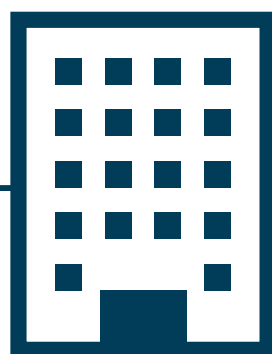


**Guidance
Note**



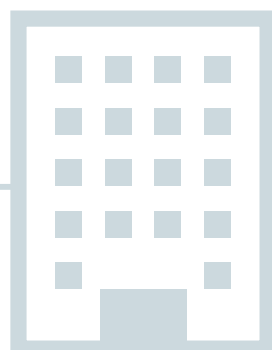
Fire Industry Association



**Guidance for Specifiers of Control
and Indicating Equipment**

FIA Guidance Document – Guidance for Specifiers of Control and Indicating Equipment

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1. INTRODUCTION

In Europe, products used in fire alarm systems must comply with a number of directives and regulations; the directives are implemented into national legislation while regulations apply directly without translation into national law.

	Product/Component	Installation/System
Legislation	<p>Construction Products Regulation (CPR)</p> <p>For further information on the CPR refer to the FIA Guidance Document: EU Construction Products Regulation 305/2011</p>	<ul style="list-style-type: none"> • In England and Wales, the Regulatory Reform (Fire Safety) Order 2005 (Abbreviation: FSO) • In Scotland the Fire (Scotland) Act 2005 in conjunction with the Fire Safety (Scotland) Regulations 2006 • In Northern Ireland the Fire and Rescue Services (Northern Ireland) Order 2006 in combination with the Fire Safety Regulations (Northern Ireland) 2010 <p>These laws identify the person with duties or responsibilities and requires a risk assessment to determine what is required to provide fire protection that is suitable and adequate</p>
Standards	EN 54 Series, EN 1155, EN 12094-1	BS 5839-1, BS 5839-6, BS 5839-8, BS 5839-9 and BS 7273 series
Proof of conformity	<p>Declaration of Performance (DoP) supported by a Certificate of Constancy of Performance (CoP) from a Notified Body</p> <p>Certificates of Conformity (CoC) were previously issued from a Notified Body under the CPD and are still valid in support of a DoP under the CPR</p>	<p>A BS 5839-1 commissioning certificate is evidence that an installation complies with the recommendations of BS 5839-1</p> <p>Although there is no legal requirement for service providers to be certified, using a certified service provider is recommended and shows due diligence in complying with legislation</p> <p>BAFE SP203 and LPS 1204 are examples of certification schemes</p>

Note 1: Products cannot be certified to show conformity with an installation standard or code of practice. It is not possible to state that a product complies with BS 5839-1. However, BS 5839-1 does recommend some features that may not be present on all CIE. These have been identified below.

Note 2: The commentary of BS 5839-1, 11.1 states that, 'Compliance of an individual component with a recognized standard does not necessarily ensure that it will operate satisfactorily in conjunction with another component that conforms to the relevant standard for that component. It is essential that compatibility between components is taken into account by the designer of the system. BS EN 54-13 can be used to confirm system compatibility.' This is commentary and not a recommendation, EN 54-13 is only one way to show system compatibility, others may also be suitable.

Note 3: Other installation codes might also be considered acceptable, e.g. NFPA 72 or HTM 05-03 Part B.

Note 4: The Construction Products Regulation is under review at time of writing, therefore, some details may change.

2. COMPLIANCE

Fire alarm systems are electrical systems and as such must comply with UK Law. Applicable UK Law comes from the Low Voltage Directive (LVD) (for electrical safety) SI 2016-1101, the EMC Directive (EMCD) (for operational reliability and coexistence with other equipment and systems) SI 2016-1091 and Construction Product Regulations (CPR) (for safety performance) SI 2013-1387. Particular devices may have to comply with further legislation, depending on their function and their application. For example, the Radio Equipment Directive (RED) SI 2017-1206 and devices located in hazardous areas (ATEX) SI 2016-1107.

Compliance with these regulations is demonstrated by manufacturers and suppliers, by marking the products with a CE mark and making available a Declaration of Conformance (DoC), and a Declaration of Performance (DoP). The LVD and the EMCD only require manufacturers to self-declare compliance, having appropriately assessed their products, but the CPR requires that products must be third-party assessed to appropriate harmonised European Standards.

The appropriate standards for fire alarm systems are the EN 54 series and EN 12094-1. The manufacturer's documentation, along with the Declaration of Performance (DoP) should identify the specific features and performance levels that have been assessed for the equipment in question. It is possible for a product to comply with a standard, but not be appropriate for a specific application, and the detail of this should be clearly recorded in the DoP.

Some products are not covered by harmonised standards, but national or insurance standards might exist, and these can be used as a way of demonstrating performance and quality. Where no standards exist for equipment, it is recommended that some form of independent assessment is made, i.e. a European Technical Assessment, (ETA) for products coming under the CPR. Draft standards could be used as part of an ETA.

Examples of products where no specific harmonised standard currently exist are repeater panels, video fire detectors and remote indicators. Some other products are covered by harmonised standards, but custom and practice is such that alternative technical solutions are often provided, e.g. remote signalling equipment to alarm receiving centres.

Buildings must comply with the building regulations and must be operated under the Regulatory Reform (Fire Safety) Order (or equivalent in Scotland and Northern Ireland) and as such, a suitable risk assessment is required.

Appropriate competent skills must be accessed to ensure that the risk assessment is sufficient, particularly where some requirements may fall outside normal custom and practice.

For example, some repeater panels might be essential for fire safety and therefore must have a high level of system integrity, (EN 54-13 component Type 1), whereas other repeaters might only be used for convenience and so a lower level of integrity, (EN 54-13 component Type 2) is acceptable.

3. GUIDANCE ON SELECTION OF EN 54-2 OPTIONS WITH REQUIREMENTS

EN 54-2 is the harmonised standard for control and indicating equipment (CIE). In the EN 54-2:1997+A1:2006 version of the standard, some functional features of the CIE are described as an ‘option with requirements’. This provision was made to allow for the variation of functional requirements in the different regions of Europe. It also allows for flexibility in the provision of functions depending on the intended application. It is important to understand the requirements of an application so that the correct ‘option with requirements’ (OwR) may be specified. If an option is required, then it is important that this function is included in the product’s independent third-party assessment and certification. If features are provided that are not specified in EN 54-2, these are only acceptable if they do not jeopardise compliance with the standard.

EN 54-2 Annex B lists the optional features and these should be listed in the documentation provided for specific products, (see EN 54-2, 12.2.1 a). The following table identifies the specific features listed and when they might be used. This table can be used to help identify the OwR that should be specified for a CIE to match the intended purpose of a FD&A system to the particular application.

TITLE	CLAUSE	APPLICATION	ADDITIONAL NOTES
Indications			
Fault signals from points	8.3	Not a recommendation of BS 5839-1	Can be useful in providing information for ongoing maintenance. The absence of a fault indication shows not only that a device is connected but that it is working correctly. Not available on non-addressable CIE but is normally provided by analogue addressable CIE
Total loss of power	8.4	Not a recommendation of BS 5839-1 <i>Note: This option is normally only required in France</i>	An additional power supply (usually a primary battery) is used to indicate for 1 hour when both the mains and the standby battery have failed
Alarm counter	7.13	Not a recommendation of BS 5839-1	This is a non-resettable counter that shows the total number of system activations (fire). This can be very useful in implementing a false alarm reduction strategy
Dependency on more than one alarm signal. Type A	7.12.1	Also called coincidence detection. BS 5839-1 identifies this as a possible tool for false alarm reduction	The fire panel does not go into alarm until two fire signals are received from one detector or two detectors in the same zone. This is suitable for reducing unwanted alarms from unoccupied premises
Dependency on more than one alarm signal. Type B	7.12.2	Also called coincidence detection. BS 5839-1 identifies this as a possible tool for false alarm reduction	Similar to type A, but the confirmation signal can come from a detector in another zone. This is sometimes used to operate extinguishing systems as well as reducing unwanted alarms

TITLE	CLAUSE	APPLICATION	ADDITIONAL NOTES
Controls			
Dependency on more than one alarm signal. Type C	7.12.3	Also called coincidence detection. BS 5839-1 identifies this as a possible tool for false alarm reduction	Type C allows the fire signal to come from a manual call point as well as a fire detector. In this case the panel goes into alarm, but the operation of outputs may be inhibited until a second signal is received. This could be used in an occupied premises, where staff are able to confirm the existence of a fire before calling the fire and rescue service (FRS)
Delays to outputs	7.11	BS 5839-1 identifies this as a possible tool for false alarm reduction	Further details of this feature are given in EN 54-2 Annex E. This is similar to 7.12.3 above in that it can be used to reduce false alarms in occupied premises but instead of a second fire signal a timer is used to allow a set maximum period of time for staff to identify whether the alarm is genuine or not. The delay is overridden on the operation of a manual call point
Disablement of each address point	9.5	Not a recommendation of BS 5839-1	This optional function will only be available on an addressable CIE. EN 54-2 is written from the point of view that as a minimum, functions are controlled by the relevant zone. However, with addressable systems it can be useful to put the control at the specific device rather than the zone and this option relates to the disablement (switching off) of specific devices
Test Condition	10	Not a recommendation of BS 5839-1, but BS 5839-1 does recommend that the alarm system is tested and maintained. A system of maintenance is also a legal requirement under the FSO	The test condition allows a fire alarm system to be tested zone by zone without putting the full system into alarm and without activation of the alarm, routing or fire protection outputs It therefore reduces disruption during regular testing and is particularly useful in larger systems
Outputs			
Fire alarm device(s)	7.8	BS 5839-1 recommends this for life safety systems. However, alarm outputs may not be required in some property protection systems	This option includes non-addressable alarm circuits used to power alarm devices from the panel or addressable alarm devices connected to an addressable detection circuit
Output to fire alarm routing equipment	7.9.1	Required for systems with a connection to an alarm receiving centre (ARC). BS 5839-1 recommends this for property protection systems and residential care premises	This output is used to operate a transmission device which sends an automatic signal to an ARC. BS 5839-1 offers advice with respect to which type of system is appropriate and also recommends that a manual call is also made using a telephone. EN 54-21 specifies the equipment that is used for transmission of the signal to an ARC

TITLE	CLAUSE	APPLICATION	ADDITIONAL NOTES
Alarm routing equipment confirmation signal	7.9.2	Required in some European countries, e.g. Germany, but not normally available in the UK	This facility provides a visual signal on the fire panel to confirm that the signal got to the ARC rather than indicating that it was sent. It does not necessarily mean that the fire and rescue service has responded and is on its way
Automatic fire protection equipment type A	7.10.1	Type A is an output only one or more such outputs may be required to interface to different types of fire protection equipment or to a control system that subsequently controls the different items of equipment. BS 5839- 1 makes reference to this and also refers to appropriate standards	This output might be used for an interface with an extinguishing system, fire door control, fire dampers, smoke curtains or to lifts and HVAC systems where a fire signal is needed For type A, the output stays active while the system is in the fire condition and is not turned off when alarms are silenced. However, EN 54-2 makes no reference to the operational requirements of BS 7273 or EN 14637 or other appropriate codes. Where the fire protection equipment or system is covered by an equipment standard it should be certified as being in compliance with that standard. EN 54-2 covers details such as speed of operation, disablements, indications etc
Automatic fire protection equipment type B	7.10.2	Same as type A above, but includes a requirement for indication of operation of the output	As type A above
Automatic fire protection equipment type C	7.10.3	Same as type A above, but also includes a confirmation indication returned from the fire protection equipment control. This might be confirmation that the signal has been received or that the equipment has operated	As type A above
Monitoring of automatic fire protection equipment	7.10.4	An indication on the fire alarm panel indicates faults from the fire protection equipment control	The minimum is a single indication for all fire protection equipment control, but a manufacturer might have provision for multiple outputs
Fault Warning routing equipment	8.9	This is a recommendation of BS 5839-1 where the standby duration would have to be extended beyond 72 hours to ensure that a system continues operation over a period of non-occupation such as a weekend	The fault signal from the fire alarm system is sent to the ARC so that someone can be informed that there is a fault, particularly a power fault
Standardized I/O interface	11	Not a recommendation of BS 5839-1	See EN 54-2 Annex G for more information This interface is required in some countries to interface to a fireman's panel or similar display unit

Several of the features in the above table are useful in the reduction of false alarms. The FIA website has a section dedicated to providing information to help in the reduction of false alarms, including information on new technologies that might be useful in specific applications.

There are other optional features that are allowed within EN 54-2. For example, a manufacturer can choose whether to use separate light emitting indicators to show the status of the system or whether to use an alpha-numeric display. Either are permitted in BS 5839-1, but if an alpha-numeric display is used then a separate zonal indication is also required to meet the recommendations of BS 5839-1 clause 23.2.2c.

The power supply for the fire alarm system is usually integrated in the fire alarm panel for smaller systems, but larger systems often have separate power supplies. EN 54-2 and BS 5839-1 have specific requirements where the power supply is remote from the control and indicating equipment.

4. GUIDANCE ON THE RECOMMENDATIONS OF BS 5839-1

In addition to the options with requirements specified in EN 54-2, BS 5839-1 also makes specific recommendations for features which might not be met by all fire alarm systems. The list below is not exhaustive but does describe those features which are commonly overlooked. As these features are not specified in the product standard EN 54-2, it is not possible for manufacturers to gain any form of independent approval for these features; compliance can only be determined by a manufacturer's declaration and inspection of the supplied documentation.

DESCRIPTION	BS 5839-1	ADDITIONAL NOTES
Zonal fire display	23.2.2c	A separate light emitting indication of fire should be provided for each zone in the system on or near the CIE or repeater panel. See above
Duplicated sounder circuit	12.2.2j	In the event of a fault on an alarm circuit, at least one alarm device near the CIE should continue to operate. This is usually achieved by providing at least two independent circuits, but could also be provided on an analogue addressable system through two sounders separated by isolators
Response to the operation of a manual call point	20.2b	When a manual call point is operated the alarm devices in the vicinity of the call point should operate within 3 seconds. This is easy for a non-addressable system but can be quite challenging for an addressable system and specifically EN 54-2 allows up to 10 seconds and this has been acknowledged in BS 5839-1, which says that this may be an acceptable variation
SELV power supply	29.1	BS 7671 requires that if live parts can be touched without the use of a special tool, then the live parts must be extra low voltage and the power supply must comply with SELV requirements. If the power supply is not designed to comply with SELV the ELV should be treated as if it were LV, so as to maintain electrical safety

DESCRIPTION	BS 5839-1	ADDITIONAL NOTES
System compatibility	11.1	The designer of the fire alarm system must ensure that the system components of the fire alarm system are compatible. One way of achieving this is by testing the system in accordance with EN 54-13. The importance of this is to ensure that the system operates correctly at all extremes of loading, temperature and power supply limits
Radio-linked fire alarm systems	27	BS 5839-1 requires that radio components comply with EN 54-25. It also identifies a series of requirements that should be met by the fire alarm system. In particular, each component should have a dual power supply. If a component is powered by a primary battery it should be supplied with two batteries – the idea being that if one fails, the other will continue to operate. This exceeds the requirements of EN 54-25 which allows a single primary battery, so long as it fails in a predictable manner at end of life. A variation should be raised if system components utilize single primary batteries
Other devices	Various	BS 5839-1 makes recommendations for the use of items of equipment in specific situations, such as tactile alarm devices, radio pagers. Some of these devices are not specifically covered by equipment standards in the EN 54 series and in some cases no published standards exist (e.g. video fire detectors). In these cases, the specifier is dependent on a manufacturer's declaration that the equipment complies with all appropriate Directives and also the recommendations of BS 5839-1 where appropriate. An ETA (see above) gives additional assurance of compliance. BS 5839-1 Annex E gives guidance on the recording and selection of fire detectors
Evacuation control	14,16,18,19, 20, 23	Many buildings simply evacuate the whole building in the event of fire being detected. However, for some buildings this is not possible or practical. BS 5839-1 addresses some of these issues and the recommendations should be complied with or variations should identify any area of noncompliance and the variation should be approved by all interested parties
System integrity	12	BS 5839-1 has many recommendations intended to ensure that the system remains as operational as possible in the event of faults or damage to system components. The supplier of the system should ensure that all of these requirements are met, or if any recommendation is not met then these are identified as variations and agreed by all interested parties. Specifically, in the event of a single fault, no more than 2000m ² of detection area should be lost and in the event of two faults no more than 10,000m ² Interfaces to system components should be selected to monitor for fault and fire where appropriate, specifically where auxiliary power supplies are used

DESCRIPTION	BS 5839-1	ADDITIONAL NOTES
Alarm zones	14	Alarm zone, where different alarm signals must be sent to separate parts of the building at the same time, are described in BS 5839-1. For example, so that one part of a building evacuates and another part waits until the first is clear. There are special requirements for alarm zones including the placing of manual call points (MCP) at alarm zone exits. Alarm zones may contain several detection zones but a detection zone should not contain more than one alarm zone
Synchronised audible and visual alert signals	16, 17	Where pulsed or flashing alarm signals are used they should stay in synchronisation. There are several technical ways of achieving this and the individual alarm devices should be certified to EN 54-3 or EN 54-23 as appropriate
Parallel batteries	12.2.1 d)	Where parallel batteries are used to achieve the standby capacity required by the fire alarm system, then a fault warning should be given in the event of one of the batteries being disconnected

5. EQUIPMENT FOR SPECIAL CONSIDERATION

In the above document we have given general guidance on how a specifier can ensure that systems and equipment are appropriate and in compliance with national codes or laws. However, there are some items of equipment that are unusual in that no standards exist or where custom and practice often falls short of appropriate levels of system integrity. These are listed below.

Fire repeaters and mimic panels

These items of equipment are used in various ways. At one extreme they may be used as duplicate fire alarm panels, or as an alternative display method to assist local management in the control of safety, or at the other extreme they may be used as a display for convenience only. The equipment might take the form of a fire panel, as a small display unit, as a large graphical display unit or as a printer.

If the repeater panel is essential for safety procedures, then it should comply with all of the control and indication requirements of EN 54-2 and BS 5839-1 and there should be adequate provision for standby power in the event of mains failure and at least duplicate signalling paths to the main CIE, to ensure that it continues to operate in the event of a fault. Such a repeater could be connected on a network loop, but a single spur would not comply, but might be accepted as a variation. If the repeater becomes faulty or is disconnected, then a fault indication should be given at the main or other CIE.

Where graphic display systems are used to simplify the user interface, the equipment should comply with all of the requirements of BS 5839-1, or if the user is trained in the use of the fire panel the standby duration of 24 hours might be reduced to three hours with an agreed variation.

Remote signalling systems

EN 54-21 is a harmonised standard for remote signalling equipment. Third-party approved equipment is available. However, the telephone network is in the process of being changed to digital technology (IP based) and as a result, some older equipment might not operate correctly over the network. These issues are network-operator specific and are made worse when the connection crosses two or more networks. To overcome these problems suppliers have fitted dual path signalling systems and there is a current move towards IP systems. Such systems work impressively well when there are no power faults or traffic issues on the network but can become unpredictable during periods of peak traffic or if the mains power supply is not available. BS 5839-1 recommends that a voice call is always used to supplement automatic signalling where possible.

At this point in time there is no clear certified route to guarantee a reliable remote signalling system. Therefore, suppliers should be able to demonstrate that they are aware of the issues and are continually vigilant to ensure that the fire systems are operating at acceptable response levels at all times.

BS 5839-1 acknowledges that it is common practice to use a security panel as the means of communicating with the fire and rescue service. This will not comply with EN 54-21 but could comply with BS 5839-1 if the standby power supply complies with the recommendations of BS 5839-1 clause 25.4.

Where the transmission device is mounted remote from the fire panel, i.e. more than 50 mm gap between them, the connection to the alarm transmission device should be monitored as if it were part of the critical signal path. The monitoring can be from the CIE, if the feature is provided, or via the remote transmission equipment. To comply with BS 5839-1, the indication of faults (on the transmission path between the CIE and the transmission equipment, or on the transmission equipment power supply, or an internal fault in the transmission equipment, or the failure of the link to the ARC) must be shown on the CIE or on the transmission equipment if it is mounted adjacent to the CIE.

Fire protection equipment

A huge range of equipment and systems fall into this general category and it is not always possible or practical to use third-party assessed equipment and installation schemes. The specifier should ensure that in such cases the requirements of the system are clearly defined in a contract, and that the supplier is able to demonstrate that they have met the requirements of the contract, using sound engineering practice. Independent third-party assessment should be used wherever possible.

BS 7273-6 describes the interfacing of the fire alarm system to many types of fire protection equipment that are not already covered by another part of the BS 7273 series. The other parts of BS 7273 specify the interface to specific items of fire protection equipment. E.g. BS 7273-4 describes the interface to doors.

Zone plans

Zone plans are essential in assisting the FRS to respond appropriately at times of crisis. BS 5839-1 increased its emphasis on zone plans at the last review and specifiers need to ensure that the requirement for the provision of suitable zone plans is clearly identified in the contract. Where the level of detail or the form of the zone plan is uncertain, the local FRS should be contacted to describe the level of detail they would expect on the specific site.

System documentation

BS 5839-1 clearly identifies the need for as-fitted drawings, logbooks and operation and maintenance (O&M) manuals to be available throughout the life of a fire alarm system. Regulation 38 of the Building Regulations and the EMC Directive also specifically require system documentation for the system to be legally compliant.

The provision of suitable and sufficient documentation should be part of the system contract, but it should also be made clear to premises management that they have a role in ensuring that such documentation is kept safe, available and up to date to ensure that the system remains compliant throughout its life. This is particularly important for fire engineered safety solutions where the effective management plays a key role in maintaining the integrity of the safety system.

Where multi-sensor detectors are used in the fire alarm system, their performance is dependent on the settings of the system as well as the device itself. BS 5839-1 now recommends that the selection of detectors is documented in the O&M manuals to ensure that the selection criteria is known throughout the life of the system. See BS 5839-1 Annex E for more details.

6. OTHER STANDARDS

BS 5839-1 refers to a number of other standards which are applicable to fire protection systems. Some standards such as BS 7273-4, BS 7273-6, BS 5839-6, 8 and 9 are codes of practice and as such, compliance to such standards is via supplier declaration or third-party assessment scheme – see below. Some standards such as EN 54-16 and EN 1155 are equipment standards and so third-party assessment or an ETA is appropriate.

7. BAFE & LPCB INSTALLATION AND MAINTENANCE SCHEMES

The above guidance deals mainly with equipment approvals and specifications. For a system to be reliable it must also be installed and maintained in a correct manner, and there are now BAFE and LPCB approval schemes covering fire detection and extinguishing systems and fire risk assessment. In addition, a requirement of FIA membership is that members should be certified to ISO 9001.

8. GLOSSARY

ARC Alarm Receiving Centre CoC Certificates of Conformity

CoP Certificate of Constancy of Performance CPD Construction Products Directive

CPR Construction Products Regulation

DoP Declaration of Performance

ETA European Technical Assessment

FRS Fire and Rescue Service

FSO Regulatory Reform (Fire Safety) Order

LVD Low Voltage Directive

EMCD ElectroMagnetic Compatibility Directive MCP Manual Call Point

OwR EN 54-2, Options with Requirements

9. REFERENCES

1. For further information on the CPR refer to the FIA Guidance Document – EU Construction Products Regulation 305/2011.

DISCLAIMER

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



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