



# Position Statement

## Automatic Fire Suppression Systems

### Introduction

The National Fire Chiefs Council (NFCC) would like to see a greater inclusion of Automatic Fire Suppression Systems (AFSS), including sprinklers, in the built environment in the UK.

In 2018 an [Independent Review of Buildings Regulations and Fire Safety](#) led by Dame Judith Hackitt found the regulatory system for buildings in England is not fit for purpose. This accords with the experience of all Fire and Rescue Services (FRS) and their protection teams and was further demonstrated throughout 2018/19 by several significant 'total loss' fires where the rate and scale of fire spread appears to have been linked to the construction of the building. Events like these are increasingly highlighting the need for strengthened fire safety requirements in buildings in England.

Latest research demonstrates clear evidence of the benefits of AFSS. As part of an appropriate package of fire safety measures, AFSS:

- save lives and reduce injuries
- protect property
- reduce the impact of fire on the environment
- reduce interruption to UK businesses
- assist search and rescue operations and reduce the risk to firefighters
- increase community resilience
- preserve heritage.

NFCC fully support the benefits of sprinklers and a significant increase in their use across the built environment. Specific priorities for the fitting of sprinklers in different types of new and existing buildings are set out in further detail below.

### The case for sprinklers

AFSS are the most effective way to ensure fires are suppressed or even extinguished before the FRS arrive.

In 2017 and 2019, NFCC and the National Fire Sprinkler Network (NFSN) investigated the effectiveness, reliability and positive contribution of sprinklers for life and property safety. The evidence, taken from actual building fires, found that:

- Sprinklers are 94% efficient in their ability to operate.
- Sprinklers are 99% effective in extinguishing or controlling a fire.

Further information on this research and other evidence is included in Annex A.

## Specific priorities

NFCC support the mandatory installation of AFSS in certain types of higher risk buildings:

### Residential premises

*Reviewing Approved Document B (ADB), England*

NFCC has previously stated that AFSS should be required from 18m in residential buildings, or as defined in any revised ADB in accordance with the outcome of the full technical review.

Since the Grenfell Tower fire, the findings of the [Independent Review](#), recent fires, new research, and recent Government policy announcements, NFCC has revised this position.

- Currently there is an anomaly for protection of buildings between 11m and 18m; most front-line equipment carried by services is fit for external firefighting and rescue up to 11m in floor height. This means that in between 11m and 18m, rescue and firefighting operations usually have to be undertaken inside the building, but without a range of firefighting and fire safety requirements (such as dry risers) because these aren't required until 18m.
- Trigger heights within ADB interact (e.g. thresholds for escape stairs, riser mains and firefighter lifts). Together they create a layered system of protection. These require careful consideration of how they interact. For example, the use of sprinklers at some thresholds impacts on other requirements currently in guidance and can in some circumstances enable design flexibilities.
- The 18m position relied on an expectation that strengthening would be made to related measures, as part of a full consideration of all thresholds and how they interact. NFCC's full response to the March 2019 Call for Evidence on ADB can be found [here](#).
- However, Government now intends (as outlined in the Autumn 2019 ADB [consultation](#)) to review the trigger height for sprinklers in isolation from these other important aspects of design which provide interlinked layers of protection.
- Buildings in scope of the future system are proposed to be subject to a safety case regime; NFCC understands the [intention is to introduce](#) the safety case regime for buildings at 18m and above, which will not address the gap for protection between 11m and 18m.
- Attempts in 2019 to clarify ADB should have gone significantly further, and it is our understanding that the full technical review could take up to five years.
- Trigger heights for sprinklers in other parts of the UK are within the context of significantly stronger fire safety requirements that apply in those jurisdictions, for instance in Scotland all new high-rise buildings are required to have two escape stairs, and the combustible cladding ban has been introduced from 11m (instead of 18m as in England).
- Recent fires in buildings lower than 18m have resulted in total building failure. The research and evidence support the view that sprinklers would have extinguished or suppressed these fires in most cases<sup>1</sup>, and where they did not, they would certainly have provided residents and firefighters with additional protection, and significantly mitigated damage<sup>2</sup>.

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<sup>1</sup> [Efficiency and Effectiveness of Sprinkler Systems in the United Kingdom: An Analysis from Fire Service Data May 2017](#)

<sup>2</sup> [Efficiency and Effectiveness of Sprinkler Systems in the United Kingdom: An Analysis from Fire Service Data Incidence of Deaths and Injuries in Sprinklered Buildings: A Supplementary Report March 2019](#)

NFCC recommend AFSS be:

#### *New builds*

- Recommended in all sleeping risk buildings
- Mandatory in all new residential buildings with a storey of 11m (or 4 floors) and above, at a minimum *[This is revised from our position of 18m linked to the full review of ADB, in response to emerging evidence, research, recent fires, and policy announcements as outlined above]*
- Mandatory in all new student accommodation

#### *Existing buildings*

- NFCC supports AFSS as being significantly beneficial in all existing sleeping risk buildings, including high-rise residential buildings regardless of overall building height
- Mandatory requirement to retrofit in all high-rise residential buildings over 30m that are served by a single staircase (regardless of future refurbishment)
- Mandatory requirement to retrofit where buildings currently exceed 30m (when these buildings are scheduled to be refurbished)
- Mandatory requirement to retrofit in all residential buildings with a storey of 11m (or 4 floors) and above, on a risk assessed basis. This requirement should be tied in with the proposals for a Safety Case regime whereby persons responsible for buildings have to justify the safety of all building occupants (which would include accounting for vulnerable persons and building deficiencies, such as lack of compartmentation).

Any framework for setting the risk assessment process for retrofitting should seek to avoid the issues experienced with the implementation of BB100, which created loopholes whereby most new schools are still being built without sprinklers. NFCC believe that this was not the intention when BB100 guidance was developed.

### **Schools**

According to UK Fire statistics, in England alone there were 686 fires in schools in 2016/17. The Association of British Insurers has reported<sup>3</sup> that the most expensive school fires typically cost around £2.8 million to address. Covering a four-year period, an average of 24 large loss fires occurred every year totalling £67.2million.

Aside from the financial impact, UK school fires disrupt the education of an estimated 90,000 children and students annually<sup>4</sup>. Whilst Government's expectation was that most if not all new schools would be fitted with sprinklers, recent estimations show that the rate has diminished from around 70% of new schools being built with sprinklers in 2007, down to a mere 30% as of December 2016. A recent study by the BBC4 suggests this is as low as 15% currently.

Recent research<sup>5</sup> examined fires in educational premises over a five-year period where sprinklers were fitted. In each occasion where the sprinklers were expected to operate, they did so. They contained and or extinguished the fires, dramatically reducing fire damage and making reopening of the school much easier, minimising the disruption to education.

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<sup>3</sup> <https://www.abi.org.uk/globalassets/sitecore/files/documents/consultationpapers/2016/08/department-for-education-consultation-on-fire-safety-design-for-schools.pdf>

<sup>4</sup> <https://www.abi.org.uk/news/news-articles/2017/10/insurers-back-fire-chiefs-call-to-tighten-rules-onschool-sprinklers/>

<sup>5</sup> [https://www.nationalfirechiefs.org.uk/write/MediaUploads/NFCC%20Guidance%20publications/Protection/Optimal\\_Sprinkler\\_Report.pdf](https://www.nationalfirechiefs.org.uk/write/MediaUploads/NFCC%20Guidance%20publications/Protection/Optimal_Sprinkler_Report.pdf)

NFCC proposes that all schools should be fitted with AFSS. The use of alternative design guidance, such as BS9999 and BS7974 should only be permitted where AFSS are to be installed, and alternative solutions based on cost reduction should not be permitted.

NFCC recommend AFSS be:

- Mandatory in all new schools (a copy of NFCC's response to the consultation on BB100 can be found [here](#)).
- Mandatory in all student accommodation (as above)

### **Care homes and specialised housing**

NFCC has serious concerns with what appear to be an increasing number of fire safety issues within care homes. Following several serious fires, in 2017/18 themed inspection programmes were carried out by some FRSs. In London, 57% of care homes inspected received a formal notification to address fire safety failures. In Hertfordshire, a program of inspection found fire safety deficiencies in approximately two thirds of care homes. Recent fires, such as the residential care home in [Crewe](#) have demonstrated serious shortcomings in current building standards.

NFCC recommend AFSS be:

- Mandatory in all new residential care premises and specialised housing.

### **Car parks**

Evidence derived from global research, and research conducted by the Building Research Establishment (BRE) demonstrates the effectiveness of sprinklers in controlling fires in car parks. It shows that the incidence of fatalities and injuries is zero, and the property loss is around 95% lower than that of an uncontrolled fire.

NFCC recommend AFSS be required in:

- Open sided car parks to protect property, including the fabric of the building. While there have been few incidences of fatalities in car parks, there have been recorded fatalities to firefighters due to structural collapse abroad.

NFCC strongly recommend AFSS be required in:

- Enclosed car parks, as is common in Europe and also recommended by [National Fire Protection Association Standard 88](#) (NFPA 88) in the USA.
- Basement car parks, and in particular, those with associated accommodation above. This is a common requirement in Europe and recommended by NFPA 88 in the USA. Research undertaken by [BRE in 2010](#) also supports this approach.
- Automated car parks, due to the extra density of fire loading created by stacking cars in carousel or racking systems. Increasingly this is being recommended globally and is required by NFPA 88.

NFCC recommend further research is carried out into fires in car parks and the design of car parks. Current designs do not take into consideration the fire loading of modern vehicles, electric vehicles and liquified petroleum gas vehicles, as well as the risk of running fuel fires from plastic fuel tanks.

### **Warehouses**

NFCC recommend:

- Lowering the threshold for the requirement to fit AFSS in large structures, such as warehousing, to 4,000 square metres.

NFCC are supporting research to assess the ability of firefighters to safely perform rescues from large structures, such as warehouses. Early results of this research suggest a limit of 4,000 square metres for effective rescue.

### **Waste management facilities**

NFCC recommend:

- AFSS in facilities providing waste management and recycling.

There is growing evidence that sprinklers are highly effective in controlling fires in these establishments. Uncontrolled fires in waste and recycling facilities are often prolonged, and are extremely resource intensive for FRSs and partner authorities. They are also commonly disruptive to local communities and to travel infrastructure.

### **Timber framed buildings**

NFCC recommend:

- AFSS in timber framed buildings.

These buildings have shown to be particularly vulnerable to fire. An example of this was the fire in a [Premier Inn](#) in Bristol in 2019 where the whole building was lost. This highlighted the vulnerability of these buildings to fire. We especially believe that sprinklers must be included in timber framed buildings that are residential or where people sleep, such as hotels.

### **Future proofing AFSS**

Sprinkler requirements in building regulations and guidance across the UK should be kept under regular review to:

- ensure fire safety requirements keep pace with new building developments
- bring standards across the UK into better alignment
- widen and strengthen the use of AFSS within relevant guidance and regulations.

NB: Sprinklers are also known as Automatic Fire Suppression Systems (AFSS) which automatically apply water to a developing fire to control or contain the fire, other examples include water misting systems and fog systems. AFSS includes sprinkler systems, water misting systems, fog systems, and such variants that automatically apply water to a developing fire with a view to either extinguish or control the fire.

## **ANNEX A – EVIDENCE AND RESEARCH**

### **NFCC and NFSN research**

In 2017 the NFCC and the National Fire Sprinkler Network jointly published the report '*Efficiency and Effectiveness of Sprinkler Systems in the United Kingdom: An Analysis from Fire Service Data*'.

The report was based on an analysis of fires recorded in all United Kingdom fire and rescue services between 2011-2016, where sprinklers were recorded as being present. Five years of data on fires in premises with sprinklers was collected from 47 fire and rescue services across the UK. A further three services covering island areas confirmed that they did not attend any fires with sprinkler systems.

The report presented the following headline results:

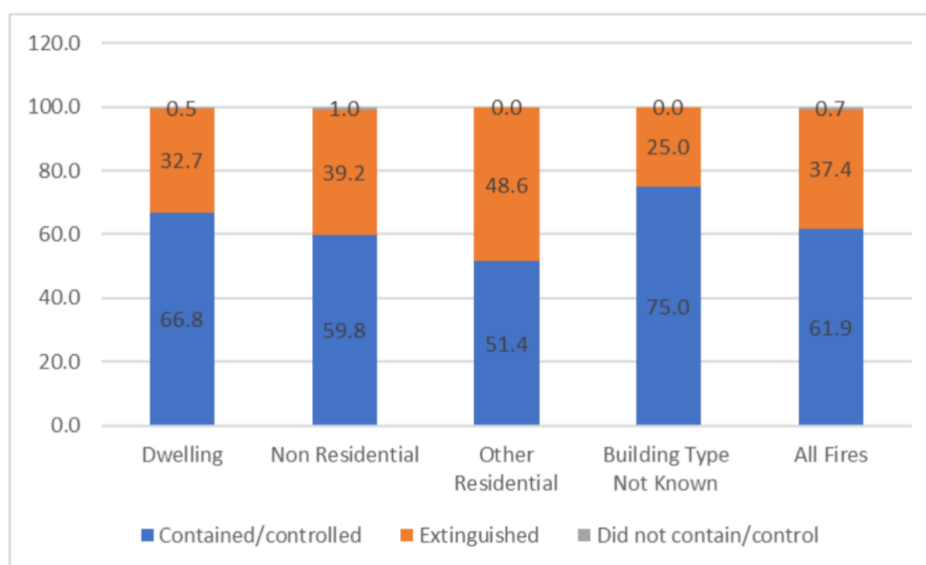
- the cases analysed amounted to 2,294 incidents of which 1,725 (75%) were in non-residential buildings and 414 (18%) in dwellings
- sprinkler systems operate on 94% of occasions, demonstrating very high reliability
- when they operate, they extinguish or contain the fire on 99% of occasions
- in both converted and purpose-built flats sprinklers were 100% effective in controlling fires.

In 2019 further research was conducted into the performance of sprinkler systems in protecting life and reducing the incidence of harm. Key findings across the reports found:

- there was not a single fatality in a building (other than a dwelling) where sprinklers were fitted and could be expected to work
- whether in a dwelling or other type of building, if sprinklers are fitted you are half as likely to be harmed by a fire
- if you were injured then the chances of going to hospital were reduced by 22%.

The full 2017 report can be read [here](#) and the follow up 2019 report can be read [here](#). The impact of sprinkler systems in controlling or extinguishing fires is shown in Figure 8 below from the 2017 analysis. Data available from 677 fires, showed sprinklers contained or controlled the fires in 62% of incidents and extinguished the fire in a further 37% of incidents. Hence, the performance effectiveness of sprinkler systems was 99% across all building types.

**Figure 8: Impact on Fires where System Operated by Building Type, %**



Source: Optimal Economics

## Further research and case studies

Recent fires, such as the residential care home in [Crewe](#) and hotels in [Bristol](#) and [Walsall](#), have demonstrated serious shortcomings in current building standards. In all three of these fires it is likely that the presence of sprinklers would have prevented the loss of these buildings, and lessened the impact on the communities and the environment.

A library of short case studies on successful sprinkler activations is available on the [NFSN website](#).

The [submission](#) from the European Fire Sprinkler Network in December 2017 in response to the *London Assembly Planning Review for Installing Sprinklers in London's Buildings*, indicated the average cost of installing sprinklers ranged from £1,200 - £2,000 in new flats and from £1,500 - £2,500 in existing flats.

### Residential and Care Homes

#### [BRE Report – Cost benefit analysis of sprinklers:](#)

- Sprinklers are cost beneficial in the following premises:
  - bedsits of six units or more
  - most purpose-built blocks of flats
  - all care homes.

### Design benefits

#### [The Impact of Automatic Sprinklers on Building Design:](#)

Produced by engineering consultancy WSP and published by the Business Sprinkler Alliance (BSA), this report provides those involved in the design and construction industry with information on the design implications of automatic sprinklers. The report focuses on the commercial and design impacts of automatic sprinklers rather than fire safety:

- The introduction of sprinklers provides many benefits including life safety, business protection and sustainability. By looking at different design options, this report identifies the capital and lifestyle costs, design benefits, and flexibility, as well as the potential to reduce the construction programme.
- Supports the view that sprinklers should be considered early on in the design process, dispelling the myths about cost and design freedoms.

### Warehouses

- Information on the benefits of AFSS in warehousing can be found on the [BSA website](#):
  - [An environmental impact and cost benefit analysis for fire sprinklers in warehouse buildings](#) – BRE Global:
    - Found that the whole-life benefits of AFSS outweigh the costs, and that there are environmental benefits for including sprinklers in warehouses.
    - *The total annual cost to the UK economy of fires in English warehouses without fire sprinklers was estimated at [£232 million](#).*
    - If all warehouses above 2,000m<sup>2</sup> were fitted with sprinklers, the annual saving to businesses in England could be up to £210m.
  - The Association of British Insurers (ABI) [were quoted in 2016](#) calling to make sprinklers compulsory in warehouses in the UK.

### Environmental and community impacts

- [Assessing the role for fire sprinklers](#) – Bureau Veritas. This study commissioned by the BSA, aims to provide insight into the environmental and community impacts of fire in the event where fire sprinklers are installed and are not installed, in single-story commercial and industrial premises.