Fire Industry Association
Thames House, 29 Thames Street
Kingston upon Thames, Surrey, KT1 1PH
Phone: +44 (0) 8549 5855
Website: www.fia.uk.com

Guidance Note

Application Guidelines for Point Type Multisensor Fire Detectors

FIA Guidance for the Fire Protection Industry

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Application Guidelines for Point Type Multisensor Fire Detectors

1. Scope

This guide provides general guidance on the selection, installation, configuration and testing of multisensor fire detectors, with reference to relevant standards. It is, however, impossible within the scope of this document to give specific guidance due to the complex and varied nature of multisensor detectors. Detailed and specific guidance will have to be obtained from device manufacturers.

This guide does not cover detectors or configurations that do not comply with current standards.

2. Introduction

A multisensor fire detector is one that incorporates in a single mechanical enclosure, sensors which detect more than one physical or chemical phenomenon of a real fire. The overall fire performance is determined utilising a combination of the detected phenomena. Sensors included in currently available multisensor fire detectors are shown in Appendix A.

Single-sensor fire detectors are perfectly suitable in most instances. However multisensors can provide advantages in certain applications, for example:

- When the expected fire is of a specific type (see table 1- selection).
- When there is a specific threat from false alarm
- When the risk varies at different times of day
- When it is deemed advantageous to standardise on one type of detector for all areas of the building.

Some multisensor fire detectors may be configured to respond differently for specific applications. This may be achieved, for example, by adjusting the contribution from each individual sensor to the overall fire decision. It should be noted that even on approved detectors, some configurations may not comply with standards.

3. Features and Functions

The features and functions available with a particular multisensor will vary depending on both detector and control panel. The following are typical features:

1. The ability to measure multiple fire phenomena and/or different aspects of the same fire phenomena, and to combine them to discriminate between a genuine fire and a nuisance signal, and then make the appropriate decision.

2. Adjustment of the way in which sensor inputs are combined in order to improve the response to genuine fire, and/or to reduce the susceptibility to false alarms. This may be achieved by means of the following:
   - Switching individual sensors on or off
   - Adjusting the sensitivity of individual sensors
   - Varying the delay from individual sensors

   These adjustments may be made on a fixed or temporary basis to suit different applications.

3. Local warning, i.e. the response from one sensor could be used to trigger a local alarm while the response from another, or from a combination of sensors, could generate a general alarm.

4. Selection

Typical applications which may benefit from the use of multisensors:

Table 1 :

Application	Possible nuisance risk	Possible Fire Risk	Applicable Features & Functions (ref above)
Hotel bedroom with en-suite shower room	Steam from shower, smoke from cigars etc	Smouldering Fire, Electrical fires	1, 2b, 2c, 3
Boiler Rooms	Dust, Fast temperature changes	Flaming Fire	1, 2b, 2c
Student accommodation, HMOs, Dormitories etc	Smoking, Small appliance cooking.	Smouldering Fire, Electrical fires, Flaming Fire	1, 2, 3
Any / Rural areas	Insect Alarms	All	1, 2a
Unheated Spaces (attics, pumphouses, outbuildings)	Condensation	Smouldering Fire, Electrical fires,	1, 2a, 2b
Industrial buildings	Dust, Dirt, Welding, strobes	All	1, 2a
Plant rooms	Dust	Smouldering Fire, Electrical fires,	1, 2a
Nightclubs, Theatres	Synthetic (stage) smoke, strobes, pyrotechnics, smoking	Smouldering Fire, Electrical fires,	1, 2a, 3
Pubs, Bars, Restaurants	Smoking , steam	Smouldering Fire, Electrical fires,	1, 2, 3
Car Parks , loading bays	Exhaust fumes , dust, condensation	Flaming Fire	1, 2
Kitchens, serveries, canteens	Steam, smoke , fast increase in temperature, flames	Flaming Fire, Electrical fires	1, 2, 3
Paint shops	Aerosols ,exhaust fumes	Flaming Fire	1, 2a
Retail – storerooms etc	Dust	Smouldering Fire Electrical fires	1, 2, 3

5. Installation

General guidance is given in BS 5839 Part 1. For guidance on particular devices reference should be made to the manufacturer's installation instructions. Consideration should be given to all potential modes of operation in which the detector may be used.

5.1. Spacing

Multi-sensor devices using a heat element to enhance the decision to alarm may be spaced in accordance with the requirements of BS5839 Part 1 for the main sensor.
If, however the detector will be used in a heat detection only mode, i.e. day/night operation, then the detector must be spaced in accordance with the requirements of BS5839 Part 1 for a heat detector.
Consideration should also be made for possible changes to the use of the protected area, and/or detectors within the area i.e. changes to use may affect the selected modes of operation of the detector, and may result in use of a heat only mode.

6. Configuration

For guidance on particular devices reference should be made to the manufacturer's installation instructions and the control panel's installation and commissioning manual.

7. Testing

The following is taken from the FIA Guidance Note - Testing Multisensor Detectors, August 2008.

1. Multisensor fire detectors should be physically tested by a method that confirms that products of combustion in the vicinity of the detector can reach the sensors and that the detector responds appropriately. A test method purely reliant on an electronic and / or mechanical means is not sufficient to comply with this requirement.

   This is a requirement of BS5839 Part 1 and many other national standards. It is not unique to multisensors. If electronic and / or mechanical means are available on any sensor they should be used to supplement – not replace – physical tests on <u>each</u> sensor on which an alarm decision depends using the appropriate physical [CO, Smoke, Heat] stimuli.

2. Due to the complex nature of multisensor fire detectors, they should also be tested in accordance with the manufacturer's instructions.

   Multisensor detectors from different manufacturers may not respond identically to the same tests. In order to test sensors using the correct physical stimuli it may be necessary to use specific procedures. For this, the manufacturer's instructions should be consulted. This recommendation is not designed as an alternative to physical stimuli but to enable proper testing with physical [heat, smoke, CO type] stimuli.

In 3,4,5 below, in order to determine upon which sensors the alarm decision is dependant, reference should be made to:

a) Operation of the multisensor

b) Configuration of the multisensor (if appropriate)

c) Configuration of the CIE

Failure to properly refer to the above may result in the detector not responding as expected to the test.

3. Where the detector or system design allows each sensor on which a fire detection decision depends (e.g. smoke, heat, CO) to be physically tested independently, then each sensor should be physically tested independently.

   Every sensor which contributes to a fire decision should be tested. If sensors can be tested independently, then they should be tested independently. When a sensor is tested independently, it may not result in the detector generating a fire condition. In this case, a special test mode may need to be selected.

4. Alternatively, individual sensors may be physically tested ***together*** if the detection system design allows simultaneous stimuli and individual sensor responses to be verified either individually or collectively.

   Where it is possible to monitor the individual outputs from multiple sensors, a combined test where multiple stimuli are applied at the same time is permissible. In this case, the individual sensor responses must be checked against the manufacturer's specification to ensure correct operation. This may be an automatic function of the test mode in the CIE or the detector, or by manual intervention at the CIE to monitor the individual sensor responses.

5. Only where the detector or system design is such that individual sensors cannot be physically tested individually, for example certain types of conventional multisensor detectors, the primary sensor alone should be physically tested.

   This limitation of the objective of physically testing each sensor on which an alarm decision depends typically applies to devices such as optical-heat or CO-heat types where no information relating to individual sensor responses is available.

6. The response to each test should be at least confirmed by the CIE.

   The results of the test should be indicated at the CIE but they may also be indicated at the detector or by some other means.

7. All tests and their results should be recorded.

   The tests may not trigger an alarm condition at the CIE (for example when the CIE is in a test mode), but the detector / sensor response should be logged in accordance with BS5839 Part 1 for future reference.

8. Applicable Standards

BS 5839-1:2002 + A1:2004 + A2:2008 Fire detection and fire alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance.

BS 5839-6:2004 Fire detection and fire alarm systems for buildings. Code of practice for the design and installation of fire detection and alarm systems in dwellings.

BS EN 54-5:2000 + A1:2002 Fire detection and fire alarm systems – Part 5: Heat detectors - Point detectors.

BS EN 54-7:2000 + A1:2002 + A2:2006 Fire detection and fire alarm systems – Part 7: Smoke detectors - Point detectors using scattered light, transmitted light or ionization.

BS EN 54-10:2002 + A1:2005 Fire detection and fire alarm systems – Part 10: Flame detectors - Point detectors.

BS ISO 7240-8:2007 Fire detection and alarm systems – Part 8: Carbon monoxide fire detectors using an electro-chemical cell in combination with a heat sensor.

CEA 4021:2003 Fire Protection Systems - Specifications for fire detection and fire alarm systems - Requirements and tests methods for multisensor detectors, which respond to smoke and heat, and smoke detectors with more than one smoke sensor.

LPS 1265: Issue 1.1 Requirements and Testing Procedures for the LPCB Approval and Listing of Carbon Monoxide Fire Detectors Using Electrochemical Cells.

LPS 1274: Issue 1.0 Testing Procedures for the LPCB Approval and Listing of Carbon Monoxide/Heat Multisensor Fire Detectors using Electrochemical Cells.

LPS 1279: Issue 1.0 Testing Procedures for the LPCB Approval and Listing of Point Multisensor Fire Detectors using Optical or Ionization Smoke Sensors and Electrochemical Cell Carbon Monoxide (CO) Sensors and, optionally, Heat Sensors.

Note : Where a BS ISO document is applicable , this will supersede any equivalent LPS document.

Various additional European standards are being drafted at this time.