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# Use of automatic fire suppression systems in heritage buildings

**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 2015 fire at Clandon Park has been estimated to be in the region of £50 million.

## 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. The Fire Protection Association say that there were 400 serious fires in historic or heritage buildings in 2019/20.

The value of automatic fire suppression systems has also been recognised in building codes, in guidance produced to accompany UK fire regulations and in BS 9999: 2017: 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 water mist 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.

## 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.

Water mist 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 extinguish fires and this will reduce collateral damage by water. For information on water mist systems see BIF 9 Water Mist.

## 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.

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.



400

SERIOUS FIRES IN  
HERITAGE OR HISTORIC  
BUILDINGS IN 2019

**“Measurable fire loss can soar to millions of pounds”**

**“a sprinkler or water mist system can protect nationally and internationally important structures and their contents”**



**NLW Low pressure water mist nozzle and part installation in proprietary crimped stainless steel**

**CASE STUDY - NATIONAL LIBRARY OF WALES GRADE II LISTED**

The NLW was a pioneer in the use of AFSS when they decided to include a sprinkler installation to protect their 1994-6 Building. Additionally, a carbon dioxide gas flooding system was installed to protect the high fire resistance storage ‘cells’ in the building’s basement. In 2019 the installation of a retrofitted water mist installation designed to BS 8489 was undertaken in the North Stack of the original library building. The new system, like the 1996 sprinkler system will provide the highest levels of protection for the priceless collection in the Aberystwyth site which is one of the five copyright libraries in the UK.



**Exterior of NLW, Penglais Hill, Aberystwyth**

**CASE STUDY - WILLOW TEAROOMS, GLASGOW (CATEGORY A LISTED)**

Rennie Mackintosh designed the original Art Deco inspired Willow Tearooms in 1903 and the premises at 217 Sauchiehall Street are the only rooms where Mackintosh had full artistic control over the interior and exterior. The premises underwent a full restoration between 2014-2018 which included the installation of a high pressure water mist system. This not only fully protects the iconic premises but provides alternative compliance with Scottish Building Standards in respect of means of escape via a single staircase



**A-Listed Willow Tearooms at 217 Sauchiehall Street**



**Interior showing complex ceiling decor with mist nozzle. Pipework is visible to avoid fabric damage.**

**HERITAGE/HISTORIC BUILDINGS WITH AUTOMATIC FIRE**

**SUPPRESSION**

As at March 2020, all are sprinklered or partially sprinkler protected other than where shown

- |   |   |
|---|---|
| Asprey, Bond Street   | 44 Berkely Square (Annabel’s Nightclub) |
| Bodelian Library  | Bicester Priory                         |
| British Library, London   | Cliffe Hotel, Lowestoft                 |
| Chatsworth House, (mist)  | Edinburgh Castle (partial)              |
| Elgar’s Birthplace, Worcester   | Flatford Mill, Suffolk                  |
| Granton Store, National Museums and Galleries, Scotland                         |   |
| Hillsborough Castle, NI   | Lambeth Water Tower                     |
| National Gallery, Sainsbury Extension   |   |
| National Library of Wales, Aberystwyth (Building 3 Sprinklers; Building 1 mist) |   |
| National Portrait Gallery, London (mist)  |   |
| Palace of Westminster (basement) (mist)   |   |
| Norwich Castle Museum   | Old Vic Theatre, Bristol                |
| Porthcurno Museum, Cornwall   | Sadler’s Mill, Romsey                   |
| St Pancras Chambers/Renaissance Hotel (mist)                                    |   |
| Worthing Pier   |   |

An up-to-date list can be found online at [bit.ly/2ZkuXDH](http://bit.ly/2ZkuXDH)

*If you have a question or seek advice regarding automatic water-based fire suppression systems, please email the team: [Ritchie.oconnell@bafsa.org.uk](mailto:Ritchie.oconnell@bafsa.org.uk) or [joe.mcafferty@bafsa.org.uk](mailto:joe.mcafferty@bafsa.org.uk). If they do not have an answer for you, they will know someone who has! FAQs can be found at [bafsa.org.uk/sprinkler-systems/faqs/](http://bafsa.org.uk/sprinkler-systems/faqs/)*

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