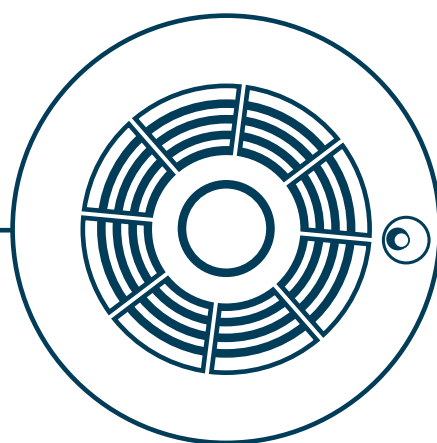


**Guidance  
Note**



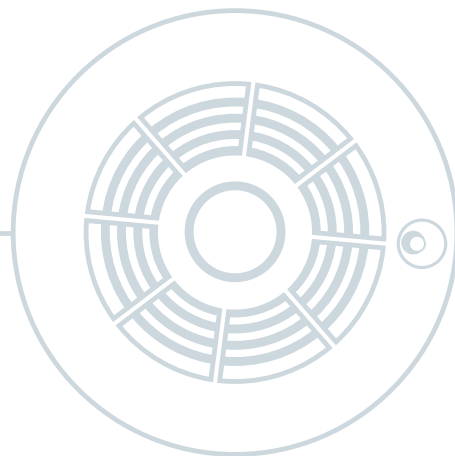
**Fire Industry Association**



**FIA Guidance on EN54-29, 30 & 31  
for Multi-Sensor Fire Detectors**

# FIA Guidance on EN54-29, 30 & 31 for Multi-Sensor Fire Detectors

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## INTRODUCTION

This guidance document provides a summary of information from various sources and takes into account, modern approaches to the design of detectors to improve fire detection by combining different sensor technologies. It also aims to define the different types of detectors which use two (or more) sensors.

## BACKGROUND

Historically, detectors comprising more than one sensing method could only be tested and certified in accordance with individual standards, such as EN 54-5 for point heat detectors and EN 54-7 for point smoke detectors, sometimes in combination with other specifications, to provide an assessment of combined functions. However, since the operation of modern multi-sensor detectors has become more complex and new sensing methods have been developed, additional European test standards have been published, as follows:

- **EN 54-29** – Multi-sensor fire detectors – Point detectors using a combination of smoke and heat sensors
- **EN 54-30** – Multi-sensor fire detectors – Point detectors using a combination of carbon monoxide and heat sensors
- **EN 54-31** – Multi-sensor fire detectors – Point detectors using a combination of smoke, carbon monoxide and optionally, heat sensors

## INTERESTED PARTIES

There are many groups of interested parties with various questions relating to multi-sensor detectors and their applications. This document summarises the likely questions and answers from two specific groups:

- **Specifiers/end users** – primarily interested in what they are and when and where they should be used
- **Manufacturers** – with questions relating to classification, testing and certification

## DEFINITIONS

EN 54-1 defines a multi-sensor detector as a 'detector using more than one sensor to respond to one or more phenomenon of fire'.

Thus, any detector incorporating more than one sensor type is (by EN 54) a multi-sensor detector.

In the past, other terms such as combined detectors or multi-criteria detectors have been used, which have been very confusing for users but all are included within the EN 54-1 definition of a multi-sensor detector.

## QUESTIONS & ANSWERS

Typical questions relating to multi-sensor detectors, their applications and third party approval are as follows:

### ***How does a multi-sensor detector typically operate to give an alarm?***

There are multiple ways that a multi-sensor detector operates to give an alarm.

The more common device comprises a heat and smoke sensor, where an increase in temperature causes the heat element to increase the effective sensitivity of the smoke element. These are often referred to as 'heat enhanced optical detectors'. Such detectors may also respond to heat alone and/or smoke alone.

Devices comprising carbon monoxide and heat sensors generally operate in a similar manner, where the alarm decision is a result of the effect of the two sensing elements or each sensor individually.

Some multi-sensors have the ability to be set to different detection modes, in order to meet specific fire alarm or nuisance alarm risks. Such modes may include single sensor modes, as well as various combinations of sensor signals to effect the alarm decision.

### ***Where is the use of multi-sensor detectors beneficial?***

Due to the way the sensing elements work together, multi-sensor detectors are suitable for detecting a broad range of combustion products, for example, fires where the generation of smoke is limited but the heat is more substantial. Under certain fire conditions, they can report a fire event quicker than a heat-only or smoke-only detector.

Multi-sensor detectors comprising a carbon monoxide sensor, are intended to provide enhanced detection of a slowly developing fire with limited combustion, where the availability of oxygen is restricted and CO is produced. This provides an earlier alarm indication than a heat-only or smoke-only detector.

Multi-sensor detectors including heat sensors, can provide enhanced detection of flaming fires as an alternative to using an ionisation smoke detector, which would have been specified traditionally.

They are also generally beneficial in applications where there is a high risk of a false alarm.

### ***What are the certification requirements for multi-sensor fire detectors?***

Although EN 54 parts 29, 30 & 31 are approved and published by CEN, they are not as yet harmonised, as they have not been cited in the *Official Journal of the European Union* (EUOJ), for the Construction Products Regulation EU 305/2011 (CPR). Therefore, it is not possible for a Notified Body to issue an EC Certificate of Constancy of Performance (CoCoP) under the CPR against these standards. Nor can a manufacturer publish a Declaration of Performance (DoP) under the CPR for these standards.

Until these standards are harmonised, multi-sensor detectors would generally need to comply with the requirements of at least EN 54-5 or EN 54-7, dependent on the product type, and be certified accordingly.

It is however, possible to have the products tested by an accredited laboratory and for a certification body to issue a 'System 5' certificate<sup>1</sup> under their own certification schemes such as LPCB, Intertek Tick Mark, BSI or other EU certification body.

***If a detector is certified to EN 54 parts 5 and/or 7, what additional testing and assessments are required for EN 54-29?***

If a smoke/heat detector is already tested and certified in accordance with EN 54-5 and/or EN 54-7, a gap analysis is needed to identify any additional testing needed to meet EN 54-29. The following list identifies the principle areas where additional testing will be needed:

1. Test fires TF1 & TF8 – EN 54-29 Para: 5.5.
2. Lower limit of heat sensitivity – EN 54-29 Para: 5.2.6.
3. Reproducibility for smoke response – EN 54-29 Para: 5.2.7 (more samples are required in EN 54-29).
4. Reproducibility for heat response – EN 54-29 Para: 5.2.8 (additional requirement for the spread of results in EN 54-29).
5. Measurement of heat response value – EN54-29 para 5.1.6 (if not previously carried out under that mode of operation).
6. Addition of the damp heat, cyclic (operational) on smoke detectors.
7. On-site adjustment of behaviour – EN 54-29 Para: 5.3.4 (applies to detectors with different modes of operation).
8. Marking, labelling and packing – EN 54-29 Para: 8.

*NOTE 1: Other tests may be applicable.*

*NOTE 2: A similar gap analysis will be necessary for multi-sensor detectors previously tested or approved to EN 54-5, EN 54-7 or other specifications that are submitted for approval to EN 54-30 and EN 54-31.*

## **RELATED STANDARDS**

- **EN 54-5** – Heat detectors – Point heat detectors
- **EN 54-7** – Smoke detectors – Point detectors using scattered light, transmitted light or ionisation.
- **EN 54-29** – Multi-sensor fire detectors – Point detectors using a combination of smoke and heat sensors
- **EN 54-30** – Multi-sensor fire detectors – Point detectors using a combination of carbon monoxide and heat sensors
- **EN 54-31** – Multi-sensor fire detectors – Point detectors using a combination of smoke, carbon monoxide and optionally, heat sensors

## **REFERENCE**

1. See ISO guide 65.

**DISCLAIMER**

*The information set out in this document is believed to be correct in the light of information currently available but it is not guaranteed and neither the Fire Industry Association nor its officers can accept any responsibility in respect of the contents or any events arising from use of the information contained within this document.*



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