



Automatic sprinkler systems are now widely accepted as providing a highly efficient and effective means for protecting life and property. Sprinklers are now installed in an increasingly wide range of properties and occupancies and their outstanding record of successful operation means that there is now a high probability that all firefighters should expect to find them at the scenes of fires. This makes it essential the basics of sprinklers are fully understood by all members of the fire and rescue services.

Standards

There are two main standards of sprinkler systems within the United Kingdom which fire and rescue service personnel should be aware of. These are:

- A Commercial and Industrial standard (BS EN 12845: 2004) as applied to buildings such as Shopping Complexes, Warehousing and Schools.
- A domestic and residential standard (BS9251) as applied to Residential Care premises, certain HMO's and domestic dwellings.
- Personnel may also encounter systems installed to other standards such as those issued by FM Global (an insurer), the US National Fire Protection Association and commercial organisations who have their own hybrid standards.

While approval of standards for individual systems is a matter for the authority having jurisdiction,

most UK authorities would expect to find the British standards documents in use.

Sprinkler System Operation

Sprinkler systems offer a way of automatically introducing water quickly and directly to the seat of a fire. All parts of the protected building are covered by a grid of pipes with sprinkler heads fitted into them at regular intervals. Water is fed to the sprinkler heads from a dedicated water supply, either from a dedicated tank/s and pumps or from the service (towns') main.

Sprinkler heads open independently when a predetermined temperature is reached and water is sprayed on to the fire. The hot gases from a fire are usually enough to make the thermal element in the head operate. Only the sprinklers in the direct vicinity of the fire open, the others remain closed. This limits fire fighting (and hence water damage) to areas where there is a fire and reduces the amount of water used.

The sprinkler heads are generally located near the ceiling and spaced so that there is always a sufficient flow of water to provide firefighting in the likely area of operation. The flow is carefully calculated so that there is always enough to control a fire, taking into account the size and construction of the building, its use and the goods stored in it.

At the point where the water enters the sprinkler system there is the Main Stop Valve (MSV). This can be used to shut off the system for maintenance. *For safety reasons it should always be locked open and only authorised persons should close it.* In most commercial premises, if a sprinkler opens and water flows through the valve it actuates a mechanical alarm gong outside the building. This feature provides a local alarm without the need for electrical connections. At the same time, most modern systems, even in dwellings, are usually fitted with a flow switch which can be connected to the **building's fire control panel and provide a local and remote alarm** – this will provide a signal to enable a commercial alarm receiving station to summon the fire and rescue service should the sprinklers operate. (The sprinkler flow alarm signal can be 'piggy-backed' on any fire or security detection system using a RedCare or similar connection).

The Chief Fire Officers' Association has agreed a national policy designed to reduce the number and impact of unwanted alarms from fire detection systems and this requires the issue of a Unique Reference Number (URN) for all such systems which relay signals via an alarm receiving centre (ARC). If a sprinkler system, on its own, is to be connected to an ARC then care must be taken to ensure that a URN is allocated to this system and that the relevant fire control is made aware of the fact that the URN relates to a sprinkler system.

Applications of sprinklers Systems

There are many fire safety objectives for different buildings. The most commonly identified objectives are:

- Life safety
- Prevention of fire spread (from building to building)
- Asset protection and business continuity
- Protection of the environment
- Safety of firefighters

Sprinkler systems are widely referenced in the guidance to the Building Regulations and Scottish Building Standards. However there are only a few circumstances where they are generally *mandated*. (Many sprinkler systems are installed at the behest of the insurers either to obtain substantial discounts on premiums or to make a property more insurable). Sprinkler protection is also specified in many local building acts for tall or large buildings. (For more details see BIF 12: Sprinklers and the Building Regulations).

The approved document 'B' (Fire safety) 2006 Edition is published in three sections: Volume 1: Dwelling house, Volume 2: Buildings other than dwelling houses and Statutory Instrument: Building and Approved Inspectors. These publications are freely available to download from:

www.planningportal.org.uk



Where sprinklers are called up or their use is suggested as an option, the circumstances may be:

a. To facilitate fire service activities in buildings where external rescue or fire fighting operations are difficult to achieve (e.g. tall buildings that exceed the reach of fire appliances rescue apparatus).

b. To reduce the fire hazard in buildings where the occupancy characteristics and the risk to life from fire is considered excessive.

c. As a means of alternative compliance where all or part of a fire safety objective cannot be met (e.g. where an open plan layout precludes a protected escape route).

d. To allow flexibility of design of a building (e.g. where an architect wishes to provide a larger open plan area, there is substantial precedent for the convention that the presence of a sprinkler system allows compartment sizes and travel distances to double).

Historically speaking, sprinklers have been installed in buildings for more than 150 years and were originally developed as a means of reducing fire losses to property and contents. Over recent years there has been a growing recognition of their use as a means of contributing to life safety, which is recognized in current UK guidance to the Building Regulations.

This recognition can be largely attributed to their good record in detecting, suppressing and controlling a fire to a much smaller size than would otherwise be the case without sprinklers. This means that a 'flashover' can be largely prevented and tenability improved. The advantages were first seen in increasing life safety outside the room or compartment of fire origin. Now, with fast response sprinklers, there is evidence that even in the room or compartment of fire origin, persons are better protected with a sprinkler system.

Fire fighting in sprinklered 'Commercial' buildings

Sprinkler systems are fitted with a variety of controls and gauges, those of importance to firefighters are:-

- The main stop valve (MSV)
- Alarm devices.

Main Stop Valve (MSV)

- Isolates the incoming water supply from the Service (Town's) Main or sprinkler pumps
- Must be right handed thread (clockwise closing).
- Handwheel marked to indicate direction of operation

- Indication of whether valve is open or shut
- MSV must be secured open by means of a strap and lock



Signs

- A plan showing location of MSV must be placed in the building where it can be easily seen by firefighters
- Additionally an indicator plate must be fixed to an external wall as close to the MSV as possible.



Sprinkler Alarms

- Every installation must be fitted with an approved external water motor alarm
- The alarm is actuated by water flowing in the system
- Water motor actuates a hammer that strikes against a gong
- Ideally, where there is more than one gong, each will be labeled to indicate in which part of the building the sprinklers are operating (See: 'Multiple Systems' below).



Alarm sounding

There are four main reasons why sprinkler alarm gongs operate:-

- Opening of sprinkler head
- Opening of a drain or test valve
- Leakage from the system due to damage
- A rise in the incoming water supply pressure.

Multiple Systems

Where a building has more than one installation fitted, each gong should be numbered in bold figures which correspond to the controlling valves of each installation.

Firefighting Considerations

- On arrival, one member of the crew to be sent to the MSV
- The MSV should be opened if found closed
- The valve MUST NOT be closed, except on the express instructions of the Incident Commander.
- If the system is fitted with a fire brigade inlet the principal supply of water can be augmented. Careful consideration should apply in very large buildings or complexes which may have more than one inlet.
- Additional water should not be extracted from the same Service Main that feeds the installation. Sprinklers should not normally be



turned off in order to fight the fire with jets or spray branches

- Although sprinklers may appear to have extinguished the fire, careful examination of the scene is still essential to confirm that the fire is out and there is no fire spread via concealed voids. When the Incident Commander is satisfied that the fire is extinguished the sprinkler control valve may be closed.
- The sprinkler pumps can then be shut down – instructions on how this can be done will be clearly stated in an instruction label on or near the pump controller, Care should be taken if diesel drive fire pumps are running to ensure that the auto-start facility is not inhibited by manual shut down



- Mopping up operations can then begin. The building owner should then contact a competent sprinkler company and have the system reinstated with the spare sprinklers, which should be on site. In the case of premises that have a sprinkler system installed as part of a fire engineered fire safety strategy, on no account should the premises be considered compliant until the sprinkler system is FULLY OPERATIONAL. If in doubt consult your duty fire safety officer.
- If only one or two sprinkler heads have opened as is likely to be the case in smaller premises then consideration should be given to restricting the further flow of water by blocking the sprinkler head with a sprinkler stopper (if one is available) or using a wooden or rubber wedge cut to size. A pair of Mole Wrench pliers may also be used.

Firefighting in sprinklered Residential or Domestic properties

The fitting of sprinkler systems in domestic and residential properties are becoming more wide spread. It therefore stands that Fire Service personnel will come into contact with such installation on a more frequent basis.

The principle components of a sprinkler system in dwellings are broadly similar to that in Commercial and Industrial buildings, the main difference being that the scale of operations is likely to be smaller.

Where a BS 9251 system is installed, there will still be a main stop valve located near to the water supply inlet to the sprinkler system. It is important to recognize if the water supply is from a pump and tank, pressure vessels or directly from the service (towns') mains.

Once this has been identified, one person should be sent to the stop valve to ensure it remains open until such times as firefighting operations are completed and the fire is out. *The temptation to shut off the sprinkler system before this must be avoided.*

Once firefighting operations have concluded and the sprinkler system is no longer required the stop valve can be closed and the system drained to facilitate replacement of sprinkler heads.

The system drain valve is usually located near to the stop valve. Operation of this will enable the sprinkler pipe-work to be drained. Where needed, a length of pipe should be connected to the drain outlet in order to feed water away from the premises.

The usual clean up operations can then be undertaken.

Recording of sprinkler system activations

It is vitally important to record accurate information where a sprinkler system has operated, both in Commercial properties and 'Dwellings'.

To this end, any information entered into FDR1 (fire reports) regarding the activation of sprinkler systems should be recorded as faithfully as possible.

Additionally, such information can be invaluable to Fire Safety Officers and Sprinkler Groups. Where possible, every effort should be made to bring sprinkler activations to the attention of the relevant person within your own Fire and Rescue Service.

Presented by: