CPVC Sprinkler Pipework - Leakage

This Loss Prevention Standard provides guidance on managing leakage risks associated with chlorinated polyvinyl chloride (CPVC), and other plastic pipework, used in residential sprinkler systems.

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Introduction

While fire protection is the primary objective of automatic sprinkler systems, achieving this requires they are engineered, installed, and maintained correctly to ensure long-term integrity.

Many leakage losses are preventable through good design, appropriate material selection, competent installation, adherence to technical standards, and compliance with manufacturer guidelines.

This Loss Prevention Standard provides specific guidance on minimising leakage risks associated with CPVC, and other plastic pipework, used in residential sprinkler systems. This type of pipework is uniquely vulnerable to chemical attack, mechanical overstress, incompatible fire-stopping, incorrect fixings, environmental exposure, and installation errors. The damage caused by leakage from CPVC systems is often significant, and many insurers limit or exclude leakage cover where plastic systems are installed incorrectly.

CPVC/Plastic Pipework System Vulnerabilities

CPVC is a chemically sensitive and mechanically brittle thermoplastic. Small errors during or after installation can lead to stress cracking, sometimes occurring months or years later without warning. Typical causes include:

Chemical Incompatibility

Even brief exposure to incompatible compounds, such as lubricants, sealants, fire-stop mastics, spray foams, paints, cleaning products, etc., can cause:

- Environmental stress cracking.
- Softening or embrittlement.
- Progressive degradation leading to sudden rupture.

This damage is irreversible and may be invisible until failure.

Incorrect Fire Stopping

Fire-stopping materials are designed to seal gaps and penetrations in fire-rated walls, floors, or ceilings to prevent fire and smoke spreading through a building.

Only fire-stopping materials explicitly approved by the CPVC manufacturer should be used. Non-compatible fire-stop products can slowly attack the pipe or fittings, creating a hidden long-term leakage risk and compromising fire compartmentation.

Incorrect Hangers, Supports or Brackets

Plastic pipework is more flexible than steel, and excessive point-loading or improper spacing leads to:

- Pipe sagging.
- Mechanical stress on fittings.
- Joint separation or rupture.
- Vibration-induced fatigue.

CPVC systems must use manufacturer-certified hangers at manufacturer specified spacings.

UV Exposure, Heat Sources and Environmental Conditions

CPVC is degraded by:

- Prolonged sunlight/UV exposure.
- High temperatures.
- Compounds emitted from adjacent materials, e.g., curing concrete, solvent vapours.

Environmental controls and protection are essential.

Permitted Use (Per Technical Bulletin: TB202.7.4.1.2)

Plastic pipework must:

- Be approved to the Loss Prevention Certification Board (LPCB) Loss Prevention Standard **LPS 1260 Plastic Pipe and Fittings** for use in automatic sprinkler systems.
- Be installed only in residential areas of a building.
- Be installed strictly to the manufacturer's instructions and LPC Rules.

Fire stopping of compartment penetrations, hangers, and jointing materials must be fully compatible and approved by the pipe manufacturer. Correct curing times, venting and flushing to be followed.

Non-compatible mastics/compounds must not be used due to the risk of chemical attack, loss of integrity, and leakage.

Training and Competence

CPVC systems must only be installed by operatives holding a valid manufacturer training certificate. Other trades must also be briefed on avoiding contamination of pipework during construction.

Untrained installers and other trades on site may unintentionally expose pipework to harmful materials or incorrect methods, significantly increasing leakage risk.

Pressure Testing Requirements

- CPVC is particularly vulnerable to brittle fracture, therefore pneumatic testing is not permitted on CPVC.
  - ✓ Hazard and brittle fracture risk are addressed in the **Pressure Systems Safety Regulations (PSSR)**.
- Hydrostatic testing must follow the guidance in the LPC Rules for Automatic Sprinkler Installations 2015 Incorporating BS EN 12845 and manufacturer limits.
- Ensure joint curing time guidance has been followed before applying test pressure.

Why Pneumatic Testing is Dangerous in CPVC Systems

Compressed air stores energy, if the pipe fails under pneumatic pressure it can result in:

- Violent pipe fragmentation.
- Serious injury or fatalities.
- Structural or equipment damage.

CPVC is particularly vulnerable to brittle fracture, which is why pneumatic testing is prohibited for CPVC and highly restricted for other materials.

Installation Good Practice

- Use only manufacturer-approved solvent cements, fittings, and tools.
- Keep CPVC materials isolated from contamination sources.
- Appropriately vent and flush the system.
- Ensure correct torque application for fittings.
- Do not overtighten hangers, refer to manufacturer guidance.

Inspection and Maintenance

A formal maintenance programme must be established with a third-party accredited sprinkler contractor, such as one approved to LPCB Loss Prevention Standard **LPS 1048 Requirements for the Approval of Sprinkler System Contractors in the UK and Ireland**, or an equivalent standard. Key considerations include:

- Distortion or sagging of pipe runs.
- Chemical exposure or overspray.
- Discolouration.
- Loose or missing hangers.
- Stress points at penetrations.
- Cracks or a brittle appearance.

Any identified defect must be escalated immediately for repair, replacement, etc.

Insurance Requirements

Because of the vulnerabilities discussed in this document, some insurers may restrict or exclude leakage cover when CPVC is used. Any proposal to use CPVC pipework should be discussed with your insurer and broker.

Specialist Partner Solutions

Aviva Risk Management Solutions can offer access to a wide range of risk management products and services at preferential rates via our network of Specialist Partners.

For more information please visit: Aviva Risk Management Solutions – Specialist Partners

Sources and Useful Links

- LPC Rules for Automatic Sprinkler Installations 2015 Incorporating BS EN 12845
- BS 9251 – Fire sprinkler systems for domestic and residential occupancies – Code of practice.
- LPS 1260 – Plastic pipe and fittings for use in automatic sprinkler systems.
- LS 1048 - Requirements for the approval of sprinkler system contractors in the UK and Ireland
- The Pressure Systems Safety Regulations
- Health and Safety Executive guidance - Pressure Systems Safety Regulations (PSSR)

Note: Whilst UK standards and legislation are referenced in this document, other international standards and legislation should be referenced where applicable.

Additional Information

Relevant Aviva Loss Prevention Standards include:

- **Sprinkler Systems - How they Operate**
- **Sprinkler Systems - Buildings Featuring Residential Occupancies**

To find out more, please visit Aviva Risk Management Solutions **or speak to one of our advisors.**

Email us at riskadvice@aviva.com or call 0345 366 6666.*

*The cost of calls to 03 prefixed numbers are charged at national call rates (charges may vary dependent on your network provider) and are usually included in inclusive minute plans from landlines and mobiles. For our joint protection telephone calls may be recorded and/or monitored.

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