

ACTIVE FIRE PROTECTION GUIDE

Detection Systems: IR Array Fire Detection Systems

This document has been produced by the RISCAuthority Active Suppression & Detection working group to provide information and outline guidance on the application of Infrared Array Fire Detection (IRAFD) Systems.

Summary

Refer to AFIG-30 Detection Series Overview, AFIG-32 Point Detection, and AFIG-34 Video Detection Systems.

Infrared Array Fire Detection Systems

- IRAFD systems represent state-of-the-art flame detection, which is more capable than point detection and, in some cases, nearing thermal imaging camera system capability.
- Onboard analysis of the array's output with additional inbuilt optical sensors gives the devices a very high reliability for the detection of fires, and rejection of false signals.
- By using an IR array instead of a point sensor, the fire's position within the field of view can additionally be reported.
- For systems with an onboard camera, the output from the IR array can be overlaid onto the video feed to show the fire's location.
- The combination of video and IR output overlay greatly improves fire detection situational awareness. On receipt of an alarm signal, the live feed can be automatically displayed on an overseer's monitor.
- Views of the same fire from multiple devices can be used to direct a robotic response to fire management, giving information on 3D location and even fire size.
- The sensor's detection accuracy is maintained across the full field of view which eliminates the need to overlap detector coverage, thereby reducing the number of units needed.
- They can cover large areas and, although they require a clear line of sight, the detector still functions even when the view is smoke logged.
- Because the detectors, unlike video detectors and smoke detectors, are not looking for smoke, they are appropriate for the protection of clean-burning fuels.
- They can perform in environments that other methods find very demanding (large area/high ceilings/dust generating) and have an emerging role to play in the protection of waste sites, supporting intelligent closed-loop detection/extinguishing robotic systems.
- Typical applications include high value/high risk commercial processing and manufacture, maritime, and oil and gas industries.

Infrared array-based detectors are very advanced, comprising an array of infrared sensors that can report fire location as an overlay to a camera view which is housed in the same device. Additional sensors within the device also confirm the alarm state and reduce false alarms. These sensors can cover very large areas and specific areas within view can be masked out to reduce the influence of non-hazardous hot spots.

These devices are designed to respond rapidly to fires that involve clean burning fuels that would be difficult to detect with smoke or carbon monoxide sensors. Views of a fire from multiple devices can be used to steer robotic suppression systems or shut down machinery in the location of the identified

fire and, as IR devices, they are immune to problems of poor lighting and smoke obscuration that video detectors are vulnerable to.

The range and speed of detection for array type devices is a function of fire size and typically a 0.7m diameter petrol fire could be detected within 10 seconds at a distance of 50 metres.

All IRAFD systems are capable of being connected to common fire protection electrical infrastructure that interprets signals, communicates alarms, and controls other fire systems (see AFIG-30). Additionally, if part of the site's computer network, the system may be remotely monitored which can assist with fire and security event confirmation and a timely response from the fire and rescue services.

IRAFD system installation must conform to the requirements of BS 5839-1 but often they are used as an additional measure to the fire detection and alarm system for property protection and business continuity purposes.

Performance requirements for point flame detectors are laid out in BS EN 54-10, whilst design, installation, commissioning, and maintenance requirements are given in BS 5839-1 for commercial premises.

As line-of-sight devices, flame detectors should be installed in accordance with manufacturer's instructions.

Key benefits

The key benefits of IRAFD systems include:

- The ability to protect very large areas and volumes without having a dependency upon the building's ceiling to channel or hold smoke.
- Suitable for use in indoor and outdoor applications such as oil platforms, industrial sites, waste sites, and marine.
- Provision of immediate situational awareness of cause upon detection via the camera network.
- The ability to partition the field of view and mask out areas where no risk exists but might cause false alarms.
- When the view of the fire is available to more than one camera, the system can be configured to report accurately where the fire is, how large it is, and provide a robotic response.
- They can be used where the aesthetics of a space cannot tolerate spot type detection.
- By encapsulating the event within the screen overlay, IRAFD systems can be used in intelligent systems to report on whether the fire event is growing or being controlled.
- As 'high-integrity' detectors, they should get the best possible response from local fire services and the video source will negate the need for manual confirmation of fire and the delay that this can entail.

Supporting a robotic response

If two detectors pick up the same fire from different locations, the location and size of the fire can be established through



stereoscopic vision. This information can be used to the advantage of providing suppressing actions that can greatly reduce consequential damage including:

- Identifying (by proximity) the equipment on fire and shutting it down (90% of electrical fires stop when the power is removed).
- Operating the zone of a suppression system only in the location of the fire.
- Aiming a water or foam monitor at the location of the fire.

Since IRAFD systems can also interpret the impact that the suppressing action is having on the fire, it can also be used to stop suppression when the fire is resolved – thereby saving further consequential damage associated with the extinguishing media.

General guidance

- IRAFD devices must have an unobscured view of the protected space.

- The system should be able to indicate the location of the fire by display and signal output.
- The integrity of the system must consider the protection of the devices, cabling routes, power supplies, processing unit, and data storage.

Management of false and unwanted alarms

Additional guidance is given in RISCAuthority document RC47: *Recommendations for the management of fire detection and alarm systems in the workplace.*

Applicable standards

BS 5839-1 *Fire detection and fire alarm systems for buildings Part 1: Code of practice for design, installation, commissioning and maintenance of fire detection and fire alarm systems in non-domestic premises.*

BS EN 54-1 *Fire detection and alarm systems Part 1: Introduction.*

BS EN 54-10 *Fire detection and alarm systems Part 10: Flame detectors. Point detectors.*

Schemes

BAFE SP203-1 *Design, Installation, Commissioning and Maintenance of Fire Detection and Fire Alarm Systems Scheme.*

LPCB LPS 1014 *Scheme requirements for certificated fire detection and alarm system firms.*

Best practice

All providers of systems should be third party certificated to approved schemes.

Fire Services should be consulted on their requirements and necessary provisions for supporting the fire safety of the property.

Provision of Regulation 38 information is essential so that the role the detection and alarm system plays in the overall fire safety management plan of the building remains front and centre.