Introduction
The extent and impact of fires in schools are a national disgrace. On average, each year in the UK there are around 2,000 fires in schools and educational establishments and, while over the past decade there have fortunately been no deaths in any of these fires, they are responsible for an average of more than 30 injuries per year\(^1\).

The direct cost of school fires is constantly rising and estimated currently to be in the region of £100 million per annum. However, when uninsured and social costs are taken into account e.g. loss of coursework, teaching aids, community facilities etc, the true cost is far higher.

But above all, the disruption and damage to children’s education is immense and something that cannot, if ever, be easily replaced.

These mounting losses, that show little or no sign of reducing, come at a time when local education authorities have spent millions of pounds on improving security at schools. Nevertheless, deliberate fire setting and arson still accounts for the vast majority of large loss fires that threaten lives, disrupt the community and, increasingly, damage the environment. In the current economic climate this is clearly not sustainable.

Demand for Sprinklers
In the face of such devastation, there has been an increasing demand from insurers, the fire & rescue service, local authorities and others to reverse this trend by using automatic fire sprinkler systems – something that has been effectively used in industrial and commercial premises for well over a hundred years.

Most UK education authorities now have policies to install sprinkler system in new school buildings and some also have decided to protect existing buildings when these are subject to a major refurbishment.

As a result, Whitehall has now taken a much more proactive stance towards the use of sprinklers and, although not yet legislating for their installation (Note: except in Scotland\(^2\)), ministers have acknowledged the value of investing in fire suppression rather than in other, more traditional but, it has to be said, less effective, forms of fire protection.

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\(^1\)Source – Annual Fire Statistics 2006 CLG.
\(^2\)Source – Proposed Scottish Technical Standards – Non Domestic Premises.

**Key facts**

- In 2006 there were over 1800 fires in schools and educational establishments.
- Around 70% of these fires were started deliberately.
- Every week a school is lost to fire
- There’s a 1 in 8 chance of a secondary school having a fire in any given year.
- Direct losses are approaching £100 million per year!
BB 100
A new design code for schools, BB 100, was published in March 2007. This guidance is the national standard for all new schools. In the introduction Jim Knight MP Minister of State for Schools and Learners announced a new policy to encourage the use of fire sprinklers and said:

“it is now our expectation that all new schools will have sprinklers fitted.”

With this in mind a ‘risk assessment’ tool has been issued the purpose of which is to identify the risk to any existing or proposed school and a means of providing a ‘cost benefit analysis’ for the inclusion of sprinklers in building design.

The Regulatory Reform (Fire Safety) Order
The Fire Safety Order came into effect in England and Wales in October 2006. In Scotland similar legislation was enacted; the Fire (Scotland) Act 2005. The Order requires a ‘responsible person’ in all premises where persons are employed or have access, to carry out a fire risk assessment and take steps to reduce the risks of fire.

As part of that risk assessment the issue of deliberate fires and arson must now be considered and reasonable steps taken to prevent or mitigate the effects of any fire. Sprinkler systems are highly effective in tackling such fires and there are many examples where they have been successful. In addition, guidance produced in support of the Fire Safety Order ‘Fire safety risk assessment educational premises’ provides information to assist with this process, recognising the use of sprinklers as a key tool in the fight against fire and emphasising the need for such systems to be carefully maintained.

“The Chief Fire Officers Association (CFOA) has for many years campaigned for the inclusion of sprinklers in schools. I believe the case for sprinklers is stronger now than at any time. It is a worrying fact that schools are still experiencing fires at an alarming rate. Year on year, when the statistics are published for major fires, educational establishments are always at the top of the list. It is also a concern that an increasing number of school fires, in some areas over half, are occurring when the schools are occupied.” Tom Carroll QFSM MI.FireE - President Chief Fire Officers Association.

Ysgol Y Graig—Eco-Friendly Primary School—Llangefni, Anglesey

The first ever eco-friendly school in Wales, set new standards with its environmentally-friendly design. The school was built as a model of environmental friendliness from sustainable timber and local stone. It includes a host of energy saving features and was also fitted with a ‘Wet Type’ fire sprinkler system with over 600 sprinkler heads. The system is totally unobtrusive and is barely visible to the schools occupants. The presence of this system made the need for fire doors and compartment walls totally unnecessary. There is a large ground floor social area complete with a fitted kitchen, whilst upstairs, the balcony is a quiet space for teachers to work and plan their lessons.

“...The mandatory requirements for fire sprinklers to be installed in schools has provided us with a unique opportunity. We can now consider incorporating fire sprinklers in other buildings as a trade off against using expensive compartment walls, fire doors and obtrusive escape ladders. This will enable us to apply forward-thinking building design techniques to deliver better buildings with added value to the building occupants” - Gareth Thomas Anglesey’s Property Section architect.

How Do Sprinklers Work?
Water is supplied to an automatic sprinkler system usually from the service main. In areas where the mains cannot provide sufficient pressure and/or flow then it is necessary to install a small pump and water tank.

The sprinkler heads are connected to the water supply via a series of pipes which are distributed throughout the protected building. The pipes can be concealed within ceiling voids or roof spaces. EACH sprinkler has its own heat detector and operates at...
predetermined temperature, normally 68°C.

Despite an impressive track record there is reluctance in some quarters to install sprinklers. This is perhaps due to misconceptions or concerns about the way they operate, the fear of excessive costs or the effects of vandalism.

A common myth perhaps perpetuated by TV and film is that all the sprinkler heads go off at once. In actual fact, only the sprinkler heads closest to the fire will operate.

‘Sprinklers in Schools’ – DCFS Guide:
This guidance document, Number 8 of a series of ‘Standard Specifications, Layouts and series notes produced to inform the ‘Building Schools for the Future’ programme.

Copies can be downloaded from the BAFSA web site under ‘Publications – Guidelines and Codes of Practice’.

The Myth of Water Damage
This is one of the most common criticisms levelled at sprinkler systems. Firstly, the chance of an accidental activation of any sprinkler head is estimated at 1:5 million - accidental activation is extremely rare.

In the event of a fire a sprinkler head will discharge between 30 and 100 litres per minute compared with a fire hose which discharges 600 to 1100 litres per minute. Sprinklers use between 6 and 10 times less water than conventional fire-fighting - and apply it at a much earlier stage of the fire, thus reducing fire damage as well as water damage.

Vandalism
To date, experience indicates that vandalism is not a problem with no reported cases of sprinklers in schools being deliberately activated.

Good design can minimise this already small risk;

- The sprinkler pipework can usually be concealed in ceiling voids and roof spaces or installed at high level.
- Concealed sprinkler heads may be used which render the head almost invisible and therefore less likely to attack.
- In vulnerable areas such as sports halls and gymnasiums the sprinklers can be fitted with protective guards.

Cost of Sprinklers
The then Department for Education and Skills, in acknowledgment of such growing concerns, commissioned a report into the costs of sprinklers in schools and this was published in 2007. The date shows that the additional capital costs of installing sprinklers in new build schools ranges from just 1.4% to 4.48% of construction costs.

However, if sprinklers are considered at the design stage, it may be possible that the cost of compliance with building regulations can be offset by ‘trade-offs’ in the reduction of passive fire protection and other fire safety measures that would ordinarily be required by the building control authority. These may include:

- Longer travel distances
- Increased compartment sizes
- Reduced fire resistance in elements of structure
- Reduced requirement for automatic fire detection and manual call points
- Reduction in the number of self-closing fire doors
- Reduction in other fire fighting equipment

Experience has already shown that, in addition to the opportunities indicated above, the ability to allow for more ‘open-plan’ and innovative designs in schools combined with allowing easier access for those with disabilities has proved sufficiently persuasive for sprinklers to be included in building design.

Installation and Design Guides

The Joint Code of Practice for the Installation of Automatic Sprinkler Systems in schools.
What Sprinklers will do:

- Detect a fire
- Extinguish or control the fire
- Raise the alarm locally
- IMMEDIATELY PROTECT Life and Property
- And do so 24 hours a day, 365 days a year.

St Gregory’s C.E. schools, Northampton.

Published by British Automatic Fire Sprinkler Association in June 2003 and supported by Royal and Sun Alliance, National Fire Sprinkler Network and Zurich Municipal insurance contains advice on the design and installations of cost-effective sprinkler systems.

Visit the Wise Up to Fire campaign website wiseuptofire.org and learn about the widespread support for sprinklers in schools.

For more information on sprinkler systems, BAFSA will be pleased to provide at no cost the following sheets:

- BIF 8B - Pumps and Pump houses
- BIF 8F - Tanks
- BIF 13 - Sprinklers and Water Supplies
- BIF 15 - Types of Sprinkler Systems

Case Study

TSH Architects (Oxford) were successful in winning the tender for the new building by employing a radical engineered approach to school design that challenges current educational model. This was achieved by installing an Active Fire Suppression System (BS EN 12845:2004) which allowed an inspiring, flexible and innovative design, while still being eminently capable of meeting the specific needs of the schools curriculum without serious implications on the fire strategy and financial budgets.

TSH Architects made use of an unusual shape central core area consisting of a multi-use resource area and a single staircase serving each floor. The single staircase serving the whole building presented a challenge as the normal Building Regulation approach would be to have two staircases at either end of the corridor serving the laboratories.

However the space available on the site and the proximity to the existing buildings would not allow staircases situated at either end of the building without providing large and costly areas of interlinking corridor space.

The single staircase scheme was made possible by the adoption of a fire engineered solution involving the use of a sprinkler system. In addition it allowed the new building to be situated closer to the existing School buildings, maximising the site potential.

The sprinkler system was installed into the new building at a cost of £89,000 which was a cost neutral installation against current prescriptive building regulations and fire safety requirements. This allowed an innovative and flexible design solution which included the following elements:-

Presented by: