

Fire detection and fire alarm systems

Part 1. Introduction

The European Standard EN 54-1 : 1996 has the status of a British Standard

ICS 13.220.20

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee FSH/12, upon which the following bodies were represented:

AEA Technology
 British Cable Makers' Confederation
 British Fire Protection Systems Association Ltd.
 British Telecommunications plc
 Chartered Institution of Building Services Engineers
 Chief and Assistant Chief Fire Officers' Association
 Consumer Policy Committee of BSI
 Department of Health
 Department of the Environment (Building Research Establishment)
 Department of the Environment (Property and Buildings Directorate)
 Electrical Contractors' Association
 Home Office
 Institute of Fire Safety
 Institution of Electrical Engineers
 Institution of Fire Engineers
 London Fire and Civil Defence Authority
 Loss Prevention Council
 Ministry of Defence
 National Association of Fire Officers
 National Caravan Council Limited
 National Inspection Council for Electrical Installation Contracting
 National Quality Assurance
 Professional Lighting and Sound Association
 Trades Union Congress

This British Standard, having been prepared under the direction of the Consumer Products and Services Sector Board, was published under the authority of the Standards Board and comes into effect on 15 December 1996

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National foreword

This Part of BS EN 54 has been prepared by Technical Committee FSH/12 and is the English language version of EN 54-1 : 1996 *Fire detection and fire alarm systems — Part 1. Introduction* published by the European Committee for Standardization (CEN).

It supersedes BS 5445 : Part 1 : 1977, which is withdrawn.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

English version

Fire detection and fire alarm systems — Part 1 : Introduction

Systèmes de détection et d'alarme incendie —
Partie 1 : Introduction

Brandmeldeanlagen —
Teil 1 : Einleitung

This European Standard was approved by CEN on 1996-01-14. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 72, Automatic fire detection systems, of which the secretariat is held by BSI.

This European Standard supersedes EN 54-1 : 1976.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 1996, and conflicting national standards shall be withdrawn at the latest by September 1996.

This standard has been prepared in cooperation with the CEA (Comité Européen des Assurances) and with EURALARM (Association of European Manufacturers of Fire and Intruder Alarm Systems).

The significant differences from EN 54-1 : 1976 are:

- a change in the general title;
- a change in the scope to include coverage of the way in which components are installed and used;
- changes to the format and structure of the series;
- extension to cover new parts.

NOTE. The current and proposed future structures of the EN 54 series are given in annex A.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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0 Introduction

The function of a fire detection system is to detect fire at the earliest practicable moment, and to give signals and indications so that appropriate action can be taken.

The function of a fire alarm system is to give audible and/or visible signals to occupants of the building who may be at risk from a fire.

Fire detection and fire alarm functions may be combined in a single system.

1 Scope

1.1 This series of European Standards specifies:

- requirements, test methods and performance criteria against which the effectiveness and reliability of the component parts of fire detection and fire alarm systems can be assessed;
- requirements and test methods against which the ability of components to be combined into an effective system can be assessed;
- guidelines for the incorporation and use of fire detection and fire alarm systems into buildings or other construction works.

1.2 This series of standards applies to fire detection and fire alarm systems for buildings. It may also be used as a basis for the assessment of components of systems for other purposes, e.g. mines, ships; however, additional testing may be required. It does not preclude the manufacture or use of systems having special characteristics suitable for the protection of specified risks.

1.3 The system is required to function satisfactorily, not only under the fire conditions, but also when exposed to conditions likely to be met in practice. The tests specified are intended to assess the performance of the components of the system under such conditions.

1.4 The performance of components is assessed from the results obtained in the specified tests and from their ability to perform the required functions. This standard is not intended to place restrictions on the design or construction of components other than those necessary for the performance of desired functions.

1.5 Where appropriate the standards may be applied to the detection part of extinguishing systems (with the exception of sprinkler heads) although the sensitivity requirements may not be applicable to all cases.

1.6 The compliance of a component with the relevant Part of EN 54 does not ensure that this component will necessarily function correctly when connected with another component also complying with the relevant Part of EN 54 (e.g. control and indicating equipment with a fire detector), unless both components have been assessed together as satisfying the requirements for a system.

1.7 This series of standards does not cover the requirements for self-contained smoke alarms (see **3.13**).

2 Normative references

There are no normative references in this European Standard. Other parts of EN 54 are listed in annex A (informative).

3 Definitions

For the purposes of this European Standard, the following definitions apply.

NOTE 1. The list of components of fire detection and fire alarm systems is not intended to be exclusive. Definitions for other components may be added in later revisions of this European Standard or by amendment when such components are produced.

NOTE 2. Additional definitions specific to individual Parts are included in those Parts.

3.1 fire detector (item A of figure 1)

A component of a fire detection system which contains at least one sensor which constantly or at frequent intervals monitors at least one suitable physical and/or chemical phenomenon associated with fire, and that provides at least one corresponding signal to the control and indicating equipment (see item B of figure 1).

NOTE 1. The decision to give the alarm of fire or to operate automatic fire protection equipment may be made at the detector or other component of the system, for example at the control and indicating equipment.

NOTE 2. Apart from those listed and their possible combinations, other types of detectors are conceivable.

Fire detectors may be differentiated in several ways. These may include:

- the phenomenon detected (see definitions **3.1.1** to **3.1.5**);
- the way in which the detector responds to the phenomenon detected (see definitions **3.1.6** to **3.1.8**);
- the configuration of the detector (see definitions **3.1.9** to **3.1.11**);
- the resetability of the detector (see definitions **3.1.12** to **3.1.14**);
- the detachability of the detector (see definitions **3.1.15** and **3.1.16**);
- the type of signal transmitted (see definitions **3.1.17** to **3.1.19**).

3.1.1 heat detector

A detector which responds to an increase in temperature.

3.1.2 smoke detector

A detector sensitive to particulate products of combustion and/or pyrolysis suspended in the atmosphere (aerosols).

Smoke detectors may be subdivided as follows.

3.1.2.1 ionization smoke detector

A detector sensitive to combustion products capable of affecting ionization currents within the detector.

3.1.2.2 optical smoke detector

A detector sensitive to combustion products capable of affecting the absorption or scattering of radiation in the infra-red, visible and/or ultraviolet regions of the electromagnetic spectrum.

3.1.3 gas detector

A detector sensitive to gaseous products of combustion and/or thermal decomposition.

3.1.4 flame detector

A detector which responds to the radiation emitted by the flames from a fire.

3.1.5 multi-sensor detector

A detector which responds to more than one phenomenon of fire.

3.1.6 static detector

A detector which initiates an alarm when the magnitude of the measured phenomenon exceeds a certain value, for a sufficient time.

3.1.7 differential detector

A detector which initiates an alarm when the difference (normally small) in the magnitudes of the measured phenomenon at two or more places exceeds a certain value, for a sufficient time.

3.1.8 rate of rise detector

A detector which initiates an alarm when the rate of change of the measured phenomenon with time exceeds a certain value, for a sufficient time.

3.1.9 point detector: A detector which responds to the phenomenon sensed in the vicinity of a fixed point.

3.1.10 multi-point detector

A detector which responds to the phenomenon sensed in the vicinity of a number of fixed points.

3.1.11 line detector

A detector which responds to the phenomenon sensed in the vicinity of a continuous line.

3.1.12 resettable detector

A detector which, after response, may be restored from its alarm state to its normal state of readiness to detect, on cessation of the conditions which caused the response, without the renewal of any component.

A resettable detector may be further subdivided as follows.

3.1.12.1 self-resetting detector

A resettable detector which will automatically restore itself to its normal state of readiness to detect.

3.1.12.2 remotely resettable detector

A resettable detector which can be restored to its normal state of readiness to detect by an operation carried out remote from the detector.

3.1.12.3 locally resettable detector

A resettable detector which can be restored to its normal state of readiness to detect by a manual operation carried out at the detector.

3.1.13 non-resettable detector (with exchangeable elements)

A detector which, after response, requires the renewal of a component or components to restore it to its normal state of readiness to detect.

3.1.14 non-resettable detector (without exchangeable elements)

A detector which, after response, cannot be restored from its alarm state to its normal state of readiness to detect.

3.1.15 detachable detector

A detector which is so designed as to permit it to be easily removed from its normal operating position for maintenance and servicing purposes.

3.1.16 non-detachable detector

A detector in which the mounting arrangements are such that easy removal of the detector for maintenance and servicing purposes is not possible.

3.1.17 two-state detector

A detector which gives one of two output states relating to either 'normal' or 'fire alarm' conditions.

3.1.18 multi-state detector

A detector which gives one of a limited number (greater than two) of output states relating to 'normal', 'fire alarm' and other abnormal conditions.

3.1.19 analogue detector

A detector which gives an output signal representing the value of the sensed phenomenon.

NOTE. This may be a true analogue signal or a digitally encoded equivalent of the sensed value.

3.2 control and indicating equipment (item B of figure 1)

A component of a fire detection and fire alarm system through which other components may be supplied with power and which:

- a) is used:
 - 1) to receive the signals from the connected detectors;
 - 2) to determine whether these signals correspond to a fire alarm condition;
 - 3) to indicate any such fire alarm condition audibly and visually;
 - 4) to indicate the location of the danger;
 - 5) possibly to record any of this information;
- b) is used to monitor the correct functioning of the system and give audible and visible warning of any faults (e.g. short circuit, line breakage, or fault in the power supply);
- c) if required, is able to pass on the fire alarm signal; for example:
 - to audible or visible fire alarm devices (see 3.3);
 - through fire alarm routing equipment (see 3.5) to the firefighting organization;
 - through the control for automatic protection equipment (see 3.7) to an automatic fire extinguishing equipment.

3.3 fire alarm device (item C of figure 1)

A component of a fire alarm system, not incorporated in the control and indicating equipment (see 3.2), which is used to give a warning of fire, e.g. sounder or visual indicator.

3.4 manual call point (item D of figure 1)

A component of a fire detection and fire alarm system which is used for the manual initiation of an alarm.

3.5 fire alarm routing equipment (item E of figure 1)

Intermediate equipment which routes an alarm signal from a control and indicating equipment (see 3.2) to a fire alarm receiving station (see 3.6).

3.6 fire alarm receiving station (item F of figure 1)

A centre from which the necessary fire protection or firefighting measures can be initiated at any time.

3.7 control for automatic fire protection equipment (item G of figure 1)

An automatic device used to actuate automatic fire protection equipment (see 3.8) after receiving a signal from the control and indicating equipment (see 3.2).

3.8 automatic fire protection equipment (item H of figure 1)

Automatic fire control or firefighting equipment, e.g. extinguishing installation.

3.9 fault warning routing equipment (item J of figure 1)

Intermediate equipment which routes a fault warning signal from the control and indicating equipment (see 3.2) to a fault warning receiving station (see 3.10).

3.10 fault warning receiving station (item K of figure 1)

A centre from which the necessary corrective measures can be initiated.

3.11 power supply equipment (item L of figure 1)

A component of a fire detection and fire alarm system which supplies power for the control and indicating equipment (see 3.2) and for those components fed with power from the control and indicating equipment. The power supply equipment may include multiple power supplies (e.g. electricity from mains and standby sources).

3.12 connecting elements

All those elements which form the links between the different components of the fire detection and fire alarm system.

3.13 self-contained smoke alarm

A single housing, containing smoke detection, power supply and alarm elements, and which is intended for raising an alarm of fire in domestic dwellings.

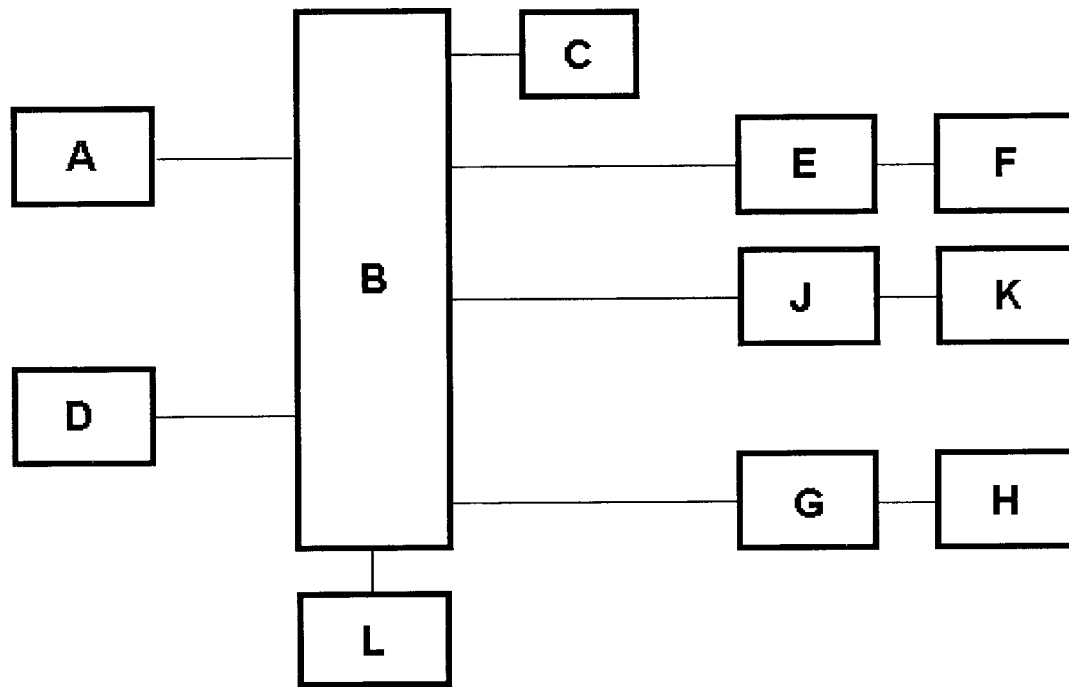
NOTE. Self-contained smoke alarms are not covered by EN 54.

4 Compliance

Components should comply with the appropriate Parts of this standard (see annex A).

Detectors that do not include a decision-making element (e.g. see 3.1.19) can only be considered to comply with the appropriate part of this standard (e.g. EN 54 : Part 7 for point smoke detectors) when tested and used in conjunction with that component of the system which includes the decision-making element (e.g. see 3.2).

Some components to be used in the system may not fall conveniently under the definitions given in clause 3. In these circumstances it is the area in which the component is intended for installation which will determine which environmental tests are appropriate. For example, components to be installed in the same conditions as control and indicating equipment should be subjected to the same environmental tests as control and indicating equipment, but components which may be installed in the same conditions as detectors should be subjected to the environmental tests specified in the detector standards. In order to determine the correct operation of the component in these tests the overall response of the system, including the component, shall be assessed against the requirements from the appropriate Part(s) of this standard.



Key

- A Fire detector(s);
- B Control and indicating equipment;
- C Fire alarm device(s);
- D Manual call point(s);
- E Fire alarm routeing equipment;
- F Fire alarm receiving station;
- G Control for automatic fire protection equipment;
- H Automatic fire protection equipment;
- J Fault warning routeing equipment;
- K Fault warning receiving station;
- L Power supply equipment.

NOTE 1. Items G and H may need to be provided with a separate power supply.

NOTE 2. The lines linking the various components indicate information flows, and not physical interconnections.

Figure 1. Example illustrating components forming a fire detection and fire alarm system

Annex A (informative)

The EN 54 series of standards

EN 54 is published in a series of Parts.

Prior to 1994 Parts were published under the general title *Components of automatic fire detection systems*.

These Parts are listed below.

EN 54-1 : 1976	<i>Introduction</i>
prEN 54-2 : 1989	<i>Control and indicating equipment</i>
prEN 54-4 : 1989	<i>Power supplies</i>
EN 54-5 : 1976 + A1 : 1988	<i>Heat sensitive detectors — Point detectors containing a static element</i>
EN 54-6 : 1982 + AC1 : 1984 + A1 : 1988	<i>Heat sensitive detectors — Rate of rise point detectors without a static element</i>
EN 54-7 : 1982/AC1 : 1984 + A1 : 1988	<i>Point-type smoke detectors — Detectors using scattered light, transmitted light or ionization</i>
EN 54-8 : 1982 + AC1 : 1984 + A1 : 1988	<i>High temperature heat detectors</i>
EN 54-9 : 1982 + AC1 : 1985	<i>Fire sensitivity test</i>
prEN 54-10 : 1991	<i>Flame detectors</i>
prEN 54-11 : 1991	<i>Manual call points</i>
prEN 54-12 : 1991	<i>Optical smoke detectors</i>

NOTE. The prefix 'pr' indicates that the standard is a draft which has not reached the formal vote stage and may have technical changes before final ratification. The prefix 'A' indicates an amendment. The prefix 'AC' indicates a corrigendum amendment.

The EN 54 series of standards is currently being revised and extended under the new general title *Fire detection and fire alarm systems*. After revision it will be published in a series of Parts as shown in table A.1.

Each Part of the series will be published when approved and not necessarily in sequential order. The existing and planned parts of EN 54 do not necessarily cover all types of components that might be included in fire detection and fire alarm systems. Further Parts may be added in the future.

Table A.1 EN 54 : Fire detection and fire alarm systems : revised structure		
Part	Title	State as at Dec. 1994
1	<i>Introduction</i>	Revision approved for formal vote
2	<i>Control and indicating equipment</i>	Draft approved for formal vote
3	<i>Audible fire alarm devices</i>	Draft approved for first enquiry
4	<i>Power supply equipment</i>	Draft approved for formal vote
5	<i>Heat detectors — Point detectors¹⁾</i>	Revision approved for 1st enquiry
7	<i>Smoke detectors — Point detectors using scattered light; transmitted light or ionization²⁾</i>	Revision approved for 1st enquiry
10	<i>Flame detectors — Point detectors</i>	Draft in preparation for formal vote
11	<i>Manual call points</i>	Draft in preparation for 2nd enquiry
12	<i>Smoke detectors — Line detectors using a transmitted light beam</i>	Draft in preparation for 2nd enquiry
13	<i>System requirements</i>	Draft in preparation for 1st enquiry
14	<i>Guidelines for planning, design, installation, commissioning, use and maintenance</i>	Draft in preparation for 1st enquiry
15	<i>Multi-sensor detectors (working title only)</i>	New work item — scope and target date approved
<p>¹⁾This revision of EN 54-5 combines the revisions of EN 54-5 : 1976 and EN 54-8 : 1982 into one Part. EN 54-5 : 1976, EN 54-6 : 1982 and EN 54-8 : 1982 will all be withdrawn on publication of this revision.</p> <p>²⁾This revision of EN 54-7 combines the revisions of EN 54-7 : 1982 and EN 54-9 : 1982 into one Part. EN 54-7 : 1982 and EN 54-9 : 1982 will be withdrawn on publication of this revision.</p>		

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