm around any openings, including risers, cores, and lift shafts, must be installed prior to any storage or installation of materials, tools, and plant.

10.8.7 Addressable leak detection strips/cables must be installed and operational around riser bases and any water storage tanks prior to the installation of temporary water supplies. These must transmit remotely to the Water Emergency Response Team and any site security team, and shall be linked to an AAFMS device to isolate the system.

10.9 Sealing of sinks, baths, and showers

10.9.1 Gaps around sinks, baths, and showers, where water could seep/flow into adjacent building elements and structures, must be suitably sealed. This extends to ensuring that wet-room floors are also sealed to prevent any leakage. An audit of all sealant work must be carried out before any of these installations are put into use.

10.9.2 Water detection devices such as detection strips, tape, leak sensors, etc. shall be installed beneath any kitchen or bathroom unit. These systems shall be linked to an AAFMS device to isolate the system locally, shall be addressable and shall send a remote alarm to the Water Emergency Response Team, to enable a prompt response. These shall also be commissioned and remain in place after handover to quickly identify, locate, and repair any defective connections.

11 MID- AND HIGH-RISE BUILDINGS

Water damage losses happen more often and have more severe consequences in buildings that have substantial pipework connections, boosted water supplies, water storage tanks, and multiple-occupancy units (including, but not limited to, apartments, student accommodation, and hotels). While there is often a focus on losses occurring in high-rise buildings, the frequency of EoW losses in mid-rise and low-rise projects is also significant.

For the purposes of this document, 'mid-rise' and above is classed as any multi-storey building of 5 storeys (or greater) or 11+ metres in height from ground level to roof level.

Water damage losses related to failure of water systems can be significant in such projects, especially residential and hotel buildings, which have a greater proportion of water-related systems and equipment. Damage from burst pipes can have a disproportionate impact, due to large volumes of water flowing vertically down from upper floors and laterally across floor plates, causing extensive damage to fixtures, fittings, and finishes, resulting in delays and extended contract periods, especially if the leak is not detected and responded to early.

Specific considerations that can aggravate water damage risks for mid- and high-rise buildings include:

- Access challenges: for example, time delays for emergency response to get to upper levels or to identify the location of the leak.

- Complexity: for example, multiple water shutoff valves, intermediate plant floors, water tanks, and booster pumps.
- Propagation: for example, increased water damage due to escaped water running down through multiple floors.

The following **must** be applied to all such projects.

11.1 Section 5

(5.11) The WSMP must be updated regularly and at not more than 6-monthly intervals.

(5.19) The WERP and the ability of the WERT and emergency responders to respond must be tested, including response and isolation of simulated leak events, at defined intervals throughout the construction project, not less than every 6 months, to ensure the WERP remains relevant, up to date, and effective.

11.2 Section 6

(6.3.1) The following unfavourable design features must be avoided:

- Combined service risers (electrical/data cabling and water systems together).
- Combined single pipework for domestic and sprinkler systems.

(6.3.2.1) AAFMS devices must be designed into both the temporary and permanent domestic water supply, booster, and any storage systems.

(6.3.2.2) The sprinkler system design must include alarm devices to include electrically operated flow switches, initiated by the flow of water to a single head with the lowest flow rate and pump running alarms. This alarm must initiate an alarm signal which is both monitored on-site and sends a remote signal to the Water Emergency Response Team.

11.3 Section 7

(7.1) Any chosen plumbing installation contractor must provide a contract-specific document detailing their management and quality controls, for both their pre-construction and construction activities. This must be reviewed and approved by the Principal Contractor and be reviewed and updated as the works progress.

11.4 Section 8

(8.3.6) All pipe joints must be marked with the installation date and installer identification (using an indelible marker, stamp or bar code) to provide a quick visual check that all joints on a pipe run have been fully formed and enable traceability to the specific installer and the machine/tools used.

(8.4.4) 24/7-operating Active Automatic Flow Monitoring Shutoff (AAFMS) devices must be fitted when installing temporary water supplies. This must, at a minimum, include an automatic shutoff device at the mains incoming supply to the project, downstream of any temporary water storage tank and any temporary boosted water system. These devices must remain in place and operational until the temporary system has been drained down and removed from the project.

This also applies to temporary buildings and welfare.

(8.4.8) If it is necessary for temporary water supplies to remain connected outside site working hours and the automatic shutoff devices are required to be overridden or turned off for any purpose, such as flushing activities, then a staffed water watch must be maintained until the automatic shutoff system is reactivated. This individual must be provided with an up-to-date copy of the WSMP.

(8.5.2) 24/7-operating Active Automatic Flow Monitoring Shutoff (AAFMS) devices must be fitted when installing permanent water supplies. These must comply with the requirements in Section 8.6.2 and be fully operable prior to filling the systems and throughout the testing and commissioning period.

(8.5.2.1) These devices must, at a minimum, be located at all mains incoming supplies, downstream of any water storage tank and any boosted water system, including those located on any intermediary plant rooms. These devices must remain in place and operational throughout the testing and commissioning period, and must be integrated into the occupied Building Management System.

(8.5.2.2) See Section 11.2.

(8.5.5) For residential/student accommodation and hotel buildings, individual apartment/bedroom connections must be manually isolated once filled, with any additional works managed through a permit system such as a lock-out/tag-out procedure.

(8.5.8) If it is necessary for permanent water supplies to be left connected (i.e. not isolated) outside site working hours, such as for flushing purposes, testing, and commissioning, then a constant water watch must be maintained on-site in the area of the work by designated and suitably trained persons. These individuals must be provided with an up-to-date WSMP with emergency response and emergency contact information. Branch pipes must be isolated wherever possible.

(8.6.3.1) Passive leak detection must have a means of detecting a water or fluid leak, and provide audible and visual alerts on-site in the event of a leak being detected. Remote alerts must be issued immediately to the designated Water Emergency Response Team to raise the alarm and begin the emergency response.

(8.6.3.2) Passive leak detection must be installed in high risk areas, including the base of mechanical risers (and any vertically fire-stopped points within), water tank rooms, bunds, plant rooms, utility rooms, around AC units, and in cable drip trays.

(8.6.3.3) Passive leak detection must be linked to an AAFMS device and supplies isolated in the event of a leak being detected.

(8.6.4.3) Flow monitoring for all other water-bearing systems, including underfloor heating, auto-refill systems, etc., shall be incorporated as part of the Building Management System as soon as these systems are charged. Any alarms raised on the system must be transmitted remotely to the Water Emergency Response Team.

11.5 Section 9

(9.1.3.1) The Principal Contractor must implement a Wet Work Permit system to formally control work on all temporary and permanent live plumbing systems, including filling, testing, commissioning, snagging, and maintenance. The permit system must require subcontractors to submit a permit form advising the Principal Contractor whenever their work involves piping, water, or other fluids.

To maintain awareness, the Principal Contractor must inform all trades working on and around water systems which systems will be live during daily pre-start meetings.

(9.1.5) At least two competent people must be available to carry out the pressure test. All personnel involved in pressure testing activities must be suitably trained. They must continuously walk the system and check for leaks progressively as the system is filled. All testing must be conducted under a Wet Work Permit.

11.6 Section 10

(10.1.2.5) A mock-up pod with all utility connections must be installed on-site to verify the integrity of the pod and connections prior to the connection of any in-situ pipework. This must be used as a training tool for any installer.

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

(10.9.2) Water detection devices such as detection strips, tape, leak sensors, etc., must be installed beneath any kitchen or bathroom unit. These systems must be linked to an AAFMS device to isolate the system locally, must be addressable and must send a remote alarm to the Water Emergency Response Team to enable a prompt response. These must also be commissioned and remain in place after handover to quickly identify, locate, and repair any defective connections.

12 ANNEX A – WATER SYSTEMS MANAGEMENT PLAN (WSMP) GUIDE

This Annex provides guidance on how to create a Water Systems Management Plan.

This includes sample headings and tables, noting the key areas and elements that shall be incorporated, together with references to the relevant sections in the main body of this document.

This can be used as a basis for creating a Water Systems Management Plan or as a benchmark review of existing plans and procedures. A sample blank template is provided in Annex B.

In all cases the format and guidance must be tailored and made bespoke to a particular project.

Purpose of the Plan

The purpose of the plan is to provide a structured, clear, and logical approach to the management and mitigation of the EoW risk, and consequential damage, from the initial design and for the duration of the project.

This is done through a risk-assessed approach considering the potential impact of failure of temporary and permanent water systems and corresponding mitigation measures.

The plan is used as a procedural document for all contractors involved in the design, installation, and commissioning of water systems, both temporary and permanent, and those responsible for responding in the event of an emergency EoW.

The plan will also provide evidence that suitable and sufficient measures have been considered and are in place to manage the risk of water damage throughout the construction period. As such, it is likely to be audited by the Insurer. It is therefore essential that it is complete and routinely reviewed and updated at least every 6 months.

The Principal Contractor has the overall responsibility to ensure the measures stated within the Water Systems Management Plan are incorporated on the project. Responsibility and accountability must not be passed on to another contractor.

Document Control

The Document Control section must include the project name, author(s), review checker/ approved sign-off, issue and revision dates and numbers, and distribution list to provide a clear record and ownership.

The distribution list must include all personnel with nominated specific roles and responsibilities, to ensure the procedures noted have been understood and implemented.

Project Name/Reference:	

Revision Record				
Issue No.	Revision Details	Revised by	Approved by	Date of Issue

Distribution List			
Issue No.	Issued to	Company	Date of Issue

Nominated Duty Holders

List of personnel with nominated specific responsibilities and who are to review the document to ensure the procedures included are understood and implemented.

List the named individuals, with a clear definition of their role and responsibilities. This must include:

- A designated Responsible Person from the Principal Contractor with responsibility for the overall control, implementation, and monitoring of the Water Systems Management Plan.
- Other designated competent individuals with defined roles in the design, quality, and execution of the installation, testing, inspection, and commissioning, plus daily routines such as end-of-day checks and isolation of supplies.

These personnel must be included in the distribution list.

Example guidance:

Role	Name/Position/Company/ Contact Details	Responsibilities
Responsible Person		Responsible for overall control of, implementation, and updating the Water Systems Management Plan. Responsible for ensuring that procedures are in place to manage risk, select and appoint skilled contractors, verify installation standards, adhere to codes, manage Quality Assurance, and ensure that duties under the plan are carried out.
Design		Design phase risk assessment process (see Sections 6.2–6.4) to identify risks and incorporate design prevention and protection measures to mitigate the ri sks, including AAFMS and Passive Leak Detection devices.
Quality Assurance		Implementation, monitoring, and recording of a Quality Control system (see Section 8.3).
Installation		Overall responsibility for installation and monitoring of wet systems, including early sequencing of mitigation measures, operation of Water Management Devices, and isolation of supplies outside project working hours (see Sections 8.2 and 8.5).
Temporary Systems		Overall responsibility for design, installation, monitoring, and testing of temporary systems, including operation AAFMS and Passive Leak Detection devices and isolation of supplies outside project working hours (see Section 8.4).
Test and Commissioning		Physical testing, commissioning, and documentation (see Section 9).
Emergency Response		Development and implementation of emergency response procedures (see Sections 5.14 and 5.15).

Summary of Systems Installed

Provides a list of all pipe systems to be installed, both temporary and permanent, including system types, installer, installation start, filling, and commissioning dates.

System Type	Installer	Start Date	Filling Date	Commission Date

Management of Water Systems

The following tables provide specific details of each water system, their control measures for escape of water, and any other relevant emergency procedures.

The details of each system:

- Individual design and installation
- Design mitigation features
- Selection and management of installation contractors
- Quality Assurance management
- Risk management and mitigation controls during construction and installation phase
- Testing and commissioning
- Emergency response planning with emergency contact details.

Example guidance:

Insert System Type	
Features	**Management and Mitigation**
Overview of System	Brief overview of each system design, installation methods, and materials
Design Features	List design features that mitigate the risks of escaping water and incorporated at the earliest possible stage of the building construction (see Section 6.3), with particular reference to: • Design inclusion of Active Automatic Flow Monitoring Shutoff (AAFMS) and leak detection devices for use during construction stages fitted prior to pipe fill (see Section 6.3.2). • Pressure-reducing valves and CAVSA or equivalent combined anti-vacuum and surge arrestor devices to reduce the risk of hydraulic shock. • Multi-pump Controlled Fill System (CFS) sets, which limit the starting sequence after a forced shutdown, reducing the rate in which the system is filled and the risk of hydraulic shock. • Isolation and shutoff valves in strategic readily accessible locations. • Temporary supplies minimised and externally routed with self-closing push-down taps and lockable discharge points. • Limiting elbow joints, free-supporting and concealed pipework. • Limiting wet trades, e.g. traditional plastering, by using tape and joint finishes, dry lining, or spray-applied plaster. • Construction work sequencing designed to mitigate the extent of damage, should an escape of water occur. • Riser and other floor slab penetration protection to openings designed to prevent vertical flow of water installed early in the works e.g. waterproof covers, seals and 100mm upstands • Drainage points designed on the floor slabs with risers for temporary and permanent water systems having temporary outlets connected to the drainage system designed to be installed early in the works. • Avoidance of combined service risers, where water and electrical services are routed together in the same risers. • Avoidance of combined single pipework and supply for domestic water and sprinkler systems, to allow separate isolation. • Water tanks not located above electrical services installations and equipment and designed with adequate bunds and suitable drainage installed prior to filling.

Insert System Type	
Features	Management and Mitigation
Active Automatic Flow Monitoring Shutoff (AAFMS)	Details of the AAFMS device that will operate during the construction phase to the building water service and internal pipework systems, including: • Water systems being monitored. • Manufacturer/supplier and model. • Location of automatic flow monitors and isolation valves (including mains intake and water tank supplies). • Parameter settings, i.e. maximum volume/flow limits per time period before automatic isolation. • Remote and on-site alerts to the designated Water Emergency Response Team and remote shutoff. • Weekly audits. See Section 8.6.2.
Selection and Management of Contractors	Provide contractor list subject to agreed contract management and quality controls (see Section 7). Detail contractor tender selection process to identify the required levels of competency and training. Identify the quality and scope of works, to include compliance to the design and works Water Systems Management Plan provisions, factored into the tender cost and programme as appropriate, with particular reference to: • Company-approved memberships or professional affiliations to recognised industry bodies (see Section 7.5). • Trade personnel competency levels, i.e. plumbing engineers with Advanced Craft CSCS qualification and training by the product manufacturer (see Sections 7.8–7.11). • List of industry regulations and standards to be complied with (see Sections 7.12-7.13). • Agreed installation of design features, especially capex items such as AAFMS and Passive Leak Detection devices installed for use during construction stages prior to pipe fill (see Section 7.3).

Insert System Type	
Features	Management and Mitigation
Quality Assurance Management	Details of how it will be proven that work is done in accordance with the project-specific water systems Quality Assurance (QA) Plan (see Section 8.3), with particular reference to: • Pre-construction and pre-start meetings, briefings, and toolbox talks held to verify adherence to Risk Assessments and Method Statements (RAMS), permits, Inspection and Test Plans (ITPs), and QA (see Section 8.3.4). • Monitoring and reviewing of installation contractors to ensure work is by suitable qualified personnel and to agreed standards (see Section 8.3.1). • QA checks made on all delivered materials and installation tools, including calibration and test certificates (see Section 8.3.5). • Joints marked with the installation date and installer identification for traceability to the specific installer and the machine/tools used (see Section 8.3.6). • Formal ITPs with mandatory hold points for quality control inspections and mandatory witness points for testing used, including void closures and certificates of compliance (see Section 8.3.7). • Processes used for defect monitoring and rectification, including defect list tracking and resolution within specified time frames and sign-off procedures (see Section 8.3.8).
Management and Mitigation Controls	Detail the engineering and management controls implemented to mitigate damage in the event of an escape of water incident from the water systems being installed. • Details of temporary system's controls (see Section 8.4). • Details of permanent system's controls (see Section 8.5). With particular reference to: • Operation and management of AAFMS and leak detection devices that will operate during the construction phase. • Procedures and method of isolation outside site working hours, including tank supplies. • Isolation and shutoff valves tagged/labelled as part of installation and throughout the works. • Daily routines such as end-of-day and start-of-day checks. • Mitigation procedures confirmed as in place until Practical Completion (PC) and handover.
Testing and Commissioning	Details of the testing and commissioning protocols and procedures (see Section 9), with particular reference to: • Formal test and commissioning plans and procedures in accordance with the equipment manufacturer's guidelines and relevant industry standards. • Details of monitoring and supervision throughout the process, e.g. the Responsible Person designated to supervise, witness, and record all tests, 'never conduct unattended', 'water watch', and Wet Work Permit procedures (see Section 9.1.3). • Reference to Pressure Test Plans, Pressure Test Certificates, and Commissioning Specification Document.

Water Emergency Response Plan (WERP)

This shall include a nominated Water Emergency Response Team supported by a Water Emergency Response Plan with a detailed set of response procedures (see Sections 5.14– 5.19).

Training must provide for an early response in the event of leaks, including the activation of flow monitoring and shutoff devices, and how to manually shut down systems and use of spill kits. Out-of-hours security guards must have relevant training and know how to shut down systems and contact the WERT if needed.

The Water Emergency Response Plan shall be reviewed and tested at regular intervals, not less than every 6 months, throughout the project to ensure it remains relevant, up to date, and effective.

Water Emergency Response Team (WERT)

List the nominated and trained WERT, with a clear definition of the roles and responsibilities of each team member. State the cover provided for each individual water system both during project working hours and outside project hours.

Water System	Name	Company	Position

Emergency Contact List

List the emergency responders with their contact details. This list must be regularly updated and displayed on noticeboards. Cover must be provided for project working hours and outside project hours.

During Project Hours			
Name	Company	Position	Phone no.

Outside Project Hours			
Name	Company	Position	Phone no.

Emergency Response Procedures

List of emergency procedures for events occurring both during and outside site working hours. This shall include:

- How to notify the WERT in an emergency upon the visual identification of a leak.
- How to manually isolate and shut down water systems, both temporary and permanent, supported by:
    - Method statements so that it is clear how isolation is to be achieved
    - Isolation valves clearly labelled on-site, with clear signage to the isolation points
    - Schematic site plans and photos identifying the locations of isolation valves and the areas that they isolate.

- Response procedures to follow upon the activation of any AAFMS and Passive Leak Detection devices.
- The location and use of spill kits, emergency pumps, etc.
- Dealing with the immediate effects of the incident, including how to remove water from the building, how to use emergency spill kits and emergency pumps, and their locations on-site.
- Recovery/restoration processes.

In addition, emergency response process charts/trees can also be a useful tool, e.g.

Leak detected/reported ⟶ Is the site closed/unoccupied?

Yes ⟶ List subsequent actions until resolved.

No ⟶ List subsequent actions until resolved.

An example table is included below, with guidance on the elements that should be incorporated.

Procedures	Actions
Emergency notification	**Leak in project hours**
	How to notify the WERT and emergency responders in the event of a leak
	Leak outside project hours
	How to notify the WERT and emergency responders (including security guards) in the event of a leak.
Isolation procedures	**Leak in project hours**
	How to manually isolate and shut down water systems, supported by: • Method statements, so that it is clear how isolation is to be achieved • Isolation valves clearly labelled/tagged • Schematic site plans and photos identifying the locations of isolation valves and the areas that they isolate • Training records
	Leak outside project hours
	How to manually isolate and shut down water systems, supported by: • Method statements, so that it is clear how isolation is to be achieved • Isolation valves clearly labelled/tagged • Schematic site plans and photos identifying the locations of isolation valves and the areas that they isolate • Training records This must include the duties of security guards, who must be given specific instructions and training on how to respond if they discover an incident.

Procedures	Actions
Response to activation of automatic Water Management Devices	Leak in project hours
	Response procedures upon the on-site and remote notification of the activation of AAFMS and/or Passive Leak Detection devices, sump pump, or sprinkler alarms (including on-site alerts), supported by written method statements.
	Leak outside project hours
	Response procedures upon the on-site and remote notification of the activation of AAFMS and/or Passive Leak Detection devices, sump pump, or sprinkler alarms (including on out-of-hours remote alerts) supported with written method statements.
Method of containing and removing water	How to deal with the immediate effects of the incident, including: • Emergency spill kits and emergency pumps, i.e. how to use and locations on-site • Method of removing water from the building.
Recovery/ restoration	Brief details of the recovery and restoration processes, e.g. details of priority contracts with specialist contractors to provide additional salvage and restoration services and equipment, such as pumps, dehumidifiers, wet-dry vacuums, etc.
Reinstatement of water supply	Brief details of the reinstatement process to ensure good communication with all trade contractors, and safe restart and reactivation of Water Management Devices (see Section 5.17).
Post-incident investigation	The Responsible Person must investigate to determine the root cause of the incident, the effectiveness of the emergency response, and any additional measures required to further mitigate the risk. Details of any incidents and lessons learned must be shared with the project team, and should also be shared with the relevant Insurer (see Section 5.18).

Water Emergency Response Plan Testing Record

The Water Emergency Response Plan shall be reviewed and tested at regular intervals, not less than every 6 months, throughout the project to ensure it remains relevant, up to date, and effective.

Test Date	Action Points Raised	Action Owner	Completed Date	Responsible Person Sign-off

13 ANNEX B – WATER SYSTEMS MANAGEMENT PLAN (WSMP) SAMPLE TEMPLATE

WATER SYSTEMS MANAGEMENT PLAN

Document Control

Project Name/Reference:	

Revision Record				
Issue No.	Revision Details	Revised by	Approved by	Date of Issue

Distribution List			
Issue No.	Issued to	Company	Date of Issue

Nominated Duty Holders

Role	Name/Position/Company	Responsibilities
Responsible Person		
Design		
Quality Assurance		
Installation		
Temporary Systems		
Test and Commissioning		
Emergency Response		

Summary of Systems Installed

System Type	Installer	Start Date	Filling Date	Commission Date

Management of Water Systems

Insert System Type	
Features	Management and Mitigation
Overview of System	
Design Features	
Active Automatic Flow Monitoring Shutoff (AAFMS)	
Selection and Management of Contractors	
Quality Assurance Management	
Management and Mitigation Controls	
Testing and Commissioning	

WATER EMERGENCY RESPONSE PLAN

Water Emergency Response Team

Water System	Name	Company	Position

Emergency Contact List

During Project Hours			
Name	Company	Position	Phone No.

Outside Project Hours			
Name	Company	Position	Phone No.

Emergency Response Procedures

Procedures	Actions
Emergency notification	Leak in project hours
	Leak outside project hours
Isolation procedures	Leak in project hours
	Leak outside project hours
Response to activation of automatic devices	Leak in project hours
	Leak outside project hours
Method of containing and removing water	
Recovery/ restoration	
Reinstatement of water supply	
Post-incident investigation	

Water Emergency Response Plan Testing Record

Test Date	Action Points Raised	Action Owner	Completed Date	Responsible Person Sign-off

14 ANNEX C – (INTERACTIVE) SAMPLE WET WORK PERMIT

A copy of the permit with Sections A and B and the checklist completed should be held by the person(s) completing the work. A copy of the completed permit (with checklist), including Sections C and D, should be retained for auditing purposes.

ISSUING COMPANY		PERMIT NO.	

A **PROPOSAL** (to be completed by the person responsible for carrying out the work)

PROJECT BUILDING	
WATER SYSTEM(S) INVOLVED	
EXACT LOCATION OF PROPOSED WORK	
NATURE OF WORK TO BE UNDERTAKEN	
DETAILS OF MONITORING DURING THE WORKS	

I have completed and submitted the Checklist and understand the scope of work and precautions to be taken.

NAME		SIGNED	
DATE		COMPANY/POSITION	

B **AGREEMENT** (to be completed by Responsible Person – the 'Issuer of the Permit')

This Wet Work Permit is issued subject to the following conditions:

ISSUE OF PERMIT:	DATE		TIME	
EXPIRY OF PERMIT*:	(Permits should not be issued for more than one day or shift)		TIME	

The above location has been examined and the Section E precautions checklist that accompanies this form has been complied with.

TIME WORK AREA CHECKED:	
ADDITIONAL ACTIONS/CONDITIONS REQUIRED:	

NAME		SIGNED	
DATE		COMPANY/POSITION	

C **FOLLOWING COMPLETION OF WORK** (To be completed by member of staff or contractor responsible for the work. The permit should then be returned to the Issuer)

Tick or N/A

System has been inspected and left in a safe condition

System and any test hoses have been drained down

System has been isolated

System left charged with water at a suitable operational pressure, with full emergency isolation procedures in place

Any outlets, such as taps, hose bibs, and other end-of-line outlets, are closed and not running

Area and pipes free of all debris, materials, and tools

Active Automatic Flow Monitoring Shutoff and Passive Leak Detection devices have been reinstated if isolated during the works

The works have been conducted in full compliance with the permit, and no signs of any leakage were found during the works

Safe-fill procedure in place to ensure isolation valves are opened slowly to fill at a reduced rate to avoid hydraulic shock

Water watch inspection adjacent to and below wet work areas at least 30 minutes post-work completion (followed by further checks, if required, based on risk assessment) have been completed on the system

TIME WATER WATCH INSPECTION COMPLETED:	

SIGNED		NAME	
DATE		COMPANY/POSITION	

D SIGN-OFF BY ISSUER OF PERMIT

The work has been completed. Any Active Automatic Flow Monitoring Shutoff and Passive Leak Detection devices have been fully reinstated.

SIGNED		NAME	
TIME		DATE	

E WET WORK PERMIT CHECKLIST

The following checks should be carried out by the wet work operative at the wet work site prior to commencing work. The person carrying out these checks should tick the appropriate boxes, then return the checklist to the Hot Work Permit issuer. Any additional actions or conditions required to be noted in Section B.

	Tick or N/A
Locations of isolation valves have been identified, tagged as to areas they isolate, and are accessible	
Schematic plans that clearly identify the location of tagged isolation valves and the areas that they isolate are available at the location of work being performed under this permit	
Warning signs are in place not to open or operate the valves or any associated pump or plant	
The necessary authorisation and training has been provided to permit operatives to safely shut off the valves in the event of a pipe burst or leakage/water damage event, including fire protection system valves	
The system has been drained prior to the start of any wet work	
The system has been isolated prior to the start of any wet work	
Active Automatic Flow Monitoring Shutoff and Passive Leak Detection devices will be kept operative during the works, if possible. If these are required to be isolated during the works, these will be reinstated upon completion of the works	
A lock-out/tag-out procedure required for the work being performed under this permit is in place	
All drains in the area of the work being performed under this permit have been inspected and confirmed as functional and free of debris	
Floor openings through which leaking fluid may pass and damage areas below have been protected	
Electrical and other sensitive equipment has been protected from potential water damage	
Adequate heat is being maintained in the area to ensure all wet systems are protected from freezing	
Nearby susceptible materials are stored off the floor/ground and protected to prevent water damage	
A copy of the Water Systems Management Plan emergency response procedures detailing what to do in the event of a leak or water damage has been provided and understood	
Spill kits are available at the work area, have been reviewed for missing items, and permit operatives are trained in their use	
A person trained in the water damage response procedures and valve shutdown procedures not directly involved with the work will provide a continuous watch for signs of water or leakage during the period of work. This includes areas adjacent to and below wet work areas. This must be maintained throughout lunch, breaks, and all shifts	
Following completion of the work and the system being charged, a visual water watch inspection adjacent to and below wet work areas will be undertaken at least 30 minutes post-work completion (followed by further checks if required, based on risk assessment)	

SIGNED		NAME	
TIME		DATE	

15 REFERENCE DOCUMENTS

Refer to latest versions:

- Best Practice Guidance: *Managing Escape of Water Risk on Construction Sites* (5th ed.). CIREG (Construction Insurance Risk Engineers Group).
- Technical Guidance Document: *Construction Projects - Water Service Systems Risk Management* (2nd ed.). Chubb Technical Lines.
- Loss Prevention Standard: *Escape of Water on Construction Sites*. Aviva.
- A Contractor's loss prevention guide: *Water Damage During Construction*. Allianz Risk Consulting.
- BS EN 806 series. *Specifications for installations inside buildings concerning water for human consumption*. BSI.
- BS EN 14336. *Heating systems in buildings. Installation and commissioning of water based heating systems*. BSI.
- 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*. BSI.
- TR6 Guide to good practice: *Site Pressure Testing of Pipework*. BESA (Building Engineering Services Association).
- *Plumbing Engineering Services Design Guide*. CIPHE (Chartered Institute of Plumbing and Heating Engineering).
- *Water Supply (Water Fittings) Regulations/Water Supply (Water Fittings) (Scotland) Byelaws/Water Supply (Water Fittings) Regulations (Northern Ireland).* Legislation.gov.uk.
- *Water distribution systems CIBSE Commissioning Code W*. CIBSE (Chartered Institute of Building Services Engineers).
- BG2: *Commissioning water systems*. BSRIA (Building Services Research and Information Association) .
- *LPC Rules for Automatic Sprinkler Installations 2015*, incorporating BS EN 12845. BSI.
- BS 9251 *Fire sprinkler systems for domestic and residential occupancies. Code of Practice*. BSI.
- BS 9990 *Non-automatic fire-fighting systems in buildings*. BSI.
- Technical Guidance Note: Residential Sprinkler Systems to BS 9251. *Guidance and recommendations for the implementation of Residential Sprinkler Systems*. FPA.
- NFPA 13 *Standard for the Installation of Sprinkler Systems*. NFPA.
- BDM10 *Code of Practice for the protection of empty buildings: fire safety and security*, RISCAuthority.
- Property Loss Prevention Data Sheets. *DS 2-0 Installation guidelines for automatic sprinklers*. FM Global.
- HSE Guidance Note GS4 *Safety requirements for pressure testing*. HSE

INSURANCE PROVISIONS RELATED TO THE JOINT CODE OF PRACTICE

If an insurance policy provides cover for a site where this *Joint Code* is in operation, this policy should normally contain an endorsement noting this, outlining the respective rights and responsibilities of Insured and Insurer.

There is no mandatory version of such policy endorsement, and no requirement for any endorsement to be used. A model form is shown below. The form may need to be adapted to ensure consistency with the terms and conditions and terminology used in the balance of the policy wording.

JOINT CODE OF PRACTICE ON THE PREVENTION AND MANAGEMENT OF ESCAPE OF WATER ON CONSTRUCTION SITES AND BUILDINGS UNDERGOING RENOVATION

The following endorsement is added to the policy.

The insured undertakes to comply with the Joint Code of Practice on the Prevention and Management of Escape of Water on Construction Sites and Buildings Undergoing Renovation 1st edition, or any subsequent amendment thereto or revised edition thereof current at inception or subsequent renewal of the policy hereinafter referred to as the Joint Code.

The appointed representative of the company shall have the right at all reasonable times to enter and inspect any construction site insured under the policy for the purpose of checking whether the conditions thereon in all respects comply with the Joint Code.

In the event of the company becoming aware of a breach of the Joint Code the company will inform the employer or their representative and the main/management contractor's construction site management of the nature of the breach, specifying the remedial measures required by the company (the remedial measures) and the period within which these must be completed.

Where the company considers such a breach is of sufficient importance, the company will confirm the same by notice in writing to the employer and main/management contractor at their respective addresses nominated by the insured at the inception of cover or as subsequently amended.

Under the terms of this or any subsequent notice, the company may suspend or cancel all cover under the policy from the date named in the notice, not being a date earlier than the date named for the completion of the remedial measures, it being understood that upon suspension such cover shall be reinstated when the company is satisfied that the remedial measures have been completed. Such notice shall be given by a reliable method, with confirmation of receipt.

The reference to suspension or cancellation of all cover shall apply only to the contract specified in the notice.

This endorsement shall not in itself be considered a condition precedent to liability, but its inclusion shall not prejudice, waive, or remove the rights of the company under the terms of other policy exclusions and conditions.

This endorsement does not apply to any public liability employer's insurance provided by the policy.

In the event of cancellation, only the company agrees to return to the Insured a pro-rata proportion of the relevant part of the policy premium.

Subject otherwise to the terms, exclusions, and conditions of this policy.

JOINT CODE OF PRACTICE ON THE PREVENTION AND MANAGEMENT OF ESCAPE OF WATER ON CONSTRUCTION SITES AND BUILDINGS UNDERGOING RENOVATION

First edition

CIREG
Construction Insurance Risk Engineers Group

RISCAuthority

FPA Fire Protection Association

LEG London Engineering Group
COMMITTED TO EXCELLENCE IN ENGINEERING INSURANCE

CIPHE The Chartered Institute of Plumbing and Heating Engineering