Derbyshire
Fire & Rescue Service
Making Derbyshire Safer

Sprinklers in Schools/Colleges

THINK SPRINKLER

Reliability and effectiveness of sprinkler systems in school fires

Introduction

In 2020, Derbyshire Fire & Rescue Service attended three severe school fires that totally destroyed the school buildings and their contents. On 28th May firefighters responded to a fire at Harrington Junior School in Long Eaton, and then in October, just 48 hours apart, firefighters responded to two further school fires. On 3rd October St Mary's School, Darley Abbey was destroyed and on 5th October Ravensdale Infants School, Mickleover suffered the same fate. All three fires were described as "devastating" by the Service's Chief Fire Officer Gavin Tomlinson, who also acknowledged the impact on the local communities affected by the fires.

None of these schools were fitted with sprinkler systems – an effective fire prevention measure that could have prevented the loss of the buildings, the untold impact on the education of the children who attended these schools and the financial impact of relocating and rebuilding the schools.

Figure 1 School fires at Harrington School, St Mary's School and Ravensdale School

The reliability and effectiveness of sprinklers in schools

DFRS has independently reviewed data from the National Fire Sprinkler Network (NFSN) regarding the reliability and effectiveness of sprinklers in schools.

The NFSN used data from the Home Office national Incident Recording System (IRS) for England and Wales for the four-year period from 1st January 2016 to 31st December 2019.

After attending incidents, fire services will record information about the incidents on the IRS, which asks a number of questions, including the location, the property type, the cause, whether sprinkler systems were present and whether they activated and the area of fire damage (no fire damage, up to 5 m², 5 to 10 m², 11 to 20 m², etc).

On average, fire and rescues services in England and Wales attend around 600 fires in schools, colleges and universities each year.

In the four-year period 2016 to 2019, the IRS data shows that fire services attended a total of 44 fires in primary schools, secondary schools and colleges and universities where sprinkler systems were present.

Year	Fires attended in schools, colleges and universities where sprinkler systems were present
2016	14
2017	10
2018	11
2019	9
Total	**44**

How do sprinkler systems work?

A sprinkler system is designed to control a fire in advance of the fire service's arrival. Firefighters can then deal with the incident to its conclusion.

The sprinkler system operates when heat from a fire raises the temperature in the room to the trigger temperature. The system will not operate if the fire is so small that the room temperature doesn't reach that trigger temperature, nor will it operate if there is no sprinkler head sited sufficiently close to the fire.

Reliability

The NFSN defines a sprinkler system as being ***reliable*** if it activates when a fire meeting the following criteria occurs: the fire is of sufficient size to increase the room temperature to the trigger point *and* when the sprinkler system is present in the room of origin of the fire.

Using this definition, the incident data shows that sprinkler systems in schools were 100% reliable, as either (a) the sprinkler system activated or (b) there was no sprinkler system in the area of the fire, there was insufficient heat to trigger the system and/or the area of fire damage was recorded as being only 0 to 5 m².

At 25 of the 44 fires at schools, colleges or universities where sprinklers were present, either the area of fire damage was no more than 5 m² or the fire was in an area not covered by the sprinkler system. At 100% of the remaining 19 fires, the sprinkler systems activated.

Effectiveness

The NFSN defines a sprinkler system as being ***effective*** if the sprinkler system (a) is present in the room of origin the fire, (b) is activated by the fire, and (c) controls the fire preventing it spreading from the room of origin.

Using this definition, the incident data shows that sprinkler systems in schools were 100% effective, as at all of the fires where sprinklers were present in the room of origin of the fire, the sprinklers activated (19 incidents) and either fully extinguished the fire (16 incidents) or contained and controlled the fire (3 incidents).

Comparison with schools and colleges without sprinkler systems

As noted above, the vast majority of fires in schools and colleges with sprinklers fitted were very small (with recorded fire damage of no more than 5 m²). Similarly, the majority of fires in schools and colleges without sprinkler systems were small, but there were also significant numbers of larger, more severe fires at schools not fitted with sprinkler systems.

On average, fire and rescue services attend 26 fires at schools and colleges each year where fire damage is recorded as being in excess of 50 m²:

Fire damage extent	Average number of fires in schools and colleges without sprinklers per year	Average number of fires in schools and colleges with sprinklers per year
51 to 100 m²	9 per year	None
101 to 200 m²	7 per year	None
201 to 500 m²	5 per year	None
501 to 1,000 m²	2 per year	None
Over 1,000 m²	3 per year	None
Total	**26 per year**	**None**

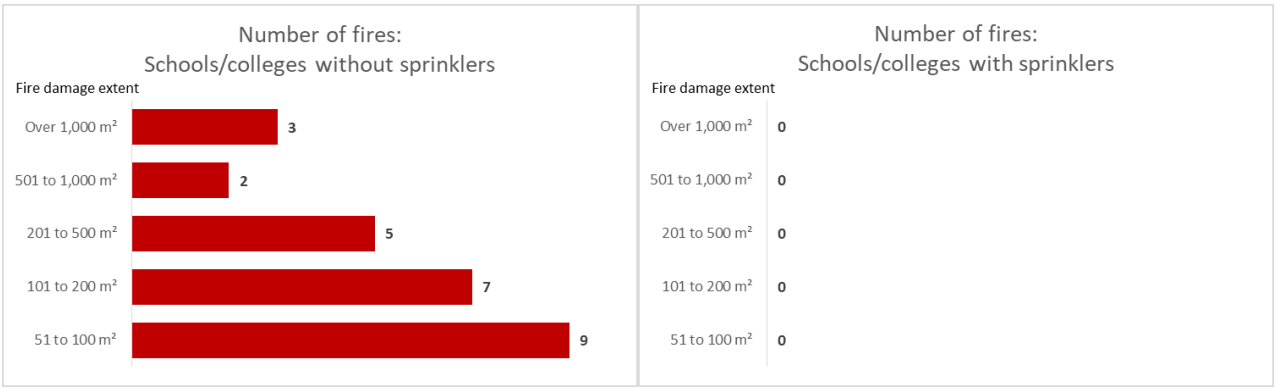

Figure 2 Fire damage recorded at fires at schools/colleges with and without sprinklers

Conclusion

Using the definitions above, sprinkler systems were 100% reliable and 100% effective in extinguishing or controlling the spread of fires in schools and colleges in England and Wales in the four years from 2016 to 2019.

Conversely, every two weeks, a school, college or university without sprinklers experienced a fire resulting in significant damage.

Summing up, Derbyshire's Chief Fire Officer/Chief Executive Gavin Tomlinson, who is also the Head of Protection and Business Safety for the National Fire Chiefs Council (NFCC), said:

"All too often we are witnessing the devastating impact of a school fire when communities are torn apart. The impact on the education and development of children attending these schools and the communities affected by the loss is immeasurable. Then there is the economic cost: temporary buildings at Harrington Junior School have cost £500,000,[1] and the estimated cost of rebuilding the school is more than £5 million.[2] Yet the cost of a sprinkler system that could have prevented the fire would have been between £65,000 and £83,500.

"We cannot sit back and continue to watch our schools, children and communities be affected by fire when there is a simple and effective solution – sprinklers.

"As part of the National Fire Chiefs Council and alongside the National Fire Sprinkler Network, I will continue to lobby Government, calling for changes to fire safety legislation that would see sprinklers fitted as mandatory in all new-build and refurbished schools."

---

[1] https://www.derbyshire.gov.uk/council/news-events/news-updates/news/new-temporary-home-for-harrington-junior-school.aspx
[2] https://www.derbytelegraph.co.uk/news/local-news/fire-ravaged-derbyshire-school-cost-4778247