Fires remain the greatest threat, facing those responsible for safeguarding our built heritage. While other risks such as theft, flood and even insect or fungal infestation can damage buildings and their contents only fire can destroy them completely. Each year, throughout the world, there are fires in all types of historic and heritage buildings. A number of these outbreaks reach serious proportions where measurable fire loss can soar to millions of pounds. The cost of the fire at Clandon Park has been estimated to be in the region of £50 million.

The loss of important artefacts, cultural resources and national heritage mean such fires are among the most feared. Since the last revision of this publication in 2013 a significant number of the UK’s built heritage has been lost or seriously damaged. Most notable victims have included Grade I and Grade II* (or their Scottish equivalents) properties including:

- Angel Hotel, Northampton
- Carnsloch House, Dumfries
- Clandon Park, NT property in Surrey with major collection/contents loss
- The Royal Clarence Hotel, reputed to be the UK’s oldest hotel
- Daresbury Hall, Warrington
- Eastbourne Pier
- Glasgow School of Art
- Glen O’Dee Hospital, Aberdeenshire
- Kelsale Manor, Suffolk
- Node Court, Herts, ‘largest thatched fire in UK’
- Newsome Mill, Huddersfield
- Sandhill Park, Somerset
- Strathmartine Hospital, Dundee (Multiple arson fires on disused hospital site)
- Wheathamstead Swan, Hertfordshire, 15th century inn
- Sydenham House, Devon
- Wrythshawe Hall, Greater Manchester

The Extent of the Problem

Almost as remarkable as the number of serious fires in important buildings is the lack of information on the extent of the problem. Sadly, Scotland no longer publishes data on listed building fires and there is no centrally available data for England & Wales. In the previous revision of this publication, it was suggested there was broad agreement that in the UK, a building of major national importance is lost or seriously damaged by fire each week. Extrapolating Scottish 2008/9 data for whole the UK suggests that there may be at least serious 200 – 250 fires each year in Grade 1/A buildings.

Requests have been made through the Fire Statistics Users Group by a wide range of interests for more reliable and easily accessible data on heritage fires to be collated by the fire and rescue services.

Following the 1992 Windsor Castle fire, the Bailey Report concluded that automatic fire suppression systems could play a useful role in the protection of heritage buildings especially where it was difficult to introduce other fire protection measures such as improved compartmentation. In fact, just as in new buildings, where the introduction of sprinklers can greatly assist the architect in bringing to life exciting new concepts in building design, sprinklers can make it possible for a historic building to meet current fire safety standards with minimal impact on heritage fabric and values.

The value of automatic fire suppression systems has also been recognized in building codes, in guidance produced to accompany UK fire regulations and in BS 9999: 2015: Code of practice for fire safety in the design, management and use of buildings. BS 9991 (2015) covers the same issues in domestic and residential premises.

Where once the idea of installing sprinkler systems into mansions, may have seemed absurd it is now clear that a sprinkler or watermist system can protect nationally and internationally important structures and their contents. Automatic fire suppression systems (AFSS) have also been widely used as a compensating feature in developments where building codes cannot be complied with in respect of means of escape or access for the fire and rescue service. Some projects have even reported that providing sprinklers has resulted in a cost saving where the building authority has permitted trade-offs in respect of means of escape facilities, structural fire protection measures and surface spread of flame requirements.

Fires in Historic Covered Markets and Piers

Amenity societies and heritage groups have expressed concern about the risks of fire in the UK’s many historic...
covered markets and arcades. These are often at risk because of the numbers of small units they contain and the variable quality of electrical wiring and equipment, which may cause a fire.

The consequence of such a fire will not only affect tourism and shoppers but also severely impact on small businesses. For example, a fire in the Great Yarmouth Indoor Market in August 2016 made 40 businesses homeless during their busiest part of the year. Businesses in neighbouring premises were also seriously affected by road closures and scaffolding.

A good example of what can be done by coordinated efforts from local authorities, owners and insurers can be seen in the presence of a sprinkler system in the Grade II listed covered market in Oxford.

In 2014, Zurich Risk Engineering were asked by Oxford City Council to undertake a review of the proposed upgrade of the existing sprinkler system for the indoor market which had reached the end of its serviceable life. Upon review Zurich found that the sprinkler system had been incorrectly designed as a dry gridded system, which was subsequently changed to a terminal range, dry gridded system. Zurich also found a number of unprotected areas on the design plans such as walk in chiller/freezers, again this was changed to ensure all areas were protected. Upon commissioning of the sprinkler system Zurich found that the dry systems failed to meet the ‘sixty second’ trip time, which required the fitting of accelerators, which subsequently solved the problem on the second commissioning test.

The value of the system was quickly proved when a fire broke out in a refrigerator in a café in December 2015. A single sprinkler head operated and suppressed the fire prior to the arrival of F&RS.

Britain’s Piers

One of the particular glories of the UK’s built heritage is the seaside pier. There are still around 50 major structures, which are accessible but this is down from more than 100 in 1900.

Recent fires on piers include Eastbourne (2014), Hastings (2010), Weston-Super-Mare (2008) and famously, Brighton’s West Pier (2003) demonstrates that the problem has not gone away. Southend-on-sea pier (the longest in Europe) has been particularly badly affected with serious fires in 1976, 1995, 2005 and 2014.

AFSS has been fitted on both the Weston and Eastbourne piers and it is now generally accepted that pier buildings (almost universally light timber construction) are particularly suited to this form of protection. Weston is protected by a watermist system while Eastbourne is sprinkler protected.

Fire upgrades as part of reconstruction efforts on Southend pier adopted a different approach as a result of the fire and rescue service’s recommendations following the 2005 fire where there were difficulties in providing an adequate flow of water as the tide was out. New onshore pumps with hydrants every 90 metres were installed. It should be remembered that for every pier there is only one way on and one way off and this should be borne in mind with regard to the safety of firefighters. Comprehensive sprinkler protection has also been installed in the structures on the pier itself.
For an independent view of the selection of fire protection systems reference should be made to BS 5306 Part 1 (2011) _Code of practice for fire safety in the design, management and use of buildings_. This standard suggests that buildings can be most effectively protected by either sprinkler systems or a watermist systems. The standard also mentions oxygen reduction systems, which may have an application in modern buildings used for the protection of the contents of reserve collection stores. However, although such systems can be very effective in preventing fires, it’s likely that few heritage buildings are sufficiently ‘airtight’ to allow the use of such systems.

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 (2015). BS 9251: 2014 may be used for smaller residential and domestic buildings. Watermist systems should be designed and installed to BS 8458 (2015) for residential properties and the BS 8489 (2016) Parts 1 and 7 for other properties.

### Types of Systems

While there are a number of different types of sprinkler systems used in a wide range of premises it is generally agreed that ‘wet’ systems should be specified in heritage buildings as these are the simplest, and easiest to maintain and are also likely to be the most cost effective. 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_.

In the case of archives and buildings containing collections, which could be irreversibly damaged by water (whether applied by an AFSS or the fire and rescue service) additional measures can be taken to ensure that an AFSS only operates when both smoke and heat are present. These ‘pre-action’ systems are more complex and inevitably more expensive to install and maintain than wet systems but do provide an additional level of reassurance.

Watermist systems are similar to sprinkler systems in terms of operation but have some additional benefits in heritage properties as they use considerably less water to suppress or extinguisher fires and this will reduce collateral damage by water. 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 of designing and installing systems in historic and heritage buildings 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_.

### Heritage Buildings with full or part protection from AFSS

- A La Ronde, Exmouth
- Abbey School, Sherborne
- Advocates Hall Library, Edinburgh
- Arden Manor, West Midlands
- The Barn, Lundy Island
- Beaminster House, Beaminster
- Bicester Priory
- British Library, London
- Broughton House,
- Dumfries Buchanan House
- Buckingham House,
- Portsmouth Chitcombe House,
- Salisbury Clavell Tower,
- Kimmeridge Cloford Manor, Frome
- College Bounds, Aberdeen
- Corrargh Castle, Aberdeenshire
- Damens Signal Box, Yorkshire
- Daimler Heritage Trust Museum
- Douai Abbey, Woolhampton
- Duff House, Aberdeenshire,
- Flatford Mill,
- Suffolk Friends Meeting House,
- Stourbridge The Hyde, Bridport
- Gilbert White’s House, Selborne
Added 2017

Chatsworth House, (mist)
Ringshall Grange Suffolk
Tudor Shops Lavenham (mist)
Tymperleys Colchester
Cupola House Bury St Edmunds (mist)
Tudor Barn Belstead (mist)
Milburns Barn Hormead
Windsor House Lowestoft
St Pancras Chambers/Renaissance Hotel (mist)
Taymouth Castle Grade (mist)
Archives, Network Rail, York (mist)
Abbotsford House, Galashiels (mist)
Under construction; Glasgow School of Art (mist)

In addition, there are a significant number of hotels in listed buildings fitted with AFSS.

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