



Retrofitting Sprinkler Systems

The wider use of sprinklers and water mist systems is due in part to an increased awareness of the benefits in protecting buildings and occupants and also the life-long cost effectiveness of these systems in comparison with other fire protection measures.

An increasing number of automatic fire suppression systems are being installed into a wide range of buildings. They are being installed for a number of reasons:

- In the conversion and refurbishment of buildings to a new use (ie offices to residential flats)
- To permit relaxation of building regulations requirements (ie open-plan flats, loft conversions, care homes)
- To enhance the protection of residents in care facilities, sheltered housing and flats
- To address shortcomings in other fire protection measures
- To provide protection for the heritage buildings and their contents
- To reduce the cost of the impact of fire to occupiers and building owners
- To provide protection for fire and rescue personnel
- As a business continuity or resilience measure

CONSIDERATIONS WHEN UNDERTAKING RETROFIT OF AUTOMATIC FIRE SUPPRESSION

There are a number of factors to take into account when considering the benefits and potential to retrofit a suppression system into an existing structure or occupied building.

If the project is a refurbishment or conversion to a new use, the use of a suppression system can provide greater flexibility in the design and layout and possible reductions in the requirement for other fire safety measures. Guidance is provided in part in Approved Document B of the Building Regulations and Scottish Building Standards' Technical Handbooks. As outlined below, further guidance is provided in both BS9991:2011, Code of Practice for Fire Safety in the design management and use of residential buildings and BS 9999:2008, Code of Practice for fire safety in the design, management and use of buildings.

It is important that where such flexibilities are being considered that the authority having jurisdiction should be consulted.

Where consideration is being given to the installation of fire suppression systems it is important that those responsible for the building understand both the potential benefits and costs of the measures. At the same time, due weight must be given to both the initial and whole life costs of all the methods of complying with building regulations and fire regulations.

In addition to the enhanced protection of occupants (and firefighters) the direct and indirect cost of fire can be used as part of the business case for suppression systems. In most cases the fire is contained to the area or room of fire limiting the financial and indeed social impact of fire. Evidence from fires in an unsprinklered building suggests that the impact can be significant both in direct financial cost but also have significant consequences for occupants in residential premises and business in commercial premises.

Housing and social care organisations are installing suppression systems into a range of high and low rise social housing, including general purpose housing, sheltered housing and care homes. These systems are being installed to enhance the protection of residents and to address short comings in other fire protection measures.

STANDARDS FOR INSTALLATION

Sprinklers can be installed using any one of a number of accepted standards. In the UK, for non-residential buildings this is BS EN 12845 (2009). BS 9251: 2005 may be used for smaller residential and domestic buildings. Watermist systems should be designed and installed to BS DD 8458 (2011) for residential properties and BS DD 8489 (2011) for other properties.



SINCE 1945 NO ONE IN THE UK HAS EVER DIED AS A RESULT OF A FIRE IN A BUILDING WITH A WORKING SPRINKLER SYSTEM



SPRINKLER SYSTEMS INSTALLED IN FULL COMPLIANCE WITH THIRD PARTY CERTIFICATION STANDARDS MAY ATTRACT INSURANCE PREMIUM DISCOUNTS.

TYPES OF SYSTEMS

While there are a range of different types of sprinkler systems used in a range of premises, it is considered that only wet systems should be specified in heritage buildings. Pipework can be in copper, steel, stainless steel or in CPVC (chlorinated polyvinyl chloride) which is approved for the purpose.

For more information on sprinkler systems refer to BIF 15, Types of Sprinkler Systems. For information on watermist systems see BIF 9 Water Mist .

SYSTEM DESIGN AND INSTALLATION

The high reliability and effectiveness of these systems has come about over the years by strict adherence to design standards. It would be wise to select a contractor who is not only capable and competent but who also has an established track record and who can offer proof of compliance with an established quality assurance system.

Full information on the various third party certification schemes can be found in BIF 20, Third Party Certification.

WATER SUPPLIES FOR RESIDENTIAL AND DOMESTIC SYSTEMS

It is important to assess the pressure/flow requirements for the specific system and the appropriate sources of water supply. Where the pressure and flow available through the town water main is adequate this is the preferred method of supply. Alternatively it may be necessary to use booster pumps or tank and pump supply.

Full information on the water supplies can be found in BIF 13 Water Supplies to Firefighting Systems and Appendix 1 to BAFSA Technical Guidance Note No 1 The Design and Installation of Residential Sprinkler Systems.

CONVERSION, REFURBISHMENT AND RELAXATION OF BUILDING REGULATIONS REQUIREMENTS

Automatic water suppression systems have been specified in a number of refurbishment and conversion projects. Their use permits relaxation of the requirements for fire resistance, compartmentation, means of escape, travel distance, fire detection and alarm systems, separation distances between buildings and fire service access.

Approved Document B identifies some specific examples where relaxation will be approved if sprinklers are fitted. More detailed guidance on the level of relaxation can be found in two British Standard documents:

- BS 9991:2011, Code of Practice for Fire Safety in the Design Management and Use of Residential buildings
- BS 9999:2008, Code of Practice for Fire Safety in the Design Management and Use of Residential buildings

These standards usefully provide alternatives to the technical solutions proposed in Approved Document B to the Building Regulations. They offer a middle ground in terms of flexibility as they sit between Approved Document B (and the fully engineered approach of BS PD 7974:2001, Application of fire safety engineering principles in the design of buildings, Code of Practice).

Developers who have utilised sprinklers in the design of refurbishment projects have identified that they provide design freedoms, cost savings and as in the case of the example below ensure the project is more cost effective.

Information from developers and organisations such as housing associations suggests that the cost of installing sprinklers in refurbishment and conversion projects is in the region of 1 – 2 % of the total project costs.

ENHANCEMENT OF FIRE PROTECTION IN EXISTING BUILDINGS

Since the introduction in October 2006 of the Regulatory Reform (Fire Safety) Order 2005, owners of residential premises including flats, care homes and sheltered housing have been required to undertake fire risk assessments of their properties. The outcome of many of these has been to identify shortcomings in the fire protection measures such as compartmental fire resistance, condition of fire doors and fire alarms. This and emerging evidence from a number of fire incidents supports the view that fire can spread within buildings where passive fire measures have not performed as expected either as a result of improper installation or to their having been damaged by the installation of building services.

In considering the outcome of fire risk assessments, building owners, fire risk assessors and the fire and rescue service should consider the effectiveness of fire protection measures to ensure they are ‘fit for purpose’ and assess the full life-costs of maintaining them. Any assessment of these measures should then be compared with the full life-cost of retrofitting sprinkler systems. Evidence from the BAFSA sponsored retrofit project to a high rise social housing block and a number of sheltered housing projects has provided both practical experience and identified potential costs.



In 2011 BAFSA agreed to lead and manage a project to retrofit a system into an existing occupied high rise block to determine the real costs, both financial and societal, of retrofitting an automatic sprinkler system into an unprotected, older, high-rise social housing block while determining the problems of doing so and developing guidance which can be used elsewhere. The Callow Mount project was the first to be conducted without decanting the residents.

The project sponsored by BAFSA undertaken in September 2011 retrofitted a sprinkler system in a 1960s high-rise block, 13 storeys high with 47 flats. The installation was completed in exactly four weeks without the need to decant the residents.

The Callow Mount project also provided definitive evidence of the initial and full life-costs of installing sprinklers into this type of property.

Full details of the project can be found in the BAFSA publication *Safer High-rise Living. The Callow Mount Sprinkler Retrofit Project.*