**SPRINKLER SPECIFICATION FOR RESIDENTIAL**

**(Inclusive of High Rise)**

**BUILDINGS OR OCCUPANCIES**

**DESIGNED UNDER BS9251:2014**

**Responsibilities**, **and Considerations**

This sprinkler specification has been developed to specifically recognise and provide the highest level of fire protection engineering, monitoring, and endurance for project sustainability

Where specific, tenders will be strictly in accordance with the specification, drawings and requirements referred to in this specification document. The terms of this enquiry will apply to any contract resulting from this enquiry. Any tender submitted which includes deviations from this specification without prior written agreement will not be accepted.

Valued engineering benefits for the clients long term project carbon footprint will be given due consideration,

Inclusive of recycling, transportation, and limiting excessive water waste

1.0 Performance Objectives

2.0 Design Parameters

2.1 System Flow Rates

3.0 System Operation Alarm

4.0 Water Supply

4.1 Design Density and Duration of Supply

4.2 Water Company

4.3 Backflow Prevention Devices (check valves)

4.4 Stored Water Supply

5.0 Mains Water Supply

5.1 Number of Dwellings on one Supply

6.0 Sprinkler Heads

6.1 Quick Response Sprinkler

6.2 Residential Sprinklers

6.3 Types of Sprinklers to be used in BS 9251

6.4 Minimum Operating Pressure

6.5 Sprinkler Location

6.6 Sprinkler Area Coverage

7.0 Core Riser

8.0 Individual Apartment Protection

9.0 Pipework and Fittings

10.0 Sprinkler Contractor

11.0 Fire Pump

12.0 Alarm device

12.1 Battery Capacity of Alarm Systems

13.0 Valves

13.1 Stop Valves

13.2 Drain and Test Valve

14.0 Frost protection

15.0 Service & Maintenance

16.0 System Commissioning

17.0 Documentation

18.0 Addressable Flow-switch testing System

1. **Performance Objectives**

The primary objective shall be life safety, aiming to control any fire that occurs within the protected premises to give time for occupants to escape or be rescued. It is assumed in standard BS9251:2014 that the sprinkler protection will form part of an integrated fire safety system as part of the building’s design, and that a fire detection system or interconnected mains-operated smoke alarms shall also be installed to give warning of a fire as early as possible.

2.0 **Design Parameters**

The entire system installation will comply fully with the edition (including amendments) of each of the following, current at the time of tender:-

BS 9251:2014 Fire sprinkler systems for domestic and residential occupancies – Code of practice.

The Water Supply (Water Fittings) Regulations.

2.1 **System Flow Rates**

The flow rates required at the operating sprinklers are clearly identified in clause 5.3.3 and table 2, BS 9251:2014 and shall be considered the minimum water discharge rates to be used in sprinkler system designs for residential and domestic hazards. Where residential pattern sprinkler heads are used they should either meet these minimum flow rates or their approved listed discharge performance, whichever is the greater.

2.2 **Additional Measures**

Attention is drawn to section 4.4, 4.5 and Annex B which lays out suggestions for additional measures to improve system reliability and availability where this is appropriate. The sprinkler contractor is encouraged to put forward suggestion for how the design of the system could be best improved to meet this criteria.

3.0 **System Operation Alarm**

ProjectFire addressable Zonecheck devices shall be installed as part of an addressable system by approved installer and available through Project Fire Products. The fire alarm panel will activate when the sprinkler system operates in accordance with clause 5.13.2, BS9251:2014. For multi-story blocks of flats, clause 5.13.3 shall be implemented. All flow-switches shall incorporate the LPCB approved water flow detector tester – Zonecheck and be monitored by the Zonecheck Addressable management system. Residential Zonecheck Addressable shall be fitted in each individual dwelling/apartment/block to locate a sprinkler head activation.

4.0 **Water Supply**

The sprinkler systems shall be connected to a reliable and sustainable supply as outlined in section 5.8, BS 9251:2014.

In addition, an alternative water supply/storage options may be considered.

* A ProjectFire WRAS approved Pressurecheck water chamber and pump module, is a self-contained compact unit specifically designed and manufactured to boost low pressure town mains supply
* A domestic pump, and water storage tank, increased to meet the require sprinkler flow and pressure demands. Inclusive of a priority valve that will isolate the domestic supply, in the event of a sprinkler activation.

4.1 **Design Density and Duration of Supply**

The minimum design density and duration of the supply shall be determined using section 5.3 and table 2 of BS 9251:2014.

For particularly high, large or complex premises such as high rise flats or residential care homes, longer times may be needed for escape or to allow the rescue of occupants. This may also be the case for premises remote from local fire stations. Residents in care homes and similar premises may be unable to make an unaided escape and therefore any fire will need to be controlled for longer while they are being rescued. In these circumstances and others described in section 4.5, BS9251:2014, where enhanced performance, reliability and resilience arrangements are required, the AHJ shall be consulted over the duration of supply requirements.

4.2 **Water Company**

In all cases the water company shall be approached before a connection is made to the mains supply. Fig A.1 and A.2 (Annex A) of BS 9251:2014 outline the elements of a typical residential sprinkler system.

4.3 **Backflow Prevention Devices (check valves)**

A backflow prevention device shall be fitted in accordance with clause 5.8.5, of BS9251:2014. Backflow prevention devices restrict water flow, double check valves significantly more than single check valves, and their resistance or friction loss shall be taken into account in hydraulic calculations. Fig A.1 and A.2 (Annex A) of BS 9251:2014 outline the elements of a typical residential sprinkler system.

4.4 **Stored Water Supply**

Stored water supplies shall be installed in accordance with section 5.8, BS9251:2014. Water tanks shall be covered to prevent the entry of foreign objects such as birds and rodents etc. Water tanks for sprinkler use shall also be protected from freezing.

5.0 **Mains Water Supply**

Where a mains water supply is to be used 5.8.3 shall be adhered to.

5.1 **Number of Dwellings on one Supply**

Where the connection to the mains water supply serves more than one dwelling, the system shall be capable of providing the flow rates at the sprinkler heads as determined by 5.3.3, BS 9251:2014at times of simultaneous peak domestic demand from all of the dwellings concerned.

Where a service mains supply serves more than one dwelling, it can be assumed that a fire would affect only one dwelling at any one time unless the AHJ or the fire risk assessment suggests otherwise.

6.0 **Sprinkler Heads**

Sprinkler heads shall be supplied manufactured to activate at pre-determined temperatures, location and ambient conditions governing selection. Sprinkler heads shall be cared for in accordance with clause 6.1.3, BS 9251:2014.

6.1 **Quick Response Sprinklers**

Quick response sprinklers shall be installed in the inhabited parts of the building in accordance with clause 5.6.1, BS 9251:2014.

6.2 **Residential Sprinklers**

Residential sprinklers shall meet extra requirements specific to residential protection in accordance with section 5.6 BS 9251:2014.

6.3 **Types of Sprinklers**

Only residential type sprinkler heads should be used in the habitable parts of the dwelling. Residential type sprinklers have a discharge pattern which ensures a high degree of wall wetting. Other types of fast response sprinkler may be used, if appropriate, in uninhabitable parts of the building, such as roof spaces, provided they are installed according to their listings and approvals and when in accordance with section 5.6, BS 9251:2014.

6.4 **Minimum Operating Pressure**

The minimal nominal k-factor and minimum operating pressure shall be selected in accordance with clause 5.6.2, BS 9251:2014. The recommended minimum operating pressure at any sprinkler head of 0.5 bar is not related to hydraulic factors. It is to ensure release of the sprinkler valve at any time in the life of the system. In some instances, the manufacturers’ specifications call for a minimum pressure at the sprinkler head of less than 0.5 bar. In such instances a minimum pressure of 0.5 bar should be applied at the hydraulically most remote sprinkler, and the increased flow rate addressed in the hydraulic calculations for this and other operating sprinklers.

6.5 **Sprinkler Location**

Sprinkler heads shall be installed in accordance with the manufacturer’s instructions. Manufacturers’ data-sheets deal with sloped ceilings, location of sprinklers in relation to beams and other requirements specific to each sprinkler head. All locations to conform to the standards set in clause 5.5, BS 9251:2014.

6.6 **Sprinkler Area Coverage**

The maximum spacing limitations of BS 9251 or UL1626 approved listed areas of coverage shall be strictly adhered to in accordance with clause 5.5, BS 9251:2014.

7.0 **Core Riser**

The outlet connection from the pump-set deliveries should be routed in a core riser (with other services) with a connection for each floor. This connection shall comprise of a monitored isolating valve and a LPCB approved Zonecheck. This equipment must be accessible and shall be periodically tested (every 13 weeks) in accordance with the code standards. The flow-switch and local monitored valve shall be wired to the local IMM as part of the Zonecheck Addressable system.

8.0 **Individual Apartment Protection**

For each tenant’s premises a separate connection to each apartment with an isolating valve and a Residential Zonecheck incorporating a T-tap flow switch shall be used and integrated with the specific fire detection and or security alarms with sounder levels that must be agreed with the local fire officer.

Where a sprinkler system is installed in any residential / domestic property, a Zonecheck device to enable routine testing of the flow-switch without the escape of water shall be included. Testing will be conducted by the Zonecheck Addressable system.

9.0 **Pipework and Fittings**

Core riser and distribution pipework to be of a suitable metal construction.

Pipework in accommodation areas can either be metal or LPCB approved CPVC. Special care must be taken to ensure that any products coming into contact with the CPVC pipework (sleeves, mastics, sealants etc.) is compatible and will not cause any reaction which could weaken the pipe.

10.0 **Sprinkler Contractor**

Contractors shall be qualified and experienced. All sprinkler contractors shall be LPS 1048 accredited, level 4 approved, listed in the Red Book and be able to demonstrate that appropriate staff members have the competency to design and install systems to BS 9251:2014. Installers shall ensure that their staff are fully trained and are fully conversant with the design and installation practices of Residential and Domestic sprinkler systems and can demonstrate competency within this scope of work.

11.0 **Fire Pump**

Pumps must be selected and installed in accordance with section 5.9, BS 9251:2014. Specialised pump packages suitable for domestic and residential sprinkler systems are available from a number of manufacturers.

Pumps should normally be installed solely to supply the sprinkler system. Where pumps are to be used for dual purposes, then the electrical supply should be installed in accordance with the recommendations in BS 9251 and the pump rating shall be sufficient to supply the maximum sprinkler requirement and the maximum requirement for other services simultaneously.

Fuses, electrical switch gear and trip functions associated with fire pumps must be sized in accordance with approved fire pump manufacturer guidelines and not sized to protect the equipment.

12.0 **Alarm Device**

An electrical alarm in accordance with 5.13, BS 9251:2014 shall be used. It should be noted that where alarms are to be provided in large and/or multi-storey buildings, the owners or the AHJ may specify different alarm arrangements to suit the particular needs of the occupants. The advice of the AHJ should be sought at the design stage.

12.1 **Battery Capacity of Alarm Systems**

Electrically operated alarm devices shall be installed in accordance with 5.13.5, BS 9251:2014.

13.0 **Valves**

Valves should be suitable for sprinkler systems and be installed in accordance with the manufacturer’s instructions and 5.11, BS 9251:2014.

13.1 **Stop Valves**

All stop valves shall be of the monitored type as well as being secured in the correct position. Monitoring of the valves shall be achieved via the Zonecheck Addressable system.

13.2 **Drain and Test Valves**

The drain and test valve referred to in Figure A.1 of BS 9251:2014 shall be fitted at the lowest point to allow complete draining of the system pipework. The LPCB approved water flow detector tester, Zonecheck, shall be used for all flow-switch testing purposes.

13.3 **Zone Valves**

In accordance with zoning requirements, each zone must have lockable full bore zone-valve as stated in 5.1, BS 9251:2014. All zone-valves will be monitored via the UL approved Zonecheck Addressable system.

14.0 **Frost Protection**

Pipework requiring protection from freezing shall be protected using the methods outlined in Section 5.12 of BS 9251:2014.

15.0 **Service and Maintenance**

All service and maintenance works shall be carried out by a 1048 Level 4 approved sprinkler contractor certificated by the LPCB. All works shall include a five year guarantee on all system components and any quotation must identify three and five year quotes for all parts and labour.

16.0 **System Commissioning**

The system shall be commissioned in accordance with 6.2, BS 9251:2014. The sprinkler contractor shall be available on site for system commissioning.

17.0 **Documentation**

All documentation shall be provided in accordance with 6.3, BS 9251:2014. Snagging sheets shall be submitted 14 days prior to commissioning. O&M manuals shall be provided in digital format available at commissioning.

18.0 **Addressable Flow-switch Testing System**

The flow-switch test system will be managed by the UL approved Zonecheck Addressable system. The contractor shall demonstrate their experience of design and install of addressable flow-switch management system by referable projects or have attended the manufacturers training course.