

Sprinkler Protected Buildings : A Guide for Responsible Persons and Duty Holders



Automatic sprinkler systems are universally recognised as the most effective way to protect people and property from fire. Evidence to support this contention can be found in BIF 19 Sprinkler Reliability and in the universal support enjoyed by sprinklers from both the fire and rescue service and the insurance industry. Current UK legislation recognises the value of automatic fire suppression systems by mandating their presence in a wide range of residential and other structures including blocks of flats, residential care premises and sheltered housing.

Not only are sprinklers very effective at what they do, containing and suppressing fire, sounding a local alarm, calling the fire and rescue service and restricting the growth of fire, but there is clear evidence that when a fire occurs in a sprinkler protected building the fire and property damage incurred is a tiny percentage of that which is likely in an unprotected building. Sprinklers are also very effective at protecting lives including the lives of fire fighters and in the UK, there has never been a multiple life loss in a building fitted with a properly designed, working sprinkler system. In industrial and commercial buildings recent real-life incidents have demonstrated the value of sprinkler systems in promoting business resilience with hotels, shops, schools, warehouses and factories back at work the day after a fire.

The reliability and efficacy of fire suppression systems demand installations which are:

- Designed strictly in accordance with published national and international standards
- Installed by competent contractors who hold third party certification from an independent, third-party certification body
- Subject to regular inspections and maintained in accordance with national and international standards

- Subject to a programme of review to ensure that the system remains compliant for the fire risks present

This publication summarises the main obligations imposed on the owner or occupier of a building or structure which is fitted with a sprinkler or water mist system.

RESPONSIBLE PERSONS AND DUTY HOLDERS

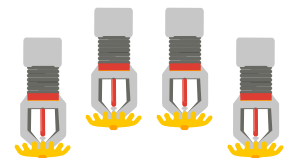
Under the Regulatory Reform (Fire Safety) Order 2005 (the FSO) and the Fire Scotland Act 2005, legal duties are imposed on those responsible for the management of most buildings. Additional duties imposed recently are summarised in the Home Office publication: Check your fire safety responsibilities under Section 156 of the Building Safety Act 2022.

Article 13 of the FSO requires that the Responsible Person must ensure that the building "...to the extent that it is appropriate, (is) equipped with appropriate fire-fighting equipment and with fire detectors and alarms..."

Article 17 of the FSO requires that the Responsible Person must ensure that all equipment provided for the safety of life is: "subject to a suitable system of maintenance and are maintained in an efficient state, in efficient working order and in good repair". This would apply to all automatic fire suppression systems regardless of their purpose.

Scotland and Northern Ireland have similar legislation.

Section 156 of the Building Safety Act 2022 (the BSA) amends the FSO and requires that the Responsible Person/Duty Holder must additionally provide information to the residents of domestic premises. This includes details of the preventive and protective measures provided in the building.



60%

ABOUT 60% OF FIRES (IN COMMERCIAL PREMISES) ARE CONTROLLED WHEN ONLY 4 SPRINKLERS OPERATING.



99%

WHEN BUILDINGS ARE PROTECTED WITH A PROPERLY DESIGNED AND MAINTAINED SPRINKLER SYSTEM ABOUT 99% OF FIRES ARE CONTROLLED BY THE SPRINKLERS.



LOSSES FROM FIRES IN BUILDINGS EQUIPPED WITH SPRINKLERS ARE 1/10 OF THOSE IN UNPROTECTED BUILDINGS

Clearly, the presence of a fire suppression system in a building is something about which residents should be notified, and this information should form part of the 'Residents' Engagement Strategy' mandated in Section 91 of the BSA.

The FSO also makes it clear that to discharge the obligations of a Responsible Person there is a need to ensure that adequate records are kept. The burden of proof in respect of offences created by the order have been reversed from the normal presumptions of English law and to escape prosecution, a Responsible Person will have to be able to prove, in the words of Article 33, that they 'took all reasonable precautions and exercised due diligence to avoid the commission of an offence'. Record keeping is therefore essential.

BAFSA also suggests that, should a sprinkler system have to be taken out of service, or rendered inoperable for some other reason, then the fire and rescue service and the appropriate insurers should be notified. This may be a 'Condition Precedent' in many insurance policies and failure to comply can result in a subsequent claim being denied. (See below)

THIRD-PARTY CERTIFIED INSTALLERS AND SYSTEMS

While not mandatory, there is no doubt that the most effective way a 'Responsible Person' can be confident that they have discharged their legal obligations in respect of fire suppression systems is to ensure that the designer, installer and maintainer of systems is accredited as a third-party certificated installer by a body approved by the United Kingdom Accreditation Service.

It would be a valuable defence to a charge under Article 32 of the FSO to be able to prove reliance on a third-party certificated contractor of an installation using approved components.

Government guidance to the FSO makes this very clear: Third-party certification schemes for fire protection products and related services are an effective means of providing the fullest possible assurances, offering a level of quality, reliability and safety that non-certificated products may lack.

FIRE SUPPRESSION SYSTEMS MAINTENANCE

Owners or managers of premises need to take routine steps to ensure that their fire protection is always available to control or suppress any fire which might occur.

Once a sprinkler system has been handed over to its owners, the responsibility for the equipment will rest with them. Whether or not the system will operate as designed will depend on whether the correct maintenance procedures have been carried out. UK legislation imposes significant liabilities on employers and/or commercial and industrial property owners who fail to maintain fire safety equipment intended for the protection of life from fire. (See above).

Property owners who contract the maintenance of their fire equipment to facilities management companies should ensure that the FM supplier is authorised to work on sprinkler and/or water mist systems.

RESIDENTIAL AND DOMESTIC SYSTEMS

Residential sprinkler systems designed and installed to BS 9251 require simple 'in house' maintenance except for an annual inspection which should be undertaken by the installer

The 'Responsible Person' should, however, make sure that:

- The system's water supply valves are open, and any tanks are full
- The power supply for the pumps and any alarms is on
- Sprinkler heads, even where recessed, are unobstructed and unpainted
- Any monitoring or self-testing system is not showing an alarm

Occupiers of sprinklered homes should be aware of how the system works and what to do in the case of faults or actuations.

To assist with this in the case of single-family dwellings, the installer should have provided a logbook containing:

- Details of the system design, water supplies and components
- A statement of compliance with the BS9251 or other appropriate standard
- Results of the commissioning tests
- Details of authorities consulted/notified
- An outline of the routine inspection and maintenance programme
- A 24-hour emergency contact number which can be used to obtain assistance
- Where systems have self-monitoring pumps, occupiers should be aware that the system will test itself each week and will sound a local alarm if any faults occur during the self-test. Some systems may automatically report faults to the installation company.

It is essential that occupiers know where the sprinkler system shut-off valves are - this will enable fire fighters to shut the system down once they are sure that the fire has been extinguished to minimise water damage. Where there are multiple valves – as example where each floor has in a block has its own valve, these should be labelled. Valves should only be operated by the fire service or the system installer/maintainer.

You should also be aware of measures which may compromise the operation of the system:

- Do not paint the sprinkler heads and/or their cover plates. The added coat of paint will absorb heat and can delay the operation of the sprinkler. The paint might also prevent water from flowing.
- Do not hang anything on the sprinkler heads. Sprinklers are sturdy, but hanging something on them could dislodge the sensor that holds the water back.
- Make sure that tall items of furniture or ornaments are not so placed as to shield the sprinkler heads or obstruct the flow of water.
- No modification should be made to any sprinkler equipment except in accordance with BS 9251 or any other standard utilised.
- Reinstatement of the system following maintenance or actuation should only be undertaken by a competent person and the logbook annotated to indicate the reason for reinstatement and any other actions taken
- Sprinkler systems must be protected from freezing, external pipes may be protected by trace heating, internal pipes will be protected by central heating systems so these should be left on if the house is unoccupied during periods when extremely low temperatures are predicted.

INDUSTRIAL AND COMMERCIAL SYSTEMS

In the UK, sprinklers in non-residential premises should be designed, installed and maintained in accordance with BS EN 12845-1. Some systems may be installed to other international standards or to those specified by FM Global. Section 20 of BS EN 12845-1 specifies maintenance requirements. The standard recommends that the testing, servicing and maintenance be carried out by the system installer or a similarly qualified company but there is no reason why weekly/monthly test procedures cannot be carried out by the owner or occupier providing that the person undertaking the work has been trained to do so and is competent.

Given that fire suppression systems not only protect life but in the case of BS EN 12845 systems, also buildings and their contents, the value of following appropriate procedures cannot be over-emphasised. Of particular importance is the need to verify that all valves are left in the correct position and that the system is fully operational on completion of any test procedure. BAFSA recommends that where these tests are carried out in-house a second person be present to verify that this has been done. Best practice would require that the second person be trained to the same standard to ensure consistency and resilience.

Where sprinklers are installed to meet insurance company requirements then additional rules may apply in the form of compliance with the Technical Bulletins (TB) of the LPC Rules for Automatic Sprinkler Installations. TB 203 reiterates the importance of appropriately trained personnel carrying out the testing procedures and the need for certificated companies to carry out inspections and maintenance. The TB also emphasises the need for documentation/recording of all testing and servicing also stressing the need for the procedures to be implemented in the event of a shutdown of the system together with the actions to be taken in the event of an alarm signal being received from the installation.

The BS EN requires that the installation is to be visually checked each week and that action is taken to activate any water-driven motor alarm. This is done by opening a valve to simulate the operation of a sprinkler head. In the case of an installation fed from a service main, it would also be necessary to record the readings of the pressure gauges before and after the test. Provided training in the necessary skills has been provided – possibly by the installer at the time of commissioning, there is no reason why a nominated staff member cannot undertake this.

In the case of an installation where the water supply is provided by pumps, the simulation of the sprinkler head activation will cause the duty pump to be operated and provide the opportunity to witness pump performance and the alarm signal activation. Where a pump is diesel powered, the engine should be run weekly for 20 minutes and checks on the cooling system, oil pressure, batteries and fuel should also be made. In winter it is essential to check that any anti-frost measures such as trace heating, pump-house heating and tank immersion heater are functioning correctly. Modern practice is for the cooling water circulated through the pump under test to be returned to the storage tank. Again, provided training in the necessary skills has been provided – possibly by the installer at the time of commissioning, there is no reason.

The BS EN also requires a quarterly inspection of sprinkler heads, pipework and pipe supports and mandates that a flow test be carried out on the water supplies. Section 20.3.2.2 requires that a hazard review of the protected area is carried out on a quarterly basis to ensure that there have been no changes of structure, occupancy, storage configuration, heating, lighting or other parameters that would change the hazard classification of the risk or render the installation in any way inadequate. The hazard review may be undertaken by any competent person provided that a report on the findings is submitted to the sprinkler servicing contractor. BAFSA however strongly advises that at least one hazard review each year is undertaken by a certificated installer.

The BS EN also requires any pumps to be tested at a 'full load' condition on a yearly basis. Additional checks are required on water storage facilities. Tanks should be visually externally checked for corrosion every three years and refurbished as necessary. All storage tanks should be cleaned and examined internally by a competent person not less than 3/10 yearly depending on the type of tank installed. These checks should be performed by a certificated installer or, in the case of the tanks, a specialist contractor.

BAFSA recommends that every 25 years a sample of the sprinkler heads should be removed for testing by an approved laboratory. At least 20 heads should be tested. (TB 203: 3.9.3). Examination and testing of pipework should be carried out at the same time to verify the condition of the internal structure of the pipework. (TB 203:3.9.1.1)

WATER MIST SYSTEMS

Most water mist systems in the UK will be designed and installed to BS 8458 (residential) or BS 8489 (industrial and commercial) or BS EN 14972 (all occupancies). Regardless of the standard employed, the maintenance requirements are similar. However, unlike sprinkler systems, water mist installations are not standardized and are unique to each manufacturer. It is likely that the original installer will not permit any form of maintenance to be carried out on its system by another party other than visual checks. This means that a nominated member of staff should at least undertake a visual inspection of the pumps/controls.

Properly briefed staff could also verify that the mist discharge nozzles are unobstructed.

The requirements below can be applied to all systems:

- The system should be subject to weekly and monthly visual checks by trained staff members. Quarterly routines should be undertaken only by the installer.
- Where required and permitted by the installer, pumps shall be tested weekly as well as a weekly diesel engine test run and restarting test. Pump tests should be undertaken by a suitably trained, competent member of staff.
- An annual inspection, undertaken by the installer or system manufacturer requires:
 - Review of premises for any change in hazards and for design compliance assessment
 - Visual inspection of nozzles for obstruction and leaking
 - Automatic pumpset flow test
 - Diesel engine 'fail to start' test
 - Infill valves on water storage tanks checked
 - Pump and system strainers examined
 - Pipework and pipe supports examined
 - Examination of cylinders and tanks
 - Remote alarm transmission tested

There are also three-yearly, five-yearly and ten-yearly routines, all by the installer or, in the case of work on tanks, by a suitably qualified contractor:

- Three-yearly
 - Storage tanks examined externally for corrosion and drained, cleaned as necessary and examined internally for corrosion. All tanks shall be repainted and/or have the corrosion protection refurbished as necessary
 - All water supply, shut off valves, control and check valves shall be examined and replaced or overhauled as necessary
- Five-yearly
 - Testing of nozzles – 2 nozzles per section shall be removed from each zone of the system. The nozzles shall be tested according to BS EN 12259-1 for function, K-factor, operating temperature and thermal response. The nozzle tests to be undertaken by an UKAS accredited fire test laboratory
- Ten Yearly
 - All storage tanks shall be cleaned, and examined internally and the fabric attended to as necessary
 - Pipework shall be flushed and inspected in accordance with the manufacturers' instructions

SYSTEM NON-AVAILABILITY

If a fire suppression system should become non-operational, for example, because of maintenance work then it is essential that several actions are undertaken. There is advice on this in Annex J of BS EN 12845 and TB 203. BAFSA recommends the following actions to be taken if a system will be impaired for any significant period - say for more than one hour.

There are two principal, specified duties which will be a feature of all insurance policy wordings where the presence of sprinklers is mandated or where a premium discount has been allowed in respect of the fitting of sprinklers. In the event of an impairment, the insured must:

1. Advise the local fire and rescue service; and
2. Inform the insurers.

There are other actions which can usefully be taken in the event of planned or unplanned shutdowns:

- Absolute ban on smoking in or near the premises
- Inform all building users and other occupiers and anyone else who might need to know.
- Implement the planned shutdown procedures
- Minimise the possibility of a fire occurring

- Patrol the area affected continuously
- Cessation of hazardous activities including any routine maintenance activity for the duration of the outage and especially Prohibition of all hot work and naked lights in the vicinity
- Minimise the possibility of a fire spreading by closing fire doors and shutters
- Making ready extinguishers and hose reels (if provided) with sufficient trained personnel available

BAFSA would go further than Annex J and suggest that the following actions should also be complied with in the event of prolonged sprinkler system impairment:

- A formal, written procedure should be in place to deal with any impairment of the fire protection systems
- Cessation of hazardous activities including all hot work and any routine maintenance activity for the duration of the outage
- Limit the operation of all power equipment including cranes, conveyors, forklift trucks etc. –
- Ban on recharging electric vehicles and refueling forklifts and tugs

MINIMISING WATER DAMAGE

Owners and occupiers should be alert to the potential for water damage if the system operates to deal with a small fire which is swiftly extinguished. Under no circumstances should the main sprinkler stop valve be operated in a confirmed fire situation without the authority of the fire service incident commander. However, if only one or two heads have opened and the fire is declared extinguished, consideration can be given to minimising the further flow of water by blocking the operating sprinkler head/s with a sprinkler stopper (if one is available) or using a wooden or rubber wedge cut to size.

In larger premises maintenance and/or security personnel should be trained to understand how the sprinkler system operates and how to act if a sprinkler head operates following mechanical damage.

Following the operation of sprinkler heads the system should be reinstated as soon as possible by the nominated sprinkler maintenance contractor. Until the system is fully reinstated the precautionary procedures described above for system non-availability should be followed.



“While not mandatory, there is no doubt that the most effective way a ‘Responsible Person’ can be confident that they have discharged their legal obligations in respect of fire suppression systems is to ensure that the designer, installer and maintainer of systems is accredited as a third-party certificated installer by a body approved by the United Kingdom Accreditation Service.”