Learning lessons from the Edinburgh Schools inquiry

As well as putting lives at risk, hidden defects in passive fire protection are leaving schools open to unplanned disruption or even closure.

Jeremy Ockenden discusses

The Edinburgh Schools inquiry exposed a worrying range of construction defects following the emergency closure in 2016 of 17 schools built under the same PFI (Private Finance Initiative) contract.

Passive fire protection, which is critical for the life safety of occupants and inhibiting the spread of fire and smoke, was among the failings identified in Professor John Cole's inquiry report.

The legacy of inadequate workmanship, compromised safety and school disruption left by this particular PFI contract made national headlines. However, school estate managers should not assume that issues with passive fire protection are solely a PFI problem; the fire safety sector is seeing concerning levels of deficiency in education buildings of all ages.

Much of the UK's school infrastructure consists of ageing stock, which invariably has been extensively refurbished or extended to meet modern educational needs. Decades of maintenance and alterations may substantially change the fire hazards within the building, leading to modified structures where the level of performance regarding passive fire safety is no longer understood.

In dynamic environments like schools, it is frequently found that the fire strategy and associated documentation have been amended and added to over the years. This often leads to a current strategy which is either difficult to interpret or no longer meets the holistic needs of the school. It is common to find that passive fire ratings are being maintained in areas where there is no longer any purpose in doing so, while new risks introduced to the building may not have been properly assessed.

In such circumstances it may be advisable to re-evaluate the fire strategy for the school as a whole. The generation of an 'as-built' fire strategy document for the building can assist in bringing its current status into a single comprehensive plan. The present-day needs of the building can be clearly laid out in order to rationalise and clarify exactly where the critical elements of fire compartmentation are required in addition to addressing other fire safety issues.

Issues with passive fire resistance requirements

Adequate passive fire resistance requirements form the critical backbone of the fire escape strategy for school buildings, all the more so in multi-level teaching blocks.

Compartmentation is relied on to contain fire and smoke spread between zones and floors, creating areas of relative safety where occupants will be safe for a time from the effects of fire, giving staff adequate time to evacuate all pupils. This is particularly important for high dependency students, allowing them to safely reach and wait in designated disabled refuges/zones while providing the additional time needed to assist them from the building.

Traditionally used for fire stopping, asbestos has been largely replaced across older school buildings. But do records show where and how the work was carried out, and whether the replacement system provides an adequate level of fire resistance performance? Often such modifications result in a wall construction which does not conform to any known fire tested system.

Other commonly cited issues relate to the modernisation of services which can leave walls, ceilings and floors peppered with holes in order to route new electrical/IT cabling, or mechanical upgrades. All too often, such modifications are implemented with little understanding of the fire strategy objectives for the building or without adequate attention to fire-stopping.

All this creates a challenge of unknown proportions for the school facility manager who is unlikely to have the expertise to assess passive fire protection and may have only patchy documentation on the safety compliance of the past.

First steps

Whatever the age of the school, and in the absence of a robust paper trail of building compliance, a thorough assessment of passive fire protection is a vital first step in understanding your current fire risk.

The initial challenge is to identify if there is a problem and the extent of it.

A large proportion of fire-stopping defects lurk above false ceilings and in areas that are out of sight and difficult to access. It means that many potential weaknesses and gaps in passive fire protection will not be spotted even during a routine fire risk assessment.

A suitably qualified specialist should be called in to carry out an initial sample survey of the building. This is a starting point that will give an indication of the quality and condition of passive fire protection to identify any deficiencies and make an expert judgement about whether there is probable cause to suspect widespread defects.

Assessing overall risk

If evidence of a systematic problem is found, what should follow is a rigorous process to determine the overall level of risk that these defects pose to the building. This will involve an understanding of fire dynamics, smoke movement, and the likely impacts on the building occupants, requiring expertise in fire behaviour and fire risk management.

Such technical judgments rely on a forensic level of fire behaviour understanding and risk appraisal generally outside the expertise of a risk assessor or contractor installing passive fire protection. Without this insight, unqualified decisions may be taken to rip out and replace fire-stopping, involving unnecessary disruption and expense.

A competent fire engineer should have the in depth knowledge of fire behaviour in order to make technical assessments of the impacts of a fire on a building and likely fire spread in its present condition. This risk assessment is paramount to the planning, design and cost rationalisation of efficient interventions to minimise intrusion on building activities.

First and foremost, it provides a clear quantification of the current fire risk. Even if a defect has been identified, it may not have compromised the specified fire performance of the compartment. Can corrective work be targeted to avoid wholesale upgrades? Does the problem need action now or can treatment be safely managed in phases?

Work planning

A robust understanding of fire risk impacts will provide the scope and confidence to prioritise and plan a programme of work. It is advantageous to work with a fire risk specialist who can also provide coordinated expertise in planning interim strategies for fire risk management.

This involves a range of often complex risk considerations. Will the current fire strategy and fire protection still function safely during a phased scheme of works, or do fire management systems need to be adjusted to address changing fire risks as work progresses? They can also advise on the implementation of suitable evacuation strategies in line with the changing logistics of work on site.

Testing before extensive replacement

If an installation defect could require extensive replacement of fire protection, then testing of the current system may be advisable.

Although a system may not have been installed in accordance with the tested specification, this does not necessarily mean that it will not achieve the intended standard of performance.

Where it is considered plausible that a system may demonstrate the expected level of performance, it may be possible to test a sample section removed from the building to demonstrate whether the existing installation is acceptable and may be safely retained.

A competent fire testing specialist may be able to assess whether a system is likely to perform to the expected standard, avoiding potentially significant costs and disruption of refurbishment for the client. Equally, they may be able to judge whether a simple modification is possible, via a desktop assessment involving professional judgment based on experience and previous test evidence.

Resolution in 5 steps

In summary, the following steps are recommended in addressing and remediating passive fire resistance risks:

- Survey the building to identify the presence, nature and extent of any problems with passive fire resistance.
- Identify the level of associated risk including:
  -Likely spread of smoke and fire
  -Persons at risk due to mobility, medical dependency or other circumstances
  -Presence of active fire safety systems and their reliability
  -Staffing considerations and safety
  -Other potential consequences of the risk
- Compile a clear risk register to assess and prioritise works.
- Determine action: does passive fire protection need remediation or will existing installations, though not in accordance with specification, achieve the intended level of performance?
- Formulate a clear plan of remedial works which does not introduce new risks to the building.

Inspection and treatment of passive fire protection problems can be a major operation in terms of the cost and logistical impacts on facilities management.

The best outcomes will be achieved by engaging a full service fire specialist who can provide a holistic, coordinated appraisal and strategy for risk management and treatment.

This offers the most effective route to quantifying the problem, understanding the risk, controlling the cost of remediation and minimising the impacts on school continuity.

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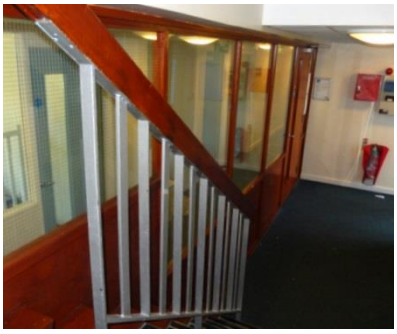
BRE Global will be exhibiting at FIREX/IFSEC (Stand C160) running June 20 to 22 at Excel, London.
http://www.firex.co.uk/exhibitors?title=&field_exhibitor_category_tid_selective=All&name_selective=All&&page=1

Images *(credit: BRE Global)*

(Img 1): Aftermath of a fire

(Img 2): Retrofitted services pushed through a fire rated door frame, rendering the existing fire rating ineffective.



(Img 3): Old style Georgian wire glass partition being used to protect escape staircase. Favoured in the past for its physical integrity, this type of glass provides little barrier to flame radiation and can allow fire to quickly penetrate.

(Img 4): Inadequate fire-stopping of service penetrations is a prevalent defect observed during inspections of passive fire protection.

(Img 5): BRE Global's 5-step plan to safeguarding passive fire protection in existing buildings.