Section two

An Introduction to the suite of EN54 standards

introduction

Overview

The Harmonisation of Standards for the design and manufacture of Fire Alarm and Detection Equipment.

Introduction

The European Committee for Standardisation, (CEN) is the organisation covering trade , welfare and the environment and who develop and maintain specifications and standards, the latter which when harmonised become law under the CPR. The CPR relates to products used in the course of construction. Proof of compliance is the CE marking.

Products for use as Fire Detection and Fire alarm systems are regulated by a set of standards referenced EN54. Standards that are in the process of being written are prefixed with the letters pr. Once written and agreed it becomes a harmonised standard, which under the EU Regulation applies in all EU member states and therefore has the status of being a national standard within that country. Annex ZA of each standard deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

All products built to EN54 standards are tested by independent third party organisations, of which there are several, across various member state countries. The testing of products is vigorous and comprehensive as will be seen from the individual standards. Approval whilst being mandatory within the EU also proves reliability and longevity as well as sensitivity which together are some of the most essential components of both life safety and property protection systems.

The aim of the following document is to provide an overview of each of the current harmonised standards, whilst not negating the need to consult, at times, both the full EN54 standard document together with other supporting documents, such as the ISO/IEC 6000 series of publications.

Foreword

These standards replace all previous versions and have the status of being national standards in all EU member states and therefore support the essential requirements of the EU regulations.

All devices should be clearly labelled with the manufacturers name or logo, part number, electrical connection detail and any further information which provides a means to identify the place and

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date of manufacture, batch and software versions. For detachable units both parts should be labelled. All labelling should use symbols or abbreviations which are in common use, otherwise such information should be explained in supporting documentation. The labelling should be permanent and clearly visible at all times. Documentation shall be provided, prior to testing, which provides an aid to both installer, maintainer and user, giving a general description, detail of the device and which will support any compatibility assessment to be undertaken, as detailed in EN54-1, including power requirements, input/output ratings, transmission paths, battery capacities, current and internal resistance levels. Information relative to the connecting cables, environmental protection, and mounting and connection detail together with operating and maintenance instruction shall also be provided.

If on site adjustment of the device's response type is provided, the data shall clearly indicate the classification, means of adjustment or programming instructions.

Configuration data relevant to the compliance with a standard shall be stored in non-volatile memory and access shall be password protected or by use of a special tool and shall only be possible when the device is taken out of normal service.

EN54- description of Test Schedules

Operational performance, to prove that the specified sound levels can be achieved across the voltage range, and that the maximum sound level does not exceed 120 dB(A) at 1 m. (EN54-3)

Additional testing for voice sounders, to verify that the output level of the broadcast message in relation to that of the alert signal is sufficient. To verify the timing between the alert signal, the silence before and after the message and before the next alert signal, is within the limits set in table C1 of appendix C of EN54-3.

Durability, to show that the sound level does not change significantly after prolonged operation.

Operational performance and functional tests are to show the call point's ability to withstand small forces when applied to the frangible element and to operate correctly and only when an appropriate force is applied, all without damage to the test and reset functions which are also tested.(EN54-11)

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Dry heat (operational), to establish the equipment functions correctly at high ambient temperatures for short periods
Dry heat (endurance), to establish the equipment can withstand long-term ageing effects.

Cold (operational), to establish the equipment functions correctly at low ambient temperatures

Damp heat, cyclic (operational), is to prove the immunity of the equipment where high relative humidity exists and where condensation may occur on the device.

Damp heat, cyclic/steady state (endurance), is to establish the equipment's ability to withstand the longer-term effects of high humidity and condensation.

Damp heat, steady state testing demonstrates the ability of the equipment to function at high relative humidity (without condensation), for short periods

Sulphur dioxide (SO2) corrosion (endurance), to establish the sounder can withstand the corrosive effect of sulphur dioxide as an atmospheric pollutant.

Shock (operational), is to establish the immunity of the equipment to infrequent mechanical shocks.

Impact test is to demonstrate the immunity of the equipment to mechanical impacts.

Vibration, sinusoidal (operational), is to display the equipment's immunity to normal levels of vibration.

Vibration, sinusoidal (endurance), is to display the equipment's ability to withstand the long-term effects of vibration

Electromagnetic compatibility (EMC), immunity tests (operational), tests are carried out in accordance with EN50130-4 and include electrostatic discharge, radiated electromagnetic fields, induced effects from electromagnetic fields, fast transient bursts and slow high energy voltage surges.

Electromagnetic Compatibility (EMC), Immunity tests are designed to demonstrate immunity to electrostatic discharges caused by personnel, who may have become charged, touching the equipment or other adjacent equipment.

Electromagnetic Compatibility (EMC), is to show the manual call points ability to comply with the EMC immunity requirements in its normal service environment. (EN54-11)

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Enclosure protection, to establish that the degree of protection provided by the enclosure of the fire alarm equipment, meets the minimum requirements for its type.

Repeatability, demonstrates a detectors stable sensitivity, during multiple alarms.

Directional dependence, to prove that performance is not dependent upon a specific airflow

Directional dependence, to demonstrate that the detector is sensitive to detecting radiation across its entire field of view (EN54-10)

Fire sensitivity, to prove that the detector has sufficient sensitivity to fire, and to determine a classification based on its detection range (EN54-10)

Reproducibity: to demonstrate that response times are within the specified limits and that the response times do not vary significantly during repeat testing.

Variation in supply parameters: to prove that within the equipment's specified voltage range the performance /response times are reasonably constant.

Air movement, is to demonstrate that the sensitivity of a detector does not significantly change in an air flow, and is not prone to false alarms in draughts or in short gusts.

Dazzling, is to demonstrate that the sensitivity of a detector does not significantly change when close to artificial light sources. (Applies only to optical detectors).

Fire sensitivity, is to demonstrate a detectors sensitivity to a broad spectrum of smoke types as required for general application in fire detection systems. (EN54-7)

Test Fires. The detectors shall be subjected to four test fires TF2 to TF5 (as detailed in Annexes G to J). The procedures are described for each test fire, along with the end of test condition and the required profile curve limits. The test fire numbers have been retained from EN 54-9. All detectors shall generate an alarm signal, in each test fire. (EN54-7).

Note: In the UK all EN standards are prefixed with BS, e.g. BS EN54-2

Note: all standards are referenced with a date and suffix to any amendments and corrigenda which have been issued since the original standard was published.

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Foreword

This standard replaces all previous versions and has the status of being a national standard in all EU member states and therefore supports the essential requirements of the EU directive(s).

Introduction

The EN54 standard, part 1 explains the use of each part of the EN54 suite of standards. The standards apply to systems used for the early detection of fires in buildings, including providing warnings both locally and remote and operating other fire precautions, such as water or gaseous suppression systems. Consideration should be given if these standards are used for systems installed in other than building applications, as to their suitability.

Each standard covers the requirements, test and performance criteria, for measuring the reliability of the system component parts which together form the complete system. The tests are designed to prove their performance under varying conditions which they are likely to be subjected to during their lifetime.

Some standards listed below are published as harmonised standards. However some are relatively new and others are still in the process of preparation and some may not be EN54 standards.

Parts 16, 24 and 32 refer to voice alarm equipment which may form a separate and sub system to the fire alarm and detection system, but which when interconnected will effectively work as a complete system. Part 32 is a guide to installation which, in the UK, would not replace BS5839-8

EN54-22 and 28 are draft standards covering line type heat detectors and resettable types.

Part 23 covers visual alarm devices which may be installed to compliment audible devices in noisy areas or to provide a warning to hearing impaired personnel.

Part 26, covers CO fire detectors, i.e.. detectors which detect the presence of the combustion gas, Carbon Monoxide, from a fire. It is anticipated that all conflicting national standards will be withdrawn by 2019.

Part 27, covers duct smoke detectors. It is anticipated that all conflicting national standards will be withdrawn by 2019.

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Parts 29, 30 and 31 cover multi sensor detection devices which may detect different fire phenomena providing a wider spectrum of detection capability than a standard single technology device. The various detection channels of these devices can be combined in software to provide either more resilience or increased sensitivity dependent upon the risk and environment. Currently ISO 7240- 8 and 15 and CEA 4021 are all published documents covering some types of multi sensors. It is anticipated that all conflicting national standards will be withdrawn by 2019.

Part 13 of the standard assesses the compatibility of components, which although individually approved to the relevant standard, have been assessed when working together as a system. This standard, whilst being the only published standard is not harmonised and is therefore not enforced under the Construction Product Regulation. It does however offer sound practical guidance to building networked systems.
Clause 4 of this Standard specifies both input and output functions associated with the fire detection and fire alarm system. Table A.1 (below), gives examples of products that fulfil these functions and references these to the applicable published standards

Annexes to EN54-1

A- 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 in Annex A gives examples of products that carry out the specified functions and gives information on relevant published standards applicable to these products and systems.

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Table A.1 — Examples of products and systems carrying out the functions of FDAS and 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)	EN54-7
		Line smoke detectors using optical beam	EN54-12
		Aspirating smoke detectors	EN54-20
		Duct smoke detectors	EN54-27
		Heat detectors (point detectors)	EN54-5
		Line type heat detectors)	EN54-22
		Line type heat detectors, non-resettable	EN54-28
		Flame detectors (point detectors)	EN54-10
		Carbon monoxide fire detectors (point detectors)	EN54-26
		Multi-sensor fire detectors:	
		Point detectors using a combination of smoke and heat sensors	EN54-29
		Point detectors using a combination of carbon monoxide and heat sensors	EN54-30
		Point detectors using a combination of smoke, carbon monoxide and optionally heat sensors	EN 54-31
		Input device for auxiliary detection functions such as:	
		Sprinkler activated input	EN 54-18a
		Input device for connection of secondary detection circuit to a Primary detection circuit	

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

Reference	Functions	Example of product carrying the function	Relevant standards
B	Control and indication function	Control and indicating equipment (CIE), in conjunction with: Networked control and indicating equipment's Fire brigade panel	EN 54-2 EN 54-13
C	Fire alarm function	Voice alarm loudspeakers Fire alarm devices such as: Fire alarm sounders Visual alarms Tactile alarm devices	EN 54-24 EN 54-3 EN 54-23
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

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

Reference	Functions	Example of product carrying the function	Relevant standards
G	Control function for fire protection system or equipment	Output device to trigger fire protection equipment Output to fire protection equipment	EN 54-18[a] EN 54-2
H	Fire protection system or equipment	Duct mounted fire dampers Electrically controlled hold-open device for fire/smoke doors Smoke and heat control systems Fixed fire fighting systems: gas extinguishing systems Fire fighting systems: sprinkler or water spray systems Other fire protection measures	EN 15650 EN 14637 EN 12101 series EN 12094 series EN 12259 series
J	Fault warning routing function	Fault warning routing equipment	EN54-21
K	Fault warning receiving function	Fault warning receiving centre	EN50518

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

Reference	Functions	Example of product carrying the function	Relevant standards
L	Power supply function	Power supply equipment (PSE)	EN54-4
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: series LAN/WAN PSTN GSM GPRS	EN 54-17 EN 54-25 EN 50136

[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

Part 2 control and indicating equipment

Introduction

The standard covers both mandatory and optional functionality with regards to the system control and indicator equipment. The "optional functions" allows for specific functions associated with requirements which may not be standard but still allows the products to comply.
The options covered in annex B are those already used by some member states and have therefore been included in this standard and may also form part of their local national standard.

Requirements

The control and indicating equipment shall be capable of being in, and also displaying indication appropriate to, Fire, Fault, disablement, and where provided, test. The rules governing alphanumeric displays are also listed. An indication of external power shall be provided. Any other kind of indication may be displayed, however all indications must be clear and unambiguous.

Audible indication, indicating a change of state shall be provided within the control and indicating equipment and shall be capable of being silenced, but not automatically. The audible alarm should resound for each subsequent event.

A reset function shall be provided and be used for both fire and fault, with the current status of the system, including points not reset being displayed within 20 seconds.

Output of the fire alarm condition may be signalled to numerous devices, including audible alarms, visual alarms, transmission equipment and other fire protection systems, with at least one output being mandatory.

Time constraints are detailed in this section, being 10 seconds, if no delays are programmed. Delays and coincidence are recognised as being acceptable in some cases with delay timers being programmable up to a maximum of 10 mins. The rules relating to these functions are detailed within the standard. The equipment may include provision to record the number of fire alarm events.

Fault recognition and indication is covered in respect of the various categories of fault which could occur. These include faults within and external to the control and indication equipment. These are prioritised into three groups, faults in specified functions, power loss and system faults. The implications of each can be quite different. Faults shall be processed and their status indicated within 100 secs.

control and indicating equipment

In the event of a mains power loss, the equipment shall have the ability to recognise if the standby supply is capable of providing at least the mandatory system function, otherwise an audible indication shall be sounded for a period of at least 1 hour.

Disablements may be applied to inputs and outputs, such as zones, audible and visual devices and signal transmission paths. Such disablement should only affect those linked indications and outputs and not be global. Indications of disablements shall be provided both generally and for specific disablements.

Indication of a Test Condition shall be displayed whenever any part of the system is under test. Those parts of the system under test must be clearly displayed and all mandatory indications from those parts of the system not under test will still be provided. Tests must be started and ended manually. Outputs from those zones under test will not be triggered by the test.

The Input/output Interface is an approved method of communicating between the main control and indicator panel and a sub panel capable of performing functions associated with the cause and effect, such as operating a fire protection system or communicating with the fire brigade. The sub panel is not a part of the main control and indicator panel under this standard; however the minimum functional requirements regarding the interface are clearly detailed. Where the sub panel is a fire brigade panel and because requirements vary from country to country, the specified interface functions negate the need for the panel specification to be harmonised under this standard. Most panels will be approved locally.

Design Requirements for the control and indicator panel are listed in clause 12 of the standard. Not all panel functionality can be tested therefore manufacturers are required to confirm compliance in accordance with the standard by way of documentation. Both electrical and mechanical details are included in the standard as is the integrity of its transmission paths, the accessibility of indicators and controls, the specification for indicator lights, including colours, alphanumeric displays, and audible indications. The panel's software and software processing methods together with the means of storing both programmes and data are also detailed.

control and indicating equipment

The panel will be clearly labelled, including the ref to the standard, the manufacturers logo and model number.

Testing of the main control and indicator panel is carried out in a test environment with a specimen configuration loaded into the panel. The test objectives are to prove the operation of the equipment and to enable this; a test schedule is drawn up prior to testing. Testing will prove the fire alarm, fault and disabled conditions. Environmental tests are carried out in accordance with table 1, below.

Table 1. Environmental tests

Test	Operational or endurance	Sub-clause number
Cold	**Operational**	15.4
Damp heat, steady state	**Operational**	15.5
Impact	**Operational**	15.6
Vibration, sinusoidal	**Operational**	15.7
Electromagnetic compatibility (EMC) immunity test	**Operational**	15.8
Supply voltage variations	**Operational**	15.13
Damp heat, steady state	**Operational**	15.14
Vibration, sinusoidal	**Operational**	15.15

control and indicating equipment

Table B.1 Optional functions

Option	See clause
Indications: Fault signals from points Total loss of power supply Alarm counter	 8.3 8.4 7.13
Controls: Dependency on more than one alarm signal Delays to outputs Disablement of each address point Test condition	 7.12 7.11 9.5 10
Outputs: Fire alarm device(s) Fire alarm routing equipment Automatic fire protection equipment Fault warning routing equipment Standardized I/O interface	 7.8 7.9 7.10 8.9 11

control and indicating equipment

Annexes to EN54-2

Annex A- Explanation of Access Levels, defines these for all mandatory functions detailed within the standard.

Annex B (informative) Optional functions with requirements and alternatives.
As described earlier this standard confirms those mandatory functions necessary to comply together with some optional functions which might also be provided. The optional functions described in this standard which have already been adopted by some countries are listed in table B1 below.

Annex C; refers to the processing of signals, where appropriate, from a fire detector to a point in the process where a decision is made.

Annex D; provides an explanation of the zones and their appropriate indications, together with the limitations regarding device loading.

Annex E; explains the process of delaying outputs when processing signals from both detectors and manual call points.

Annex F; covers the recognition and processes when dealing with faults.

Annex G; explains the requirements for the interfacing of the input/output equipment such as fire brigade panels.

Annex H; refers to the integrity of transmission paths to limit the effects caused by faults.

Annex I is specific to control and indication equipment which requires software.

Annex ZA; deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 3 fire alarm devices - sounders

Introduction

This standard covers the requirements for the construction and performance of sounders and their performance under climatic, mechanical and electrical interference conditions. Sounders are classified as indoor (A) and outdoor (B). In fire detection and fire alarm systems, voice sounders are also used for warning the occupants of a building of the outbreak of fire, using a combination of signal and voice message(s).The requirements, test methods and performance criteria specified in this standard for sounders are also applicable to voice sounders. Additional requirements specific to voice sounders are incorporated in Annex C.

Requirements

The sounder may produce different sound levels under different conditions, e.g., when operating on different voltage ranges or with different sound patterns. When appropriate the sound level of each unit may be measured for each sound pattern when tested. Alternatively the sounder will be tested using an output deemed to consume max current and produce the maximum sound output. The sounder shall produce A-weighted sound levels of at least 65 dB in one direction and not exceeding 120 dB in any direction.

(A- weighted sound level sound pressure expressed in dB, characteristics are given in IEC 60651).

Sounders can produce different frequencies and sound patterns and, therefore, this standard does not specify a minimum and maximum for either. These may also vary from country to country; therefore local standards need to be consulted. Access to the device shall be restricted by the use of special screws or tools and it should not be possible to change the manufacturer's settings without use of the same or by breaking a seal.

If on site adjustment of the device settings is provided, then the factory setting, which complies with this standard, should be clearly displayed for each and should only be accessible to change with a password or special tool.

Sounders shall be rated for a minimum of 100 hours which will not affect their ability to cycle on and off as required as part of the compliance testing. This requirement does not apply to the capacity of any integral batteries used as a means of providing local standby power. The capa-

fire alarm devices - sounders

city and charging requirements of such batteries should meet the requirement of the system.. The degree of protection provided by the enclosure of fire alarm sounders shall be in accordance with EN60529, IP21 for type A and IP33 for type B. The attached labelling, will provide, reference to this standard, type A or B.

Voice Sounders are audible devices for generating and broadcasting recorded voice messages. The voice sounder shall meet all of the requirements applicable to audible fire alarm devices. To prevent acoustic interaction between adjacent voice sounders the provision for synchronising the alert signal and message sequence with that of other devices of the same type may be necessary. In this case, the requirements of the test described in appendix C shall be met.

Tests, are carried out to prove the sound levels specified by the manufacturer are achievable within the specified voltage range and do not deviate by more than 6dB for each direction. The maximum sound level must provide an output greater than 65dB (A) in at least one direction, and not exceed 120dB (A) in any direction, at 1 metre. Sound levels are required to be at the specified level for each of the angles specified by the manufacturer, through a semi -circular arc in front of the device).

fire alarm devices - sounders

Table 1 — Schedule of tests

Test	Subclause
Reproducibility	5.2
Operational performance	5.3
Durability	5.4
Dry heat (operational)	5.5
Dry heat (endurance)	5.6
Cold (operational)	5.7
Damp heat, cyclic (operational)	5.8
Damp heat, steady state (endurance)	5.9
Damp heat, cyclic (endurance)	5.10
SO2 corrosion (endurance)	5.11
Shock (operational)	5.12
Impact (operational)	5.13
Vibration (operational)	5.14
Vibration (endurance)	5.15

fire alarm devices - sounders

Table 1 — Schedule of tests

Test	Subclause
Electrostatic discharge (operational)	5.16
Radiated electromagnetic fields (operational)	5.16
Conducted disturbances induced by electromagnetic fields (operational)	5.16
Voltage transients, fast transient bursts (operational)	5,16
Voltage transients, slow high energy voltage surge (operational)	5.16
Enclosure protection	5.17

1) Where after one of the test specified in 5.5 to 5.16 the A-weighted sound level of the specimen being tested differs from that measured during the reproducibility test by more than 6 dB, a new specimen shall be used for the next test on the schedule for that specimen. The sound level shall be first measured as specified in 5.2.

2) The EMC tests specified in 5.16 are not required for sounders which do not rely on active electronic components for their operation.

3) The tests on an individual specimen may be carried out in any order except that the reproducibility test (5.2) shall be performed first on all specimens and the tests on specimens 1 and 2 shall be carried out in the order listed (i.e. 5.17 last).

fire alarm devices - sounders

Annexes to EN54-3

Annex A- Sound level test
Annex B- Comparative sound test
Annex C- Voice Sounders
Annex ZA; deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 4 power supply equipment

Introduction

This standard covers the requirements, test procedures and performance of power supplies used with fire alarm and detection systems in buildings, both internal and external to the control and indicating equipment.

General requirements

The requirements for meeting this standard are detailed in clauses 4-8 and testing is as detailed in clause 9 of this standard. The power supply unit will operate from an incoming mains supply and incorporate at least one rechargeable standby battery. The unit will be capable of maintaining a fully charged battery. Each source of power shall be capable of supplying the specified output or for an integral power supply, the equipment into which it is integrated.

The incoming mains supply should be solely for the fire detection and alarm system and its standby batteries. The battery should automatically supply the system in the event of an incoming power failure and revert to standby when the supply is restored. Failure of an integrated power supply incoming mains shall be transparent other than to operate any power warning indicators. Any known interruptions during changeover of power source shall be detailed by the manufacturer. Failure of one power source shall not render the unit inoperative such that no power is delivered to the system.

Functionality

The power supply shall be capable of delivering full power to the system irrespective of the standby battery condition, including when recharging a discharged standby battery. The standby battery charging current can be reduced when the power supply is required to supply maximum current to the system. The standby battery should also be capable of supplying the systems demands when the incoming mains supply is disconnected. The power supply shall be fully monitored, including incoming mains, battery supply, and battery high resistance. The power supply shall signal a fault condition within 30 minutes of the fault occurrence. If the power supply unit is an integral part of the control and indicating equipment such faults shall be signalled in accordance with EN54-2.

The design, electrical and mechanical, shall be in accordance with section 6 of the standard. If the power supply is de-

power supply equipment

signed for use with the control and indicating equipment but external to, then duplicate connections should be made ensuring that a single short circuit cannot result in a loss of power.

The standby battery will be suitably labelled indicating its age and type and if integral to other components of the fire alarm and detection system, shall be of the sealed type. The batteries output voltage should be monitored and outputs turned off if that voltage falls below the specified level.

The battery charger will charge the battery automatically and when discharged to its final voltage be recharged to 80% of its capacity within 48 hours. The charger shall be designed and operate within the battery manufacturers temperature limits. Other than for monitoring purposes the battery shall not discharge through the charger, when a potential difference exists.

If required to operate during the testing the power supply equipment shall be connected to both mains and a suitable battery. The output shall be connected to suitable cable and tested under a full load. Fully functional tests are as detailed in section 9 and carried out in accordance with table 1. However the procedure and requirements do vary between integrating and non-integrating power supply equipment.

power supply equipment

Table 1-Functional tests

Test	Mains supply voltage	Condition of battery	Loading condition	Duration of test
1	Vna + 10 %	Discharged b	I max. a	4 h
2	Vn 15 %	Discharged b	I max. a	4 h
3	Vn 15 %	Discharged b	I max. b	Manufacturer's specification with a minimum of 5 min
4	Disconnected	Discharging c	I max. b	
5	Vn 15 %	Replaced by short circuit d	I max. a	
6	Vn 15 %	Replaced by short circuit e	I max. a	
7	Vn + 10 %	Disconnected	I max. b	
8	Vn 15 %	Disconnected	I max. b	
9	Vn + 10 %	Fully charged f	I min	

a Vn is nominal voltage of the public electricity supply or equivalent.
b A battery of max specified capacity discharged to its final voltage as described in 9.3.1.1. The battery is allowed to charge during the test.
c In this test the battery may be replaced by a laboratory power supply capable of supplying the required output current. The output voltage of the power supply shall be gradually reduced from the fully charged voltage of the battery to the voltage at which the PSE output(s) switch off as in 5.2.3.
d Mains shall be applied after having replaced the battery by a short circuit.
e Replace the battery by a short circuit after the mains is applied.
f A battery charged to its fully charged voltage

power supply equipment

Environmental tests are carried out in accordance with table 2 below. If the power supply unit is housed within other equipment for which there is a different standard, then testing in accordance with that standard shall apply. (e.g. EN54-2). However functional tests, required by this standard, to be undertaken after environmental testing, shall also take place. If the power supply is housed separately or in an enclosure for which there is no standard then table 2 shall apply.

Table 2 — Environmental tests

Test	**Operational or endurance**	**Clause number**
Cold	Operational	9.5
Damp heat, steady state	Operational	9.6
Impact	Operational	9.7
Vibration, sinusoidal	Operational	9.8
Electromagnetic compatibility (EMC) immunity tests	Operational	9.9
Damp heat, steady state	Endurance	9.14
Vibration, sinusoidal	Endurance	9.15

power supply equipment

Annexes to EN54-4

Annex A- Laboratory procedure for testing compliance with the requirements of 5.2.1 and 5.4.c

Annex ZA- Deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 5 heat detectors - point detectors

Scope

This standard specifies the requirements for point type heat detectors. Typical application temperature is the temperature of the environment into which the detector is placed and which exists for most of the time in a none fire situation as detailed in table 1.Maximum application temperature is that which the detector may be subjected to for short periods of time, in a non-fire situation as detailed in table 1.

Static response temperature is that at which the detector would be in an alarm state if subjected to a vanishingly small rate of rise temperature, typically 0.2K min -1

Classification

Detectors shall conform to one or more of the following classes, as shown in the attached table, column 1, according to the requirements of the detailed tests.

Table 1 Detector Classification temperatures

Detector Class	Typical Application Temperature°C	Maximum Application Temperature °C	Minimum Static Response Temperature °C	Maximum Static Response Temperature °C
A1	25	50	54	65
A2	25	50	54	70
B	40	65	69	85
C	55	80	84	100
D	70	95	99	115
E	85	110	114	130
F	100	125	129	145
G	115	140	144	160

heat detectors - point detectors

Manufacturers may add the suffix S, (Static) or R, (Rate of Rise) to the detector data. Detectors which provide only a static response do not respond below their minimum response temperature irrespective of the rate of rise in temperature. Detectors incorporating a rate of rise characteristic will meet the response requirements shown in table 4, even when installed where temperatures are significantly lower than the typical application temperature.

Individual alarm indication shall be provided for class A1, A2, B, C or D detectors via a red visual indicator which shall be extinguished when the detector is reset. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the detector is in service mode. For detachable detectors the indicator may be in the head or the base and should be visible at a distance of 6 metres directly below the detector in ambient light levels of up to 500 lux.

Classes E, F or G detectors shall contain either an integral red indicator or some other means of indicating its alarm state.

Monitoring of detachable detectors shall be provided by which removal of the detector from its base without some form of indication is not possible.

The manufacturer's settings should not be accessible to change without the need for a password, special tool or by the breaking or removal of a seal. If on site adjustment of the detectors response type is provided, then the factory setting, which complies with this standard, should be clearly displayed for each detector and should only be accessible to change with a password or special tool or by the removal of the detector from its base.

Any settings which are not compliant with this standard shall only be accessible by the same means and it should be clearly displayed, either on the detector or in data format, the detector does not comply with this standard. The adjustments may be carried out either at the detector or via the control and indicator equipment.

Configuration data relevant to the compliance with a standard shall be stored in non-volatile memory and access shall be password protected or by use of a special tool and shall only be possible when the device is taken out of normal service.

heat detectors - point detectors

Detectors are subjected to the following Test Schedules.

Directional dependence: to prove that performance is not dependent upon a specific airflow

Static response temperature: to confirm the detectors response to a slow rate of rise in temperature. Static type detectors may also be subjected to further testing to ensure they do not respond below their stated response temperature relative to their class.

Response times from typical application temperature: to prove the detectors response, (table 1) to a range of rate of rise air temperatures. The response times should lie between the upper and lower levels shown in table 4, relative to its class.

Variation in supply parameters: to prove that within the detectors specified voltage range the response times are reasonably constant

Reproducibity: to show that response times are within the specified limits and for resettable detectors that the response times do not vary significantly during repeat testing. Response times shall be as detailed in table 4, between the upper and lower levels.

Cold (operational): to prove the detector operates correctly in low temperature environments. The detectors, (resettable) response when subjected to a rise in temperature of 3 Kmin-1 shall not be less than 7min 13s. At a temperature rise of 20 Kmin-1 the response time shall not be less than 30s for Class A1 and 1min for other classes. For non- resettable detectors the response times shall be those shown in table 4, between the upper and lower times for the relevant class.

Dry heat (endurance): proves the performance of detectors in classes C, D, E, F and G when installed in high ambient temperatures. The tests are at temperatures indicated in table 1. The detectors, (resettable) response when subjected to a rise in temperature of 3 Kmin-1 shall not be less than 7min 13s. At a temperature rise of 20 Kmin-1 the response time shall not be less than 1min. For non- resettable detectors the response times shall be those shown in table 4.

Damp heat, cyclic and steady: These tests prove the detectors ability to exist in humid conditions and where there

heat detectors - point detectors

may be condensation present, for short and long durations. The detectors shall remain fault free and their response (for resettable) when subjected to a rise in temperature of 3 Kmin-1 will not be less than 7min 13s. At a temperature rise of 20 Kmin-1 the response time shall not be less than 30s for Class A1 and 1min for other classes. For non- resettable detectors the response times shall be those shown in table 4

Corrosion (SO2) will demonstrate the detectors resistance to corrosive atmospheres. The detector should remain fault free and respond, (resettable) to a rise in temperature of 3 Kmin-1 within 7min 13s. At 20 Kmin-1 the response time shall not be less than 30s for Class A1 and 1min for other classes. For non- resettable detectors the response times shall be those shown in table 4,

Shock, Impact and Vibration: these tests are designed to prove the detectors immunity to mechanical shocks, impact and short and long term vibration. The shock test procedure is that described in the IEC document 60068-2-27. long term vibration tests are conducted in accordance with IEC document 60068-2-6. The detector should remain fault free and respond, (resettable) to a rise in temperature of 3 Kmin-1 within 7min 13s. At 20 Kmin-1 the response time shall not be less than 30s for Class A1 and 1min for other classes. For non- resettable detectors the response times shall be those shown in table 4,

Electromagnetic compatibility (EMC): tests are carried out in accordance with EN50130-4. The detector should respond, (resettable) to a rise in temperature of 3 Kmin-1 within 7min 13s. At 20 Kmin-1 the response time shall not be less than 30s for Class A1 and 1min for other classes. For non- resettable detectors the response times shall be those shown in table 4.

heat detectors - point detectors

Table 4 Response time limits

Rate of rise of air temperature	Class A1 detectors			
	Lower limit of response time		Upper limit of response time	
K min - 1	Min	S	Min	S
1	29	0	40	20
3	7	13	13	40
5	4	9	8	20
10	1	0	4	20
20		30	2	20
30		20	1	40

heat detectors - point detectors

Table 4 Response time limits

Rate of rise of air temperature	Class A2, B, C, D, E, F and G detectors			
	Lower limit of response time		Upper limit of response time	
K min - 1	Min	S	Min	S
1	29	0	46	0
3	7	13	16	0
5	4	9	10	0
10	2	0	5	30
20	1	0	3	13
30		40	2	25

Response times from high ambient temperature: proves the detectors ability to perform correctly in a high temperature environment. The detectors response time should fall between those indicated below in table 5.

heat detectors - point detectors

Table 5 Response time limits for maximum application temperature

Detector class	Lower limit of response time at air temperature rise of			
	3K min-1		20K min-1	
	Min	S	Min	S
A1	1	20		12
All other	1	20		12

Detector class	Upper limit of response time at air temperature rise of			
	3K min-1		20K min-1	
	Min	S	Min	S
A1	13	40	2	20
All other	16	0	3	13

Annexes to EN54-5
Annex A - Heat tunnel for response time and response temperature measurements
Annex B - Information concerning the construction of the heat tunnel
Annex C - Derivation of upper and lower limits of response times
Annex D - Apparatus for impact test
Annex ZA - Clauses of this European Standard addressing essential requirements or other provisions of EU construction products regulation.

part 7 smoke detectors

Scope, the standard specifies the requirements, test methods and performance criteria for point type smoke detectors, both optical and ionisation, including smoke detectors with more than one sensor. Ionisation detectors are not permitted in certain countries therefore local codes should be consulted.

Requirements
Compliance, for the detector to meet the requirements of this clause shall be verified by visual inspection or engineering assessment, tested as described in clause 5 and, for detectors with more than one smoke sensor, shall meet the requirements of the tests detailed in Annex N.

Individual alarm indication shall be provided via a red visual indicator which shall be extinguished when the detector is reset. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the detector is in service mode. For detachable detectors the indicator may be in the head or the base and should be visible at a distance of 6 metres directly below the detector in ambient light levels of up to 500 lux. Where there is a connection to remote indicators, control relays etc., failures of these connections shall not prevent the correct operation of the detector.

Monitoring of detachable detectors shall be provided by which removal of the detector from its base without some form of indication is not possible.

The manufacturer's settings should not be accessible to change without the need for a password, special tool or by the breaking or removal of a seal.

If on site adjustment of the detectors response type is provided, then the factory setting, which complies with this standard, should be clearly displayed for each detector and should only be accessible to change with a password or special tool or by the removal of the detector from its base.

Any settings which are not compliant

smoke detectors

with this standard shall only be accessible by the same means and it should be clearly displayed, either on the detector or in data format, the detector does not comply with this standard. The adjustments may be carried out either at the detector or via the control and indicator equipment.

The detector shall be designed to restrict the access of insects into its sensitive parts without restricting smoke entry. In order to achieve this it may be necessary to take other precautions against false alarms due to the entry of small insects.

The provision of "drift compensation" to counter the effects of a build-up of dirt in the detector shall not significantly reduce the detector's sensitivity to slowly developing fires. To verify this, an assessment of the detector's response to slow increases in smoke density shall be made. The detector shall meet the requirements of clause 4.8 if its response times falls within those specified.

Testing a detectors response with very slow increases in smoke density is impractical and therefore assessment is made of the detectors response by a combination of test and simulations together with analysis of the software. The detectors performance is measured against formulae designed to confirm a response within 100 seconds when the increase in smoke density is greater than one fourth of the detector threshold value multiplied by 1.6. This ensures the detectors response value does not increase by more than a factor of 1.6 before an alarm condition is reached. A detectors response should fall between a maximum sensitivity of 1.5% and a minimum of 6% obscuration per metre when tested.

smoke detectors

Test schedule

Test	Clause
Repeatability	5.2
Directional dependence	5.3
Reproducibility	5.4
Variation in supply parameters	5.5
Air movement	5.6
Dazzling [1)]	5.7
Dry heat (operational	5.8
Cold (operational)	5.9
Damp heat, steady state (operational)	5.10
Damp heat, steady state (endurance)	5.11
Sulphur dioxide (SO2) corrosion (endurance)	5.12
Shock (operational)	5.13
Impact (operational)	5.14

smoke detectors

Test schedule

Test	Clause
Vibration, sinusoidal (operational)	5.15
Vibration, sinusoidal (endurance)	5.16
Electrostatic discharge (operational)	5.17
Radiated electromagnetic fields (operational)	5.17
Conducted disturbances induced by electromagnetic fields (operational)	5.17
Fast transient bursts (operational)	5.17
Slow high energy voltage surge (operational)	5.18
Fire sensitivity	

1) This test only applies to detectors using scattered or transmitted light.

smoke detectors

Annexes to EN54-7

Annex A - Smoke tunnel for response threshold value measurements
Annex B - Test aerosol for response threshold value measurements
Annex C - Smoke measuring instruments
Annex D - Apparatus for dazzling test
Annex E - Apparatus for impact test
Annex F - Fire test room
Annex G -Smouldering (pyrolysis) wood fire (TF2)
Annex H -Glowing smouldering cotton fire (TF3)
Annex I - Flaming plastics (polyurethane) fire (TF4)
Annex J - Flaming liquid (n-heptane) fire (TF5)
Annex K - Information concerning the construction of the smoke tunnel
Annex L - Information concerning the requirements for the response to slowly developing fires
Annex M - Information concerning the construction of the measuring ionization Chamber
Annex N - Additional requirements and test methods for smoke detectors with more than one smoke sensor
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 10 flame detectors

Scope This European Standard specifies the requirements, test methods and performance criteria for point-type, resettable flame detectors that operate using radiation from a flame for use in fire detection systems.

Requirements

Compliance is for the detector to be verified by visual inspection or engineering assessment and successfully tested as described in clause 5. Detectors will be classified, when responding to fires within 30 secs as: Class 1, up to 25metres, Class, 2 up to 17 metres or Class 3, up to 12 metres. Below 12metres detectors will not be classified.

Individual alarm indication shall be provided via a red visual indicator which shall be extinguished when the detector is reset. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the detector is in service mode. For detachable detectors the indicator may be in the head or the base. Where there is a connection to remote indicators, control relays etc., failures of these connections shall not prevent the correct operation of the detector.

Monitoring of detachable detectors shall be provided by which removal of the detector from its base without some form of indication is not possible.

The manufacturer's settings should not be accessible to change without the need for a password, special tool or by the breaking or removal of a seal and for each setting. For those settings which the manufacturer claims compliance with this standard, each shall have achieved a classification corresponding to that marked on the detector for that setting;

If on site adjustment of the detectors response type is provided, then the factory setting, which complies with this standard, should be clearly displayed for each detector and should only be accessible to change with a password or special tool or by the removal of the detector from its base.

flame detectors

Any settings which are not compliant with this standard shall only be accessible by the same means and it should be clearly displayed, either on the detector or in data format, the detector does not comply with this standard. The adjustments may be carried out either at the detector or via the control and indicator equipment.

Technical data regarding both installation and maintenance should be provided with each detector or in the case of supporting documentation, document references should be provided. If on site adjustment of the detectors response type is provided, the data shall clearly indicate the classification, means of adjustment or programming instructions.

For detectors which are software control controlled then the documentation, design, and storage of programs and data will meet the requirements of 4.9.2, 4.9.3 and 4.9.4.

The Principle of testing is to measure the response point when exposing the detector to radiation from a suitable flame source and establishing the maximum distance at which the detector will reliably enter the alarm condition within a time of 30 s. The test apparatus shall be as described in annex A, B and C. When testing, the radiation source is modulated in accordance with the manufacturer's specification. Tests are conducted using methane, n-heptane, and methylated spirit.

flame detectors

Table 1 — Test Schedule

Test	Clause
Reproducibility	5.2
Repeatability	5.3
Directional dependence	5.4
Fire sensitivity	5.5
Dazzling (operational)	5.6
Dry heat (operational)	5.7
Cold (operational)	5.8
Damp heat cyclic (operational)	5.9
Damp heat steady state (endurance)	5.10
Sulphur dioxide (SO_2) corrosion (endurance)	5.11
Shock (operational)	5.12
Impact (operational)	5.13
Vibration, sinusoidal (operational)	5.14
Vibration, sinusoidal (endurance)	5.15

flame detectors

Table 1 — Test Schedule

Test	Clause
Variation in supply parameters (operational)	5.16
Electrostatic discharge (operational)	5.17
Radiated electromagnetic fields (operational)	5.17
Conducted disturbances induced by electromagnetic fields (operational)	5.17
Fast transient bursts (operational)	5.17
Slow high energy voltage surge (operational)	5.17

Annexes to EN54-10
Annex A - Optical Bench Response test
Annex B - Methane Burner
Annex C - Test Fires
Annex D - Dazzle test
Annex E - Impact test apparatus
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 11 manual call points

Scope

This standard specifies the requirements and methods of test for both indoor and outdoor manual call points and includes the appearance and operation for both types A (single action) and B (dual action). It covers simple devices, those fitted with electronic components (e.g. resistors, diodes) and addressable units. This Standard does not cover manual call points for use as intrinsically safe or for in hazardous conditions, where such applications require further requirements or tests. The Colours of various parts of the call point shall be in accordance with 4.7.2.3

Compliance is for the manual call point which shall be verified by visual inspection or engineering assessment and successfully tested as described in clause 5.

Requirements

Each manual call point should be clearly labelled providing information regarding the relevant standard, type, and whether indoor or outdoor version. The normal condition of the call point shall be recognizable by the appearance of the operating face as detailed in 4.7.which shall be flat and shall not be broken, deformed or displaced?

Change from the normal to the alarm condition, will be by the following methods

For type A manual call points, breaking and/or displacing the frangible element together with changing the appearance of the operating face.
For type B manual call points: as above plus manually activating the operating element.

It shall be possible to see that the operating element is in the activated position but not possible to activate it without breaking or displacing the frangible element [see 4.3.2 b)] or without the use of a special tool (see 4.6).

A transparent flap may be fitted over the call point to protect against accidental operation of a type A call point.

manual call points

If Individual alarm indication is provided it shall be positioned on the front of the call point, be red and shall be extinguished when the call point is reset. It shall be visible from a distance of 2 m directly in front of the manual call point in an ambient light intensity up to 500 lx. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the call point is in service mode. The call point shall be marked with the appropriate symbols as detailed in paragraph 4.7.3.

The manual call point shall be reset after operation as follows:

a) for non-resettable frangible elements, by inserting a new element;
b) for resettable frangible elements, by resetting the frangible element.

Furthermore for type B manual call points, it shall only be possible to return it to its normal condition by means of a special tool.

The manual call point shall incorporate a test facility, which will require a special tool to simulate an alarm condition by activating the operating element, allowing the manual call point to be reset without breaking the frangible element. Operating the frangible element shall not cause injury to the operator.

For type B manual call points the actuation force of the operating element shall meet the requirements of EN 894-3:2000.

For manual call points which are software control controlled then the documentation, design, and storage of programs and data will meet the requirements of 4.8.2, 4.8.3 and 4.8.4.

The alarm signal shall respond to the required test, indicated at the supply and monitoring equipment (see 5.1.2) within 10 s after the operating element has been activated.

manual call points

Table 2 — Test Schedule

Test	Clause number
Variation of supply parameters	5.6
Dry heat (operational)	5.7
Dry heat (endurance)	5.8
Cold (operational)	5.9
Damp heat, cyclic (operational)	5.10
Damp heat, cyclic (endurance)	5.11
Damp heat, steady state (endurance)	5.12
SO2 corrosion (endurance)	5.13
Shock (operational)	5.14
Impact (operational)	5.15
Vibration (operational)	5.16
Vibration (endurance)	5,17

manual call points

Table 2 — Test Schedule

Test	Clause number
Electromagnetic compatibility (operational)[a]; i.e. a) electrostatic discharge b) radiated electromagnetic fields c) conducted disturbances induced by electromagnetic fields d) voltage transient, fast transient bursts e) voltage transient, slow high-energy voltage surge	5.18
Enclosure protection	5.19
[a] Test only for manual call points with active electronic components.	

manual call points

Table 2 — Test Schedule

Test	Indoor use	Outdoor use
Variation of supply parameters	x	x
Dry heat (operational)	x	x
Dry heat (endurance)		x
Cold (operational)	x	x
Damp heat, cyclic (operational)	x	x
Damp heat, cyclic (endurance)		x
Damp heat, steady state (endurance)	x	x
SO2 corrosion (endurance)	x	x
Shock (operational)	x	x
Impact (operational)	x	x
Vibration (operational)	x	x
Vibration (endurance)	x	x

manual call points

Table 2 — Test Schedule

Test	Indoor use	Outdoor use
Electromagnetic compatibility (operational)[a]; i.e. a) electrostatic discharge b) radiated electromagnetic fields c) conducted disturbances induced by electromagnetic fields d) voltage transient, fast transient bursts e) voltage transient, slow high-energy voltage surge	x	x
Enclosure protection		x

Annexes to EN54-11
Annex A- Test apparatus (for operation)
Annex B - Test apparatus (for non-operation)
Annex C- Test apparatus for impact test
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 12 smoke detectors - line type

Scope

This European Standard specifies requirements, test methods and performance criteria for line type smoke detectors utilising the attenuation of an optical beam, for use in fire detection systems. The detector will consist of a transmitter and a receiver and may include reflector(s).

Requirements

Compliance, for the detector to meet the requirements of this clause, shall be verified by visual inspection or engineering assessment and successfully tested as described in clause 5.

Individual alarm indication shall be provided via a red visual indicator which shall be extinguished when the detector is reset.

The manufacturer's settings should not be accessible to change without the need for a password, special tool or by the breaking or removal of a seal.

If on site adjustment of the detectors response type is provided, then the factory setting, which complies with this standard, should be clearly displayed for each detector and should only be accessible to change with a password or special tool or by the removal of the detector from its base.

Any settings which are not compliant with this standard shall only be accessible by the same means and it should be clearly displayed, either on the detector or in data format, the detector does not comply with this standard. The adjustments may be carried out either at the detector or via the control and indicator equipment.

Monitoring of detachable detectors shall be provided by which removal of the detector from its base without some form of indication is not possible.

A fire alarm signal shall have priority over faults resulting from a rapid change in obscuration or by a result of the limit of compensation being reached.

smoke detectors - line type

Configuration data relevant to the compliance with a standard shall be stored in non-volatile memory and access shall be password protected or by use of a special tool and shall only be possible when the device is taken out of normal service.

The detectors shall be tested in accordance with the test schedule in Table 1 and include the following test which are applicable to linear) beam) type smoke detectors.

Directional dependence, whereby the detector is tested to show that small inaccuracies in alignment do not affect its performance.

Slow changes in attenuation whereby the detector is tested to ensure that it can detect a slowly smouldering fire despite any sensitivity compensation applied to counter the effects of contamination of the optical components.

Optical path length dependence, whereby the detector is tested to show that the response threshold does not change significantly over the stated minimum and maximum optical path length.

Tests are conducted ensuring its sensitivity to a broad spectrum of fires likely to be encountered in various types of buildings and applications.

smoke detectors - line type

Table 1 — Test Schedule

Test	Clause
Reproducibility	5.2
Repeatability	5.3
Directional dependence	5.4
Variation of supply parameters	5.5
Rapid changes in obscuration	5.6
Slow changes in obscuration	5.7
Optical path length dependence	5.8
Fire sensitivity	5.9
Stray light	5.10
Dry heat (operational)	5.11
Cold (operational)	5.12
Damp heat, steady state (operational)	5.13
Damp heat, steady state (endurance)	5.14
Vibration (endurance)	5.15

smoke detectors - line type

Table 1 — Test Schedule

Test	Clause
Electrostatic discharge (operational)	5.16
Radiated electromagnetic fields (operational)	5.16
Conducted disturbances induced by electromagnetic fields (operational)	5.16
Fast transient bursts (operational)	5.16
Slow high energy voltage surges (operational)	5.16
Sulphur dioxide SO2 corrosion (endurance)	5.17
Impact (operational)	5.18

Annexes to EN54-12

Annex A - Smoke test for response threshold value measurements
Annex B – Fire test room
Annex C – Smouldering pyrolysis wood fire TF2
Annex D – Glowing Smouldering Cotton TF3
Annex E – Flaming Plastic (polyurethane) fire TF4
Annex F – Flaming liquid (n-heptane) fire TF5
Annex G –Stray light test set up
Annex H - Glowing smouldering cotton fire (TF3)
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 13 compatibility assessment of system components

Scope

This document specifies the requirements for the compatibility and connectability of system components that comply with the requirements of EN 54 or with their specification in the absence of an EN 54 standard and includes system requirements only when these are necessary for compatibility assessment. It also specifies requirements for the integrity of the fire detection and fire alarm system when connected to other systems.

Requirements

Compliance with this standard requires the system design and compatibility of its components to meet the requirements of this clause. This shall be verified by assessment (5.1) with regard to the documentation (4.7), and shall be successfully tested (if necessary) as described in 5.2 to 5.5. System requirements can also be stated in national application guidelines /codes of practice. Suppliers of components must ensure that they meet the requirements of this document and the relevant part of EN 54 and also the requirements of the application guidelines of the countries where the components are intended to be used.

Networked systems

A fault in a single fire alarm control panel shall not affect other control units. A single fault on a transmission path connecting control panels shall not adversely affect the functionality of the network. Where more than a single fault results in control panels being disconnected it shall be clearly displayed which panels are affected. All faults shall be indicated. Where there is justification, e.g. a high life risk the standard suggests that at each control panel there be a facility to communicate with the fire brigade, should 2 simultaneous transmission faults occur, disconnecting a panel from the network and the main control panel.

A fire alarm condition shall be indicated on the main control panel within 20 s and a fault within 120s.

compatibility assessment of system components

The means provided for minimizing the effect of a fault on a transmission path shall complete the restoration within 300 s. The main control panel shall at least indicate general conditions as defined in EN 54-2.

At the main control panel it shall be possible to identify the panel from which the signal originated.

At the main panel, it may be possible to operate controls which are found on the individual panels, but only with the same affects. Any software that is used for networking shall conform to EN 54-2:1997, Clause 13.

Compatibility can be achieved if essential components (type 1) operate within the specified limits in the relevant part of EN54, whereas essential components not covered by an EN54 standard shall conform to EN54-1, clause 4 and meet the EMC immunity requirements of EN50130-4. For a non-essential component (type 2), such as a printer, to be connected, then such a device must in no way jeopardise the operation of the system.

Input and output devices for connection to a fire protection system are considered as type 1.

Assessment methods and tests

A theoretical analysis to assess the compatibility of components when interconnected will take place and the outcome will indicate whether a physical test is required. (Annex C provides an example). EMC testing will be carried out if thought necessary.

Functional test for compatibility

This test is to prove compliance of components in a specified configuration provided by the manufacturer and in accordance with the relevant EN54 part.

compatibility assessment of system components

Annexes to EN54-13

Annex A - Function of a Fire Detection and Alarm System
Annex B – Classification of component types 1 and 2
Annex C – Example methodology for theoretical assessment

part 16 voice alarm control and indicating equipment

Introduction

This standard covers the requirements for the construction and performance for voice alarm control and indicating equipment for use in fire detection and fire alarm systems where the audible signal is in the form of tone(s) and/or voice message(s).Those parts of the system concerning audibility and intelligibility, are not covered in this standard. Consideration should be given to the requirements of an overall system that may affect the design and which may be specified in another part of EN 54, in national legislation, codes and standards or in contractual documents.

Requirements

A voice alarm system, when forming part of the fire detection and fire alarm system provides an audible fire alarm signal. Such a system will require voice alarm control and indication in order to react to an incoming alarm and subsequently generate and broadcast a message. The two systems may share an integrated form of control or be separate.

This standard being similar in structure to part 2 stipulates those functions that are mandatory, as well as those which are optional. As in part 2 the optional functions may be specific to certain applications

When the systems are truly integrated they may share common indications, manual controls and outputs (see Annex F); however a single fault affecting the control and indicator panel shall not affect the mandatory functions of the voice alarm system. The indications and manual control(s) of the voice alarm condition shall be clearly identifiable.

The system power supply equipment may be common to both systems but must comply with the requirements of EN 54-4.

The voice alarm control and indicator shall be capable of clearly displaying the following, a quiescent condition; voice alarm condition; fault warning condition and a disablement condition .The control shall be capable of displa-

voice alarm control and indicating equipment

ying, on different alarm zones at the same time, a voice alarm condition; fault warning condition and a disablement condition.

Where specified, all mandatory indications shall be clearly identified and where alpha numeric displays provide additional information for different functional conditions these may be displayed at the same time. Information should be grouped and separated for each condition. A separate power on indicator shall be provided on each enclosure, where they exist. Where further indication is provided it shall be distinguishable and not override the primary indicators. A system normal display may be provided but must not conflict with the above. The voice alarm control shall be capable of receiving and processing alarm signals and generating the appropriate voice alarm outputs within 3s or on the expiry of any delay period.

Annex E provides additional information concerning the interface between the voice alarm and the fire alarm controllers. The voice alarm control shall provide a fault warning within 100 s of the occurrence of a fault, unless specified differently in this European Standard or in other parts of EN 54. The voice alarm control may have provision for at least one spare power amplifier which should replace the faulty equipment within 10 secs of the fault being detected. The spare should be supervised when not in use.

A common fault warning shall be provided if there is a condition relating to any short circuit or interruption in a voice alarm transmission path, including the microphone and loudspeakers, even where the fault does not affect the operation of loudspeakers; and to any fire alarm devices when used, and the failure of any power amplifier.

The mandatory indications and/or outputs shall not be corrupted by multiple alarm signals when received simultaneously, either automatically or manually. Where the voice and fire alarm systems are separate, failure of the transmission path between the two

voice alarm control and indicating equipment

shall not result in any loss of control or change of state of the voice alarm, without indication being provided.

The audible alarm (message) may be delayed, up to a maximum of 10 minutes but may be over-ridden manually. Delays can be turned on/off manually or automatically, with the applicable level of access and a separate and discreet indicator or display shall be visible when an alarm occurs when the delay is turned on. The display will be cancelled when the alarm message is broadcast. The system can be configured for phased warning broadcasts, which can be switched on and off with the applicable level of access.

Where the voice alarm condition has been triggered from the fire alarm control, the message broadcast may be silenced and reset from the same control panel; incomplete messages will be completed before being silenced. The silence function should be reversible and messages rebroadcast when required. Any parts of the system which remain in alarm after rest shall be redisplayed within 20 secs.

In addition to the voice alarm outputs the control may have provision for the automatic transmission of fire signals to other devices such as beacons and tactile devices. It shall be possible to deactivate and reactivate these with the appropriate level of access, but not automatically.

The alarm broadcast may be manually activated, zone by zone, or in groups of zones with the appropriate access level. Manual activation will activate all mandatory inputs and outputs. Indication that a voice alarm condition exits in each zone shall be provided and may be via a led and/or LCD display. Fault and disablement conditions can be displayed in similar fashion.

The voice alarm control may be interfaced to external control device(s) such as those required by local regulations; such interfaces shall provide only limited access and the mandatory functions of the voice alarm control

voice alarm control and indicating equipment

shall not be overridden. Any faults in the transmission path between the two shall not prevent the operation of the mandatory functions, and shall display a warning if such a fault occurs.
The external control devices should comply with available local codes, European Standards or national standards.

The voice alarm control may contain emergency microphones which shall have priority over all inputs, including pre-recorded messages. Access will be by an appropriate level. Where a pre-alarm tone precedes the activation of the microphone an adjacent indicator will display when the microphone becomes active.

When the emergency microphone is in use any audible indication that causes any interference shall be automatically muted. Where multiple microphones are provided they shall be configured via appropriate access level and only a single microphone can be in use at any one time. Pre-recorded messages shall be stored in non-volatile memory.

All mandatory Indicators shall be visible at 3 m distance for general indications and the supply of power and at 0, 8 m distance for others. If flashing indications are used, both the on and off periods shall be a minimum of 0,25 s, and the flash frequency shall be a minimum of 1 Hz for voice alarm indications and 0,2 Hz for fault indications.

If the same led's are used for the indication of faults and disablements, fault indications shall flash and disablement shall be steady. Mandatory indications on an alphanumeric display shall be legible for at least one hour following the display of a new indication of an alarm and 5 min for fault or disablement conditions, at 0,8 m distance, in ambient light of 5 lux to 500 lux. The colours of the general and specific led's shall be red for alarms, yellow for fault, and disablements and green for power. Where voice alarm automatic message status indicators are provided, it might be advantageous to differentiate between evacuation and alert message with red for emergency messages and yellow for alert messages.

voice alarm control and indicating equipment

Table 1 — Test schedule on voice alarm control equipment

Test	Subclause number
Output power	16.4
Signal-to-noise ratio	16.5
Frequency response of Voice alarm control without microphone(s)	16.6
Frequency response of Voice alarm control with microphone(s)	16.7
Cold (operational)	16.8
Damp heat, steady state (operational) Operational 16.9	16.9
Damp heat, steady state (endurance)	16.10
Impact (operational)	16.11
Vibration, sinusoidal (operational)	16.12
Vibration, sinusoidal (endurance)	16.13
Supply voltage variation (operational)	16.14
Electromagnetic Compatibility (EMC), Immunity tests (operational)	16.15[a]

[a] Visible and audible indications of purely transitory nature are allowed during the application

voice alarm control and indicating equipment

Annex to EN54-16

Annex A - Explanation of Access levels
Annex B – Optional functions
Annex C – Design Requirements for software controlled systems
Annex D – General Information
Annex E – Interface between Fire and Voice Alarm controls
Annex F – Common Indications, controls and outputs in combined systems
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 17 short circuit isolators

Introduction

The purpose of a short-circuit isolator is to limit the consequences of faults in fire alarm circuits, both loops and spurs. Sections of these circuits are separated by installing short circuit isolators at strategic locations, and where applicable in accordance with the national standard of the country of installation where such a standard exists, or where there is no country standard then to the European standard, CEN/TS54-14, or ISO 7240-14.

In addition the short circuit isolators should be installed in accordance with the system manufacturers design limitations to ensure that circuits are not overloaded such as to create volt drop which is also likely to cause similar problems and jeopardise the correct operation of components.

Scope

This standard specifies the requirements and methods of test for short circuit isolators, for use in fire detection and fire alarm systems. Compliance shall be verified by visual inspection or engineering assessment and successfully tested as described in clause 5. However, for short circuit isolators which are integrated into other devices already covered by an existing European Standard the environmental conditioning shall be performed in accordance with that EN.

Requirements

If the short-circuit isolator incorporates an integral status indicator then this shall not be red.

Where it provides protection to ancillary devices, failures of these connections shall not prevent the correct operation of the short circuit isolator. If the isolating device is detachable (i.e. it is attached to a mounting base), then a means shall be provided to detect the removal of the device from the base in order to give a fault signal. It shall not be possible to change the manufacturer's settings or provide for on-site adjustment of the short-circuit

short circuit isolators

isolator without the use of a code or special tool. For each setting the short circuit isolator shall comply with the requirements of this European Standard.

The functional testing is to verify operation within the manufacturer's specification and to test each condition claimed to cause it to operate and at the maximum specified current. The isolator should open circuit when detecting a short circuit condition and /or excess current causing a volt drop below a level at which the devices will function correctly.

short circuit isolators

Table 1 — Test schedule

Test	Clause
Reproducibility	5.2
Variation in supply voltage	5.3
Dry heat (operational)	5.4
Cold (operational)	5.5
Damp heat, cyclic (operational)	5.6
Damp heat, steady state (endurance)	5.7
Sulphur dioxide (SO2) corrosion (endurance)	5.8
Shock (operational)	5.9
Impact (operational)	5.10
Vibration, sinusoidal (operational)	5.11
Vibration, sinusoidal (endurance)	5.12
Electrostatic discharge (operational)	5.13
Radiated electromagnetic fields (operational)	5.13

short circuit isolators

Table 1 — Test schedule

Test	Clause
Conducted disturbances induced by electromagnetic fields	5.13
Fast transient bursts (operational)	5.13
Slow high energy voltage surge (operational)	5.13

Annex to EN54-17
Annex A – Examples of testing procedure
Annex B – Impact Test
Annex ZA – deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 18 input/output devices

Scope

This Standard specifies the requirements, test methods and performance criteria for input/output devices connected to a fire detection and fire alarm system, which may transmit and/or receive signals which are, necessary for the operation of the fire detection and fire alarm system and/or fire protection system.

An input/output device may be physically separate or its function may be integrated into another device. Control and indicating equipment and ancillary control and indicating equipment (e.g. repeater panels and fire brigade panels) are not covered by this Standard.

Compliance

In order to comply with this Standard, the input/output devices shall be verified by inspection and engineering assessment and shall be successfully tested as described in Clause 5. If the input/output device is detachable then a means shall be provided to detect the removal of the device from its base in order to give a fault signal.

Introduction

The term input/output devices cover a wide range of different types of devices whose applications are different. These may include, digital inputs, monitored inputs for voltage, together with relay outputs, voltage outputs or solid state drivers to switch external devices.

This Standard does not therefore include detailed functional requirements for the devices themselves but requires that their function is sufficiently specified by the manufacturer and that they function correctly in accordance with that specification.

Devices shall be supplied with sufficient data to ensure their correct installation and operation. This data shall include the parameters necessary to define the input and/or output functions (e.g. output voltage and current ratings, alarm and fault trip levels and logic levels).

For devices which rely on software control, these shall meet the requirements of 4.5.2, 4.5.3 and 4.5.4.

input/output devices

Table 1 — Test schedule for input/output devices

Test	Clause
Performance and variation of supply parameters	5.2
Dry heat (operational)	5.3
Cold (operational)	5.4
Damp heat, cyclic (operational)	5.5
Damp heat, steady state (endurance)	5.6
SO2 corrosion (endurance)	5.7
Shock (operational)	5.8
Impact (operational)	5.9
Vibration (operational)	5.10
Vibration (endurance)	5.11
Electromagnetic Compatibility (EMC), immunity tests	5.12

input/output devices

Annex to EN54-18

Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 20 aspirating smoke detectors

Scope

This Standard specifies the requirements, test methods and performance criteria for aspirating smoke detectors for use in fire detection and fire alarm systems.

Aspirating smoke detectors are used for the protection of more special and specific risks.

There are some aspects of the detectors functionality therefore not covered by this standard.

An aspirating smoke detector is one in which air and aerosols are drawn through a sampling device and carried to one or more smoke sensing elements by an integral fan or pump.

To comply with this standard the detector shall meet the requirements of this clause, which shall be verified by inspection and engineering assessment, and, when successfully tested in accordance with those described in Clause 6.

Requirements

Individual alarm indication shall be provided outside of the detector via a red visual indicator which shall be extinguished when the detector is reset. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the detector is in service mode.

The response of an aspirating smoke detector is dependent upon both the sensitivity settings of the smoke sensing element and the design of the sampling device; e.g. pipework and sampling points. In some detectors the smoke sensing sensitivity can be adjusted in order to suit the application and sampling device.

The manufacturer's settings should not be accessible to change without the need for a password, special tool or by the breaking or removal of a seal. The adjustments may be made at the detector or at the control and indicating equipment.

aspirating smoke detectors

Changing the sensitivity settings can affect the classification of the installed detector. If it is possible to reconfigure the detector such that it no longer complies with the standard, then this shall be clearly marked on the detector or in the associated data. The provision of "drift compensation" to counter the effects of a build-up of dirt in the detector, and /or the provision of algorithms to suit an environment shall not significantly reduce the detector's sensitivity to slowly developing fires.

The sampling pipes and fittings shall have adequate mechanical strength and temperature resistance in accordance with EN 61386-1 to at least Class 1131. Pipes which are not classified by the manufacturer of the detector shall either be tested, as part of the approval, or be supported by evidence that the requirements of this standard are met.

An airflow fault signal will be generated, within 300secs, when the flow is outside the manufacturer's operational limits. The airflow shall be monitored to detect leakage or obstruction of the sampling device or pipework sampling point(s). This time is additional to any delay between signalling the fault and its indication at the control panel and is to allow for spurious short term flow variations which would otherwise cause unwanted fault signals.

The power for the aspirating detector shall be supplied by a separate power supply complying with EN 54-4 which may be within the main control and indicating equipment.

Aspirating Smoke Detector systems are classified based upon the sensitivity setting as shown in the table below. The method used for determining the classification is likely to take into account the sizes and number of sampling points, their position along the sampling device/pipe, the sensitivity of the detector and the sampling device/ pipework arrangement and its length.

aspirating smoke detectors

Classification table for aspirating smoke detectors

Class	Description	Example application(s)
A	Aspirating smoke detector providing very high sensitivity	Very early detection: the detection of very dilute smoke for example entering air conditioning ducts to detect the extremely dilute concentrations of smoke that might emanate from equipment in the environmentally controlled area such as a clean room.
B	Aspirating smoke detector providing enhanced sensitivity	Early detection: for example special fire detection within or close to particularly valuable, vulnerable or critical items such as computer or electronic equipment cabinets.
C	Aspirating smoke detector providing normal sensitivity	Standard detection: general fire detection in normal rooms or spaces, giving, for example, at least an equivalent level of detection as a point or beam type smoke detection system.

The detectors shall be tested according to the test schedule in the following table.

aspirating smoke detectors

Test schedule

Test	Clause
Repeatability	6.2
Reproducibility	6.3
Variation of supply voltage	6.4
Dry heat (operational)	6.5
Cold (operational)	6.6
Damp heat, Steady State (operational)	6.7
Damp heat, Steady State (endurance)	6.8
SO2 corrosion (endurance)	6.9
Shock (operational)	6.10
Impact (operational)	6.11
Vibration (operational)	6.12
Vibration (endurance)	6.13
Electromagnetic compatibility, Immunity tests	6.14
Fire sensitivity	6.15

aspirating smoke detectors

Fire test requirements for multi-class detectors

Detector Class	Combination of configurations	Configuration to be used	Test fires to be applied (see Annexes B to H)
A only	Config A	Config A	TF2A, TF3A, TF4, TF5A
B only	Config B	Config B	TF2B, TF3B, TF4, TF5B
B only	Config C	Config C	TF2, TF3, TF4, TF5
B and C	Config B = Config C	Config B/C	TF2B, TF3B, TF4, TF5B
B and C	Config B ≠ Config C	Config B Config C	TF2B, TF3B, TF5B TF2, TF3, TF4, TF5
A, B and C	Config A = Config B = Config C	Config A/B/C	TF2A, TF3A, TF4, TF5A
A, B and C	Config A = Config B ≠ Config C	Config A/B Config C	TF2A, TF3A, TF4, TF5A TF2, TF3, TF4, TF5
A, B and C	Config A ≠ Config B = Config C	Config A Config B/C	TF2A, TF3A, TF5A TF2B, TF3B, TF4, TF5B
A, B and C	Config A ≠ Config B ≠ Config C	Config A Config B Config C	TF2A, TF3A, TF5A TF2B, TF3B, TF5B TF2, TF3, TF4, TF5

"Config A" means the worst case configuration for the Class A testing;
"Config B" means the worst case configuration for the Class B testing;
"Config C" means the worst case configuration for the Class C testing;
"=" means that configurations are the same (e.g. Config A = Config B means that the same configuration is used for the Class A testing as for the Class B testing);
"≠" means that configurations are different (e.g. Config B ≠ Config C means that a different configuration is used for the Class B testing than for the Class C testing).

aspirating smoke detectors

Annex to EN54-20

Annex A – Response threshold values
Annex B – Test Fire TF2
Annex C - Test Fire TF2A and B
Annex C - Test Fire TF2A and B
Annex D - Test Fire TF3
Annex E - Test Fire TF3A and B
Annex F - Test Fire TF4
Annex G - Test Fire TF5
Annex H - Test Fire TF5A and B
Annex I – Fire test room
Annex J – Slow developing Fires
Annex K – Air Flow test
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 21 alarm transmission and fault warning routing equipment

Scope

This Standard specifies the requirements, test methods and performance criteria for fire alarm and fault routing transmission equipment for use with fire detection and fire alarm systems. If functions other than those specified in this Standard are provided, they shall not jeopardize the functionality required for compliance. Transmission equipment can be type 1 where a dedicated alarm path exists and type 2 for a digital communicator using the public switched telephone network, both in accordance with EN50136-1-1.

Requirements

The alarm transmission routing equipment shall be capable of receiving fire alarm signals from the Control and indicator panel and faults from the transmission network which together with acknowledgements from the alarm receiving centre will be transmitted to the control and indicator panel. It shall also be capable of transmitting fire alarm signals to the alarm receiving centre.

The fault warning routing equipment shall be capable of receiving fault warning signal from the control and indicator panel and from the transmission network and transmitting faults to both the control and indicator panel and the alarm receiving centre.

Indication of signals shall be provided at the transmission equipment, via led's, or at the control and indicator equipment for both the received acknowledgement signal from the alarm receiving centre as defined in EN 50136-2-1 and at least one common fault warning be used to indicate the following:

1) if the acknowledgement signal is not received at the routing equipment within 100 s for type 1 and 240 s for type 2 of the initiation of the transmitted fire alarm.

2) a failure within the routing equipment (e.g. power supply failure).

3) a failure within the alarm transmission network.

alarm transmission and fault warning routing equipment

4) where the routing equipment and the fire alarm control panel are in separate enclosures and where a fault exists on the interconnection path, a fault signal shall be indicated locally and transmitted to the alarm receiving centre.

The routing equipment enclosure shall be of robust construction, consistent with the recommended installation method and shall be a minimum of IP30 of EN 60529.
All light emitting indicators shall be clearly labelled with the information being legible at 0, 8 m distance in an ambient light intensity from 100 lux to 500 lux. If flashing indications are used, the on off-periods shall be a minimum of 0, 25 s and the flash frequency not less than 0, 2 Hz for fault indications. The light-emitting indicators shall be yellow for fault and red for the indication of the acknowledgement. All terminals and fuses shall be clearly labelled.

If the processing and transmission of fire and fault signals is achieved in separate equipment then both can operate simultaneously. If the signals are combined in a single piece of equipment then the fire signal shall take priority. A fault in any transmission path between the routing equipment and the transmission network (as defined in EN 50136-1-1) shall not affect the routing equipment or any other transmission path.

The power supply for the transmission equipment shall be in accordance with EN54-4. If the power supply is within a separate enclosure then duplicate paths will be arranged so that failure in one does not isolate the transmission equipment. The change over from the primary to standby power supply shall not affect any indications other than those specifically associated with power supplies. Any provision for disconnecting or adjusting the power supply to the equipment will not be readily accessible, without the required access.

Access shall be provided on the routing equipment, from level 1 (most acces-

alarm transmission and fault warning routing equipment

sible) to level 4 (least accessible). Manual controls and other functions shall be grouped on the appropriate access level, as specified in EN 54-2.

Environmental tests

Test	**Clause number**
Cold	10.4
Damp heat, steady state, (operational)	10.5
Impact	10.6
Vibration, sinusoidal, (operational)	10.7
Electromagnetic compatibility (EMC) immunity tests	10.8
Supply voltage variations	10.9
Damp heat, steady state, (endurance)	10.10
Vibration, sinusoidal, (endurance)	10.11

alarm transmission and fault warning routing equipment

Annex to EN54-21

Annex A – Performance requirements for type 1 and 2 systems
Annex B – Verification of performance requirements
Annex C – Design requirements for software
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 23 fire alarm devices – visual alarm devices

Introduction

This Standard specifies the requirements, test methods and performance criteria for visual alarm devices in a fire detection and alarm system which are intended to signal a warning of a fire.
It applies only to pulsing or flashing visual alarm devices, such as xenon or rotating beacons.

In order to comply devices shall meet the requirements of Clause 4, which shall be verified by visual inspection or engineering assessment and shall be successfully tested as described in Clause 5.

Requirements

The purpose of a visual fire alarm device is to warn persons within, or close to a building of the outbreak of a fire. This Standard allows manufacturers to specify devices in terms of the range at which the required illumination is met. Three categories are defined; for ceiling and wall mounted devices and an open category. The maximum range of the visual alarm device is tested by measuring its light output in the surrounding hemisphere. As the light output can vary over time a test is made to check that any variation is acceptable. This Standard gives common requirements for the construction as well as for their performance under varying conditions Devices are classified as Type A, indoor and Type B, outdoor. The degree of protection provided by the enclosure shall be IP21 for Type A and IP33 for type B, in accordance with EN 60529.

The device shall be rated for a minimum of 100 hours which will not affect its ability to cycle on and off as required as part of the compliance testing. This requirement does not apply to the capacity of any integral batteries used as a means of providing local standby power. The capacity and charging requirements of such batteries should meet the requirement of the system.

Access to the device shall be restricted by the use of special screws or tools and it should not be possible to change the manufacturer's settings without

fire alarm devices – visual alarm devices

use of the same or by breaking a seal.
If on site adjustment of the device settings is provided, then the factory setting, which complies with this standard, should be clearly displayed for each. Any settings which are not compliant with this standard shall only be accessible by the same means and it should be clearly displayed, either on the device or in data format that the device does not comply with this standard. The adjustments may be carried out either at the device or via the control and indicator equipment.

Visual alarm devices shall meet the requirement for coverage as either a 'C', ceiling mounted, or 'W', wall mounted, or 'O', open class device.

Category C devices shall be further specified as C-x-y where: x is either 3, 6 or 9 and is the maximum ceiling mounting height in metres and y is the diameter, in metres, of the coverage. e.g. C-3-12 would represent a 12 metre diameter coverage when mounted at 3 metres
Category W devices shall be further specified as W-x-y where x is the maximum wall mounting height in metres, with a minimum value of 2.4 m; and y is the width of a square room, in metres covered by the device. e.g. W-2,4-6 represents a device mounted at a height of 2.4m in a room measuring 6mx6m.
For category O devices the coverage volume in which the required illumination is achieved shall be specified.

The visual alarm device shall produce either red or white light of at least 1 candela for 70 % of all measurement points and shall not exceed 500 cd for any measurement points. The flash rate shall be between 0.5 and 2 Hz measured at 10 % of the peak values of consecutive leading edges of the first pulse of each flash. The maximum on time, measured between the leading and trailing edge shall not exceed 0.2 s. The light temporal pattern and frequency of flashing may vary in different countries and therefore reference needs to be made to local regulations.
Flashing lights may require synchronization to prevent the possibility of a flash frequency/temporal pattern; that could adversely affect some occu-

fire alarm devices – visual alarm devices

pants inducing epileptic fits when multiple devices are within a field of view. In such cases, devices shall meet the requirements of the test described in 5.3.7.

Technical data regarding both installation and maintenance should be provided with each device or in supporting documentation.

fire alarm devices – visual alarm devices

Table 1 — Test schedule

Test [c]	Clause
Reproducibility	5.1.7
Duration of operation	5.2.1
Enclosure protection	5.2.4
Coverage volume	5.3.1
Variation of light output	5.3.2
Synchronization (option with requirements)	5.3.7
Dry heat (operational)	5.4.1.1
Dry heat (endurance)	5.4.1.2
Cold (operational)	5.4.1.3
Damp heat, cyclic (operational)	5.4.2.1
Damp heat, steady state (endurance)	5.4.2.2
Damp heat, cyclic (endurance)	5.4.2.3
Shock (operational)	5.4.3.1

fire alarm devices – visual alarm devices

Table 1 — Test schedule

Test [c]	Clause	
Impact (operational)	5.4.3.2	
Vibration (operational)	5.4.3.3	
Vibration (endurance)	5.4.3.4	
SO2 corrosion (endurance)	5.4.4	
Electromagnetic compatibility (EMC), immunity (operational): · Electrostatic discharge · Radiated electromagnetic fields · Conducted disturbances induced by electromagnetic fields · Voltage transients fast transient bursts · Voltage transients slow high energy voltage surge	5.4.5 [b]	

[b] The EMC tests specified in 5.4.5 are not required for devices which do not rely on active electronic components for their operation.

[c] The tests on an individual specimen may be carried out in any order except that the reproducibility test (5.1.7) shall be performed first on all specimens and the tests on specimen 2 shall be carried out in the order listed, except for the enclosure protection test, 5.2.4, which shall be conducted last.

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fire alarm devices – visual alarm devices

Annexes to EN54-23

Annex A – Measuring light distribution
Annex B – Comparative light output measurement
Annex C – Light test chamber
Annex D – Flammability test requirements
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 24 components of voice alarm systems - loudspeakers

Introduction

This Standard specifies the requirements, test methods and performance criteria for voice alarm loudspeakers for use with fire detection and fire alarm systems .For compliance, voice alarm loudspeakers shall be verified by visual inspection or engineering assessment and shall be successfully tested as described in Clause 5.

The purpose of a voice alarm loudspeaker is to provide intelligible warning to person(s) of a fire, whilst at the same time advising appropriate methods of evacuation. Providing such information speeds up a person's response time to an incident, removes uncertainty, allowing evacuation times to be reduced. Voice alarm loudspeakers need to achieve a minimum acoustical performance, as well as constructional and environmental requirements, to be suitable for use in fire detection and fire alarm systems.

Requirements

This standard recognizes that the performance of voice alarm loudspeakers will vary according to the nature of the space into which they are installed. It therefore specifies the minimum requirements and a common method for testing their operational performance against parameters specified by the manufacturer.

As the types of loudspeaker included are electromechanical devices without sensitive electronics, electromagnetic compatibility (EMC) tests are excluded. Loudspeakers are suitable for either indoor, type A or outdoor, type B, applications as specified. Type B loudspeakers can be beneficial in some indoor situations where high temperature and/or humidity are present. For type A the degree of protection required is to IP21 and for type B, IP33 of EN 60529.

Loudspeakers suitable for special applications or hazardous areas are not covered by this standard.

components of voice alarm systems - loudspeakers

The voice alarm loudspeaker shall be rated for a minimum of 100 hours operation at the rated noise power specified by the manufacturer. Access to the device will be limited and require special tools, codes, or be restricted by the use of hidden screws or seals.

Voice alarm loudspeakers shall be clearly marked and in addition to the standard data, detailed in the overview shall contain information relative to the rated noise voltage for transformer-coupled loudspeakers; the rated impedance for direct-coupled loudspeakers; the rated noise power at the highest power setting; and the various power settings (e.g. transformer tapping options for transformer-coupled loudspeakers).

Some loudspeakers are a combination of one or more housings together with a termination box and an interconnecting cable. The housing(s), cable(s) and terminal box should be considered to be 'the loudspeaker' for the purposes of this Standard. Examples include: pendant types and those with adjustable orientation such as horn or column loudspeakers and loudspeaker arrays.

The maximum sound pressure level is expressed in dB and measured at a distance of 4 metres from the reference point on the reference axis over a period of at least 30s. The loudspeaker shall be deemed to conform to the rated sound pressure test if the sound pressure level is greater or equal to the value specified by the manufacturer.

The loudspeakers shall be constructed using materials capable of withstanding the tests detailed in clause 5.

Plastic materials shall conform to EN60695-11-10 when operating on a voltage ≤ 30V RMS or 42.4 V dc with less than 15 watts of power, or, EN 60695-11-20 when operating on a voltage ≥ 30V RMS or 42.4 V dc with less than 15 watts of power.

components of voice alarm systems - loudspeakers

Table 1 — Schedule of tests

Test c	Subclause
Reproducibility (frequency response / sensitivity)	5.2
Rated impedance	5.3
Horizontal and vertical coverage angles	5.4
Maximum sound pressure level	5.5
Rated noise power (durability)	5.6
Dry heat (operational)	5.7
Dry heat (endurance)	5.8
Cold (operational)	5.9
Damp heat, cyclic (operational)	5.10
Damp heat, steady state (endurance)	5.11
Damp heat, cyclic (endurance)	5.12
SO2 corrosion (endurance)	5.13
Shock (operational)	5.14

components of voice alarm systems - loudspeakers

Table 1 — Schedule of tests

Test c	Subclause
Impact (operational)	5.15
Vibration, sinusoidal (operational)	5.16
Vibration, sinusoidal (endurance) 5.17 7	5.17
Enclosure protection	5.18

components of voice alarm systems - loudspeakers

Annexes to EN54-24

Annex A – Acoustical Measurements
Annex B – Rated noise power
Annex C – Physical references
Annex ZA; deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 25 components using radio links

Introduction

The purpose of this Standard is to define additional requirements to other parts of EN 54 that allow compliant radio fire detection systems and components to be at least as efficient and stable as approved wired fire detection systems. Systems and components are covered because it is difficult to describe the components separately. Limitations with respect to the use of radio components may be specified in national technical rules or guidelines and consideration should be given to the frequencies, bands and channels used by radio based systems. The requirements in this standard shall apply together with those in other parts of EN54 where the component has the same function as that covered in the other standard, and when not specifically covered in this standard. e.g. A heat detector installed on a wireless system will comply with EN54-5

Scope

This Standard specifies the requirements, test methods and performance criteria for both systems and components used in fire alarms systems which use radio frequency links to communicate. Compliance with this standard requires the components to meet these requirements which shall be verified by visual inspection or engineering assessment, and successfully tested as described in Clause 8.

Where combined wired and radio systems are used the relevant part of EN54 together with this standard will both apply. The requirements for wired systems are superseded or modified by this standard. This document does not cover those issues which relate to national regulations which may vary from country to country, and which may include frequencies, power and limitations of losses on circuits or radio links.

components using radio links

Requirements

The manufacturer shall provide a safeguard to ensure any attenuation, which may be caused by differing influences on site, does not affect the radio link in such a way as to prevent communication between components. The limits will be at least 10dB for frequencies up to 10MHz and as defined in Annex B for frequencies greater than 10MHz. The system shall use a secure transmission protocol which ensures that signals are not lost. Each component will be marked individually as an indication that they belong to the same system and components belonging to different systems should not be compatible.

The system should demonstrate immunity to its own radio influences and others on the spectrum. Those produced as a result of electromagnetic affects are covered by those guidelines in EN50130-4. Influences as a result of a direct attack is not covered or required in the EN54 standards. Where two or similar systems from the same manufacturer are operating within range it shall be ensured that they do not affect each other. The manufacturer shall also ensure that signal transmission is possible, without causing interference, even if other users are working in the same band. Interference to a single receiver shall not cause alarm or fault messages at the control equipment. If any radio linked component is unable to transmit a message to the CIE within EN 54-2 defined periods it shall be indicated in less than 100 s.

Power supplied to the components shall be via a primary battery or an external power supply unit complying with EN54-4. Components powered by the independent power source shall be contained within the same enclosure. The battery shall have a minimum life of 3 years. The system requirements shall not cause the battery to discharge below 85% by end of life. The remaining 15 % of the rated capacity takes account of self-discharge of the power source.

All components powered from the independent power source shall be

components using radio links

capable of transmitting a fault signal (low power) before the power source fails whilst still functioning.

Annexes to EN54-25
Annex A – Radio frequency shielded test
Annex B – Immunity to attenuation
Annex C - Autonomous power supply
Annex ZA; deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

part 26 carbon monoxide detectors - point detectors

Scope

The standard specifies the requirements, test methods and performance criteria for point type carbon monoxide fire detectors for use in fire detection and fire alarm systems. This standard applies only to those detectors sensing CO and not those combining other elements, sensing different fire phenomena. The tests are designed for standard detectors and do not cover those which might be construed as special, incorporating non-standard features.

Requirements

Carbon monoxide (CO) is a product of the incomplete combustion of carbon-based materials. CO fire detectors can provide a faster response than other types because CO is dispersed by convection and diffusion. CO fire detectors might also be less prone to unwanted alarms than other fire detection techniques due to the absence of CO in most dusts and vapors.

The objective of this standard is to prove that the sensitivity and reliability fall within acceptable parameters and that such a detector is suitable for use in systems protecting life and/or property.
CO detectors may not be suitable for the early detection of certain classes of fires, typically electrical fires and those likely to flame rather than smoulder. It is recommended that a risk assessment is carried out to ensure the suitability of CO detectors as they should not be considered a direct replacement for smoke detectors, either optical or ionisation.

CO sensing techniques may vary but may be affected by other gases and phenomena. The test schedule for such detectors therefore includes an assessment of their ability to ignore substances that may co-exist in the detectors environment.

CO detectors are beneficial in detecting smouldering fires and therefore the test schedule include test fires TF2 and 3, (EN54-7) only. Both tests have added criterion to enhance their suitability for this type of detector.

carbon monoxide detectors - point detectors

Compliance for the detector to meet the requirements of this standard shall be verified by visual inspection or engineering assessment, or tested as described in clause 5.

Individual alarm indication shall be provided via a red visual indicator which shall be extinguished when the detector is reset. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the detector is in service mode. For detachable detectors the indicator may be in the head or the base and should be visible at a distance of 6 metres directly below the detector in ambient light levels of up to 500 lux. Where there is a connection to remote indicators,control relays etc., failures of these connections shall not prevent the correct operation of the detector.
Monitoring of detachable detectors shall be provided by which removal of the detector from its base without some form of indication is not possible. The manufacturer's settings should not be accessible to change without the need for a password,special tool or by the breaking or removal of a seal.If on site adjustment of the detectors response type is provided, then the factory setting, which complies with this standard, should be clearly displayed for each detector and should only be accessible to change with a password or special tool or by the removal of the detector from its base. Any settings which are not compliant with this standard shall only be accessible by the same means and it should be clearly displayed, either on the detector or in data format,that if these are used the detector does not comply with this standard. The adjustments may be carried out either at the detector or via the control and indicator equipment.

The response of the detector may depend upon the rate of change of CO in the vicinity. Any form of compensation allowing the detector to discriminate between normal CO levels and those indicative of a fire, shall not significantly reduce the detectors ability to detect fire nor make it more susceptible to unwanted alarms.

carbon monoxide detectors - point detectors

The provision of "drift compensation" to counter the effects of ageing of the detector shall not significantly reduce the detector's sensitivity to slowly developing fires. To verify this, an assessment of the detector's response to slowly developing fires shall be made as specified in 5.2.3.

The detector will demonstrate its stability after a number of alarm conditions as specified in clause 5.2.5. Multiple detectors shall demonstrate similar degrees of sensitivity, as specified in 5.2.6.

Those detectors whose performance is tied to software shall conform to the requirements of 4.3.5.2, 3 and 4.

carbon monoxide detectors - point detectors

Table 1 — Test schedule

Test	Clause
Repeatability	5.2.4
Directional dependance	5.2.5
Reproducibility	5.2.6
Air movement	5.2.7
Long term stability	5.3.6
Variations in supply parameters	5.4.1
Dry heat (operational)	5.6.1.1
Dry heat (endurance)	5.6.1.2
Cold (Operational)	5.6.1.3
Damp heat,cyclic (operational)	5.6.2.1
Damp heat, steady state (operational)	5.6.2.2
Damp heat, steady state (endurance)	5.6.2.3
Low humidity, steady state(operational)	5.6.2.4

carbon monoxide detectors - point detectors

Table 1 — Test schedule

Test	Clause
Sulphur dioxide SO2corrosion(endurance)	5.6.3
Shock (operational)	5.6.4.1
Impact (operational)	5.6.4.2
Vibration, sinusoidal(operational)	5.6.4.3
EMC, immunity tests (operational) - Electrostatic discharge - Radiated electromagnetic fields - Conducted disturbances induced by electromagnetic fields - Fast transient bursts - Slow high energy voltage surge	5.6.5.1a
Exposure to high levels of carbon monoxide	5.6.6.1
Exposure to chemical agents at environmental concentrations	5.6.6.2
Fire sensitivity	5.5.1

[a)] In the interests of test economy , it is permitted to use the same specimen for more than 1 EMC test. In that case intermediate functional test(s) on the specimen(s) used for more than one test can be deleted and the functional test conducted at the end of the sequence of tests. However it should be noted that in the event of a failure, it may not be possible to identify which test exposure caused the failure. (see EN 50130-4:2011,clause 4).

carbon monoxide detectors - point detectors

Annexe to EN54-26
Annexe A - Gas Test Chamber spec
Annexe B - CO and Smoke measuring instruments
Annexe C - Fire Test room
Annexe D - Establishing exposure level of chemical agents
Annexe E - Smouldering (pyrolysis) wood fire test (TF2)
Annexe F - Glowing smouldering cotton fire test (TF3)
Annexe G - Construction of Gas test chamber
Annexe H - Apparatus for impact test
Annexe ZA - deals with the clauses of the standard in respect
of their compliance with the mandate of the EU Construction product Regulation

part 29 multi sensor fire detectors - point detectors using both smoke and heat detection

Scope

Multi-sensor fire detectors combining both smoke, (optical or ionisation) detection and heat detection technology and in compliance with this document are classed as general purpose fire detectors. Such detectors can detect both a wider range of fire types whilst being less prone to generating unwanted alarms. For multisensor type devices, additional environmental tests are carried out in order to demonstrate increased stability. Special detectors for special applications are not covered by this standard.It should be noted that in certain countries the use of ionisation detectors is banned due to their being a radioactive source present.

Fire tests include TF1, 2, 5 and 8 in order for the detector to demonstrate its response to the wider range of fires. The detection channels do not individually need to satisfy the requirements of the relevant heat and smoke detection standards, in addition to meeting the requirements of this standard.

Requirements

Compliance for the detector to meet the requirements of clause 4 of this standard shall be verified by visual inspection or engineering assessment, or tested as described in clause 5.
Individual alarm indication shall be provided via a red visual indicator which shall be extinguished when the detector is reset. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the detector is in service mode. For detachable detectors the indicator may be in the head or the base and should be visible at a distance of 6 metres directly below the detector in ambient light levels of up to 500 lux.

Where there is a connection to remote indicators,control relays etc., failures of these connections shall not prevent the correct operation of the detector.

Monitoring of detachable detectors shall be provided by which removal of the detector from its base without some form of indication is not possible.

multi sensor fire detectors - point detectors using both smoke and heat detection

The manufacturer's settings should not be accessible to change without the need for a password,special tool or by the breaking or removal of a seal.If on site adjustment of the detectors response type is provided, then the factory setting, which complies with this standard, should be clearly displayed for each detector and should only be accessible to change with a password or special tool or by the removal of the detector from its base. Any settings which are not compliant with this standard shall only be accessible by the same means and it should be clearly displayed, either on the detector or in data format, that if used the detector does not comply with this standard. The adjustments may be carried out either at the detector or via the control and indicator equipment.

The provision of "drift compensation" to counter the effects of contamination of the detector shall not significantly reduce the detector's sensitivity to slowly developing fires. To verify this, an assessment of the detector's response to slowly developing fires shall be made as specified in 5.2.2.

The detector will demonstrate its stability after a number of alarm conditions as specified in clause 5.2.3.The sensitivity of the detector to both heat and smoke shall not be unduly dependent upon airflow and in this respect will be assessed in accordance with 5.2.4 and 5.

The heat detectors sensitivity in isolation shall not exceed that stated in EN54-5-2000, with amendments, which shall be assessed as detailed in 5.2.6. Detectors used for testing shall demonstrate similar sensitivities, (5.2.7/8) and optical type smoke detectors will not be affected when in close proximity to artificial light as assessed in 5.2.9.

Those detectors whose performance is tied to software shall conform to the requirements of 4.3.6.2, 3 and 4.

multi sensor fire detectors - point detectors using both smoke and heat detection

Table 1 — Test schedule

Test	Clause
Repeatability of smoke response	5.2.3
Directional dependance of smoke response	5.2.4
Directional dependance of heat response	5.2.5
Lower limit of heat sensitivity	5.2.6
Reproducibility of smoke response	5.2.7
Reproducibility of heat response	5.2.8
Air movement	5.2.9
Dazzling	5.4.1
Fire sensitivity	5.5.1
Dry heat (operational)	5.6.1.1
Cold (operational)	5.6.1.2
Damp heat cyclic (operational)	5.6.2.1
Damp heat steady (endurance)	5.6.2.2

multi sensor fire detectors - point detectors using both smoke and heat detection

Table 1 — Test schedule

Test	Clause
Shock (operational)	5.6.3.1
Impact (operational)	5.6.3.2
Vibration , sinusoidal (operational)	5.6.3.3
Vibration , sinusoidal (endurance)	5.6.3.4
Electrostatic discharge (operational) Radiated magnetic fields (operational) Conducted disturbances induced by electromagnetic fields (operational) Fast transient bursts (operational) Slow high energy voltage surge (operational)	5.6.4.1a
Sulphur dioxide SO2corrosion (endurance)	5.6.5.1

[a)] a In the interests of test economy , it is permitted to use the same specimen for more than 1 EMC test.In that case intermediate functional test(s) on the specimen(s) used for more than one test can be deleted and the functional test conducted at the end of the sequence of tests. However it should be noted that in the event of a failure, it may not be possible to identify which test exposure caused the failure. (see EN 50130-4:2011, clause 4).

multi sensor fire detectors - point detectors using both smoke and heat detection

Annexe to EN54-29
Annexe A - Smoke tunnel specification
Annexe B - Test Aerosol for smoke detector response
Annexe C - Smoke measuring instruments
Annexe D - Heat tunnel specification
Annexe E - Apparatus for Dazzling test
Annexe F - Apparatus for impact test
Annexe G - Fire test room
Annexe H Open wood fire (TF1)
Annexe I - Smouldering (pyrolysis) wood fire (TF2)
Annexe J - Glowing smouldering cotton fire (TF3)
Annexe K - Open plastic(polyurethane) fire (TF4)
Annexe L - Liquid (heptane) fire (TF5)
Annexe M - Low temperature black smoke(declane) liquid fire (TF8)
Annexe N - Construction of the smoke tunnel
Annexe O - Construction of the heat tunnel
Annexe P - Test procedures and requirements for the response to slow developing fires
Annexe Q - Construction and measurement of ionisation chamber

Annexe ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU Construction product Regulation

part 30 multi- sensor fire detectors - point detectors using a combination of carbon monoxide and heat sensors

Scope

Carbon monoxide (CO) is a product of the incomplete combustion of carbon-based materials. CO fire detectors can provide a faster response than other types because CO is dispersed by convection and diffusion. CO fire detectors might also be less prone to unwanted alarms than other fire detection techniques due to the absence of CO in most dusts and vapors.

Multi-sensor fire detectors combining both carbon monoxide and heat detection technologies and in compliance with this document are classed as general purpose fire detectors. Such detectors can detect both a wider range of fire types whilst being less prone to generating unwanted alarms.
Detectors incorporating CO and heat detection technologies will be more responsive to fires producing flame/ heat and less CO than that required to activate a CO detector, as the two detection channels combine,effectively increasing the sensitivity of the CO channel.

For multisensor type devices, additional environmental tests are carried out in order to demonstrate increased stability. Special detectors for special applications are not covered by this standard.

Fire tests include TF1, 2, 5 and 8 in order for the detector to demonstrate its response to the wider range of fires. The detection channels do not individually need to satisfy the requirements of the relevant heat and smoke detection standards, in addition to meeting the requirements of this standard.

Requirements

Compliance for the detector to meet the requirements of clause 4 of this standard shall be verified by visual inspection or engineering assessment, or tested as described in clause 5.

multi- sensor fire detectors - point detectors using a combination of carbon monoxide and heat sensors

Individual alarm indication shall be provided via a red visual indicator which shall be extinguished when the detector is reset. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the detector is in service mode. For detachable detectors the indicator may be in the head or the base and should be visible at a distance of 6 metres directly below the detector in ambient light levels of up to 500 lux. Where there is a connection to remote indicators, control relays etc., failures of these connections shall not prevent the correct operation of the detector.

Monitoring of detachable detectors shall be provided by which removal of the detector from its base without some form of indication is not possible. The manufacturer's settings should not be accessible to change without the need for a password, special tool or by the breaking or removal of a seal. If on site adjustment of the detectors response type is provided, then the factory setting, which complies with this standard, should be clearly displayed for each detector and should only be accessible to change with a password or special tool or by the removal of the detector from its base. Any settings which are not compliant with this standard shall only be accessible by the same means and it should be clearly displayed, either on the detector or in data format, that if used the detector does not comply with this standard. The adjustments may be carried out either at the detector or via the control and indicator equipment.

The provision of "drift compensation" to counter the effects of contamination of the detector shall not significantly reduce the detector's sensitivity to slowly developing fires. To verify this, an assessment of the detector's response to slowly developing fires shall be made as specified in 5.2.3.

The detector will demonstrate its stability after a number of alarm conditions as specified in clause 5.2.4. The sensitivity of the detector to both heat and CO shall not be unduly dependent upon airflow and in this respect will be asses-

multi- sensor fire detectors - point detectors using a combination of carbon monoxide and heat sensors

sed in accordance with 5.2.5 and 6.
The heat detectors sensitivity in isolation shall not exceed that stated in EN54-5,which shall be assessed as detailed in 5.2.7.

Those detectors whose performance is tied to software shall conform to the requirements of
4.3.6.2,3and 4.

multi- sensor fire detectors point detectors using a combination of carbon monoxide and heat sensors

Table 1 — Test schedule

Test	Clause
Repeatability of CO response	5.2.4
Direction dependance of CO response	5.2.5
Direction dependance of heat response	5.2.6
Lower limit of heat response	5.2.7
Reproducibility of CO response	5.2.8
Reproducibility of heat response	5.2.9
Air movement	5.2.10
Long term stability (operational)	5.3.6
Tolerance to supply voltage , variations in supply parameters	5.4
Dry heat (operational)	5.6.1.1
Dry heat (endurance)	5.6.1.2
Cold (operational)	5.6.1.3

multi- sensor fire detectors point detectors using a combination of carbon monoxide and heat sensors

Table 1 — Test schedule

Test	Clause
Damp heat cyclic (operational)	5.6.2.1
Damp heat steady-state (operational)	5.6.2.2.
Damp heat steady-state (endurance)	5.6.2.3
Low humidity steady state (operational)	5.6.2.4
Shock (operational)	5.6.4.1
Impact (operational)	5.6.4.2
Vibration, sinusoidal (operational)	5.6.4.3
Vibration, sinusoidal (endurance)	5.6.4.4
Electromagnetic Compatibility (EMC) , immunity tests (operational) Radiated electro magnetic fields (operational) Conducted disturbances induced by electromagnetic fields (operational) Fast transient bursts (operational) Slow high energy voltage surge (operational)	5.6.5a

multi- sensor fire detectors point detectors using a combination of carbon monoxide and heat sensors

Table 1 — Test schedule

Test	Clause
Sulphur dioxide SO2 corrosion (endurance)	5.6.3
Exposure to high levels of carbon monoxide	5.6.6.1
Exposure to chemical agents at environmental concentrations	5.6.6.2
Fire sensitivity	5.5.3a

[a)] In the interests of test economy, it is permitted to use the same specimen for more than one EMC test. In that case , intermediate functional test on the specimens used for more than one test can be deleted, and the functional test conducted at the end of the sequence of tests. However it should be noted that in the event of a failure , it may not be possible to identify which test exposure caused the failure.(see EN 50130-4:2011, clause 4).

multi- sensor fire detectors point detectors using a combination of carbon monoxide and heat sensors

Annexe to EN54-30

Annexe A - Gas chamber specification
Annexe B - Fire Test Room
Annexe C - CO measuring instrument
Annexe D - concentration of chemical agent for test gases
Annexe E - Heat tunnel specification
Annexe F - Smouldering (pyrolysis) wood fire (TF2)
Annexe G - Glowing smouldering cotton fire (TF3)
Annexe H - Open plastics (polyurethane) fire (TF4)
Annexe I - Liquid (heptane) fire (TF5)
Annexe J - Construction of gas test chamber
Annexe K - Construction of the heat tunnel
Annexe L - Impact test apparatus
Annexe ZA -deals with the clauses of the standard in respect of their compliance with the mandate of the EU Construction product Regulation

part 31: multi- sensor fire detectors - point detectors using a combination of smoke, carbon monoxide and heat sensors

Scope

Multi-sensor fire detectors combining smoke, carbon monoxide and heat detection technologies and in compliance with this document are classed as general purpose fire detectors. Such detectors can detect both a wider range of fire types whilst being less prone to generating unwanted alarms.
Detectors are categorised as M/N (without heat sensor) and MT/NT (with heat sensor).These are introduced in order to distinguish between different detector behavior and to identify detectors or settings including the output of an optional heat detector.

For multisensor type devices, additional environmental tests are carried out in order to demonstrate increased stability. Special detectors for special applications are not covered by this standard.

Fire tests include TF1, 2, 5 and 8 in order for the detector to demonstrate its response to the wider range of fires. The detection channels do not individually need to satisfy the requirements of the relevant heat and smoke detection standards, in addition to meeting the requirements of this standard.

Requirements

Compliance for the detector to meet the requirements of this standard shall be verified by visual inspection or engineering assessment, or tested as described in clause 5. Category M and N signifies those without a heat sensor output. Category M are designed not to alarm in the presence of a single high channel output whilst those in an N category will. Categories MT and NT signifies detectors which have an output from a heat channel with the former being, as an M and the latter as an N in their response to a single channel high output.The requirements of 4.8.1 and 2 apply to category M detectors with an additional category 4.8.3 also applying to MT detectors. Both category N and NT are exempt from the requirements of 4.8.

multi- sensor fire detectors - point detectors using a combination of smoke, carbon monoxide and heat sensors

Individual alarm indication shall be provided via a red visual indicator which shall be extinguished when the detector is reset. Where conditions other than fire are indicated these shall be clearly distinguishable other than when the detector is in service mode. For detachable detectors the indicator may be in the head or the base and should be visible at a distance of 6 metres directly below the detector in ambient light levels of up to 500 lux. Where there is a connection to remote indicators, control relays etc., failures of these connections shall not prevent the correct operation of the detector.

Monitoring of detachable detectors shall be provided by which removal of the detector from its base without some form of indication is not possible. The manufacturer's settings should not be accessible to change without the need for a password, special tool or by the breaking or removal of a seal. If on site adjustment of the detectors response type is provided, then the factory setting, which complies with this standard, should be clearly displayed for each detector and should only be accessible to change with a password or special tool or by the removal of the detector from its base. Any settings which are not compliant with this standard shall only be accessible by the same means and it should be clearly displayed, either on the detector or in data format, that if used the detector does not comply with this standard. The adjustments may be carried out either at the detector or via the control and indicator equipment.

The provision of "drift compensation" to counter the effects of contamination of the detector shall not significantly reduce the detector's sensitivity to slowly developing fires. To verify this, an assessment of the detector's response to slowly developing fires shall be made as specified in 5.2.2.

multi- sensor fire detectors - point detectors using a combination of smoke, carbon monoxide and heat sensors

The detector will demonstrate its stability after a number of alarm conditions as specified in clause 5.2.4. and 6. The sensitivity of the detector to both smoke and CO shall not be unduly dependent upon airflow and in this respect will be assessed in accordance with 5.2.5 and 7. For category MT and NT detectors the same conditions shall apply to the heat channel as specified in 5.2.8., detectors will not be affected when in close proximity to artificial light as assessed in 5.2.14.

The heat detectors sensitivity in isolation shall not exceed that stated in EN54-5-2000, with amendments, which shall be assessed as detailed in 5.2.9.

Those detectors whose performance is tied to software shall conform to the requirements of 4.3.6.2,
3 and 4.

multi- sensor fire detectors - point detectors using a combination of smoke, carbon monoxide and heat sensors

Table 1 — Test schedule

Test	Clause
Repeatability of smoke response	5.2.4
Directional dependance of smoke response	5.2.5
Repeatability of CO response	5.2.6
Directional dependance of CO response	5.2.7
Directional dependance of heat response	5.2.8a
Lower limit of heat response	5.2.9a
Reproducibility of smoke response	5.2.10
Reproducibility of CO response	5.2.11
Reproducibility of heat response	5.2.12a
Air movement	5.2.13
Dazzling	5.2.14
Long term stability	5.3.7

multi- sensor fire detectors - point detectors using a combination of smoke, carbon monoxide and heat sensors

Table 1 — Test schedule

Test	Clause
Variations in supply parameters	5.4.1
Fire sensitivity	5.5.1
Dry heat (operational)	5.6.1.1
Dry heat (endurance)	5.6.1.2
Cold (operational)	5.6.1.3
Damp heat cyclic (operational)	5.6.2.1
Damp heat steady state (operational)	5.6.2.2
Damp heat steady state (endurance)	5.6.2.3
Low humidity steady state (operational)	5.6.2.4
Shock (operational)	5.6.3.1
Impact (operational)	5.6.3.2
Vibration , sinusoidal (operational)	5.6.3.3

multi- sensor fire detectors - point detectors using a combination of smoke, carbon monoxide and heat sensors

Table 1 — Test schedule

Test	Clause
Vibration , sinusoidal (endurance)	5.6.3.4
Electrostatic discharge (operational) Radiated magnetic fields (operational) Conducted disturbances induced by electromagnetic fields (operational) Fast transient bursts (operational) Slow high energy voltage surge (operational)	5.6.4.1
Sulphur dioxide SO2corrosion (endurance)	5.6.5.1
Exposure to high levels of carbon monoxide	5.6.5.2
Exposure to chemical agent at environmental concentrations.	5.6.5.3
Sensitivity to smoke	5.7.1
Sensitivity to carbon monoxide	5.7.2
Sensitivity to heat	5.7.3

[a)] In the interests of test economy , it is permitted to use the same specimen for more than 1 EMC test.In that case intermediate functional test(s) on the specimen(s) used for more than one test can be deleted and the functional test conducted at the end of the sequence of tests. However it should be noted that in the event of a failure, it may not be possible to identify which test exposure caused the failure. (see EN 50130-4:2011, clause 4).

multi- sensor fire detectors point detectors using a combination of carbon monoxide and heat sensors

Annexe to EN54-31

Annexe A - Smoke tunnel for smoke response values
Annexe B - Test Aerosol for smoke detector response
Annexe C - Gas test chamber
Annexe D - Heat tunnel specification
Annexe E - Apparatus for Dazzling test
Annexe F - Measuring instruments for CO
Annexe G - Exposure level of chemical agents
Annexe H - Dazzling test
Annexe I - Impact test equipment
Annexe J - Fire test room
Annexe K Open wood fire (TF1)
Annexe L - Smouldering (pyrolosis) wood fire (TF2)
Annexe M - Glowing smouldering cotton fire (TF3)
Annexe N - Open plastic(polyurethane) fire (TF4)
Annexe O - Liquid (heptane) fire (TF5)
Annexe P - Low temperature black smoke(declane) liquid fire (TF8)
Annexe Q - Construction of the smoke tunnel
Annexe R - Construction of the gas test chamber
Annexe S - Construction of the heat tunnel
Annexe T - Test procedures and requirements for the response to slow developing fires
Annexe U - Construction and measurement of ionisation chamber
Annexe ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU Construction product Regultion. (in planning).

electrical apparatus for potentially explosive atmospheres Intrinsic safety 'I'

BS EN 50020

Scope

This European standard was approved by CENELEC whose members are bound to comply. This gives this standard, with conditions, the status of a national standard.

The Standard specifies the construction and testing of intrinsically safe circuits, apparatus and associated apparatus for use in potentially explosive atmospheres. It applies to electrical apparatus in circuits which are safe and incapable of causing an explosion. The standard also applies to apparatus located outside the potentially hazardous area, or which are protected by another type of protection listed in EN 50014, where the intrinsic safety of the circuit may depend upon the apparatus itself.

Where intrinsically safe apparatus is required to be Category 1 G in accordance with EN 50284 it must also comply with the requirements in this standard.

Where it is required to be Category M1 equipment in accordance with EN 50303 it must also comply with the requirements of this standard.

Note:The former EN54 standard ceased to have harmonised status under the ATEX directive and was replaced by EN 60079-0. (Equipment in Explosive atmospheres). EN 50284 Equipment for use in Group II category 1G (general) EN50303 Equipment for use in Group I category M1 (mining)

Requirements

The requirements of this standard apply to both levels of Intrinsically safe apparatus protection "ia" and "ib, unless otherwise stated, and In the determination of the level, failure of components and connections shall be considered in accordance with 7.6.

When the maximum voltage is applied to the intrinsically safe circuits and apparatus of level "ia", it shall not be capable of causing ignition in normal operation when up to two countable and a number of none countable faults,

electrical apparatus for potentially explosive atmospheres Intrinsic safety 'I'

which present the most difficult conditions, are present.

When the maximum voltage is applied to the intrinsically safe circuits and apparatus of level "ib", it shall not be capable of causing ignition in normal operation when up to one countable and a number of none countable faults, which present the most difficult conditions, are present.

(Note: non countable faults are those in non-conforming components of the apparatus known as the associated apparatus; countable faults are those in components which conform to the constructional requirement of this standard, known as intrinsically safe apparatus. The application for ia covers all zones whereas ib devices are only approved for use in zone 1 and 2.

Simple apparatus can be defined as being a passive component such as a switch, or one where sources of stored energy are within defined parameters, for example capacitors, or where components can only generate very low levels of energy, which is also within the defined parameters, for example photocells. When simple apparatus is located in the hazardous area, it shall be temperature classified.

Where simple apparatus is to be located in a Category 1 G or M1, then the apparatus shall also comply with the requirements of EN 50284 or EN 50303 as applicable.

Temperature classification, (T1-6) defines the maximum surface temperature of any surface exposed to the atmosphere and ensures it remains below the ignition temperature.

Intrinsically safe and associated apparatus require an adequate enclosure so as to secure the method of protection, which for Group II is IP20 in normally benign environments and for Group I is IP 54, in accordance with EN 60529, (degree of protection provided by enclosures).

electrical apparatus for potentially explosive atmospheres Intrinsic safety 'I'

The maximum current in any insulated cable shall not exceed that specified by the manufacturer.

Terminals for intrinsically safe circuits shall be separated from non-intrinsically safe circuits including where intrinsic safety can be impaired by disconnected external wiring coming into contact with conductors or components. Terminals should be suitably arranged that components will not be damaged when connections are made and where separation is achieved by distance then the clearance between terminals shall ensure any bare conducting parts are at least 50mm apart and unlikely to come into contact, even if dislodged.

When separation is accomplished by locating terminals for intrinsically safe and non-intrinsically safe
circuits in separate enclosures by use a partition and a single cover, the partitions separating terminals shall extend to within 1,5 mm of the enclosure walls, or shall provide a minimum distance of 50 mm between the bare conducting parts of the external conductors. Metal partitions shall be earthed and have sufficient strength and rigidity to prevent any damage during the connection of field wiring. The clearance between the terminals of separate intrinsically safe circuits is given in Table 4 of the standard. In addition, the clearances between the bare conducting parts of connected external conductors shall be at least 6 mm and between any conducting parts of external conductors and earthed metal shall be 3 mm.

Plugs and sockets used for connection of external intrinsically safe circuits shall be separate from and non-interchangeable with those for non-intrinsically safe circuits.

Protection shall be provided within intrinsically safe apparatus to prevent the reversal of the polarity of supplies including within a battery where this could occur. For this purpose, a single diode shall be acceptable.

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Where a relay coil is connected to an intrinsically safe circuit, the contacts in normal operation shall not exceed their manufacturer's rating and shall not switch more than 5 A. or 250 V or100 VA. When the values exceed these but do not exceed 10 A or 500 VA, the values in Table 4 for the relevant voltage shall be doubled. For higher values, all circuits shall be connected to the same relay only if they are separated by a suitable earthed metal or insulating barrier. Where a relay has some contacts in intrinsically safe and others in non-intrinsically safe circuits, the contacts shall be separated by an insulating or earthed metal barrier in addition to Table 4. The relay shall be designed such that a broken or damaged contact cannot impair the integrity of the separation.

Where earthing of enclosures and equipment is required to maintain the type of protection (ia or ib), the cross-sectional area of any conductors, connectors and terminals used shall be rated to carry the maximum possible continuous current under the conditions specified in clause 5. Components shall also conform to clause 7.Where a connector carries a conductor such as an earth connection on which intrinsic safety depends, the connector shall incorporate at least three independent connecting elements for "ia" circuits and two for "ib" circuits and be rated to carry the maximum possible current.

Where a casting compound is used to exclude a potentially explosive atmosphere from components and intrinsically safe circuits, it shall conform to 6.4.4, and where used to reduce the ignition capability of hot components its profile shall reduce the maximum surface temperature of the casting compound to the desired value.

In both normal operation and fault conditions, any remaining components on which the type of protection depends, shall not operate at more than two-thirds of their rating. These maximum rated values shall be the normal commercial ratings specified by the manufacturer of the component.
Connectors shall be designed such that

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interchangeability with others in the same apparatus is impossible unless it does not result in an unsafe condition or the connectors are easily identified.

Where an explosion could adversely affect intrinsic safety, the use of cells and batteries, capable of exploding, under certain conditions must be confirmed as being safe for use in intrinsically safe and associated apparatus for both ia and ib applications. They shall be of a type where leakage onto components is not possible and preferably should be sealed. Batteries which are not sealed shall be tested in accordance with 10.9.2

The diodes and resistors within a safety barrier limit the voltage and current applied to an intrinsically safe circuit. These assemblies are used as interfaces between intrinsically safe and non-intrinsically safe circuits, and shall be subjected to the routine test of 11.1. The requirements of Table 4 shall also apply except that lines 5, 6 and 7 do not apply to opto-coupled barriers; e.g. galvanic isolators. In addition to any connection which may be at earth potential, the diode type barrier shall have a connection to earth through a 4mm(min) insulated wire.

Intrinsically safe and associated apparatus shall be marked in accordance with EN 50014.

For associated apparatus, the symbol EEx ia or EEx ib shall be enclosed in square brackets.

Connection facilities including terminal boxes, plugs and sockets shall be clearly marked and identifiable
and where colour coded, it shall be light blue.

The documentation required by 23.2 of EN 50014 shall include the electrical parameters for the apparatus, power sources: output data; power receivers: input data, any special requirements for installation and use; the maximum voltage (ac/dc) which may be applied to non-intrinsically safe circuits or associated apparatus; special conditions relating to the type of protection, con-

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formance or otherwise with insulation values (6.4.12); the designation of the surfaces of any enclosure where relevant to intrinsic safety and the environment for which the apparatus is suitable.

Appendix to EN50200
Annex A – Assessment of intrinsically safe circuits
Annex B – Spark test equipment
Annex C – Measurement of creepage, clearances and separation distances
Annex D – Encapsulation
Annex E – Certification for torches

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EN 12094-1, Requirements and test methods for electrical automatic control and delay devices

Scope

This Standard specifies the requirements and test methods for electrical automatic control and delay devices (device) for use with automatic fire detection and fire alarm systems and CO2-, Inert Gas- or Halocarbon Gas-Fire Extinguishing Systems. The standard specifies both compulsory and optional functions. Additional functions associated with fire extinguishing can be provided, but are not covered by this standard.

Requirements

The electric auto control and delay may be an independent unit or an integral part of a control and indicator panel. If the devices are integral to a control panel and use the same indication and controls as that as the fire detection and alarm system then the requirements for this standard and EN54-2 shall both be fulfilled. The power supply requirements shall be in accordance with EN54-4 and there shall be duplicate paths between the two if the power supply is not integral to the automatic control and delay device.

The functionality of the device shall be in accordance with clauses 4, 5, 6 and 9.3 of this standard. Testing is as detailed in section 9.

The device shall be classified for one of the following based upon the intended ambient conditions:

Class A: temperature range of - 5 °C to + 40 °C;
Class B: temperature range of – 20 °C to + 50 °C;
Class C: temperature range of - 5 °C to + 40 °C and corrosive atmosphere class 3C4 of EN 60721-3-3;
Class D: temperature range of - 20 °C to + 50 °C and corrosive atmosphere class 3C4 of EN 60721-3-3.

The device shall receive and process all the necessary functions associated

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with the electrical control of the extinguishing system and indicate signals for each flooding zone, within 3 secs of the input being received. The compulsory functions to be performed by the device shall include receiving inputs from both the fire detection system and a manual station connected directly to the device. On receipts of input signals, a signal to the release mechanism and to a distinctive continuous alarm sounder, which shall only be silenced by an appropriate access level and after confirmation of a discharge occurring, shall occur within 1 further sec unless a delay is incorporated within the programme. The activation of an emergency hold button, will be displayed on the device, both audibly and visually, and if occurring during the pre-discharge warning time will affect a change to the signal from the alarm devices in the protected area. Faults affecting the emergency hold device shall be recognised and indicated within 2secs and prevent the transmission of the extinguishing signal. Any delay time shall be adjustable between 0 and 60 sec.

The device shall be capable of displaying all conditions including device activated, fault and extinguishing system gas released. The released condition can be established upon receipt of a signal indicating a flow of the gas, (both audibly and visually), or upon the triggering of the extinguishing signal output.

The monitoring of components such as a loss of gas will in the event of an abnormal condition indicate a fault, clearly displaying the nature of the condition and within 100s of its occurrence.

If a signal is sent to an external signalling unit, separate indication will be provided to that affect.

National guidelines can require other/ different functionality, e.g. a separate indicator per flooding zone or a maximum number of monitored components per indicator.

Where an alphanumeric display is used to provide the required information, additional led's for the "Activated", "Re-

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leased", "Fault", "Disabled" and "Blocked" conditions shall be provided.
The display should be capable of indicating all released flooding zones simultaneously. If it has insufficient numbers of fields the zones shall be indicated by separate light emitting indicators.
A field shall consist at least of 16 characters, where it cross refers to other information or 40 characters, where the display provides a full description.

Faults signals shall be displayed for any open, short circuit or earth fault associated with all input and output devices, including monitoring circuits, disablement devices, signal transmission equipment and power supplies, both AC and DC; or if there is a fault affecting the operating program in any software controlled device. In which case not more than one flooding zone shall be affected except where a room and its void are subdivided into two zones.

Optional functions which may be performed by the device can include, delaying the signal to the release mechanism whilst providing a distinct intermittent pre-discharge warning, which shall not be interrupted, shortened or reset by a signal from the emergency hold button. To provide indication of a flow of agent together with the monitoring and control of valves and other associated components. If an emergency hold button is fitted it shall signal its status to the device together with any other mechanical parts capable of disabling the extinguishing system. The device shall receive and display any changeover from a manual to an automatic status.

If a controlled discharge of extinguishing agent is required this will be performed by the device as will the initiating of any secondary discharges. A secondary discharge will result from a second manual input, after the initial discharge and whilst the sounders in the area are still operating.

Signals to pilot cylinders, spare cylinders, optical devices, doors, ventilation plant, required as part of the cause and effect will be performed by the device.
If the information is transmitted to an

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external centre this shall be indicated by a separate light emitting indicator and/or by an alphanumeric display. If a device is intended to control the flooding time, it shall be adjustable from a minimum time specified by the manufacturer up to at least 300 s.

In some European countries there are regulations stipulating that the activated condition can only be established after the receipt of two input signals, from independent circuits, one from the fire detection and alarm system and a further signal from the device. The first input must be both audibly and visually indicated and outputs such as plant shutdown may be triggered. If the same indicator is used for both inputs, the first input shall be indicated with a flashing light, changing to a steady light when the second input is received.

The processing of the input signal shall have the highest priority unless a signal from an emergency hold or abort button is present; a fault exists within its circuit or if the gas discharge is disabled.

If the processing of the input signal has started, the disablement of any gas zone is prohibited.

Following a reset command the activated, released and fault conditions will be reset and the display will provide indication of the current status, including any not normal conditions, within 20 s. Provision shall be made to inhibit the reset , either for a period up to 30 seconds or until an end of discharge signal is received. Disablements shall not be removed by the reset function.

Annexes to EN12094-1
Annex A – Summary of Indications
Annex B – Software controlled device
Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.

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Part 3: Requirements and test methods for manual triggering and stop devices

Scope

This standard specifies the requirements and test methods for manual triggering and stop devices of CO2-, Inert Gas- or Halocarbon Gas fire extinguishing systems.

Requirements

Electrical triggering devices shall comply , generally, with the requirements of EN 54-11 type B with clear indication of the function marked on the front face with "MANUAL RELEASE - Gas extinguishing system" (or in the national language(s) acceptable in the country of use)). The colour of the component shall be yellow. A suitable yellow colour is specified in ISO 3864.

Electrical stop devices shall comply, generally, with EN 54-11 with clear indication of the function marked on the front face with "EMERGENCY STOP - Gas extinguishing system", (or in the national language(s) acceptable in the country of use2)). The colour of the component shall be blue. A suitable blue colour is specified in ISO 3864. Triggering and stop devices, which do not follow the design requirements of EN 54-11, shall have the same electrical function, performance and marking as specified above.

The pressurized parts of components, except seals, shall be made of metal with the working pressure specified by the manufacturer. The device will be marked as suitable for wall and/or machine mounting.

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For triggering devices the tests shall be in accordance with EN 54-11 Non-electrical triggering devices - Test samples and order of tests

Tests	**Sub Clause**
Compliance	5.2.3
Pressure	5.2.4
Strength	5.2.5
Function	5.2.6
Temperature	5.2.7
Operational reliability	5.2.8
Corrosion	5.2.9
Stress corrosion	5.2.10
Vibration	5.2.11

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Marking

Each component shall be marked in a permanent and legible manner with the name or logo of the manufacturer/ supplier, the model (type / environment category as defined in EN 54-11, the installation detail, relevant data by which, at least, the date or batch and place of manufacture and the version number(s) of any software can be ascertained together with the working pressure for manual triggering devices and associated pipework.

Where the CE marking give the same information as above, the requirements of this clause 6 have been met.

Annex ZA - deals with the clauses of the standard in respect of their compliance with the mandate of the EU construction products regulation.