

Introduction

BAFSA provides a free inquiry service for both its members and the general public and each year deals with around 1800 enquiries. Many of the same questions crop up regularly and this publication is intended to provide a ready reference to some of the most Frequently Asked Questions.

1. Sprinkler Myths: The most commonly asked questions relate to the myths which appear to have grown up around sprinklers.

Don't all the heads go off at once? I'm sure I've seen this happening on tv!

No, each sprinkler head is effectively a self-contained heat detector and will only operate when the predetermined temperature at which it is set to operate is reached. This is normally 68°C, so only the heads in the immediate vicinity of a fire will operate. This is also why sprinklers will not 'false alarm' - unlike smoke detectors, they will not operate if you burn the toast or let steam from your shower escape from the bathroom! Sprinkler heads will only operate at their preset temperature. Operating a key-switch or lever cannot turn on sprinklers. The depictions of sprinklers on tv and in films is invariably wrong!

Surely sprinklers create more water damage than the fire and rescue service?

Absolutely not: a sprinkler head discharges between 35 - 100 litres per minute (depending on the design of the system). The discharge will begin around 10 - 30 seconds after the fire produces enough heat to operate the sprinkler head. No fire brigade, however efficient and effective, is likely to reach the premises involved in less than four minutes and unlikely to get to the seat of the fire for five - ten minutes after they have been called. When fire crews get to work, they are likely to pump 1000 - 3000 litres per minute on what will inevitably have become a much larger fire. You should remember that even if you have an automatic fire detection system linked to the fire service via a central alarm station it could take up to three minutes for the call to reach your nearest fire station.

Surely sprinklers create more damage than a fire?

This is clearly nonsense when considered against the information already supplied. Which would you prefer: 35 litres per minute two minutes after the fire starts or 2000 litres per minute applied by the brigade after the fire has been burning for 20 minutes?

If sprinklers false alarm, won't they create a lot of damage?

Sprinklers cannot false alarm. The only way they can operate is when the air around them reaches the head's predetermined temperature. They will not respond to smoke, dust or fumes from aerosol sprays. It is true however, that a few heads each year are damaged by for example, the masts of fork lift trucks. Where this can happen, special protective cages should be fitted around the sprinkler head.

How do sprinkler heads work?

A sprinkler head is a temperature-controlled valve that opens, to release a spray of water, when the heat-sensitive element reaches a specific temperature. Most sprinkler heads installed today are of the 'glass bulb type'. The bulb is filled with a liquid and a small bubble of vapour. As the bulb heats to its operating temperature, the liquid expands compressing the vapour, at the preset temperature, the vapour disappears and the expanding liquid fractures the bulb. This allows the release of the water in the pipework behind the head. Under normal conditions in temperate climates, a rating of 68°C or 74°C will be suitable. However, sprinkler heads with an operating temperature range from 57°C to 230°C are available as needed.

Is there not a risk of vandalism to sprinkler heads?

Sprinklers can be damaged deliberately but this is an extremely rare event and in most cases, where this happens, the vandal will get very wet and be easily identified. All sprinkler systems should be fitted with waterflow alarms so that those present will be alerted to a sprinkler actuation. In many cases the waterflow alarm is connected to a commercial alarm receiving centre which will arrange for the Fire and Rescue Service to respond. There have been, to date, no known cases of sprinklers in UK schools being vandalized despite that fact that more than 800 schools are now fitted with sprinklers. Note that deliberate damage to any part of a sprinkler system probably constitutes a criminal offence.

If there are particular concerns about risks of vandalism then special 'Institutional' sprinkler heads can be specified. These have an exposed heat collection device that will break away if struck or pulled but which will not release water. These types of heads also prevent the risk of the exposed sprinkler heads being used as a method of suspending a ligature.

Is there not a risk of sprinklers causing Legionnaire's Disease?

There has been extensive international research which shows that there is no realistic chance of a member of the public contacting *Legionella pestis* from a sprinkler system when it operates. Current thinking is that the

water droplet sizes generated by sprinkler head deflectors are too large to pass through the membranes of the lung and this, together with the fact that the oxygenation, pH and temperature of the water in sprinkler pipes does not provide a suitable environment for the Legionella bacteria to flourish suggests that there is no substantive issue.

There may be a tiny, statistical possibility of a sprinkler maintenance technician contracting the disease if he is standing below a sprinkler head that he is removing. There are no recorded cases of anyone contracting Legionella from a sprinkler system anywhere in the world. Such risk as might exist for maintenance personnel can be eliminated by adherence to proper working practices.

For more detailed information reference should be made to: Technical Briefing Note *Legionella and fire fighting* (2004) published as part of the LPC Sprinkler Rules by the Fire Protection Association. In respect of school sprinkler systems, refer to the DfE document *Standard Specification 8, Sprinklers in Schools*.

Aren't sprinklers expensive to maintain?

Far from it! Unlike other fire protection systems, which usually depend on electronics that may need frequent updating or replacement, sprinkler systems need only very basic maintenance. Usually two visits each year by the installation company will suffice to keep the system in good working order. Simple weekly and monthly checks of pumps (where fitted), pressure gauges and valve settings can be carried out by a suitably trained employee.

Given the information provided below on the life expectancy of a sprinkler system, it will be seen that the whole-life costs of systems is very low indeed.

I provide a range of facilities management services for a number of clients who have sprinkler-protected premises. Can I undertake the maintenance of the sprinkler systems?

There is no reason (subject to insurers' approval) why staff working for an FM company cannot be trained to undertake most routine checks on a sprinkler system. Competence is the primary requirement and this can be achieved by a combination of training and experience. However one of the tasks which must be undertaken every six months as part of a maintenance package is a 'hazard review' of the system. This is intended to ensure that the sprinkler system as installed is still fit for purpose and that the fire risks in the premises (e.g. the materials stored) have not changed. It is BASFSA's view that significant specialist training would be necessary to enable an employee to undertake hazard reviews. Significant liabilities could be incurred if these were not done properly including the possibility that an insurer would decline to pay out after a fire.

2. Questions about sprinkler systems and protected premises

I have been told that I need to install a 'life safety' sprinkler system. How does this differ from an 'ordinary' sprinkler system?

All sprinkler systems are 'life safety' systems and the appropriate design and installation standard EN 12845 does not use this term. However, the British version of the standard, BS EN 12845 2009 does contain an optional Annex F (which does not appear in any other national version of the standard).

This annex states that quick response sprinklers shall be used in 'all life safety systems'. The LPC Sprinkler Rules (which are an 'optional extra' in respect of the design of sprinkler systems in the UK) include a Technical Bulletin, TB207. In this, table T3 gives the sensitivity rating of upright and pendant sidewalls as being 'quick response' but recessed, concealed and horizontal sidewall sprinklers are 'unrated' and therefore cannot be used in 'life safety' systems in an installation which is required (probably by an insurer) to comply with the LPC Rules. This rule essentially means that concealed and sidewall sprinklers cannot be specified for life safety systems in hotels which is plainly contrary to what happens all over the world.

One has to ask what a 'life safety system' (and some prefer the term 'enhanced availability system') actually is. Clearly it is intended to be an installation that protects lives by applying water to control the outbreak of fire - but that's what all sprinkler installations do! Since a fire could occur during a period of maintenance, 'life safety' installations must be provided with a bypass facility so that their valves can be serviced without putting the sprinkler system out of commission. However, the current rules for EN 12845 require all wet installations to have such a bypass arrangement. The monitoring of these valves is also important and this is mandatory in the case of 'life safety' installations - but this is recommended for all installations, particularly in schools. A 'life safety system' would also require zoning but there is no reason why a 'property protection' installation can't also be zoned. So why incur the not-insignificant additional costs of a life safety installation? It should be acceptable to have a 'property protection' system with enhancements which can be designed to suit the particular situation rather than comply with a set of rules which may not be relevant.

EN 12845 is currently being reviewed and it is hoped that the revised version will provide a definitive response to this potential confusion.

My local building control department has told me that permission to convert the attic of my house to a living space depends on my providing a protected means of escape or installing a sprinkler system. If I opt for sprinklers, do I have to protect the whole house or just the escape route?

While it would be technically possible just to protect some parts of the building this would not necessarily ensure that the escape route was always available. More than 50% of fires in dwellings that kill people start in bedrooms or living rooms and it is these areas that should be protected and not simply the staircase and hallway. Unless you can guarantee that the doors to these rooms are always closed it would be impossible to ensure that smoke from fires in these areas did not compromise the escape routes.

I have a fully sprinklered building and have been told that I no longer need to provide portable fire extinguishers, is this correct?

While sprinklers are an extremely effective way of protecting people and property, BAFSA recommends that some portable fire extinguishers should still be provided so that those who have been trained and are present can swiftly extinguish small fires before they trigger the nearest sprinkler head. Extinguishers may be demanded by insurers or as part of regulatory compliance.

I am installing a BS 9251 sprinkler system in a block of flats and the owner has decided that he would like the sprinkler system extended to cover the car park. Can I do this?

No, BS 9251 is intended only for use in residential and domestic premises. The more serious hazard of a car park requires a greater application of water through an increased design density/volume of water discharged. This system should be designed to be BS EN 12845: 2009.

The same answer would apply to an enquiry regarding the sprinkler protection of rubbish chutes and bin stores. The likely size of fires in these areas could overwhelm a BS 9251 system.

How long should a sprinkler system last without major upgrading?

Most authorities agree that correctly specified and installed sprinkler systems will not need any major modification for at least 30 years and some people have said that even 40 years may be possible. It is suggested that if a building is being upgraded or modified or subject to a change of use it would be wise to test a sample of sprinkler heads in systems more than 30 years old. Should any of these fail to operate as designed then all of the heads should be replaced. There is no need to replace sprinkler heads as a matter of routine unless they are damaged or covered in paint.

I want to install sprinklers in a new building but the installer I have spoken to tells me that the water supply from the local mains is inadequate. Can I still install sprinklers?

The simplest solution in this case is to install a water storage tank and the necessary pump/s. It may be however, more cost-effective to pay for a reinforced water

supply¹ - this will depend on the distance of the property from the nearest large service main. Alternatively, some water suppliers will permit the installation of a booster pump between the supply pipe and the sprinkler system.

There have been significant reductions in the maintained pressures in water service mains in many parts of the UK largely as a means of leak reduction and all water suppliers are wary of providing any guarantees of pressure or flow rates. Useful information on sprinklers and water supplies can be found in the publication Guidelines for the Supply of Water to Fire Sprinkler Systems which can be downloaded from the BAFSA website at: <http://www.bafsa.org.uk/pdfs/publications/00000033.pdf>

I'm installing a sprinkler system on a large industrial estate which has a centralised fire water supply system, can I use this to supply the new sprinkler system?

If you are proposing to use the water supply for multiple occupancies/tenants BAFSA would recommend that careful consideration be given to the responsibility for the upkeep and testing of the water supply. Communication with all protected building occupiers and owners and their insurers is also essential.

With regard to a sprinkler system designed to BS EN 12845, very few installations are now sized using the pre-calculated method. In most cases, sprinkler water demand is calculated hydraulically.

The process is shown below:

- Classify the risk
- Determine the height of storage
- Determine if in-rack protection is required
- Obtain the density of water required and the area of operation.
- Combine the roof and rack demands
- Add a safety factor for hydraulic balancing (30% is suggested).
- Determine the duration of supply
- Size the tank.

With regard to limitations on the tank size, the only likely limitation related to the LPCB list of approved products² where there is a limit to a maximum volume of 1300m³ per tank. However this does not prevent multiple tanks that installed adjacent to one another.

Where the water from a tank is used for non-fire fighting purposes it is usual to arrange the suction connections by height so as to provide for a reserved capacity for the fire supply which will always be the lowest take off point.

3. Installing and maintaining sprinkler systems

I am an experienced plumber and want to set up in business as a sprinkler installer for domestic

and residential properties. What formalities or registration do I have to comply with?

At the time of writing, anyone can design and/or install a sprinkler system providing that they can demonstrate their competence. If the system is to be supplied with water from a water company service main then the supply company concerned will require an installer to demonstrate its competence or have the work undertaken under the control of a Registered Plumber.

Residential and domestic systems should comply with BS 9251: 2005, *Sprinkler systems for residential and domestic occupancies - Code of Practice*. This requires, among other things, that such systems be installed by an 'experienced sprinkler contractor' such being defined as a 'contractor who is suitably qualified and experienced and has independent documentation providing evidence of this'.

Most domestic and residential sprinkler systems presently being installed in the UK are either at the behest of a caring housing association or local authority, enlightened developer, aware homeowner or as a requirement of achieving alternative compliance with Approved Document B of the Building Regulations (or Scottish Building Standards). In the latter case it is likely that the building control department will require evidence of competence before granting approvals. Note that the position in Wales will change in 2013 when new regulations will require sprinklers to be installed in all new or refurbished domestic and residential premises. New and refurbished residential care homes in Scotland are also required to be sprinkler protected as are blocks of flats higher than 18m.

Can I install or maintain sprinklers without registering with anyone or being approved by the government or any other agency?

It is a legal requirement that anyone installing or maintaining any type of fire systems required for the safety of life must be able to prove their competence. The simplest way to do this is to obtain third party certification from an UKAS³ accredited body.

The LPCB/BRE Certification Ltd, FIRAS Exova Warrington and IFC Certification Ltd all provide third party certification schemes and the three schemes all cater for new entrants to the industry.

It is unlikely that you will be invited to install or maintain any systems that are either mandated by an insurance company or which are being required as a condition of building regulations approval unless you have some objective evidence of competence.

Note that BAFSA requires all of its installer members to have or achieve third party certification within two years of joining the association.

What standards do I need to comply with when designing or installing sprinkler systems?

There are a number of standards that relate to sprinklers:

- a. Domestic/Residential Sprinkler Systems
BS 9251: 2005 Sprinkler systems for residential and domestic occupancies - Code of practice. Components for such systems should comply with BS 9252:2011: *Components for residential sprinkler systems - Test methods and specifications*.
- b. All Other Systems
BS EN 12845: 2009 *Fixed firefighting systems - Automatic sprinkler systems - Design and maintenance*. There is also a full range of equipment standards for system components for systems installed to BS EN 12845 in BS EN 12259.
- c. LPC Rules for Automatic Sprinklers
These are insurer's requirements and consist of the text of BS EN12845: 2009 together with a series of Technical Bulletins (TBs). The TB's interpret and in some cases impose requirements that exceed those of the BS EN. Compliance with these Rules is invariably specified by a client/owner if the sprinkler system is being installed at the behest of the insurer. Note that when compliance with the LPC Sprinkler Rules is required an approved international test house must list all components utilised in the system.
- d. FM Standards
FM Global is a US-based, international insurer that issues its own sprinkler standards. You can access these from its website: www.fmglobal.com.
- e. NFPA Standards
The US National Fire Protection Association issues a wide range of standards which are used extensively in the US and elsewhere. NFPA 13:2010 is the main sprinkler standard (ie equivalent to BS EN 12845) while NFPA 13-R covers residential sprinkler systems and 13-D is for domestic properties.
- f. Company Standards
Some large companies have their own sprinkler standards and installers are expected to comply with these even where they deviate from national standards. It's essential in such cases that written acceptance of any deviations from the BS standards is provided by the owner.

BAFSA cannot supply copies of standards /documents. You can purchase these from the publishers. (See Useful Addresses below).

Where can I find training in the design, installation or maintenance of sprinkler systems. Does BAFSA provide this?

BAFSA does not offer any such training courses but does however accredit training providers. At present these are:

FIRAS Exova Warrington and X-act Training. BAFSA is also working with Neath Port Talbot College who are aiming to provide training in the installation of residential sprinkler systems.

Can I train one of my existing maintenance staff to undertake routine sprinkler system maintenance?

Many organisations already do this subject to the matter of competence mentioned above. However insurers views should be sought and it should be remembered that UK fire safety legislation now imposes strict liabilities on employers/property occupiers with regard to the need for proper maintenance of fire systems installed for the protection of life. It is BAFSA's views that weekly and monthly checks are within the capabilities of most maintenance personnel but that other maintenance activity (quarterly, six-monthly and annual) should be undertaken only by third party certificated installation or maintenance companies. For more information on sprinkler maintenance for industrial and commercial systems see the BAFSA Publication BIF 16B: <http://www.bafsa.org.uk/pdfs/publications/00000076.pdf>

Even if an employee were to be fully trained to an appropriate level it would be wise to ensure that all sprinkler system components are inspected on a regular basis by a specialist contractor. Don't overlook the need to check electric and diesel pumps and water storage tanks (see below). There is also a requirement to undertake regular checks ('the hazard review') to ensure that the fire risks in the protected premises have not changed.

I have recently taken over a warehouse building that is fitted with a sprinkler system. I don't need this for insurance purposes do I have to maintain it?

If the sprinkler system was originally installed for life safety purposes, a failure to maintain this in good working order would be a criminal offence under Article 17 of the Regulatory Reform (Fire Safety) Order 2005 in England & Wales or Article 16 of the Fire Safety (Scotland) Regulations 2006 - note that if maintenance is undertaken by a second party, that party becomes a Competent Person within the meaning of the regulations.

Even if the system is not mandatory you should consider carefully its value in preventing fire damage to your organisation. Reliable data shows that fires in sprinklered buildings do more than 85% less damage than fires in unsprinklered buildings and in many cases fires are extinguished by the operation of only one or two sprinkler heads. Sprinkler protection should be seen as a valuable adjunct to a Business Continuity Plan.

Does the installation of sprinklers permit 'trade-offs' in respect of requirements regarding escape routes and passive fire protection measures?

'Trade-offs' or trade-ups as they should be more correctly termed, are often appropriate when a building is fitted with a full sprinkler system. Examples of the sort of trade-ups that might be possible include:

- Doubling compartment sizes.
- Doubling travel distances to escape routes.
- Reductions in fire compartment ratings.
- Reductions in the number of smoke stops doors and lobbies.
- Accepting sprinklers as alternative compliance for the access requirements for access by the fire and rescue service under Approved Document B5 or the Scottish Technical Handbooks
- Allowing open plan living rooms/kitchens in dwellings.
- Accepting non-compliance in the provision of means of escape for attic and loft conversions.
- Insurance premium discounts.

For more information on this topic see BS 9999: 2008: Code of practice for fire safety in the design, management and use of buildings and BAFSA BIF 12: *Sprinklers and the Building Regulations* and BAFSA Technical Guide No 2: *Using Sprinkler Systems in Buildings and Structures: Compliance with current fire safety guidance*.

I have been told that my insurers require me to have my sprinkler tank surveyed as it is more than 10 years old, What do I have to do?

Assuming that it's an LPCB-listed tank in an LPS 1048/LPC Sprinkler Rules System. TB 6 (2000) *Care and Maintenance of Automatic Sprinkler Systems* requires that at ten-year intervals 'Ten Year Tanks' shall be drained, cleaned as necessary, examined internally and externally for corrosion and fitness for purpose and have any damaged fabric attended to as necessary and restored in accordance with the manufacturers' recommendations.

The wording 'shall be' suggests that it's a mandatory requirement. For 'Three Year Tanks' the above routine should be carried out every three years.

If the system was designed and installed to the now obsolete standard BS 5306 Part 2:1990 or earlier then you should follow the requirements set out in Section 35 of that document. This requires, among other things:

- An annual check of float switches.
- A three-yearly check of suction, gravity and pressure tanks with external examination for corrosion.
- Type B and C suction tanks (as defined by 17.4.11.6) shall be drained, cleaned as necessary and examined internally for corrosion.
- All tanks shall be repainted and/or have the corrosion protection refurbished, as necessary.
- At not more than 15-yearly intervals, Type A and D pump suction tanks shall be drained, cleaned as necessary, examined internally and the fabric attended to as necessary.

Third Party Certification for Sprinkler Systems

BAFSA has published a BAFSA Information File dealing with this important topic, BIF 20. You can download a copy from the BAFSA web site: <http://www.bafsa.org.uk/pdfs/publications/00000092.pdf>

4. Miscellaneous

I am unhappy with the service received from a sprinkler installer. Can BAFSA intervene and make the installer correct a problem?

BAFSA is a trade association not a regulatory or certification body. The correct route for complaints is to the installer's certification body (either LPCB/BRE Certification, FIRAS Exova or IFC Certification). Should you have selected an installer who is not certificated but is a BAFSA member, BAFSA may be able to assist you depending on the circumstances. In the first instance you should write to the Secretary General at info@bafsa.org.uk giving as much detail as you can.

Non-Compliant Fire Suppression Systems

BAFSA is often asked to provide confirmation that a system does or does not comply with the appropriate standard. We do not have a technical inspection function so cannot look at individual systems or premises - there are a number of consultants who are members of BAFSA who can undertake this work for you.

However we have recently been advised that there are a number of companies installing what are claimed to be BS 9251 compliant sprinkler systems when it is clear that this claim is not sustained by a technical examination. BAFSA have issued a statement covering such systems which include so-called 'double knock systems' and grey

water systems. This can be viewed at: <http://www.bafsa.org.uk/publications/guidelines-codes-of-practice.php>

It should also be noted that notwithstanding claims from some installers, water mist systems cannot be said to be compliant with BS 9251 and that any water mist system intended for the protection of a residential or domestic occupancy must be designed and installed to BS DD 8458:2010 Part 1: *Fixed fire protection systems – Residential and domestic watermist systems - Code of practice for design and installation*

Joining BAFSA

If you have an interest in sprinkler systems and their capabilities BAFSA would be pleased to hear from you. BIF 12 *BAFSA and Its Members* describes the benefits of membership and the process which is followed. You can download this document at: <http://www.bafsa.org.uk/pdfs/publications/00000108.pdf>

Useful Names and Addresses

BSI Global
389 Chiswick High Road,
London, W4 4AL
Tel: 020 8996 9000
Fax: 020 8996 7001
Web: www.bsi-global.com

**Department of Communities and Local Government
Fire Safety and Resilience**
Eland House
Bressenden Place
London
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European Fire Sprinkler Network
70 Upper Richmond Road
London SW15 2RP
email: info@eurosprinkler.org
Web: www.eurosprinkler.org

FIRAS Exova Warrington
Holmesfield Road,
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Cheshire, WA1 2DS
Tel: 01925 655 116
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Web: www.wfrc.co.uk

FM Global
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Brendan McGrath, Manager,
International Standards
Email:
brendan.macgrath@fmglobal.com
Web: www.fmglobal.com

Fire Protection Association
London Road, Morton in Marsh,
Gloucestershire GL56 0RH
Tel: 01608 812500
Fax: 01608 812501
Web: www.thefpa.co.uk

IFC Certification Ltd
20 Park Street
Princes Risborough
Buckinghamshire HP27 9AH
Tel: +44(0)1844 275500 Fax:
+44(0)1844 274002
E-mail: info@ifccertification.com
Web: www.ifccertification.com

LPCB/BRE Certification Ltd
Bucknalls Lane, Garston,
Watford, Hertordshire WD 25 7JR
Tel: 01923 664000
Fax: 01924 664010
Web: www.brecertification.co.uk or
www.bre.co.uk

National Fire Protection Association
1 Batterymarch Park, PO Box 9101
Quincy, Massachusetts 02269, USA
Tel: 00 1 617 984 7445
Fax: 00 1 617 770 3000
Web: www.nfpa.org

National Fire Sprinkler Network
c/o Ronnie King, Vice Chairman
Web: www.nfsn.co.uk

Footnotes

- ¹ For example, a larger diameter water supply connection.
- ² Compliance with this is required for LPS 1048 compliant systems.
- ³ United Kingdom Accreditation Service - a government-sponsored organisation.

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