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# Domestic & Residential Sprinklers

## Introduction

The 2017 Grenfell Tower tragedy has focussed communities and Governments on the impact of sprinkler systems being fitted into high rise domestic buildings.

Whilst it is important to acknowledge that the fitting of a sprinkler system may not have controlled the Grenfell Tower Fire, as any system would be unlikely to cover the external walls, the following story concerning a recent fire in a sprinkler installed residential building highlights the value of sprinklers, particularly in domestic situations, in saving lives and preventing property damage.

## Sprinkler Save; high rise flat, Bedfordshire

Bedfordshire Fire & Rescue Service was called to a 5th floor residential flat fire at 23:06 on 31 July 2017. The resident had fallen asleep leaving a chip pan on, a fire broke out whilst the resident slept. Fortunately the fire activated the residential sprinkler system and the sprinkler head within the kitchen extinguished the fire as well as raised the alarm. One female casualty was escorted from the flat by fire service personnel and handed over to ambulance services.

## Historical Evidence

### The Scottsdale, Arizona Study<sup>1</sup>

The most widely known study into the benefit of residential sprinklers was done in Scottsdale, Arizona where a sprinkler ordinance was implemented on January 1, 1986. The Rural/Metro Fire Department published a report in 2013 with an analysis of 15 years data. With more than 50% of the homes in Scottsdale (41,408 homes) protected with fire sprinkler systems, the outcome of the study is compelling in the drive towards fitting of sprinklers.

### Lives Saved

In the 15 years there were 598 home fires.

Of the 598 home fires, 49 were in single-family homes with fire sprinkler systems:

- There were no deaths in sprinkler installed homes.
- 13 people died in homes without sprinklers.
- The lives of 13 people, who would have likely died without sprinklers, were saved.

## Less Fire Damage

There was less damage in the homes with sprinklers<sup>2</sup>:

- Average fire loss per sprinkler installed incident: \$2,166.
- Average fire loss per non-sprinkler installed incident: \$45,019.
- Annual fire losses in Scottsdale (2000-2001) were \$3,021,225 compared to the national average of \$9,144,442.

## Reduced Water Damage

Only the sprinkler closest to the fire will activate, spraying water directly on the fire. 90% of fires are contained by the operation of just one sprinkler.

According to the Scottsdale Report, there was less water damage in the homes with sprinklers:

- Sprinkler systems discharged an average of 341 gallons (1550 litres) of water per fire.
- 2,935 gallons (13,343 litres) of water per fire were released by firefighter hoses.

Fire deaths in the UK occur predominantly in domestic situations and rarely in a workplace. Additionally, to date there has been no reported fire death in a sprinkler-installed building in the UK. So why are sprinklers not fitted in our homes?

## 1.1 The Movie Myth

Perhaps one reason is the movie world view of sprinklers which deters the fitting of them.

There is a perception that if the sprinkler system activates, the whole building will be water damaged. This is not the case: a sprinkler system is designed, in most cases, to detect and control a fire until the fire and rescue service arrived. As can be seen from the Scottsdale report, the design of a system is such that the maximum number of sprinklers discharging water at any one time should be no more than 4 but in many cases is only 1 or 2.

So what about water damage? In a fire situation where there is a sprinkler system installed to British Standard BS9251<sup>3</sup>, one sprinkler head will discharge a maximum of 60 litres per minute; where there are between 2 and 4 operating, the flow rate of water should be about 42 litres per minute. Contrast this to the firefighter using a 45mm lay flat hose which may discharge up to 280 litres per minute.

Where there's a fire in a compartment fitted with sprinklers, the fire is then detected early (less fire damage) and controlled using minimum amount of water (less water damage). In a compartment with no sprinklers, the fire spread and subsequent damage is unchecked, and firefighting operations result in greater water damage, meaning longer restoration periods.

## 1.2 Building Regulations

Up until 2007, there was no requirement to fit sprinkler systems into any buildings, domestic or commercial. Buildings Regulations and the relevant Standards to meet these within the UK, only required sprinklers to be fitted where there was a desire by a designer or occupier commissioning a property, to go beyond the compartmentation sizes allowed under the Standards. This has now changed with sprinklers systems being made mandatory in some buildings such as care homes, schools, and blocks of flats with a floor more than 30m in height<sup>4</sup>, but with few requirements for retrofitting.

## 1.3 Cost: Wales Study into Domestic Sprinklers

Sprinkler systems differ from most other safety features in buildings. The system lies dormant; it may never operate; it costs money to install and maintain; it brings other risks with it. The value is not immediately tangible until a fire occurs.

In September 2014, the Welsh Government commissioned a study into a pilot scheme for the designing and installation of fire sprinklers in social housing. The scheme was monitored by the British Research Establishment who published a Client Report<sup>5</sup> in 2016. The value of this report is that it provides some insight into the fitting costs (ranging from less than £1000 to £3000) per dwelling.

The Welsh Government announced plans in April 2019 to promote retro-fitting sprinklers in high rise buildings.

## 1.4 Legislation & Risk Assessment

The requirement to carry out fire risk assessment is contained in the Regulatory (Fire Safety) Order 2006 (RRFSO), and in Scotland; The Fire (Scotland) Act 2005, and 2006 Regulations. Within the fire legislation the requirements for firefighting which requires *'where necessary the premises are, to the extent that it is appropriate, equipped with appropriate firefighting equipment'*. The key words here are *'where necessary'*, and *'appropriate'*. Both of these will depend on the outcome of the evaluation of General Fire Precautions<sup>6</sup>, but very rarely will it result in sprinkler systems being a requirement.

## Conclusion

Currently, there is legal requirement to install fire sprinkler systems into certain occupancies, including new residential blocks of flats exceeding 30m in height, but this is not retrospective.

There is no doubt that fire sprinklers save lives and significantly reduce damage to property, evidence is there to draw upon. The occupier involved in the Bedfordshire fire was saved by the activation of the sprinkler, however, someone within the Council made a conscious decision to fit the system, not knowing if it would ever need to operate. This wasn't a decision made to comply with legislation and it can be presumed that the decision was one of both moral stand point and economic investment.

Hopefully, it is clear within this news article that investment into fitting sprinklers can provide longer term gains for the local authority in having safer tenants, reduced fire damage, and significant reduction in the cost of restoration and rehousing, as well as improved stakeholder relationships.

## References

- 1 <https://homefiresprinkler.org/fire-department-15-year-data/>
- 2 Based on fires, 1998-2001. 15-year data did not separate residential fire damage from all structures with fires.
- 3 BS9251:2014 Scope – Code of Practice for the design, installation, components, water supplies and testing of automatic fire sprinkler systems for the use in domestic and residential occupancies
- 4 See Approved Document B Volume 2 Paragraph 8.14
- 5 <https://gov.wales/welsh-government-promote-retro-fitting-sprinklers-high-rise-buildings>
- 6 [http://www.cewales.org.uk/files/8614/8163/8572/Llandudno\\_Sprinkler\\_complete\\_presentation.pdf](http://www.cewales.org.uk/files/8614/8163/8572/Llandudno_Sprinkler_complete_presentation.pdf)
- 7 See the RRFSO. In Scotland the Fire Safety Measures within Schedule 2 to the ACT

## Further information

For access to further RMP Resources you may find helpful in reducing your organisation's cost of risk, please access the RMP Resources or RMP Articles pages on our website. To join the debate follow us on our LinkedIn page.

## Get in touch

For more information, please contact your broker, RMP risk control consultant or account director.

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