

Introduction

There are a large number of healthcare premises in the UK which are affected by around 50 fires a week and account for approximately 2.4% of all recorded fires in the UK. It should be noted that around 23% of these fires are deliberate.



Fire at Royal Marsden Hospital, January 2008

Most of these premises employ a phased horizontal evacuation should a fire occur, moving patients to an unaffected fire compartment. This invariably requires an extended evacuation time which is more easily achieved where there is a fire suppression system.

A major concern in hospitals in particular is the impact of a fire on patients who cannot easily be evacuated - particularly those undergoing surgical procedures or in intensive or critical care units.

Fires & Casualties in Healthcare Premises

Year	Fires	Fatal	Non Fatal
2000	3244	4	115
2001	3348	5	148
2002	2281	2	108
2003	2669	4	101
2004	2491	4	115
2005	2552	4	130
2006	2221	5	110

UK Fire Statistics (ODPM/CLG)

In sprinklered premises, unless a fire actually occurs inside the area in question, evacuation may be deferred unless smoke, heat or flames actually enter the treatment area(s).

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 have an outstanding record of successful operation for over a century, and are recommended by all UK Fire Services.

Applications of Sprinkler Systems

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

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

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 premises and their 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 guidance to the Building Regulations and Scottish Building Standards.

Building Standards

Sprinkler systems are widely referenced in the guidance to the Building Regulations, Scottish Building Standards and Health Technical Memorandum. (The guidance in Health Technical Memorandum satisfies all the requirements of Part B – ‘Fire Safety’ of the Building Regulations 2000).



Health Services’ Technical Memoranda 05-02 & HTM 88, SHTM 82

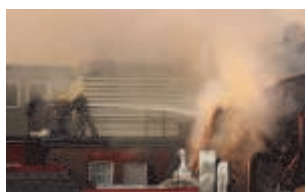
These are some of the areas where sprinklers can be used as a compensation to allow improvement of the normal standards

- Fire resistance of the compartment walls
- Compartment Size
- Glazing in sub-compartment walls
- Fire hazard rooms and areas
- Permitted unprotected area external wall
- Distance to the relevant boundary may be halved
- Number and location of fire-fighting shafts
- Mechanical smoke extraction in basements

However there are only a few circumstances where they are generally *mandated*. Sprinkler protection is however specified in many local building acts for tall or large buildings. (for more details see BIF 12: Sprinklers and the Building Regulations).

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

- 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).

- To reduce the fire hazard in buildings where the occupancy characteristics and the risk to life from fire is considered excessive.
- 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 or evacuation strategies require extended time scales.
- 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 be increased.

Sprinkler System Operation

Sprinkler systems offer a way of automatically applying water quickly and directly to the seat of a fire. All parts of the protected building are covered by a pipework grid with sprinkler heads fitted 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.** (See BIF No 13)

Sprinkler heads open independently when their operating temperature is reached and water is sprayed on to the fire. The hot gases from a fire activate the thermal element in the head operate. Only the sprinklers in the direct vicinity of the fire open, the others remain closed. This limits the water damage to areas where there is a fire and reduces the amount of water used.

Sprinkler heads are generally located near the ceiling and spaced so that there is always a sufficient flow of water to combat fire in the likely area of operation. The flow is carefully calculated so that each head delivers enough water to control a fire, taking into account the size and construction of the building, its use and nature of the contents stored in it.

As the water from the sprinkler heads is applied in small droplets, in a finely divided stream, there is no danger of electrical conductions via the sprinkler water. It is equally safe to use sprinklers in kitchens or where hot oil is being used as boil over will not follow sprinkler activation.



In most premises, if a sprinkler opens and water flows through the control valve it also actuates a mechanical alarm 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 call fire and rescue service. The sprinkler flow alarm signal can be 'piggy-backed' on any fire or security detection system using a RedCare or similar connection to an alarm receiving station.

Types of Systems

There are several types of installation (see BIF 15) but the one most commonly used in healthcare premises is the wet type, where the installation is permanently filled with water.

Standards

There are two main standards for sprinkler systems within the United Kingdom :

- A Commercial and Industrial standard (BS EN 12845: 2004) as applied to buildings such as Shopping Complexes, Warehousing, Hospitals and Schools.
- A domestic and residential standard (BS9251) as applied to Residential Care premises, certain HMO's and domestic dwellings.

Environmental Issues

There are a good number of environmental reasons for reducing the size and frequency of fires. Any reduction will minimise the volume of toxic gases released to the atmosphere. Even in a minor fire, the products of combustion, including CO₂ will pollute the atmosphere and contaminate the fire fighting water. This contaminated water is very difficult to contain and often finds its way into water courses and drainage systems.

The use of a sprinkler system reduces dramatically the size of the fire by attacking the fire in its early stages therefore reducing smoke production and the amount of water required to control the fire.

Many fires are actually extinguished by sprinkler systems leaving little for the fire and rescue service to do on their arrival.



Sprinkler Protected Hospitals (UK)

Partial Protection:

Norfolk and Norwich

Noble's Hospital, Isle of Man

Chelsea & Westminster

East Surrey, Redhill

Full Protection

UCL London

Manchester Joint (MRI)

Protected but extent unknown

Addenbrooks

Crosshouse Hospital, Kilmarnock

Hartland Hospital, Birmingham

Manchester Royal

St James Hospital, Leeds

St Thomas Hospital, London

Lewisham War Memorial Hospital, Andover



Benefits of sprinklers in Health-care premises

- Early attack of a developing fire
- Reduction in smoke logging
- Extended evacuation times required for moving patients
- Larger compartment sizes thus reducing the number of fire doors
- Reduction in fire rating of walls and doors
- Reduced disruption for patients
- Minimise need to move - especially vulnerable patients from theatre/ITU etc.



Presented by:



bafsa

British Automatic Fire Sprinkler Association Ltd

Richmond House • Broad Street • Ely • CB7 4AH

Telephone: 01353 659187 Fax: 01353 666619

Email: info@bafsa.org.uk Web Site: www.bafsa.org.uk

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