Sprinkler Systems - Buildings Featuring Residential Occupancies

This Loss Prevention Standard sets out Aviva's minimum property protection requirements for sprinkler systems in buildings that feature residential occupancies alongside non-residential areas, e.g., car parks, plant rooms, retail and offices.

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Sprinkler Systems - Buildings Featuring Residential Occupancies

Introduction

Many buildings are now subdivided for residential and commercial use, which can create challenges when specifying sprinkler protection.

This document provides guidance on specifying sprinkler systems for properties with combined residential and commercial use. It applies to mixed-use buildings containing residential occupancies of any height and sets out additional requirements for integral car parks, retail, office and plant areas, as well as shared infrastructure such as water supplies, zoning and monitoring. The guidance aligns with the intent of LPC Rules Technical Bulletin **TB202 – Sprinkler Protection to Buildings Featuring Residential Occupancies: Insurance Requirements** and should be applied alongside the relevant British and European standards.

TB202 exists to bridge the gap between life-safety designs, and the property protection and business resilience outcomes insurers require.

- Residential sprinkler systems such as **BS 9251: Fire Sprinkler Systems for Domestic and Residential Occupancies**. **Code of Practice** and **NFPA13R: Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies** primarily address life-safety, providing occupants time to evacuate. They may extend to limited non-residential areas, but they are not intended to protect property for insurance purposes.
- Where property protection is required, systems shall be designed in accordance with the **LPC Rules for Automatic Sprinkler Installations incorporating BS EN 12845 Fixed Firefighting Systems. Automatic Sprinkler Systems. Design, Installation and Maintenance**, and applicable Technical Bulletins and/or local codes designed to provide property protection.

Design Engagement

At design stage, consult the Fire Authority, Water Authority, the Fire Insurer, and third-party accredited sprinkler contractors, e.g., **LPS 1048 Requirements for the Approval of Sprinkler System Contractors in the UK and Ireland** approved or equivalent in the United Kingdom, at an appropriate approval level for the proposed works. Aviva will need to review full designs in accordance with **BS EN 12845** clause 4 and technical bulletin **TB205 Consultation and Acceptance for Sprinkler System Approval by Fire Insurers**.

Residential Sprinkler Protection

Design Standard and Philosophy

- Aviva's expectation is for the sprinkler system to be able to achieve coverage to a property protection standard design, and water supply provisions shall meet or exceed the LPC Rules for Automatic Sprinkler Installations with specific reference to TB202 guidance.
- Sprinkler protection is required in all parts of the residential areas, including bathrooms and external balconies. Exceptions may be considered for small, enclosed rooms with internal floor areas of less than 2m² and the smaller dimension less than or equal to 1m.

Hydraulic and Hardware Requirements (Residential Zones)

- Wet-pipe installation only shall supply the residential pipework.
- Fully hydraulically calculated (FHC) methodology shall be used.
- Design density: 5 mm/min for a maximum of 4 sprinklers operating.
- Minimum operating pressure: 0.5 bar at each operating head (consistent with LPC Rules minimums for higher hazard categories; see **TB229 LPC Rules for Automatic Sprinkler Installations Variations to BS EN 12845**).
- Nominal sprinkler K-factor: K40 minimum up to K108 maximum; maximum coverage 25m² per head; sidewall sprinklers are permitted where appropriate to BS/Manufacturer guidance.
- External balconies may be protected using dry-pipe sidewall sprinklers where exposure/ambient conditions necessitate.

Pipework and Materials (Residential Zones)

- Minimum pipe diameter: 25 mm.
- CPVC pipework approved to **LPS 1260 - Plastic Pipe and Fittings for Use in Automatic Sprinkler Systems** may be considered, subject to the manufacturer's design and installation guidance, trained operatives, curing, venting/flush and compliant hangers. It should be noted that sprinkler leakage cover may not be provided. You must consult Aviva prior to agreeing to use CPVC pipework.
- CPVC pipework must itself be sprinkler-protected and must not be used in concealed spaces containing/made from combustibles that require sprinkler protection, nor in external areas.
- Fire-stopping of penetrations through compartment walls must use compatible materials approved by the pipe manufacturer; non-compatible compounds must not be used to avoid pipework integrity degradation and leakage risk.

OH3 Commercial Sprinkler Protection (Retail/Office/Plant, etc.)

Design Standard

- Non-residential commercial areas (not car parks) may be treated as Ordinary Hazard Group 3 (OH3) under BS EN 12845 and LPC Rules. Pre-calculated methodology may be used where permitted by TB229; otherwise use FHC.

Hydraulic Parameters (OH3)

- K80 sprinklers with maximum coverage of 12 m^2 per head.
- Design density: 5 mm/min.
- Minimum operating pressure: 0.35 bar at the hydraulically most unfavourable head (per LPC Rules/TB229 minimums).
- Provide trace heating and thermal insulation in unheated areas to prevent freezing.
- Commercial/industrial areas shall be controlled by separate installations from those serving the residential/domestic risks.

HHP3 Commercial Sprinkler Protection for Car Parks

Hazard Classification

- Integral/covered car parks present elevated fire hazards due to increased plastic content of modern vehicles and the popularity of EVs with lithium-ion batteries; car parks are classified High Hazard Process Group 3 (HHP3) in the LPC Rules.

Design Approach (Car Parks)

- Water supply shall be high-hazard rated (pumps and tanks) to deliver the required discharge and pressure to the most remote area.
- Design density: 12.5 mm/min over an assumed fire area of 260 m^2 (Aviva requirement based on TB202 provisions for property protection).
- Sprinklers: K115 heads, maximum 9 m^2 per sprinkler (spacing and layout to manufacturer/LPC Rules guidance), FHC methodology.
- Minimum operating pressure: 0.5 bar at the hydraulically most unfavourable head (consistent with LPC Rules minimums for high hazard categories; see TB229).
- Preferred system type: Wet-pipe installation with trace heating and thermal insulation. Where this is unavoidable, a Type B pre-action system is acceptable only when integrated with automatic fire detection to **BS 5839-6 Fire Detection and Fire Alarm Systems for Buildings - Code of Practice for the Design, Installation, Commissioning and Maintenance of Fire Detection and Fire Alarm Systems in Domestic Premises** at Category L1 coverage across relevant areas.

Additional Information

Zoning and Controls

- The system must be zoned per BS EN 12845 Annex D/F (as applicable). Each residential floor shall have a separate zone valve located in secure areas accessible to authorised personnel only.
- All sprinkler activations and faults must be transmitted to a remotely, permanently occupied central monitoring station or directly to the Fire and Rescue Service to ensure prompt response. (BS 5839 series provides the overarching framework for detection/alarm systems interfacing.)

Approvals and Component Selection

- Commercial (OH3/HHP3) sprinkler heads shall be LPCB-approved (or equivalent).
- Residential sprinklers shall be UL/FM approved and installed per manufacturer recommendations.
- Contractors shall be third party accredited (such as LPS 1048 or equivalent) and approved to the appropriate level for the scope of works.

Water Supplies and Storage

- Water supplies shall be provided by either a single superior supply per BS EN 12845 clause 9.6.2 or in accordance with **TB233 Water Supplies for Systems Intended to Comply with Approved Document B (ADB)** (apply the most onerous design criterion from OH3/HHP3 or residential—whichever is greater).
- Storage may be via a single full-capacity tank or two half-capacity tanks, sized to provide 60 minutes minimum duration (property protection basis).
- Where a car park is present, 90 minutes duration is required. In this case, a full-capacity tank providing 60 minutes to OH3 areas may be used if the town's main infill can reliably provide the shortfall to achieve 90 minutes duration for the HHP3 demand.
- Where pumps draw from two tanks, they must be arranged so that either tank may be isolated for maintenance while maintaining supply to both pumps from the remaining tank.

Breeching Inlets (Fire and Rescue Service)

- Provide breeching inlets conforming to **BS 5041-3 Fire Hydrant Systems Equipment - Specification for Inlet Breechings for Dry Riser Inlets** and housed in inlet boxes to **BS 5041-5 Fire Hydrant Systems Equipment - Specification for Boxes for Foam Inlets and Dry Riser Inlets**, connected to the distribution mains between the water supplies and installation control valves, and located 400–600 mm above ground level.
  - ✓ For ordinary hazard installations: 100 mm 2-way inlet.
  - ✓ For high hazard installations: 150 mm 4-way inlet.

Installation in Commercial Areas

- Pipework in commercial areas shall be installed per BS EN 12845 clause 13 (or Annex E for high-rise systems) and TB229 variations.

Quality and Workmanship (Plastic Pipe)

- All plastic pipes/fittings must be fully assembled, cemented and cured per manufacturer guidance; air must be vented and pipework flushed before fitting sprinklers; full support with compliant hangers; damaged/faded/scratched components must be rejected; plastic pipework must be protected by sprinklers in its location; and not used in concealed combustible spaces that require protection. (See **LPS 1260 Plastic pipe and Fittings for Use in Automatic Sprinkler Systems** and manufacturer literature for compatibility, chemical resistance and UV considerations).

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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.
- BS 5839 6:2019+A1:2020 – Fire detection and fire alarm systems for buildings – Part 6: domestic premises (Category L1 coverage reference).
- BS 5041 3 Fire Hydrant Systems Equipment - Specification for Inlet Breechings for Dry Riser Inlets
- BS 5041 5 – Fire hydrant systems equipment – inlet breechings and boxes.
- LPS 1048 – Requirements for the approval of sprinkler system contractors in the UK and Ireland.
- LPS 1260 Issue 3.1 – Plastic pipe and fittings for use in automatic sprinkler systems.

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 - Review of Hazards**
- **Sprinkler Systems - Storage of Lithium-ion Batteries**
- **Sprinkler Systems - Tank Inspections**

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.*

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