BS EN 54-1:2011

BSI Standards Publication

Fire detection and fire alarm systems

Part 1: Introduction

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National foreword

This British Standard is the UK implementation of EN 54-1:2011. It supersedes BS EN 54-1:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee FSH/12, Fire detection and alarm systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Foreword

This document (EN 54-1:2011) has been prepared by Technical Committee CEN/TC 72 “Fire detection and fire alarm systems”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by September 2011, and conflicting national standards shall be withdrawn at the latest by September 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 54-1:1996.

This edition incorporates the following main changes made with respect to the previous edition of EN 54-1:1996 as follows:

a) extension to cover new parts of the EN 54 series,

b) revised approach of Figure 1: introduction of functionalities.

EN 54, *Fire detection and fire alarm systems*, consists of the following parts:

— *Part 1: Introduction*

— *Part 2: Control and indicating equipment*

— *Part 3: Fire alarm devices — Sounders*

— *Part 4: Power supply equipment*

— *Part 5: Heat detectors — Point detectors*

— *Part 7: Smoke detectors — Point detectors using scattered light, transmitted light or ionization*

— *Part 10: Flame detectors — Point detectors*

— *Part 11: Manual call points*

— *Part 12: Smoke detectors — Line detectors using an optical light beam*

— *Part 13: Compatibility assessment of system components*

— *Part 14: Guidelines for planning, design, installation, commissioning, use and maintenance* (CEN/TS 54-14)

— *Part 16: Voice alarm control and indicating equipment*

— *Part 17: Short-circuit isolators*

— *Part 18: Input/output devices*

— *Part 20: Aspirating smoke detectors*

— *Part 21: Alarm transmission and fault warning routine equipment*

— *Part 22: Resettable line type heat detectors*

— *Part 23 Fire alarm devices — Visual alarm devices*

— *Part 24: Components of voice alarm systems — Loudspeakers*

— *Part 25: Components using radio links*

— *Part 26: Point fire detectors using carbon monoxide sensors*

— *Part 27: Duct smoke detectors*

— *Part 28: Non-resettable line type heat detectors*

— *Part 29: Multi-sensor fire detectors — Point detectors using a combination of smoke and heat sensors*

— *Part 30: Multi-sensor fire detectors — Point detectors using a combination of carbon monoxide and heat sensors*

— *Part 31: Multi-sensor fire detectors — Point detectors using a combination of smoke, carbon monoxide and optionally heat sensors*

— *Part 32: Guidelines for the planning, design, installation, commissioning, use and maintenance of voice alarm systems*

NOTE This list includes standards that are in preparation and other standards may be added. For current status of published standards refer to www.cen.eu.

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Introduction

This European Standard gives the necessary information for the intended use of the series of EN 54 standards. The EN 54 series applies to fire detection and fire alarm systems in and around buildings composed of several components that communicate for the purpose of detecting fire at the earliest practicable moment, and to provide:

— local and/or remote fire alarms to organizations having authority to take care of buildings and their environment;

— signals to initiate, in the event of a fire, the operation of other fire protection and equipment/systems.

The EN 54 series may be used for other applications e.g. mines and ships, but one should consider the specific nature of each application before use. Additional performance and environmental tests may be necessary. This does not preclude the manufacture or use of systems having special characteristics suitable for the protection of specific risks against specific hazards.

As this revision of the standard includes terms and definitions collated from specific parts of EN 54, there may now be some duplication of terms and definitions in other parts. This situation will be corrected in future revisions of the different parts of EN 54 so that definitions are defined only once and are applied consistently throughout the series.

1 Scope

This part of EN 54 defines the terms and definitions that are used throughout EN 54. It gives the principles on which each part of the standard has been based and describes the functions carried out by the components of a fire detection and fire alarm system.

This European Standard applies to fire detection and fire alarm systems in and around buildings.

This European Standard does not apply to smoke alarm devices which are covered by EN 14604.

2 General

2.1 Standardization series

EN 54 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.

2.2 General principles

The function of a fire detection and fire alarm system is:

— to detect fire at the earliest practicable moment, and to give signals and indications so that appropriate action can be taken;

— to give audible and/or visible signals to the occupants of the building who may be at risk from a fire.

The functions of a fire detection and fire alarm system may be grouped to form subsystems such as a fire detection subsystem and a voice alarm subsystem.

As the system is required to function satisfactorily, not only under fire conditions, but also when exposed to conditions likely to be met in practice, the tests specified in the EN 54 series are intended to assess the performance of the components and the system under such conditions.

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.

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 conforming to the relevant part of EN 54 (e.g. control and indicating equipment with a fire detector), unless both components have been assessed together as conforming to the requirements for a system.

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE 1 The list of components of fire detection and fire alarm systems is not intended to be exclusive.

NOTE 2 Definitions for other components may be added in later revisions of this European Standard or by amendment when such components are produced.

NOTE 3 Additional definitions specific to individual parts are included in those parts.

3.1.1
fire alarm and fault warning transmission system
system used for routing fire alarm and fault warning signals from fire detection and alarm systems in buildings to fire alarm and/or fault warning receiving centres

NOTE Alarm and fault transmission system comprises fire alarm routing equipment, fault warning routing equipment, receiving equipment and a communication network.

3.1.2
ancillary equipment
equipment which support fire related functions not currently defined in EN 54

3.1.3
aspirating smoke detector
smoke detector, in which air and aerosols are drawn through a sampling device and carried to one or more smoke sensing elements by an integral aspirator (e.g. fan or pump)

NOTE Each smoke-sensing element may contain more than one sensor exposed to the same smoke sample.

3.1.4
building management system
facilities used to monitor, control and manage equipment installed in a building for comfort, safety and/or security purposes

3.1.5
combustion gas detector
fire detector sensitive to gaseous products of combustion and/or thermal decomposition

EXAMPLE Carbon monoxide fire detector.

3.1.6
commissioning
process by which it is verified that the installed system meets the defined requirements

3.1.7
compatibility
ability of a component of the system to operate with another component of the same system

3.1.8
component
device contained in one housing performing at least one, or part, of a function of a fire detection and fire alarm system

EXAMPLE Fire detectors, alarm devices and control and indicating equipment are components of a fire detection and fire alarm system.

NOTE Where a function is distributed in separate housings each housing is considered as a separate component.

3.1.9
CIE (control and indicating equipment)
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 and/or manual call points;

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;

b) is used to monitor 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); and, if necessary is able to pass on the fault warning through fault warning routing equipment to a fault warning receiving centre;

c) if necessary, is able to pass on the fire alarm signal; for example:

— to audible or visible fire alarm devices or to a voice alarm system;

— to the fire alarm routing function to a fire alarm receiving centre;

— to the control function for fire protection equipment or systems;

— to fire brigade panel;

— to other systems or equipment not covered by EN 54

EXAMPLE Visualization equipment, such as a mimic panel.

3.1.10
control for fire protection equipment or system
device used to actuate fire protection equipment or fire protection systems after receiving a signal from the control and indicating equipment

3.1.11
detachable detector
detector which is designed for removal of the head from its base

NOTE The use of detachable detectors can assist during maintenance without disconnecting the fixed wiring.

3.1.12
duct smoke detector
smoke detector that monitors the air in a duct

3.1.13
fault warning receiving centre
centre from which the necessary corrective measures can be initiated on receipt of fault signals

3.1.14
fault warning routing equipment
equipment which routes a fault warning signal to a fault warning receiving centre

3.1.15
fire alarm device
component of a fire alarm system, not incorporated in the control and indicating equipment, which is used to give a warning of fire

EXAMPLE Fire alarm sounders, visual alarms, voice alarm loudspeakers, tactile devices.

3.1.16
fire alarm receiving centre
centre from which the necessary fire protection or fire-fighting measures can be initiated on receipt of a fire alarm signal

3.1.17
fire alarm routing equipment
equipment which routes an alarm signal from a control and indicating equipment to a fire alarm receiving station

3.1.18
fire alarm sounder
fire alarm device intended to signal an audible warning of fire between the fire detection and fire alarm system and the occupants of the building

3.1.19
fire brigade panel
device connected to the CIE specifically designed for use by the fire brigade

3.1.20
fire detection and fire alarm system
FDAS
group of components including the control and indicating equipment which when arranged in (a) specific configuration(s) is capable of detecting and indicating a fire, and giving signals for appropriate action

3.1.21
fire detector
component of a fire detection and fire alarm 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

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

EXAMPLE These may include:

— flame detectors, smoke detectors, heat detectors, combustion gas detectors;

— point detectors, line type detectors, multipoint detectors, aspirating detectors;

— resettable detectors, non-resettable detectors;

— detachable detectors, non detachable detectors.

3.1.22
fire protection equipment
equipment to limit the effect of fire

3.1.23
fire protection system
FPS
group of devices that in combination are capable of automatically actuating measures to limit the effect of fire

EXAMPLE Compartmentation systems, smoke control systems and fire fighting systems.

3.1.24
flame detector
fire detector responding to radiation emitted by flames from a fire

EXAMPLE Infrared (IR) flame detectors, ultra-violet (UV) flame detectors, multiband flame detectors

3.1.25
heat detector
detector which responds to an increase in temperature

3.1.26
hierarchical system
networked system in which one CIE is designated as the main CIE and in which the main CIE is able to receive signals from and/or transmit signals to the CIE of a sub-system, and indicate the status of the CIE of a sub-system

3.1.27
infrared (IR) flame detector
flame detector responding only to radiation having wavelengths greater than 850 nm

3.1.28
ionization smoke detector
detector sensitive to combustion products capable of affecting ionization currents within the detector

3.1.29
input/output device
device connected to a transmission path of a fire detection and fire alarm system, used to receive and/or transmit electrical signals necessary for the operation of the fire detection and fire alarm system

3.1.30
installation
work of fixing and interconnecting the components and elements of a system, which may be carried out by one or more parties

3.1.31
installed system
system after installation and commissioning has been completed

3.1.32
line detector
detector which responds to the phenomenon sensed in the vicinity of a continuous line

3.1.33
linear heat detector
detectors which respond to heat applied to any point along the length of the sensing element

3.1.34
line smoke detector using an optical beam
detector consisting at least of a transmitter and a receiver and which may include reflector(s) for the detection of smoke by the attenuation and/or changes in attenuation of an optical beam

3.1.35
line type heat detector
detector which responds to heat sensed in the vicinity of a continuous line

EXAMPLE Linear heat detectors, multipoint heat detectors.

NOTE A line type heat detector may consist of a sensor control unit, a sensing element and functional units.

3.1.36
manual call point
component of a fire detection and fire alarm system which is used for the manual initiation of an alarm

3.1.37
manual call point type A: direct operation
manual call point in which the change to the alarm condition is automatic (i.e. without the need for further manual action) when the frangible element is broken or displaced

3.1.38
manual call type B: indirect operation
manual call point in which the change to the alarm condition necessitates a separate manual operation of the operating element by the user after the frangible element is broken or displaced

3.1.39
multi-band flame detector
flame detector having two or more sensing elements each responding to radiation in a distinct wavelength range and each of whose outputs may contribute to the alarm decision

3.1.40
multi-point detector
detector which responds to the phenomenon sensed in the vicinity of a number of fixed points

3.1.41
multi-point heat detector
detector which contains multiple discrete temperature sensors, separated by a distance embedded within a sensing element

3.1.42
multi-sensor detector
detector using more than one sensor to respond to one or more phenomenon of fire

3.1.43
networked system
fire detection and fire alarm system in which control and indicating equipment are interconnected and able to exchange information

3.1.44
non-detachable detector
detector which is designed to be mounted directly to a surface without the use of a mounting base

3.1.45
non-resettable detector (with exchangeable elements)
detector which, after response, requires the renewal of a component or components to restore it to its normal state of readiness

3.1.46
non-resettable detector (without exchangeable elements)
detector which, after response, cannot be restored from its alarm state to its normal state of readiness

3.1.47
optical smoke detector
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

3.1.48
point detector
detector which responds to the phenomenon sensed in the vicinity of a fixed point

3.1.49
PSE (power supply equipment)
component of a fire detection and fire alarm system which supplies power for the control and indicating equipment and/or for other components including those directly fed with power from the control and indicating equipment

NOTE The power supply equipment may include multiple power sources (e.g. electricity from mains and standby sources).

3.1.50
resettable detector
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

3.1.51
short circuit isolator
device, which may be inserted into a transmission path of a fire detection and fire alarm system, to limit the consequences of low parallel resistance faults between the lines of this transmission path

NOTE A short circuit isolating device may be a physically separate device or it may be incorporated into another device (e.g. integrated into a smoke detector or detector base).

3.1.52
smoke detector
detector sensitive to particulate products of combustion and/or pyrolysis suspended in the atmosphere (aerosols)

EXAMPLE Point smoke detectors, aspirating smoke detectors, duct smoke detectors, line smoke detectors using an optical beam

3.1.53
subsystem
part of a fire detection and fire alarm system which may cover a specific area or specific functionalities

EXAMPLE Voice alarm system.

3.1.54
tactile device
device able to generate a tactile sensation for warning person(s) that a fire condition exists

3.1.55
transmission path
connection between components used for the transmission of information and /or power

EXAMPLE Cables, radio links.

3.1.56
ultra-violet (UV) flame detector
flame detector responding only to radiation having wavelengths less than 300 nm

3.1.57
visual alarm
device able to generate a flashing light to signal to the occupants of a building that a fire condition exists

3.1.58
visualization system
additional equipment used to visualize, in a user friendly manner, the information provided by a fire detection and fire alarm system

3.1.59
VACIE (voice alarm control and indicating equipment)
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 signals from the fire detection control and indicating equipment (CIE);

   2) to manage priority and signal routing from emergency microphone(s) and message generator(s);

   3) to transmit messages to loudspeaker circuits;

b) is used to monitor the correct functioning of the voice alarm system and give audible and visible warning of any faults, e.g. short circuit, open circuit, or a fault in the power supply or power amplifiers;

c) provides:

   1) if required, manual controls for the selection of loudspeaker circuits;

   2) if required, indicators for identifying which loudspeaker circuit is selected;

   3) message generators and power amplifiers;

   4) if required, emergency microphone(s) for broadcasting live emergency messages

3.1.60
voice alarm loudspeaker
device able to generate a voice message and/or an acoustic sound from an electrical signal sent by the VACIE

3.1.61
voice alarm system
group of components, including VACIE and loudspeakers, which broadcasts speech messages and/or warning signals in an emergency

3.1.62
zone
geographical sub-division of the protected premises in which a function may be carried out separately from any other sub-division

3.2 Abbreviations

For the purpose of this document, the following abbreviations apply.

CIE control and indicating equipment

FDAS fire detection and fire alarm system

FPS fire protection system

PSE power supply equipment

VACIE voice alarm control and indicating equipment

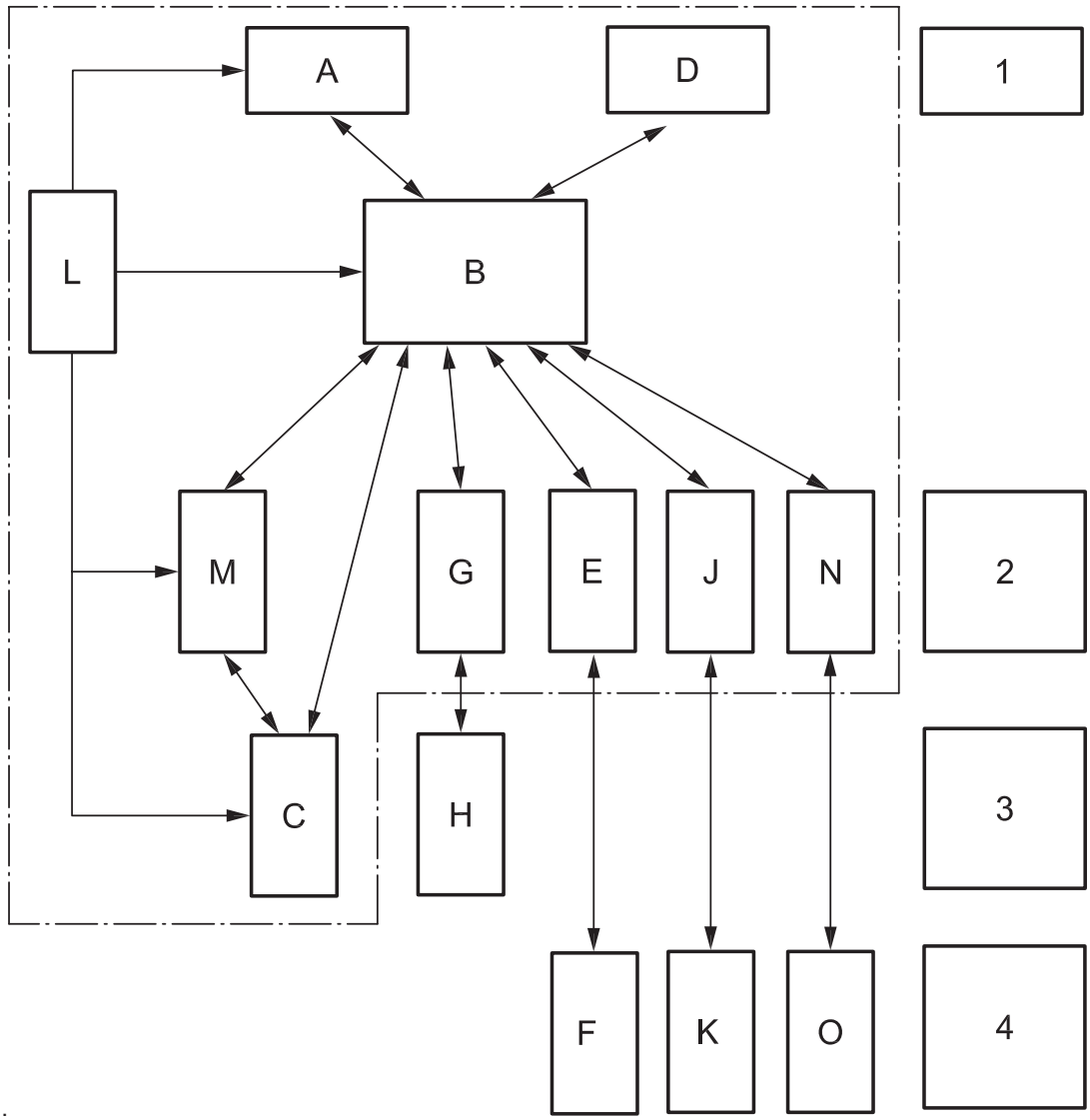
4 Functions

To achieve the overall functionality of a fire detection and fire alarm system, basic functions need to be implemented. These functions are identified in Figure 1. They may be complemented by ancillary functions to offer more convenience to the user.

All these functions are performed by components which are inter-linked using wire, radio communication or other suitable means to achieve the overall functionality of the fire detection and fire alarm system.

Functionality may be distributed in one or more component.

Annex A gives additional information about the use of functions and applicable standards.



Key

1	detection and activation functions	G	control function for fire protection system or equipment
2	control functions for actions	H	fire protection system or equipment
3	local associated functions	J	fault warning routing function
4	remote associated functions	K	fault warning receiving function
A	automatic fire detection function	L	power supply function
B	control and indication function	M	control and indication function for alarm annunciation
C	fire alarm function	N	ancillary input or output function
D	manual initiating function	O	ancillary management function
E	fire alarm routing function	⟷	exchange of information between functions
F	fire alarm receiving function		

NOTE The functions that are included within the FDAS are shown inside the dotted line.

Figure 1 — Fire detection and fire alarm system and associated systems, functions and equipment

5 Compliance

Each function performed by a component shall be clearly stated and shall conform to the appropriate parts of EN 54.

Detectors that do not include a decision-making element shall only be considered to conform to the appropriate part of this standard (e.g. EN 54-7 for point smoke detectors) when they are tested and used in conjunction with that component of the system which includes the decision-making element.

Some components to be used in the system may not fall conveniently under the definitions given in Clause 3. In these circumstances the area in which the component is intended for installation shall determine which environmental tests are appropriate. For example, components to be installed in the same conditions as control and indicating equipment shall be subjected to the same environmental tests as control and indicating equipment, but components which may be installed in the same conditions as detectors shall be subjected to the environmental tests specified in the standards for detectors. 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 EN 54.

Annex A
(informative)

Functions, examples and relevant standards

Clause 4 of this European Standard specifies functions and equipment of the fire detection and fire alarm system and associated systems. Table A.1 gives examples of products that carry out the specified functions and gives information on relevant published standards applicable to these products and systems.

Table A.1 — Examples of products and systems carrying out the functions of FDAS and FDAS associated systems and applicable relevant standards

Reference	Functions	Example of product carrying the function	Relevant standards
A	Automatic fire detection function	Fire detectors such as:	
		Smoke detectors (point detectors)	EN 54-7
		Line smoke detectors using optical beam	EN 54-12
		Aspirating smoke detectors	EN 54-20
		Duct smoke detectors	EN 54-27
		Heat detectors (point detectors)	EN 54-5
		Line type heat detectors	EN 54-22
		Line type heat detectors, non-resettable	EN 54-28
		Flame detectors (point detectors)	EN 54-10
		Carbon monoxide fire detectors (point detectors)	EN 54-26
		Multi-sensor fire detectors:	
		Point detectors using a combination of smoke and heat sensors	EN 54-29
		Point detectors using a combination of carbon monoxide and heat sensors	EN 54-30
		Point detectors using a combination of smoke, carbon monoxide and optionally heat sensors	EN 54-31
		Input device for auxiliary detection functions such as:	EN 54-18[a]
		Sprinkler activated input	
		Input device for connection of secondary detection circuit to a Primary detection circuit	
B	Control and indication function	Control and indicating equipment (CIE), in conjunction with:	EN 54-2
		Networked control and indicating equipments	EN 54-13
		Fire brigade panel	
C	Fire alarm function	Voice alarm loudspeakers	EN 54-24
		Fire alarm devices such as:	
		Fire alarm sounders	EN 54-3
		Visual alarms	EN 54-23
		Tactile alarm devices	
D	Manual initiating function	Manual call points	EN 54-11
E	Fire alarm routing function	Fire alarm routing equipment (alarm transmission routing equipment)	EN 54-21
F	Fire alarm receiving function	Fire alarm receiving centre	EN 50518
G	Control function for fire protection system or equipment	Output device to trigger fire protection equipment	EN 54-18[a]
		Output to fire protection equipment	EN 54-2

Table A.1 *(continued)*

H	Fire protection system or equipment	Duct mounted fire dampers	EN 15650
		Electrically controlled hold-open device for fire/smoke doors	EN 14637
		Smoke and heat control systems	EN 12101 series
		Fixed firefighting systems: gas extinguishing systems	EN 12094 series
		Firefighting systems: sprinkler or water spray systems	EN 12259 series
		Other fire protection measures	
J	Fault warning routing function	Fault warning routing equipment	EN 54-21
K	Fault warning receiving function	Fault warning receiving centre	EN 50518
L	Power supply function	Power supply equipment (PSE)	EN 54-4
M	Control and indication function for alarm annunciation	Voice alarm control and indicating equipment (VACIE) Control for other fire evacuation measures	EN 54-16
N	Ancillary input or output function	Data communication interface	
O	Ancillary management function	Visualization system Building management system	
⟷	Exchange of information between functions	Short-circuit isolators Components using radio links Alarm transmission systems such as: LAN/WAN PSTN GSM GPRS	EN 54-17 EN 54-25 EN 50136 series

[a] EN 54-18 does not include detailed functional requirements for the input/output devices but requires that their function is sufficiently specified by the manufacturer and that the CE attestation of conformity assesses that they function correctly in accordance with the manufacturer's specification.

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