



Guidance Note

Design Guidelines for Point Type Multisensor Fire Detectors and Associated Control and Indicating Equipment with Respect to Field Testing

FIA Guidance for the Fire Protection Industry

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Background

This document builds on previous work carried out by the FIA. Two documents have been issued to date:

1. *“Guidance Note - Testing Multisensor Detectors. FIA Guidance for the Fire Protection Industry” (Aug 2008)*
2. *“Guidance Note - Application Guidelines for Point Type Multisensor Fire Detectors. FIA Guidance for the Fire Protection Industry” (Jan 2009)*

These documents detail the fundamentals of multisensor field testing and the principles and reasoning why all sensors are to be tested for function.

This document describes how the above field testing practices on multisensor detectors can only be carried out properly if field testing capability is designed in to the fire detectors and CIEs from the start, in tandem with appropriate field test equipment design.

1. Scope

This document provides guidance on the design of point type multisensor fire detectors, associated control and indicating equipment (CIE), and field test equipment functionality to facilitate field testing of such multisensor devices. The aim is that simple and efficient field testing shall be possible, according to previously-issued FIA guidelines and BS5839 pt1 recommendations.

Given that these are guidelines to aid the design of future products, any recommendations in this document cannot be applied retrospectively to systems currently in the field.

2. Introduction

Historically, functional field testing of single-sensor point type fire detectors has been relatively simple, generally consisting of either smoke or heat stimulus being applied to the detector to ensure that an alarm signal is obtained. The CIE function has also been simple to comprehend, testing typically accomplished by using a test mode (according to EN54 pt 2, clause 10). Consequently, field test

personnel have been able to carry out effective, compliant testing quickly and easily.

However, multisensor detectors are far more complex devices and can be configured in many different ways, either at the detector, at the CIE or both. This makes field testing a more challenging activity and can lead to confusion over the appropriate test methods required.

Furthermore, with a range of sensor types possible within a single detector, there is a requirement to test each sensor with the appropriate stimulus. This has an impact on the test methods and the test equipment required to make sure that the detector is functioning as expected.

Hence, there is a need for the designers of point type multisensors and CIEs to consider functional field testing requirements from the outset. (Note: this is not sensitivity or calibration testing). Similarly, designers of field test equipment need to consider the tests appropriate for multisensors. Typical considerations would include:

- quick and simple testing
- 1-man testing if possible
- ability to test all sensors
- ability to test sensors concurrently
- detector compatibility with available test equipment
- common approach to test methodologies
- varying functionality of detectors and/or CIEs

3. Ease of Testing

It is the intention that detectors, CIEs and test equipment should work together to ensure that multisensor fire detectors can be tested by a single test technician, ideally testing sensor elements simultaneously.

The sensor elements which should be tested are described in the FIA document: “Guidance Note - Application Guidelines for Point Type Multisensor Fire Detectors. FIA Guidance for the Fire Protection Industry” (Jan 2009), section 7.3, as follows:

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.

The aim in testing concurrently is to increase efficiency of service and maintenance tasks performed in the field. It allows for a complete and compliant functional test on a multisensor detector to be accomplished in the minimum time. Again, reference is made to the FIA guidelines mentioned above, section 7.4, as follows:

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.

If the sensor elements are not tested simultaneously, it should still be possible to carry out a compliant functional test on a multisensor detector.

Manufacturers of multisensor detectors, CIEs and field test equipment should provide relevant and adequate training to ensure that test methods are clearly understood and executed correctly.

4. Test Methodology

Any installed fire detection system should be able to be tested to ensure functionality. Therefore, whilst a multisensor detector is in the design stage, consideration should be given to the methods of test. These could be using currently available test equipment or may even require new test equipment to be developed. Similarly, the CIE should be capable of supporting any test procedures or modes required for field testing.

A special mode for the CIE and/or the detector to allow testing to be accomplished as above may be required. The normal operation of the detector/CIE may not allow access to the responses of the relevant individual sensors, thus their operation cannot be properly verified. A test mode would provide this facility. It would also provide the test technician with a known acceptable test procedure.

Test equipment which supplies only a single stimulus to a multisensor detector may be insufficient to carry out the appropriate functional testing because the algorithms within the detector would not necessarily allow a fire signal from a single stimulus. Using a test mode however, would allow for a series of single stimulus tests to be carried out, provided that each sensor is activated with its relevant stimulus in turn.

5. Common Approach to Functional Testing

The goal of the design for field testing of multisensor detectors, their CIEs and test equipment should be:

- Single man
- Simple test mode
- Simple test
- Single or multiple results indicating pass/fail at the CIE or at both the CIE and the detector

This should be achieved regardless of detector, CIE or test equipment manufacturer.

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