SMOKE, HEAT & FLAME –

MAKING SENSE OF DETECTION

No two buildings are the same in terms of hazard or fire protection. Even buildings that are architecturally similar will have their unique safety challenges. Room sizes may not be identical, evacuation routes may differ, the goods stored in each building may vary in volume or fuel load, and the fire threat posed by nearby structures or processes may have a significant impact. This, of course, is why such legislation as the UK's Regulatory Reform (Fire Safety) Order makes it mandatory for every building owner or occupier to undertake a fire risk assessment, and ensure that this assessment is kept up to date.

So, while it is essential to get expert professional advice when selecting fire detection devices, ensuring that the installation remains appropriate to changes in the building structure or use is equally vital. To put that another way, to be effective, the detection devices – indeed the fire protection installation as a whole – has to match the risk that exists when a fire breaks out; this may be different to the risk that was identified when the **system was originally designed.** So, the golden rule is to keep reassessing fire protection, in the form of re-visited fire risk assessments, high on the corporate agenda.

DETECTOR OPTIONS.

In terms of fire detection, there have been a number of innovations in recent years that have added to the sophistication and reliability of the individual devices. However, the downside of these developments is that those responsible for fire safety can be easily confused by the options that are now available, unless they are intimately familiar with the new technology.

Essentially sensors and detectors can be fitted that detect smoke, heat and flames, and the characteristics of each depend on the type of fire detection and alarm system that is being installed. These are known as "non-addressable" and "analogue addressable" systems. In a non-addressable installation, detectors are in one of two states – normal or alarm. Individual detectors are not identified or given a specific "address", so non-addressable systems tend to be used in smaller buildings. In an analogue addressable system, each sensor has its own unique "address" number on the control panel, and these systems are invariably the preferred solution for high-hazard, large or complex buildings, or those with complicated or phased evacuation procedures. The term "sensor" is normally used for analogue addressable devices, while "detector" usually applies to non-addressable devices.

Optical devices detect smoke using light scatter or obscuration techniques; when visible smoke enters the device's chamber some light is scattered by the smoke particles, which is then detected by the sensor. Ionisation detectors were once used for detecting smoke but are now less popular due to their radiation content and issues surrounding their shipment and ultimate disposal. Aspirating smoke detectors sense microscopic smoke particles in a sampling chamber, and beam detectors work by smoke obscuring a percentage of the light between an infrared transmitter and receiver.

Some heat detectors use what is called a thermistor to detect temperature changes, while others use resistance as a type of detection. Fixed detectors have a pre-set temperature threshold, and rate-of-rise detectors react to a sudden rise from a baseline condition. A linear detector uses a special cable to detect heat anywhere along its length. A flame detector detects either ultraviolet or infrared light emitted by a fire.

In addition to straightforward smoke, heat, flame and beam detectors the current Hochiki non-addressable offering, for example, also includes: intrinsically safe smoke and heat detectors; waterproof fixed temperature heat detectors; and industrial intrinsically safe and industrial explosion-proof flame detectors. The company's analogue addressable sensor line-up comprises: high performance optical sensors; combined optical and heat models; variable temperature and multi-heat sensors; and waterproof multi-heat sensors.

So, each type of detector is designed for a particular fire risk. Change the risk – for example, turn an office into a test laboratory – and you may well need to change to another type of sensor or detector to maintain the integrity of the installation, which reinforces the need for ongoing fire risk assessments. A failure to spot the need to change the detector may, at best, lead to the now-inappropriate device initiating false alarms; at worst, the outcome could be a fire, followed by an investigation by the local fire safety enforcing authority. Neither are appealing outcomes, particularly as modern detectors and sensors can be changed so easily, and as expert advice of device selection is so readily available.

ENHANCED PERFORMANCE

In recent years there have been a number of improvements to detection devices that have boosted their reliability and performance. In particular, major advances have been made to their ability to differentiate between a real fire and environmental pollution or other conditions that may previously have initiated a false alarm.

For example, Hochiki incorporates what is called Flat Response high performance chamber technology into all of its optical sensors and detectors, including the intrinsically safe and marine-approved devices. This optimises the device's sensitivity to both smouldering and flaming fires. Also, by re-engineering and refining the internal optics, the sensor's or detector's reaction to a wider range of inputs has been enhanced.

A suite of false alarm management tools is incorporated within Hochiki's ESP – Enhanced System Protocol – analogue addressable open protocol to further improve immunity from false alarms. This suite, called ARM – which stands for Alarm Reduction Management – includes Drift Compensation that, when activated by the control panel, automatically recalibrates sensors every 24 hours. ESP also provides what is called full digital transmission for exceptionally secure signalling, and incorporates Checksum error checking to safeguard the integrity of the data and ensure reliably correct communication. It also has high immunity from electrical noise, so there are no false alarms due to corruption.

SITING DETECTION DEVICES.

BS 5839 Part 1: 2002 (Fire detection and alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance) is the appropriate European standard. It provides recommendations for fire detection and fire alarm systems in and around buildings, other than dwellings. The Standard covers systems that range from those comprising only one or two manual call points and sounders to complex networked systems that incorporate a large number of automatic fire detectors, manual call points and sounders, connected to numerous inter-communicating control and indicating panels.

It sets out a number of requirements that apply to detectors and sensors. These include: the coverage radius and need for overlapping to avoid "blind spots" for optical smoke and heat detectors; the requirements for smoke and heat detectors in rooms with apex ceilings; the spacing of devices in corridors; and the positioning of devices in relation to obstructions. The Standard also covers the mounting of devices near light fittings, in ceiling voids, near lifts, elevators and stairways, etc.

Hochiki Europe (UK) Ltd
Grosvenor Road
Gillingham Business Park
Gillingham
Kent ME8 0SA
United Kingdom