Sprinklers Save Lives

Produced by Tyne and Wear Fire and Rescue Service and partners

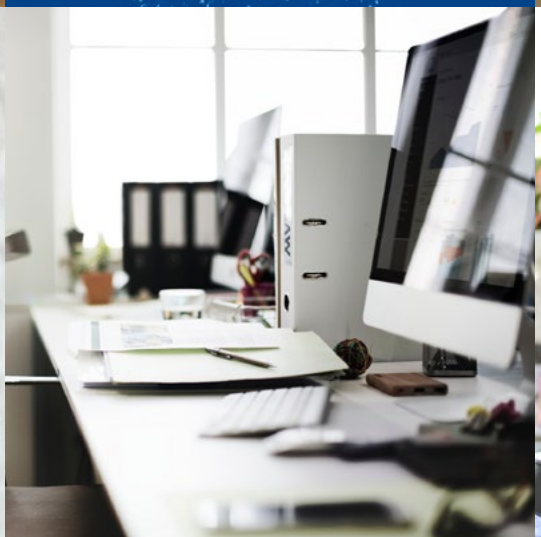
Tyne and Wear Fire and Rescue Service

Creating the Safest Community








Foreword

Assistant Chief Fire Officer John Baines, BA (Hons) MIFireE
Tyne and Wear Fire and Rescue Service

Every day people die and are injured in fires in the UK. The estimated cost of fire to the economy runs into billions of pounds.

Behind this enormous economic loss lies an even more devastating story; the tragedy of the families who lose loved ones, whose homes and memories are damaged or destroyed beyond repair and of people forced to uproot to new homes, sometimes new communities.

Tyne and Wear Fire and Rescue Service (TWFRS) work to protect people, homes and businesses in the communities it serves by preventing fires and responding to emergencies. Through partnership, engagement, enforcement and education we have been able to significantly lower the number of fires in our communities, together with reducing resultant deaths and injuries year upon year. The result is that Tyne and Wear is one of the safest areas of the UK to live and work.

However, more can be done, especially for the most vulnerable people in our communities. Sprinklers offer the best protection to those who need it most; children, older and disabled people and those who have a drug or alcohol dependency. Age, infirmity, a disability or a dependency mean some people cannot escape their homes even if they have working smoke alarms to give them early warning. Sprinklers control a fire immediately when it breaks out, affording vulnerable people a greater level of protection.

In a building fitted with an appropriately designed and properly maintained sprinkler system, any death is extremely rare and there have never been multiple fire deaths in England and Wales. This guide is here to support you in considering sprinklers to protect people across your communities.

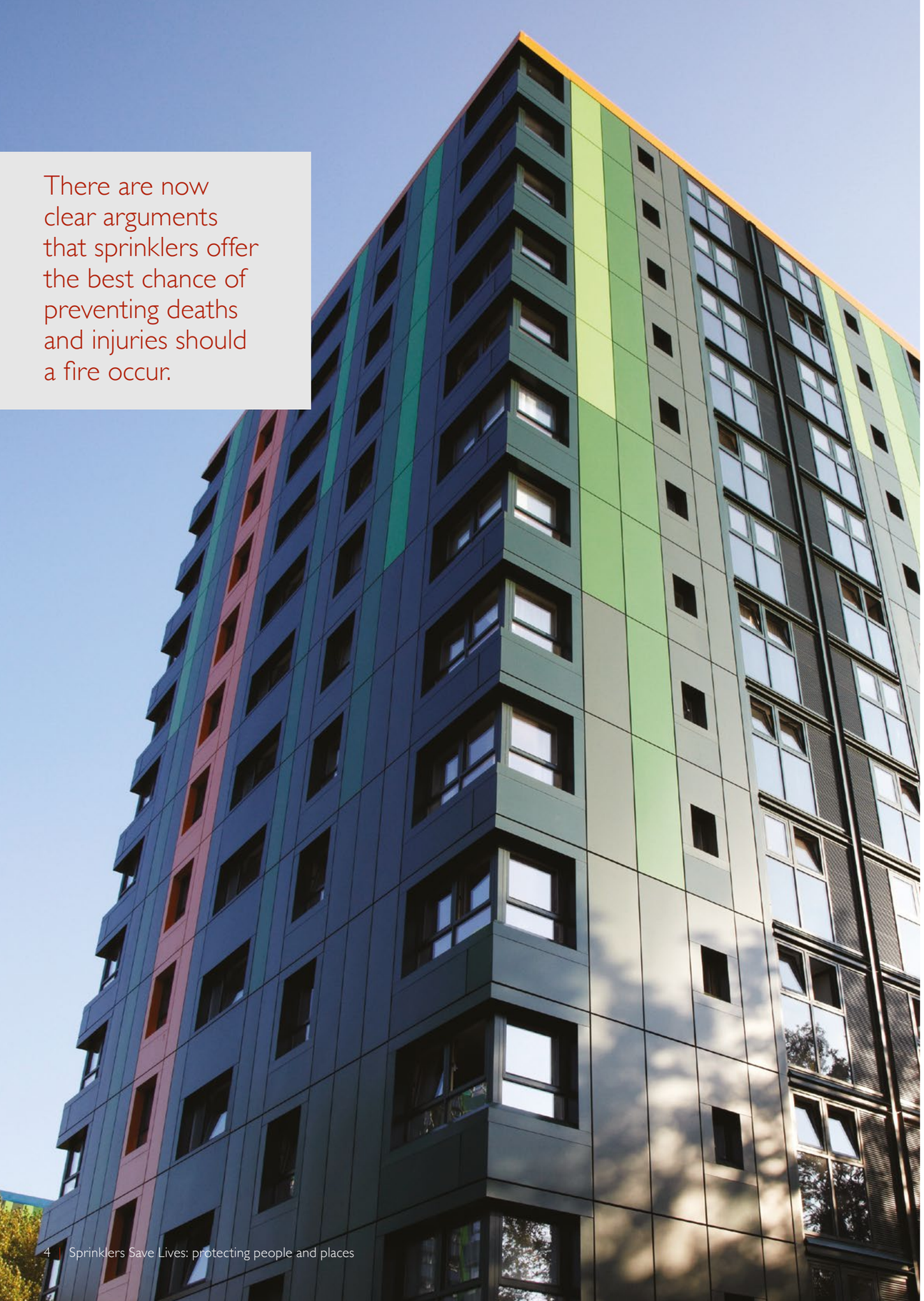
Sprinkler systems have advanced in terms of technology, suitability and cost effectiveness. Bespoke designs to suit individual needs have driven down costs to such a point that systems are now more cost effective, with minimal maintenance fees.

TWFRS actively promotes the installation of sprinklers and we would also like you to consider the benefits, as we work together to improve the lives of our communities and protect those most vulnerable in our society.

Please visit our website **www.twfire.gov.uk** to find out more.

We look forward to working with you in the future.

Contents



There are now clear arguments that sprinklers offer the best chance of preventing deaths and injuries should a fire occur.

Introduction

Sprinklers have been used to protect industrial and commercial property for more than a century.

But there is now a growing understanding of how they can protect lives in the home, especially those of society's most vulnerable people. There is increasing evidence that people who live in buildings with sprinklers enjoy a much higher level of protection from fire than those who lack this additional safety system.

Sprinklers work very simply. Sprinkler systems are a network of pipes that carry water from a source to the sprinkler head where it remains until the sprinkler head activates when a fire breaks out.

While fire detection systems such as smoke alarms are estimated to save between 80 and 100 lives each year, it is also clear that many people who do not survive are those whose age, disability or impairment prevent them from escaping. Sprinklers tackle fires when and where they break out, meaning people who cannot help themselves are properly protected even if they cannot escape.

In the case of social housing, residential care premises, homes of multiple occupation, hostels and similar properties there are now clear arguments that sprinklers offer the best chance of preventing deaths should a fire occur. In 2012 TWFRS launched a Sprinkler Partnership, which aims to provide the best prevention and protection measures, especially for those most vulnerable in its communities.

It was a response to a clear need to kick start a change in understanding and attitudes to the costs and benefits of sprinkler systems. Many myths have grown up around sprinklers and one of the aims of the project was to support partners to change their perceptions and invest in better protection for residents and businesses. To support this process, TWFRS committed targeted funding and resources to assist partners in installing sprinklers to protect residents and property.

To start engagement with partners, the service hosted seminars to encourage local authorities, social housing providers, private landlords and installers to install sprinklers during construction or refurbishment of housing stock.

Up to
2485
properties have had or are due to have sprinklers fitted.

Partners then visited Callow Mount in Sheffield where the UK's first full domestic sprinkler retrofit had recently been completed in a high rise block of flats.

This insight into the practicalities of installing sprinklers helped to overcome some of the myths which may have deterred housing providers from seriously considering investing in sprinkler systems.

Strong partnerships have been forged as a result of the ongoing dialogue and the approach has proved highly successful in driving up the number of sprinkler installations in all five of Tyne and Wear's local authority areas.

Since launching the partnership, up to 1,724 properties have had sprinklers fitted. TWFRS funding is considered on a case by case basis, with partners committing significant resources to this joint work.

TWFRS maintains its commitment to the Domestic Sprinkler Partnership and continues to work with partners to secure more sprinkler installations to protect those most vulnerable.

No sprinkler installed

Sprinkler installed

2. Benefits of sprinkler systems

2.1 Cost of fire

Fire costs the UK economy significantly in financial, social and environmental terms. The most recent government statistics state that the total annual cost of fire in England is an estimated £8.3 billion, equating to 0.91% of the gross value added of the whole economy.** Around £3.3 billion of this total consisted of the consequential costs arising from fires such as property damage, lost business, financial losses from injuries and deaths and expenditure by the police, criminal justice system and prison service.

The remainder of the £8.3 billion is made up of two types of costs:

- **Cost in anticipation:** This covers structural and passive fire protection in buildings, fire prevention measures, insurance administration and the resource and capital costs for training and fire safety.
- **Cost in response:** The expense of responding to reports of incidents as well as extinguishing and clearing up after a fire has occurred.

2.2 Consequences of fire, including deaths

The human cost of fire is considerable, with 334 people in Great Britain having lost their lives in fires between 2017 and 2018.*

Fires in the home account for 80% of all fire deaths and nearly half of all property fires in that period.**

Analysis of the causes showed that careless handling of fire or ignition sources, such as disposal of cigarettes, were the main reason for the incidents. Year on year, almost half of deaths from accidental fires in homes arose from fires which started in either the living or dining rooms.

* Fire Statistics: Great Britain April 2017 to March 2018. HO
** Economic Cost of Fire 2008. DCLG

2.3 Benefits of sprinklers

For occupiers

In the UK there have been no multiple deaths from fires in buildings fitted with working sprinklers.

A correctly fitted and maintained sprinkler system provides immediate and continuous protection. Its fast activation means suppression of the fire starts swiftly and prevents it from growing and spreading. This gives occupiers time to escape altogether, move to a safer place or await rescue by firefighters in a much safer environment, depending on the evacuation strategy of the building.

Protecting property drastically reduces the risk of an occupier having to move out of their home or a business to close until repairs are complete, and all the financial and emotional costs this entails.

These benefits are important given that the chances of an adult experiencing a fire in their home in their lifetime are approximately 1 in 5*.

*www.firesafe.org.uk/residential-sprinklers

“The work only took a few days to complete. I’ve now got smoke alarms to give me early warning of fire and sprinklers in every room. These will contain a fire, if one occurs, until the fire and rescue service arrives.”

Resident, Regent Court, Gateshead, Tyne and Wear

For owners

Installing a sprinkler system will significantly reduce risk to occupiers, minimise heat and smoke damage, and lower repair costs if a fire does break out. With a sprinkler system, only the head closest to the fire discharges water, so suppression of the fire starts almost immediately. This near instantaneous intervention halts the fire’s development and, as a result, less water is needed to extinguish the fire than if it were allowed to fully develop. Furthermore, the run-off water from sprinkler systems is minimal, which reduces the impact on the environment from extinguishing a fire.

Social housing providers should be encouraged to consider the retro-fitting of sprinklers in all existing high rise buildings in excess of 30 metres in height, particularly those identified by Fire and Rescue Services as having complex designs that make firefighting more hazardous and/or difficult.
Coroner’s Rule 43 Letter, Shirley Towers, Hampshire, Shropshire and Wrekin Fire and Rescue Authority, 24 April 2013

In 2013 Coroner Frances Kirkham wrote to the then Communities Secretary Eric Pickles recommending that the government encourage housing providers responsible for high rise flats to consider retrofitting of sprinkler systems following the deaths of six people in Lakanall House Fire in 2009.

“Your Homes Newcastle is committed to providing a safe environment for residents and this has led to sprinkler systems being installed in sheltered accommodation buildings and new build housing. Sprinkler systems make a significant contribution to the safety of residents and have the added benefit of protecting valuable assets in the event that a fire does occur.”

Property Service Manager,
Your Homes Newcastle

Adults have a
1 in 5
chance of experiencing
a fire in their home.

Incorporating a fire sprinkler system dramatically increases the design opportunities.

For developers

Installing sprinklers can bring added benefits for developers in complying with building regulations. Requirements in Approved Document B regarding travel distances for escape may be extended and certain requirements around access for the fire and rescue service may be relaxed. Savings in construction and building costs by relaxation of elements of passive protection measures and the freedom to allow open plan design in three storey dwellings and apartments may also be considered.

As an example, it is possible to adopt a more suitable open plan layout for vulnerable residents in a development, because installing sprinklers unlocks greater design freedoms allowed under the building regulations. Disabled people living in sheltered accommodation could find it much easier to move around their homes as a result.

Regulations on the spacing requirement between buildings is halved if the new buildings are fitted with sprinklers which has obvious benefits if space on a site is restricted.

“Incorporating a fire sprinkler system into a communal living development dramatically increases the design opportunities. It reduces the need to compartment communal areas and facilities. It increases the flexibility to provide layouts that are more open plan with natural daylight. It also gives the opportunity to incorporate furnished meeting spaces in circulation areas, which often adds to the character, identity and community spirit of the building. The decision to include a fire sprinkler system can be a positive specification decision which has significant outcomes for the interaction and enjoyment of residents.”

Architect

For firefighters

As the immediate response of a sprinkler head means firefighting starts straight away, occupants have a greater chance of surviving and the environment is safer for firefighters undertaking search and rescue operations.

Firefighters attending an incident where sprinklers are in use are less likely to face a fully developed fire, which clearly reduces the risk to them.

A tragic example of the deadly consequences of fire in dwellings without sprinkler protection was a fire in Lakanal House, a 14 storey residential block in Camberwell, London. Six people died and more than twenty were injured.

In a separate incident, a fire in Harrow Court, Stevenage, tragically claimed the lives of two firefighters. Sprinklers had not been installed in the building. Following inquests into the deaths, Coroner Edward Thomas issued a Rule 43 Letter, Harrow Court, Stevenage, 2005, recommending ‘safety features in respect of high rise buildings’, ‘personal protective equipment’ and ‘water supplies’. Although direct reference was not made to the provision of sprinklers, if they had been installed, the opportunity for the fire to be controlled at an early stage could have reduced the risk conditions which firefighters are exposed to.

“Both occupiers and firefighters are most at risk during the development stages of a compartment fire. Flashover and backdraught pose a significant risk and account for high numbers of injuries and fatalities. Sprinklers fitted to compartments greatly reduce fire development.”

Fire behaviour specialist, TWFRS

3. Installations

Costs vary according to whether the project is a new build or a retrofit and whether it encompasses all rooms or just the rooms where there is greatest risk of fire.

Automatic Water Suppression Systems (AWSS) include installations such as commercial and domestic sprinkler systems, domestic low flow misting systems, low cost domestic systems and portable misting systems.

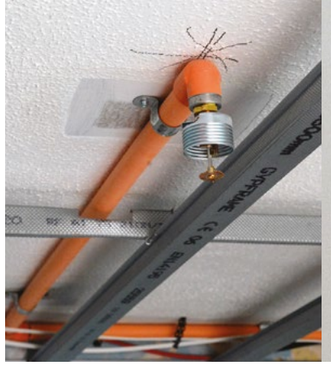
3.1 Commercial installations

Commercial sprinkler systems

There are two types of sprinkler system – wet and dry.
The wet pipe is the most common type of sprinkler system. This system maintains a constant supply of water, and is held in the pipes above the sprinkler heads. The system is connected to a water supply to offer a continuous stream of water and discharge when exposed to heat from a fire. In addition to wet systems, commercial premises may also see dry pipe systems and pre-action systems.

Dry systems are charged with compressed air or another inert gas i.e. nitrogen. When a fire sprinkler head is activated by the heat from a fire, the air pressure drops and the valve opens allowing water to fill the pipes and discharge from the sprinklers on to the seat of the fire. Pre-action systems are installed in areas such as data processing facilities, document storage or cold storage warehouses. The system can only be activated by a combination of events i.e. operation of a smoke/heat detection system AND the operation of a sprinkler in a fire condition. The pipes are normally filled with compressed air and water is only allowed to fill the pipes when the smoke/heat detection system is activated. This ensures that accidental discharge will not occur.

All areas of the building to be protected are covered by a grid of pipes with sprinkler heads fitted into them at regular intervals. Each sprinkler head operates only when it reaches its predetermined operating temperature and will then spray water on to a fire. Only the sprinklers in the immediate area of the fire open. The others remain closed. The sprinkler heads are spaced, generally on the ceiling, so that if one or more operate there is always sufficient flow of water. Sprinkler heads can be placed in enclosed roof spaces and into floor ducts to protect areas where fires can start unnoticed. In a large warehouse sprinklers may be placed within the storage racks as well as the roof.



During installation

Finished installation

Commercial costs

Costs vary dramatically across commercial premises depending on sprinkler type, and on size of the building.

Whilst the infrastructure cost varies depending on the building size, it only does so in a minor fashion due to fact that automatic sprinklers are designed to operate a fixed number of heads independent of floor area. Therefore as the building grows in size, the cost associated with the infrastructure does not vary significantly. This means that the cost efficiency of automatic sprinklers generally increases with building size.

For a comparison the rates shown below are "Shell and Core" costs for installing automatic sprinkler systems (including the water supply) for offices with gross internal area between 3,000 – 15,000 m2 and hotels (2 to 5 stars). These rates highlight the variability in costs between building types.

Building use	Installed as part of building shell Rate /m2	Installed as part of building fit-out Rate /m2
Office – regional average	**£14.73**	**£19.08**
Warehouse (fitted racking installed)	**£42.32**	**n/a**
Hotels (2 – 5*)	**£20 – 30**	**n/a**

The Impact of Automatic Sprinklers on building Design; BSA (2018)

3.2 Domestic installations

Domestic sprinkler systems

In domestic dwellings, wet pipe systems are generally recommended, in accordance with appropriate British Standards or guidance. Wet systems are widely regarded as the simplest, easiest to maintain and most cost effective systems available.

In their simplest form, domestic systems are a network of pipes (copper, steel or approved plastic CPVC (chlorinated polyvinyl chloride) that carry water from a source to the sprinkler head, where it remains until the sprinkler head activates. The water source may be direct from the incoming water main (subject to the approval of the water authority) or from a storage tank via a water pump or a combination of all three.

Whichever system is chosen to protect vulnerable people, it can be fitted to a single home or multiple properties, either when they are being built or retrospectively. Linking the sprinkler system to a call centre enables fire and rescue services, the landlord or the owner to be alerted to a fire automatically. This feature can save vital time in getting firefighters to the incident.

Domestic costs

Installation in a new build property with only high risk rooms covered	**Less than £1500**
Installation in an average sized new build home with all rooms covered	**Average cost £2000 ***
Retrofit installation with all rooms covered	**Average cost £2,500**
Additional tank and/or pump	**£500 - £1000**
Annual maintenance	**£75 - £200**

*TWFRS and its partners has secured costs as low as £1,100 per property for a BS compliant installation in a new build development (pre-Grenfell).

Domestic low flow misting systems

The water mist system is a fire suppression system which uses very fine water spray to suppress or extinguish fires. They operate almost identically to sprinkler systems by removing the heat element from fire.

Systems can protect single or multiple rooms and the water supply is generally from pressurised cylinders or from a storage tank fitted with a pump.

Cylinders can be stored in the room at risk, or in other locations such as a loft or storage cupboard. These are less common and costs for the provision and installation of misting systems vary between suppliers.

As with sprinkler systems, linking to a call centre enables fire and rescue services, the landlord or the owner to be alerted to a fire automatically. This feature can save vital time in getting firefighters to the incident.

British Standard BS 8485:2015 was introduced in 2015 for residential and domestic water mist systems and includes a code of practice for their design and installation.

Portable low pressure misting systems

TWFRS has purchased a number of portable misting systems which can be deployed at very short notice to provide almost immediate protection for people identified as being particularly vulnerable.

The units can be utilised to protect single rooms and spaces until a more permanent solution, such as a fixed protection system, can be installed or until other support measures can be put in place to reduce risk.

Each unit has a self-contained, 10 minute water supply and can be configured to operate via smoke and heat detection.

Due to their limited water supply it is essential that a monitored alarm is connected to a call centre so that the fire and rescue service, landlord or owner is contacted upon actuation of the system.

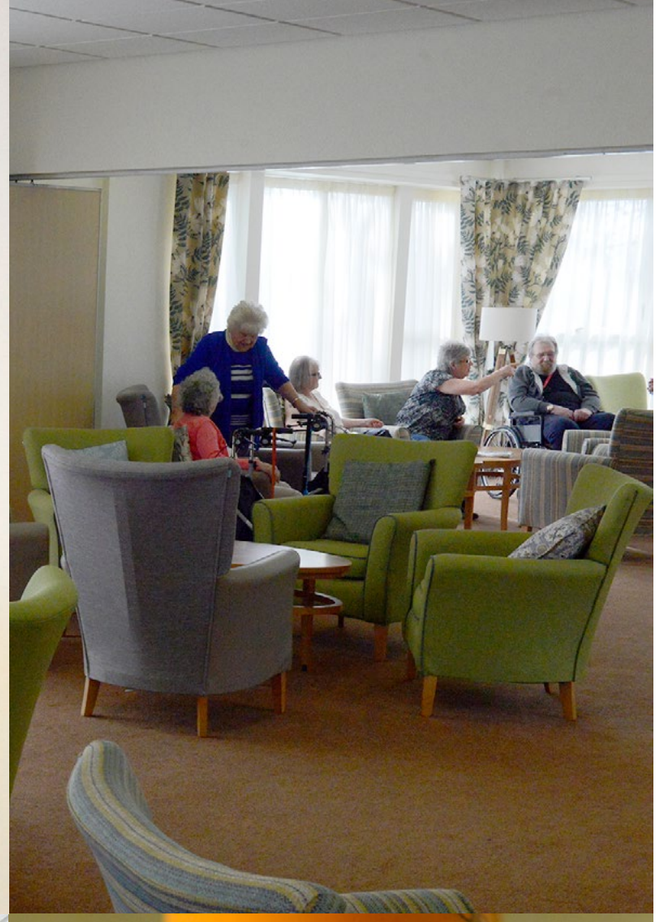
Low cost domestic systems

Low cost domestic systems generally rely upon local supply pressures to deliver water without the need for a pump. Without the pressure boost provided by a pump, the height that satisfactory water supplies can be delivered to is almost inevitably limited.

Generally, two storeys is the limit, provided the mains supply, pressure monitoring and future demands on the mains that may affect pressure are both known and thought to be sufficient.

Costs for systems in the home can be **less than £1,000** in a new build home if only the higher risk rooms are covered by sprinklers. This would cost more if a tank and pump are required.

Some sprinkler companies offer the addition of a water tank in place of a mains upgrade. These partial low cost systems generally work out to be cheaper than full systems but are unlikely to meet British Standards or DCLG draft standards. As there is currently no legislation in England requiring AWSS to be fitted, potential system owners may decide that the need for a cost effective system without BS standard may still meet their needs.



3.3 The myths

Misconceptions around the cost, effectiveness and functioning of sprinkler systems may well account for some of the reluctance on the part of some housing providers and developers to seriously consider their installation.

This good practice guide can set the record straight by busting some of the most common myths which surround what is a very cost-effective and efficient means of fire suppression.

Concealed sprinkler head

Myth: All sprinklers in a building go off when one is activated

Facts: Each sprinkler head only responds to heat in the area it is situated. If there is no fire in the vicinity of a sprinkler head it will not activate. This means there is no chain reaction if one of the heads goes off.

Myth: Sprinklers do more damage with water than the fire itself

Facts: A sprinkler uses relatively small amounts of water and will only activate in the area of the fire itself. Its immediate response prevents a fire from developing fully, meaning far less water is needed to extinguish it - approximately 100 to 1,000 times less. Sprinklers commonly used today deliver just 45 litres of water per minute and take about 10 minutes to extinguish the fire. The devastation and cost of a developed fire is many times greater.

Myth: Sprinklers regularly malfunction

Facts: Modern sprinklers are very reliable and very rarely activate accidentally. Tests conducted over the last decade reveal the chances of a sprinkler malfunctioning are about 16 million to one. The research includes all kinds of defects, including leakage, so the odds of an accidental activation are even lower.

Myth: Sprinkler systems are expensive

Facts: The cost of modern sprinkler systems has reduced dramatically. TWFRS and its partners have secured costs as low as £1,100 per property for a BS compliant installation in a new build development.

Myth: Sprinklers are not in wide use

Facts: Globally, more than 40 million sprinklers are fitted each year.

Myth: Sprinklers have a high failure rate

Facts: International research conducted over decades demonstrates a very low failure rate. A study conducted by the National Fire Protection Association (NFPA), a global not-for-profit safety body, examined 67,457 incidents. It showed that sprinkler systems failed to adequately control fires in only 2,554 cases, giving a failure rate of 3.8%. Many of these failures could have been prevented by planned inspections and regular maintenance.

Myth: Sprinkler heads are prone to damage

Facts: The design of modern sprinkler heads and their positioning in ceilings mean that it is highly unlikely that a sprinkler will be damaged accidentally.

Myth: Sprinkler heads are ugly and obtrusive

Facts: Modern sprinklers are almost unnoticeable, as their design means that the sprinkler head cannot be seen and only a small white disc is visible.

4. Case studies

4.1 Callendar Court

Where: Beacon Lough East, Gateshead

The Challenge: Callendar Court is a remodelled 40 unit tower block in Beacon Lough East, Gateshead, Tyne & Wear. The court provides modern and comfortable extra care accommodation plus on-site care, support services and facilities for older people.

In light of the Grenfell tower tragedy, Housing 21 was keen to ensure that all high rise buildings had robust fire protection measures in place to support evacuation strategies appropriate for their client group. They decided to retrofit a fully serviceable Category 3 sprinkler system providing 4 operational heads in any one space for a period of 30 minutes.

Consideration had to be given to:

- Maintaining a safe environment for the residents still in occupation.
- Ensuring Residents and their families were supportive of the approach.
- Incorporating the design and installation into the existing building configuration.
- The need to avoid to as much additional building works as possible.
- Finding the right location for the water storage tanks required to service the system.
- The need to retain a water supply throughout the block to back up any firefighting equipment needed in a fire situation.

The solution: Housing 21 employed the support of professional services to help in the design and installation of the system to accommodate the needs of the Client and the Local Fire Authority.

Fully detailed drawings and specifications were produced which then led to:

- Involving the residents and their families from the outset.
- Getting the support of the local fire and rescue service.
- The solution involved the relocation of the Court Managers office into an under used shop facility. This allowed for the siting of a 13,000 litre sectional tank and pumping equipment on the Ground Floor of the tower block.
- The design utilised the existing dry riser and converted it to a wet riser / sprinkler system supply riser.
- Suitable valve arrangements ensured the wet riser would remain primed and ready to provide the water to the sprinkler system in the event of a fire. It also allows any attending fire and rescue crew to still supplement the now wet riser and tackle any fire should the need arise.
- An interface with the fire alarm system gives an indication of any fires location so that staff can investigate the cause at the same time as an alarm is raised with the local fire and rescue services.

The overall cost of the project was in the region of £245,000.

The benefits: A considerate design process led to an out of the box approach in designing and installing a retrofit system, which in turn meant minimal internal building works.

With no need to run a new riser the full height of the tower block internal disruption was kept to a minimum and new connections were contained within the existing riser housing.

The court now affords a greater level of fire safety assurance to residents, family members, and the fire and rescue services crews that attend Callendar Court

Housing 21 now has the confidence of knowing that Callendar Court and other high rise properties have the necessary protection systems to suppress a fire emergency situation.

> A fire death in a building with sprinklers is extremely rare where the sprinkler is appropriately designed, fully operational and maintained.

4.2 High rise retrofit

Where: Regent Court, Gateshead

The challenge: Regent Court, a 10 storey residential building in the centre of Gateshead, Tyne and Wear, has 160 flats with two communal staircases and lifts accessing long enclosed corridors. Risk levels for the residents vary, with many vulnerable residents living on the upper floors.

A survey demonstrated a range of fire protection issues within the building, prompting discussions between TWFRS and The Gateshead Housing Company.

The solution: Following an options appraisal, including a retrofit sprinkler installation or equipping corridors and flats with new fire protection features, The Gateshead Housing Company approved the sprinkler installation.

The benefits: The sprinkler retrofit was 38% more cost effective than the alternative passive fire protection solution. The retrofit unlocked savings because it met British Standard 9251:2005, allowing Gateshead Housing Company to avoid replacing front doors to flats and to reduce the number of new communal fire doors.

4.3 New build bungalows

Where: Barr Close, North Tyneside

The challenge: To provide safe homes for vulnerable residents as part of a new build programme by North Tyneside Council, Barr Close was the first of a number of schemes planned by the council to improve affordable housing for vulnerable residents.

The solution: TWFRS and North Tyneside Council jointly funded the installation of independent sprinkler systems in a number of two bedroom bungalows.

The benefits: The benefits to vulnerable residents at Barr Close were shown in January 2016 when a kitchen fire started in one of the bungalows. The nearest sprinkler head was activated and quickly suppressed the fire, minimising the damage so the residents were able to continue living in their home while repairs were carried out.

Evidence clearly demonstrates the effectiveness of sprinklers in protecting residents from fire, especially vulnerable people who cannot escape their homes. A fire death in a building with sprinklers is extremely rare where the sprinkler is appropriately designed, fully operational and maintained.

North Tyneside Council and TWFRS remain fully committed to campaigning for the installation of sprinklers in new build or existing homes, together with non-domestic premises.

4.4 Cardinal Hume Catholic School

Where: Cardinal Hume Catholic School (CHCS), Old Durham Road, Gateshead

The Challenge: CHCS is a 4 storey, £24m state of the art Secondary School building in East Gateshead, Tyne & Wear - A school with approximately 1,500 Pupils and 150 Staff. Since opening in 2007, due to parental demand for the growing number of students, the school successfully bid for an additional £5 million to further enhance and extend the existing site. It is a landmark building 'jam packed' with the latest available technology. Students, staff and the community benefit from a purpose built, bespoke design that has the education, welfare and comfort of its primary users (the children and staff) at its core.

The solution: In order to prevent the rapid spread and catastrophic devastation of fire damage, the decision was made in 2006 to reduce risk at the design stage, to include a sprinkler system throughout the school. The driving factor was to protect our school community and assets, and it is a decision that has been undoubtedly a wise one.

The benefits: The sprinkler system provides peace of mind and reassurance that we have done all that we can to ensure our building will be maintained and functional as quickly as possible in the event of a fire, which benefits our whole school community.

5. Working in partnership

The Domestic Sprinkler Partnership aims to safeguard vulnerable residents while fostering better awareness with partners and creating a heightened cultural desire for fire protection through sprinkler systems.

TWFRS has been able to support a range of partners, including local authorities, management organisations, and housing associations. The installations have targeted significant and large flagship projects, but also some important smaller projects. A follow-on effect has been observed so far in terms of some self-funding of subsequent sprinkler installations by all local partners.

Key partnership work has been successfully carried out in all five local authority areas of Tyne and Wear. Central to the success was a joint funding arrangement with TWFRS to 'pump prime' funding and initiate change. Our dedicated partners have taken the initiative with installations planned and completed by YHN, Leazes Homes, Gentoo, Gateshead Housing Company, South Tyneside Homes, North Tyneside Homes and Karbon Homes, all with support, advice and guidance provided by TWFRS to champion sprinklers in new buildings but also retrofit in existing buildings, to ensure that the community of Tyne and Wear is ultimately safer.

Lessons learned from the partnership include:

- Ensuring an adequately sized water main supply is configured during construction is beneficial, and will remove the need for tanks and pumps if sprinklers are installed at a later date.
- Asbestos surveys will be needed before many retrofit projects begin.
- Bespoke tanks may need to be manufactured for retrofit projects if there is insufficient loft space to accommodate standard models.
- Installing tanks may require work with structural engineers who may recommend joists are reinforced.
- Experiences of fire and rescue service officers are shared across all local authority areas to ensure the best outcomes for the most vulnerable people.

A key consideration for projects of this type is to engage with vulnerable residents at the outset to improve their understanding of the protection sprinklers offer and how little disruption installations bring.

6. The Legislation - Drive for Change

In England, housing providers and developers face no legal requirement to fit sprinklers in domestic properties, except in new residential blocks more than 30 metres high. This requirement is to be found in approved documents accompanying the Building Regulations in England and Wales which make specific reference to the use of sprinklers.

There is no obligation on housing providers or developers to install sprinklers as a retrofit in existing high rise dwellings whatever the height, unless material changes are made to the building which require a Building Regulations submission. Such material changes require sprinkler installation under Approved Document B.

This approach differs from the proactive stance taken by the Welsh Assembly and Scottish Government. Both governments have passed legislation requiring sprinklers to be fitted in many types of new build domestic properties. In Scotland, from 1 May 2005, all new residential care homes, sheltered housing and residential accommodation above 18 metres high have had to be fitted with sprinklers.

The Welsh Assembly approved a Legislative Competence Order requiring the installation of sprinklers in a wide range of dwellings. This took effect in two stages. From April 2014 all new and refurbished residential care homes, homes of multiple occupation and hostels (as well as certain other types of premises) have had to be fitted with an approved fire suppression system. From 1 January 2016, all new and converted single family dwellings, including houses and flats, have also had to be protected with approved automatic fire suppression systems.

TWFRS, along with the National Fire Chiefs Council (NFCC), Local Government Association (LGA), the British Automatic Fire Sprinkler Association (BAFSA) and other partners, are actively lobbying Parliament to encourage Government to make sprinklers a requirement in law in England.

In the absence of legislation for England, improving protection through sprinkler systems relies on housing providers, builders, architects, developers and other key partners to identify the need for sprinklers to protect vulnerable residents and communities from fire.

Special focus on high risk housing, commercial and educational premises.

7. Fire Sector

The fire sector, including TWFRS, champions the installations of sprinkler systems in new buildings but also retrofit in existing buildings particularly to protect the most vulnerable of society. The fire sector is working together to effect change where we can.

Tyne and Wear Fire and Rescue Service (TWFRS) Sprinkler Position Statement

TWFRS believe Automatic Water Suppression Systems (AWSS) installations play a positive role in reducing the risk from fire; reducing the human, economic and environmental cost of fire in any building they are installed. We believe that a risk based approach should focus on properties where the risk is most significant; such as schools, residential care homes, homes housing the most vulnerable including high risk blocks and complex commercial premises.

TWFRS promote the benefits of AWSS installations in the community through education and engagement. We recommend the fitting of sprinkler and misting systems in all types of buildings including residential and domestic premises whether they are new buildings or existing.

TWFRS is committed to reducing the impact of fire on people, property and the environment. There is clear evidence that AWSS installations and other forms of automatic fire suppression systems (such as gaseous or powder systems) can be effective in the rapid suppression of fires and can therefore play an important role in achieving a range of benefits for individuals, firefighters and the community. For example, early activation of sprinklers stops the development of fire, allowing for escape, reduction of fire damage and assisting firefighters to extinguish the fire. Having a net result of allowing occupiers to reoccupy their business or home at the earliest opportunity.

National Fire Chiefs Council (NFCC) Sprinkler Position Statement

NFCC wants to see a greater inclusion of Automatic Water Suppression Systems (AWSS) in the built environment in the UK. As part of an appropriate package of fire safety measures, sprinklers will save lives, protect property, reduce the impact of fire on the environment and support UK PLC by reducing the interruption to business. A greater inclusion of AWSS will also assist search and rescue operations and reduce the risk to firefighters, by restricting the development of a fire.

A greater inclusion of AWSS will be beneficial in nearly all buildings but in particular, NFCC wants to see a greater inclusion of sprinklers in housing for vulnerable people, care facilities, high-rise accommodation, large volume warehousing, factories, car parks and waste and recycling facilities.

This will be achieved by working with partners to demonstrate the benefits, provide evidence and advise politicians, developers, designers and the public of the benefits of AWSS. There is already clear evidence of these benefits shown in published national and international research.

The Local Government Association (LGA) calls for tougher sprinkler regulations

The LGA are calling for tougher rules governing the installation of sprinklers in high-rise buildings. The LGA says the height threshold at which automatic fire suppression systems are required in residential buildings should be lowered to 18 metres, down from the current 30-metre/10-storey limit. It is also urging the Government to require automatic fire suppression systems to be installed in all new premises where vulnerable people sleep, including care homes and residential schools.

8. The industry

The sprinkler industry is working hard to raise awareness of the benefits of sprinklers from potential to save lives to the cost effectiveness of sprinkler systems

8.1 British Automatic Fire Sprinkler Association (BAFSA)

It is important to understand the role that key partners play in relation to promoting the benefits of sprinklers. BAFSA's primary objectives include providing authoritative information on the benefits of sprinkler systems and how sprinklers can play a significant role in saving life and property from the devastating effects of fire.*

* Source BAFSA Sprinkler Yearbook 2015/16

8.2 The National Fire Sprinkler Network (NFSN)

NFSN works in partnership with the fire community to promote awareness of the value of sprinklers for life safety, protection of property and the environment and for creating sustainable businesses and communities.

The key strength of the network is its membership, which is primarily, though not exclusively, formed from fire and rescue services from across the UK. Through regular meetings and networking, the NFSN has been highly successful in collating, sharing and disseminating pertinent information which is used to promote the wider use of water based fire suppression systems. It also actively lobbies for the effectiveness of such systems to be more widely appreciated both at local and national levels.

9. Water company

Regulator Office of Water Services (Ofwat) sets standards covering the flow and pressure of water supplied by the water company.

Flows and pressures will vary throughout the day and seasonally, and supplies may be interrupted at any time for various reasons. The company will need to carry out planned and unplanned maintenance on its network and on rare occasions the network can be affected by third party activity. All of these factors mean that flow and pressures cannot always be guaranteed.

It is important that the designers of sprinkler systems take these factors into consideration when designing a system that relies on direct mains flow, pressure and continuity of supply for their satisfactory operation.

As a result, in some instances, the water supply may be insufficient to enable installation of a system to achieve the current British Standard. However, there are sprinkler systems that, although they do not meet the British Standard, can be fitted and certified to achieve an appropriate level of protection. It is better for a resident to have some protection, even if the system does not guarantee 100% uninterrupted water supply, rather than no system and no protection.

The use of fire suppression systems and subsequent design freedoms for all systems are the responsibility of the system owner and their commissioned engineer. In all but portable systems TWFRS advise that the minimum flow rate, pressure and water storage capacity for the appropriate British Standard should be followed where possible.

Consultation and approval from the Water Company will always be required for sprinkler installations when it is necessary to connect to the water mains or when a larger diameter main is required to achieve the necessary sprinkler flow rates.

Designers of sprinkler systems must also ensure that the system complies with the Water Supply (Water Fittings) Regulations 1999. These cover all fittings, including any pumps and boosters. The approved sprinkler contractor must also provide operation, maintenance and other such information to the landlord/partner agency on completion of installation.

It should be noted that although most areas will have adequate pressure available from the mains supply, the existing pipework is unlikely to be able to provide the necessary flow to comply with all requirements. It is difficult, therefore, to establish a standard installation because design and costs will vary depending on enabling works to provide adequate water pressure and flow.

The Northumbrian Water policy for sprinkler systems is available on the company website (www.nwl.co.uk).

Individual households - domestic sprinkler systems

Domestic fire sprinkler systems can be fitted to new and existing residential properties. It is their policy not to meter the supply pipe to domestic sprinklers.

Commercial and multi-occupancy buildings – sprinkler systems (for example, sheltered housing complexes or apartment blocks)

Supplies for sprinkler systems designed to serve commercial or multi occupancy domestic buildings (for example, sheltered housing complexes or apartment blocks) will be metered. It may install a single connection with a meter that is capable of measuring both the domestic flow and water used by the fire system. Alternatively, it may provide separate metered connections for the domestic supply and fire system supply.

It is better for a resident to have some protection, even if the system does not guarantee 100% uninterrupted water supply, rather than no system and no protection.

10. Conclusion

Sprinklers save lives.

Installing them in new properties and as retrofits is a cost effective way to protect vulnerable people and business from fire and to minimise damage.

They work simply and tackle fires immediately, creating a greater chance for residents to survive and delivering a safer environment for firefighters conducting search and rescue operations.

Despite the myths that have grown up about sprinklers, the case for more installations is becoming clearer.

Partnerships between fire and rescue services, social housing providers, builders, architects, developers and local authorities can deliver significant improvements in protection for vulnerable people and properties.

The case studies featured in this document demonstrate what can be achieved when there is commitment to working together on behalf of communities.

TWFRS maintains its commitment to assisting organisations in considering sprinkler installations. TWFRS are building on the successes of the Domestic Sprinkler Project by working closely with not just our housing partners but with businesses, schools and other non-domestic premises to improve safety through the installation of sprinklers.

Further information on the benefits of sprinkler systems, along with a copy of this and other supporting documents, can be found on our website at **www.twfire.gov.uk**

Sprinkler systems work simply and tackle fires immediately, creating a greater chance for occupiers to survive.

11. References

Fire Statistics: Great Britain April 2017 to March 2018
Department for Communities and Local Government

Economic Cost of Fire 2008
Department for Communities and Local Government

Fire Safety Advice Centre
www.firesafe.org.uk/residential-sprinklers

Coroner's Rule 43 Letter
Shirley Towers, Hampshire, Shropshire and Wrekin Fire and Rescue Authority, 24 April 2013

Coroner's Rule 43 Letter
Harrow Court, Stevenage, 2005

Automatic fire sprinklers, a toolkit for local authorities
Local Government Association 2004

British Automatic Fire Sprinkler Association
www.bafsa.org.uk

12. Acknowledgements

TWFRS would like to acknowledge the contributions and support of the following:

- British Automatic Fire Sprinkler Association
- National Fire Chiefs Council
- Gateshead Council
- Gentoo
- Leazes Homes
- Local Government Association
- National Fire Sprinkler Network
- Newcastle City Council
- North Tyneside Council
- North Tyneside Homes
- Northumbrian Water
- South Tyneside Council
- South Tyneside Homes
- South Tyneside Homes Venture Trust
- Sunderland City Council
- The Gateshead Housing Company
- Tyne and Wear Fire and Rescue Authority
- Your Homes Newcastle
- Cardinal Hume Catholic School
- Housing Care 21

Tyne and Wear Fire and Rescue Service
Creating the Safest Community

Produced by Tyne and Wear Fire and Rescue Service and partners

Tyne and Wear Fire and Rescue Service
Service Headquarters, Nissan Way,
Barmston Mere, Washington,
Sunderland, Tyne and Wear,
SR5 3QY

0191 444 1500
www.twfire.gov.uk
sprinklers@twfire.gov.uk

twfrs
tyne_wear_frs
twfrs
twfrs
tyne-&-wear-fire-&-rescue