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FIRE DOORS are yours fit for purpose?

Passive fire protection plays an essential role in providing fire safety protection. It is vital that fire doors are installed and maintained as fit for purpose.

Let's examine the legal obligations that building, estates and facilities managers as well as installation and maintenance contractors are under as well as how to make sure fire doors are correctly maintained while avoiding costly mistakes and unnecessary expense.

Fire Doors and the law

Any person, company or organisation that owns, manages or operates buildings must comply with the Regulatory Reform (Fire Safety) Order 2005. This means that the 'Responsible Person' must ensure that a suitable and sufficient fire risk assessment has been carried out and that this includes fire doors and escape doors.

Article 17 of the order includes the duty to engage 'Competent Persons' (as referenced in Article 18) as necessary to assist with fire safety measures which of-course includes fire doors.

Furthermore, under clause 5.3 and 5.4 anyone procuring or responsible for installing a fire safety system must ensure that those installing it are up to the job. We have seen many successful prosecutions for failing to meet these requirements, but now attention is turning to those who procure and install.

So if they are to comply with fire safety law, what important issues should housing providers and the contractors be aware of?

The winning fire door in the Dodgy Fire Door of the Year Awards 2014

What, why and how

Fire doors are an essential part of a building's passive fire safety strategy. In a fire they provide compartmentation to prevent fire and smoke spread, assisting in safe evacuation and providing protection to the rest of the building.

Essentially, they help to keep fire in the part of the building where it started and help check its development.

Fire doors are tested and rated for fire separation performance in terms of the time elapsed before the ultimate failure of the door and the most common ratings as referenced in UK Building Regulations are FD30 and FD60 (although higher rated doors such as FD90 and FD120 are available for use where additional protection is required).

The important issue here is to understand how specification, installation and any alterations such as glazing may impact on the doors' fire performance.

Let's start with procurement. The fire door manufacturer will have had the fire door performance tested at a laboratory, together with suitable door hardware, glazing and seals, and an assessment will have been made providing details about the type of configuration for which the door may be used and the type of door hardware (locks, latches, hinges and door closers etc.) that may be fitted.

Think of a fire door as an engineered fire safety device that must be installed on-site to replicate what was tested in the fire performance test or you can't be sure that the door will provide the required level of protection.

These days most fire doors and hardware components will have actual fire test evidence and also belong to certification schemes so the supplier will be able to provide the certificates, instructions and assurances you need.

Take time to study these and you will see that there are limitations to the trimming of door edges and to sizes and types of door hardware and seals that may be fitted. You

should also insist on buying products whose manufacturers can back up stated claims with actual performance documentation.

Beware of claims such as 'complies with…' Insist instead on evidence that products have achieved the required ratings in the fire performance test.

Using this information will enable you to not only carry out correct installation but to provide the necessary information required for the operation and maintenance manuals.

One particular area where heeding manufacturer's instructions is essential is where glazed vision panels are required.

Many fire doors these days must have any apertures cut and the glazing system fitted only at the manufacturers own factory or by a licensed door processor. On-site cutting of apertures and glazing is not permitted and will invalidate the fire performance certification.

Existing doors

Of course in many buildings you will be dealing with existing doors rather than new and it will be necessary to inspect and maintain them to ensure they are fit for purpose. This is where it is important that the maintenance team or the contractor has the necessary competence.

With existing doors there may be no product certification and maintenance instructions so how can you be sure the repair work you do is correct and that the doors are fit for purpose?

The answer is to make sure that the work is carried out or overseen by qualified people who have fire door qualifications and credentials. Qualified fire door inspectors, repairers and maintainers will be aware of the British and European standards relating to fire doors and their installation as well as publications and best practice guidelines.

Fire Door Inspection Scheme (FDIS) Certificated Fire Door Inspectors are reporting that they still see recently installed fire doors that are not compliant with these standards and regulations and the infographic shown here outlines the most common problems they have spotted.

A competent repair will not compromise the fire separation properties of the door so often seen 'repairs' such as holes and voids covered with push plates and signs are clearly not acceptable! Suitable fire rated components must always be used and sufficient intumescent protection must be maintained.

Sometimes it's not possible to repair a fire door because damage to its integrity is so severe or the fire performance certification may limit scope for repairs and alterations.

The door's fire performance data sheet must be consulted before attempting repairs otherwise this certification may be void.

Fire safety legislation makes it clear that fire doors are installed and maintained as fit for purpose and BS9999 gives guidance about inspections and how often they should be made so it's an area where you cannot afford to take chances.

Only by appointing competent people, whether they are in-house maintenance staff or outside contractors, can you be sure that any inspection, repair and maintenance works are carried out correctly and legally.

Of course appointing a competent person will have a cost but they will be able to identify the exact work required avoiding unnecessary costs going forward. And using a qualified fire door inspector will help you avoid non-compliant and sometime unnecessary work carried out by some contractors.

There are many useful resources to help you comply available through FDIS, BWF-Certifire and the Guild of Architectural Ironmongers (GAI). FDIS also provides online learning education modules leading to a diploma and independent assessment that can enable you to become certificated as a fire door inspector.

And because it's online and available through smartphones and tablets too, it can be worked through whenever and wherever it suits you.

Developed by industry experts and delivered by the BWF-CERTIFIRE Scheme and the Guild of Architectural Ironmongers (GAI), FDIS was Europe's first qualification specifically aimed at transforming people's knowledge about fire doors. It currently has over 600 people registered.

Installers have been reminded about the importance of meeting new regulatory requirements stipulating that escapes routes must be protected from the risk of falling cables in the event of a fire.

Coming into came into force earlier this year BS7671 amendment 3 highlights the danger of fallen or falling cables blocking escapes routes for those escaping or fighting a fire.

SWA, which supplies cable terminations, fastenings, fixings and tools for the electrical and construction industry, has highlighted the amendment in its efforts to market fire safety clips.

Tested and approved to BS 5839-1 the clips "are the safest way to fix fire resistant cables inside plastic cable trunking", says the Gloucestershire-based company. The fold-over tabs are quick and easy to attach, it also claims.

Each zinc plated clip can accommodate 2×1.5mm 2-core fire performance cables and are suitable for 25x16mm trunking. Supplied in packs of 50 the clips can withstand heat up to a melting point of more than 1000ºC.

More information available from: **sales@swaonline.co.uk**

A sign of the times

BS EN ISO 7010:2012+A5:2015 Graphical symbols – Safety colours and safety signs – Registered safety signs

With increasing trade and travel across international borders, it is essential to communicate safety information in a common language.

So ISO 7010 specifies safety signs that use standardised symbols instead of words. The standard also reduces the potential for confusion and accidents by ensuring that there is only one sign for each meaning.

ISO 7010 is updated as new signs are specified, and the latest edition now published by BSI includes revisions and improvements to:

- Add recently registered signs
- Simplify and coordinate the wording
- Ensure truly international images – particularly of human characteristics

ISO 7010:2012+A5:2015 prescribes safety signs for accident and fire protection, health hazards and emergency evacuation. It specifies the sign originals that can be scaled for reproduction and application.

The standard applies to all locations where safety issues must be addressed, including workplaces and other buildings, ships and public areas; as well as signs that appear in manuals, notices, product labelling, and escape and evacuation plans.

Anyone with responsibility for public or workforce safety will need this standard – in particular building owners, facility managers, safety managers and sign makers, and people who select, install or inspect safety signs. Because everyone should be aware of safety messages, the revised standard should also be of interest to schools and other places of education.

For more information contact: **www.BSIgroup.com**

ASDs - a sensitive issue

The early warning capability of Aspirating Smoke Detectors (ASDs) is well established and regularly proven by the hot wire performance tests conducted in numerous telecommunication and computing centre applications across the world.

Their reputation for providing early warning has been underlined by the publication of EN 54-20:2006 which includes three sensitivity classes (A, B & C) where Class A detectors are required to be 40 times more sensitive to smouldering smoke than a "normal" sensitivity Class C detector. However, it is not widely appreciated how much smoke is needed to trigger a "normal" sensitivity detector because few people have personal experience of the standard European fire tests (TF2-TF5) or the US equivalents.

In parallel with this deprivation there is an increasing tendency to use "lowest possible" sensitivity detectors in order to minimise the risk of nuisance alarms. However, in the majority of applications a higher sensitivity system, such as a Class B ASD system, will operate without nuisance alarms and will inevitably provide earlier detection of a threatening fire event. This paper aims to illustrate the alarming amount of smoke present in the test room, to present reasons why there is a common misconception that smoke detectors are too sensitive and to emphasise the benefits of early warning.

The paper concludes that early warning should be considered for many more environments and outlines some of the recent product innovations which provide cost-effective early warning without nuisance alarms in smaller and larger areas.

Introduction

There was a time when every paper about ASD started by describing how they work. While that is no longer the case (because it is a well- established technique), it is still surprising how many misconceptions remain about how they really operate and how much more sensitive they are than some of the traditional technologies such as beam or point type smoke detectors.

So much attention is focused on the importance of minimising nuisance alarms that there is an inevitable tendency towards using less sensitive detectors rather than trying to achieve the earliest possible detection of a potentially threatening fire event – ideally using pre-alarms and staff warning to initiate early investigation and intervention before starting disruptive evacuation procedures.

Standard and reduced test fires

The standard test fires, TF2-TF5, as specified in various parts of EN 54, are conducted in a relatively small room and are surprisingly large – producing flames that reach >1m high and smoke layers at the ceiling which are over 1m deep! Fast forward videos can reveal in a matter of seconds just how much smoke and flame are present at the end-of-test – that moment before which all approved detectors should have responded. In comparison, the reduced test fires specified in EN 54-20 for Class A & B Aspirating Smoke Detectors are significantly smaller. For example the flame heights in a TF5A test typically reach about 30cm and the end-of-test for a TF2A fire is only 0.05dB/m compared to 2dB/m in the standard TF2 fire. Very few people have experienced the vast difference but again, fast forward videos can give a quick insight.

Real-world expectations

There is a general expectation in the field that smoke detectors will respond to the first signs of visible smoke. This is usually based on personal experience with domestic ionisation smoke detectors – which have had an annoying tendency to go into alarm at the first sign of burning food! Of course, there is plenty of evidence (and lots of material on the internet) to illustrate how ionisation detectors can have a very poor response to smoke from a slow smouldering fire.

Furthermore, it is also well documented that photoelectric/optical smoke detectors can be very insensitive to flaming fires. However, the fact remains that for the average man-on-the-street, the size of the standard test fires is unknown and there is a perception that they are much smaller than they actually are.

Very few of us have experience of a fire detector operating in anger – alerting us to the danger of a threatening fire event. However, by contrast, many of us have some experience of a nuisance or unwanted alarm – emptying a building at the most inconvenient time possible!

Unfortunately, these two perceptions lead to a misconception that smoke detectors are generally too sensitive and this view is increasingly fuelled by campaigns to reduce nuisance alarms.

Reducing nuisance alarms

An easy but imprudent way to reduce the likelihood of a nuisance alarm is to ensure that the smoke detector is as insensitive as possible – which has some obvious, and some less obvious consequences. Despite this it is an uncomfortable fact that many installers will look to install the least sensitive detection system possible – using the cheapest solution with maximum spacing – which meets the product approval and installation codes, and reduces the likelihood of future visits to investigate and resolve unwanted alarms.

The obvious consequence of using low sensitivity devices is that they will respond to a fire later than a more sensitive system. Vital minutes can be lost during an emergency.

Less obvious is the fact that many detectors incorporate drift compensation algorithms to counter the effects of contamination. For example many detectors become more sensitive over time due to contamination, and the drift in signal is suppressed or compensated to reduce the likelihood of nuisance alarms.

The challenge of understanding and assessing the effects of such compensation algorithms on the response to slowly developing fires and to high background levels are discussed in a separate paper[1] which illustrates that it is rarely possible to distinguish a drift in signal due to contamination from that caused by a high environmental background.

A more effective way of reducing nuisance alarms is to make effective use of the earliest possible warning of a fire event by signalling it as a pre-alarm or local technical/informative signal. This can provide time for those local to the alarm to investigate and intervene before the event escalates to a scale that warrants evacuation and the summoning of the fire & rescue services.

However, while many smoke detectors provide a pre-alarm function which is generally an indication that the system is approaching an alarm condition (e.g. 75%), an early warning signal provides an indication that normal conditions no longer prevail. This is an important distinction and is why the first level of alarm on VESDA detectors is called "Alert".

Early warning in practice

While it is clear that Class A and B ASD systems are required to be significantly more sensitive than a Class C ASD system it is often commented that they are too sensitive for normal environments and suffer from a high nuisance alarm rate. However, experience using VESDA detectors over many years[2] indicates that the majority of installations, commissioned using default thresholds or using AutolearnTM (which sets the alarm thresholds based on a 14-day analysis of the normal environment), are Class B sensitivity (or higher), and nuisance alarms are not an issue. Of course there are challenging environments where background levels are unusually high or where there are processes or activities that occasionally lead to nuisance alarm phenomena being present – but these are rare. In fact one important trick to address the more challenging environments is to increase the number of detectors so that

each is sampling from fewer holes and can consequently be configured with higher alarm thresholds while still achieving the Class B (or higher) sensitivity at each sampling hole.

In addition to the inherently higher sensitivity offered by Class A & B ASD systems (at each sampling hole individually!), the "cumulative effect" which is a hallmark of the technique ensures that ASD systems are inherently capable of providing early warning where it is most valuable. Specifically they are particularly effective at detecting small amounts of smoke emanating from slowly developing fires. Such smoke lacks the thermal energy needed to carry it towards the ceiling in a dense plume but instead has time to migrate throughout a space over the course of several tens of minutes. Such dispersed, low density smoke entering several sampling holes is detected by an ASD detector long before it is of a density that might trigger a detector monitoring for smoke at a single location (point or sampling hole).

This natural sensitivity to dispersed smoke, coupled with the inherently higher sensitivity available in Class A & B ASD systems, means that they are the ONLY sensible option for applications where the early detection of a fire is needed – i.e. detection of an incipient smoke condition long before it might be considered to be a damaging or life threatening fire.

This realisation of true early warning inevitably means that there are a few situations where tracing the source of an event can be challenging – particularly where the event is transitory. In such situations the ability to review the event using a comprehensive trend graph which is easy to retrieve from non-volatile memory and/or is available in real time is a valuable feature provided on many ASD systems. However the trend is only really useful if it presents an absolute measurement and the prevailing alarm thresholds. This is not the case with all ASD systems.

Innovations

Innovations in the field of ASD systems have been interesting – some are technology-led and look to exploit the advances available in the field of detection while others look to address the challenges of maintaining a highly sensitive measurement of smoke in challenging environments. For example, several ASD manufacturers are promoting the benefits of detection chambers incorporating multi-criteria/dual-wavelength technologies to provide improved rejection of nuisance alarm phenomena, while others are promoting the robustness of their products in particularly "shocking" environments. It is for the market to decide if these innovations are really necessary for the provision of reliable early warning of fires.

At Xtralis our focus remains on providing the earliest possible reliable detection of fires with minimum nuisance alarms – detection that is not compromised by contamination or adaptive algorithms and is provided within a comprehensive portfolio of products which can address the needs of all but the most challenging environments. For example, all products within the VESDA portfolio incorporate our unique clean-air barrier technology which keeps contamination away from the critical optical components within the chamber. The VLI incorporates patented fail-safe intelligent filtration technology to maximise the longevity of the product in industrial environments where contamination is the major risk to effective smoke detection.

More recently we have launched the VEU which incorporates a revolutionary detection chamber using imaging technology to achieve unprecedented stable and consistent measurement of smoke down to 0.001%/m. This new chamber can also be used to analyse the particulate present and provide targeted detection of particular risks. For example one licensable analytic is called DieselTraceTM which is specifically targeted at applications where the diesel engine exhaust particles are abnormally present. The primary objective is to provide an actionable response to activate ventilation when diesel particles concentration exceeds a certain limit. Another recent addition to the Xtralis portfolio is the VLQ which is a very cost effective solution for small (single room) areas providing four Class A sampling holes in a convenient ceiling-mounted package. Other innovations are in the pipeline and have been revealed at various exhibitions. Visit www.xtralis.com for the latest information.

Conclusion

ASD systems are the only sensible choice for any application where the earliest possible warning of a fire event is needed because:

- They can be approved with enhanced (Class B) and very high sensitivity (Class A) which means that a single sampling hole is required to detect fires significantly smaller than those detected by Class C ASD systems and point type detectors
- The majority of environments can be successfully protected by Class B ASD systems without undue risk of false alarms and many environments can be effectively protected by Class A systems
- The natural cumulative effect of ASD systems (whereby they are increasingly sensitive as smoke spreads and enters more sampling holes) makes them particularly effective in areas where the early sign of smoke is diluted through a space – as they are able to detect levels of smoke that would never trigger a point type detector measuring the smoke density at a single location.
- Event logs (available on many ASD systems) provide factual information about any event – whether a nuisance alarm, an incipient incident or a major smoke event – which is invaluable during the investigation of these cases and can enable optimum setting to be established for each particular application.
- The Pre-alarm and warnings signals (available on many ASD systems) can be used to summon an appropriate response to the earliest possible indication of abnormal conditions within an area – long before the conditions become life threatening and require a full fire response/evacuation. Time is a valuable asset during the early stages of a life threatening emergency.
- Most importantly, a wide portfolio of detector styles and types is now available offering a variety of coverage and features – from a basic "point in a box" product to provide remote sampling at a single location to multichannel detectors which can identify which sampling hole is exposed to smoke.

[1] Massingberd-Mundy & Vayeda "A practical method for testing the performance of smoke detectors with drift compensation to slowly developing fires and to high background levels" AUBE14, Duisburg 14-16th October 2014.

[2] Massingberd-Mundy "Understanding the normal capability of Aspirating Smoke Detection" International Fire Protection, November 2008.

For more information on this subject contact **www.xtrails.com**

Landlady hit with £160,000 fire safety fine after fatal house blaze

A landlady has been fined £160,000 and ordered to pay £40,000 prosecution costs for breaking fire safety laws following a fatal fire in one of the Hounslow properties she rented out. Surinder Rana was found guilty of four offences under the Regulatory Reform (Fire Safety) Order 2005 and was sentenced on Friday (1 May) at Kingston Crown Court.

The fire occurred shortly after 5am, on 8, August 2011 at 41 Cromwell Road, which was a house in multiple occupation (HMO) containing 10 people. Four fire engines and 20 firefighters were called to tackle the blaze which affected the ground floor, first floor and loft.

A number of people managed to escape the first floor of the property but one of the residents – Mr Sukhi Singh - was found in the heavily smoke logged kitchen on the ground floor. He was taken to hospital where he died shortly afterwards.

London Fire Brigade fire safety inspectors visited the house the same day and found a number of fire safety breaches including:

- that it wasn't possible for people to evacuate the premises quickly and safely
- no fire detectors or smoke alarms
- no firefighting equipment
- that no proper fire risk assessment was in place for the property

Following the inspection of the property and the neighbouring house, also owned by Mrs Rana and used as an HMO, the Brigade issued a prohibition notice, preventing their use as residential accommodation until they had been fitted with suitable fire separation, adequate fire detection and emergency lighting.

Speaking after the sentencing London Fire Brigade's Assistant Commissioner for Fire Safety Neil Orbell said: "Landlords have a responsibility to keep their tenants safe from fire and if they are ignoring those responsibilities and putting the people living in their properties at risk we will not hesitate to prosecute.

"The sentence handed down to Mrs Rana is a stark reminder to landlords that the court's take fire safety as seriously as we do and that the penalties for ignoring it are severe."