FFE Specialist fire detection

White paper

Right Tech Right Place

Early-Warning Fire Detection for Warehouses and Logistics

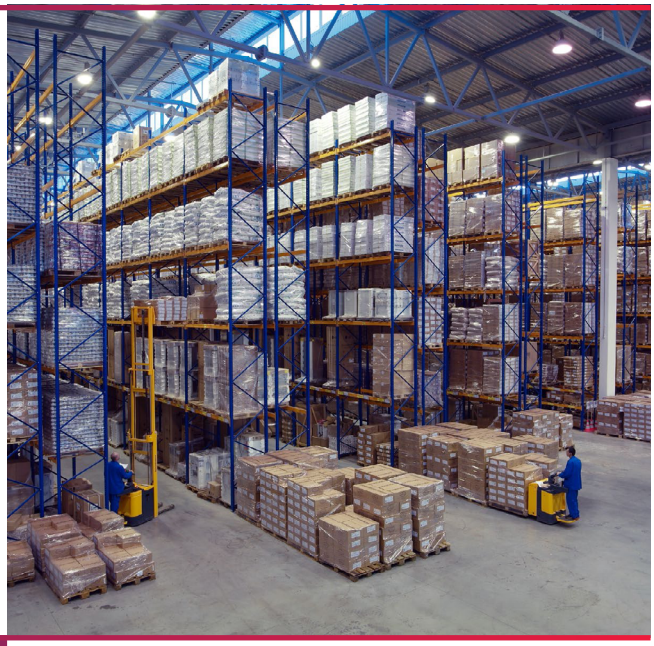

Figure 1: Typical high-bay warehouse aisles with long runs and high fire load.

KEY FACTS
Warehouses contain different fire risks that need different detection approaches
Beams, ASD, flame and linear heat each have clear “best fit” areas
Designing by process zone (bays, docks, conveyors, charging) keeps operations running
The right mix cuts nuisance alarms, work at height and overall lifecycle cost

Note on scope & claims

This paper is educational and illustrative. Example layouts and outcomes are indicative only. Designs must be validated to the site, follow BS 5839 or local standards and requirements, and be commissioned before drawing conclusions. Any case study references are anonymised and may reflect works in progress.

Who is this paper for?

Designers, consultants, installers, facilities and risk managers working on fire detection for warehouses, distribution centres and logistics facilities.

Purpose

Warehouses and distribution centres contain many different spaces stitched together; long high-bay aisles, dock doors, conveyors, returns rooms, chillers and freezers, and plant areas. Each behaves differently in a fire scenario. This paper explains how to combine complementary detection methods so each zone gets the right protection without creating operational headaches.

Why warehouses are hard to protect

The environment in different areas of a warehouse can vary considerably. In a high-bay aisle, smoke can take time to reach the ceiling and may become diluted or stratify as it does so. On a conveyor or at a dock door, air flow and process movement can disturb smoke paths, making its behaviour less predictable. Charging rooms, pallet-wrap stations and plant areas can present fast-flaming risks due to the material present. Freezers add challenges due to low

temperatures, condensation and limited access. Conveyors and other large pieces of equipment can overheat internally with no initial visible signs of trouble. Treating all these spaces the same risks under- or over-protection, with potentially adverse effects on the performance and cost-effectiveness of the detection system.

Roles of each detection technology

Beam smoke detection (e.g., Fireray): the most efficient method for coverage of long, open volumes at height. Modern platforms such as the Fireray Hub Reflective connects multiple heads to a smaller number of controllers on a simple bus cable. Laser-based automatic alignment routines provide quick, stable setup, with short, standards-compliant delay settings configured to ignore fleeting obstructions.

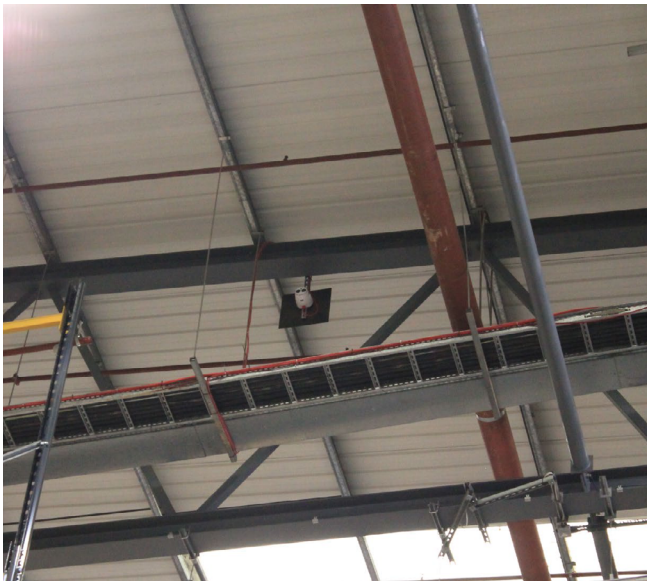

Figure 2: Beam smoke detection providing wide-area coverage across high-bay warehouse aisles

Aspirating smoke detection (ASD, e.g., Sensis): gives earlier warning of fire in enclosed or air-disturbed spaces, such as returns rooms, QA labs, mezzanines, or chillers. In cold stores, heated sampling points and careful pipe routing prevent icing; testing using controllers at low level is faster and safer.

Flame detection (e.g., Talentum): provides rapid response to energetic fires in charging rooms, pallet-wrapping areas, conveyor transfer points, loading bays, and plant rooms, allowing appropriate action to be taken while the fire is small and easier to contain.

Linear heat detection (LHD, e.g., Proreact): provides rapid and early warning of potential fire hazards along long distances or throughout large pieces of equipment, such as conveyors and high-bay racking. These hazards could include overheating components which cause fires subsequently.

Why combine them?

No single method is best everywhere. Combining technologies gives early warnings where it matters most (ASD), wide area coverage where it's efficient (beams), overheat detection in harsh environments (LHD), and speed where fires can develop quickly (flame). The overall result is better detection with less disruption to business operations.

Design rules that keep operations running

1. **Map zones by process, not just on an arbitrary grid.** Use bays, docks, conveyors, returns/QA, charging and maintenance areas, and design your zones to follow the workflow in the building.

2. **Plan to minimise the requirements for working at height.** Use networked beams to reduce the number of controllers at height, and bring ASD test points to ground level to save time working on elevated platforms.

3. **Configure systems for reality.** Short delay-to-alarm/fault windows set within BS 5839 limits can allow brief obstructions to be ignored without compromising safety. Select activation temperatures and rate-of-rise thresholds for LHD to optimise detection sensitivity while minimising the likelihood of false alarms.

4. **Consider the environment.** Use heated air sampling pipes in cold stores, apply condensation/ice management infreezers and chillers, and install LHD in dusty, humid or corrosive conditions.

5. **Integrate cleanly.** Keep sprinkler/suppression interfaces simple and clearly labelled, and document cause-and-effect for the components of the overall system.

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Principles of design by sub-sector

General warehouses:
- Beams along long, open bays;
- ASD in enclosed rooms/returns rooms and mezzanines;
- Flame at hot-work, pallet-wrap and charging areas;
- LHD along high-bay racking

Distribution centres / 3PLs:
- Beams on main aisles and high bays;
- ASD for QA/returns and complex ceiling zones;
- Flame at transfer points and loading bays;
- LHD on conveyors and lift shafts

Cold stores / freezers:
- ASD with heated sampling or LHD in cold areas;
- Beams in adjoining high-bay spaces where conditions allow;
- Flame around plant/defrost equipment and adjacent charging rooms

Compliance and assurance

Always follow BS 5839 and local insurer guidance. Use sensible and justifiable alarm delays and thresholds, provide documented maintenance requirements, and deliver appropriate training for facilities teams. Keep zoning intuitive; people think in terms of docks, aisles and rooms. Provide clear diagrams, cause-and-effect charts, and a simple maintenance plan at handover.

Cost and value

A good design saves time twice, during installation and across the system's lifetime. Networked beams reduce devices at height and compress install windows. ASD testing at ground level shortens visits.

Fewer nuisance alarms mean fewer evacuations and faster recovery. A simple lifecycle model compares capital expenditure (devices, cabling, hours) with operational expenditure (time working at height, cleaning, testing, false-alarm impact), the right mix of detection technologies improves both.

Bringing it all together

Use beams where they are most efficient; ASD where you need the earliest warning signal; LHD in harsh or highly congested environments; and flame where fires can develop quickly. Map zones to how people work in the building and document the system in plain language. Done well, the warehouse keeps moving, and stays protected.

Appendix - Estimating the cost of a false alarm

Use this simple checklist to build your own cost model. Use your site's numbers in the calculator below to quantify the business impact of nuisance alarms and justify investments that reduce them.

False Alarm Cost Calculator
1. Estimate downtime per evacuation and alarm reset
2. Calculate lost labour costs of staff on duty based on 1) and hourly rate of pay
3. Calculate lost gross margin on delayed orders based on 1) and average fulfilment rate
4. Estimate overtime costs needed to make up time
5. Include technician's time and equipment hire to investigate causes of alarms
6. Include fire service call-out fee (if appropriate)
7. Include penalty charges from carriers or due to SLAs with customers
8. Estimated cost per incident = 2) + 3) + 4) + 5) + 6) + 7)

About FFE

FFE designs and manufactures specialist beam smoke, flame, ASD and linear heat detection solutions for challenging applications worldwide, including warehouses and logistics facilities.

Contact FFE

To discuss fire detection for warehouses and logistics, or to request support on a project, please contact:

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