

Queries and interpretations on BS 5839 : Parts 1 and 4 (as amended)

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- Engineering Industries' Association
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- Institute of Sound and Communications Engineers

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Contents

	Page
Foreword	iii
1 Scope	1
2 Interpretations of BS 5839 : Part 1 : 1988	1
2.1 Manual and automatic systems	1
2.2 Short circuit monitoring	1
2.3 Monitoring of alarm sounder circuits	1
2.4 The use of isolators between zones	2
2.5 Addressable detector/sounder units	2
2.6 Isolation of staircase zones	3
2.7 Sounder and detector cabling	3
2.8 Cabling of multiple sounder circuits	3
2.9 Disk memories	4
2.10 'Search distance' in addressable systems	4
2.11 Zoning of multi-storey buildings	4
2.12 Starting or restarting fire alarm sounders	4
2.13 Loudness of alarms in residential care homes	5
2.14 Loudness measurement for voice alarm signals	5
2.15 Travel distance to manual call points	5
2.16 Positioning of detectors in a roof apex	6
2.17 Detectors in ventilated ceiling voids	6
2.18 Optical beam detectors in congested roof spaces	6
2.19 Siting of detectors near ceiling obstructions	7
2.20 Detectors in lift shafts	7
2.21 Detectors in ventilation ducts	7
2.22 Use of L2 and L3 systems	8
2.23 Smoke detector standards for type L systems	8
2.24 Smoke detectors used to operate door-holding devices	9
2.25 Door smoke seals	9
2.26 Sprinkler protection	9
2.27 Time delays	9
2.28 Reduced sensitivity	10
2.29 Remote isolation facilities	10
2.30 Diagrammatic representation of the building	11
2.31 Connection to mains supplies	11
2.3 Fire protection of mains wiring to fire alarm systems	11
2.33 Use of standby generators	11
2.34 Conditions to be satisfied for absence of mechanical protection to cables	12
2.35 Rodent attack on cables	12
2.36 'Low smoke' cables	12
2.37 Fire resistant armoured cables	12
2.38 Cabling of ring-connected data-transmission systems	13
2.39 Radio-linked sounders	13
2.40 Ancillary services	13
2.41 Testing of manual call points	13
2.42 Zone testing	14
2.43 Testing voltages	14
2.44 Insulation testing at the 5-year test	14
2.45 Cable fixings	14

3	Interpretations of BS 5839 : Part 4 : 1988	15
3.1	Silencing facilities	15
3.2	Short circuit warnings	15
3.3	Fire alarm response to manual call point	15
3.4	Earth faults	15
3.5	Fault location displays	16
3.6	Memory check sums	16
3.7	Disk memories: see 2.9 of this Published Document	16
3.8	Memory check routines	16
3.9	Total loss of power	16
3.10	Battery monitoring current	16
	Subject index	17
	List of references	Inside back cover

Foreword

This Published Document has been prepared under the direction of the Fire Standards Policy Committee. It supersedes PD 6531 : 1992, which is withdrawn. It is intended that this Published Document will be updated every two to three years.

This Published Document contains queries dealt with in the previous edition, some of which have been amended, together with the inclusion of further queries. A background to this, and the previous edition, is as follows.

Since the publication of the various Parts of BS 5839, a number of queries on interpretation have been submitted to BSI. In some cases these queries have shown the standards to be in need of amendment, and amendments have now been published. In other cases, however, the queries have shown that although the standards are correct, they are so expressed that misunderstandings have arisen over both their interpretation and the philosophies behind their recommendations.

The subcommittees responsible for the standards have, of course, answered the queries individually, but believe that many of them (and their answers) deserve a wider audience. This document, therefore, gives not merely the queries and answers, but seeks to give the intentions of the standards in the hope that these may help in future interpretations.

Queries that have subsequently been clarified by the issue of amendments have not been included in this Published Document (see Amendment Nos. 1 and 2 to BS 5839 : Part 1 (AMD 6317 and AMD 6874, respectively) and Amendment Nos. 1 and 2 to BS 5839: Part 4 (AMD 6654 and AMD 6875, respectively). It is essential that readers refer to the amended text when reading this Published Document.

Points already covered in the amendments include the following.

- a) In BS 5839 : Part 1.
 - 1) In **6.6.2**, an ambiguity concerning the removal of detectors from the circuit has been resolved by Amendment No. 1.
 - 2) In **6.6.3**, confusion over whether 'sounder' refers to the whole of the sounder or just to the sound generating part has been resolved by Amendment Nos. 1 and 2.
- b) In BS 5839 : Part 4.
 - 1) There was no requirement forbidding the use of a single cable entry point for the mains power lead into the equipment and for cables to detectors and sounders, although there was such a recommendation in BS 5839 : Part 1. Amendment No. 1 to BS 5839 : Part 4 brings the two standards into line.
 - 2) The case of signal cables, such as those to door release units, using voltages other than extra low voltage has been inserted.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 18, an inside back cover and a back cover.

1 Scope

This Published Document gives queries concerning the interpretation of BS 5839 : Part 1 (as amended by Amendment Nos. 1 and 2) and BS 5839 : Part 4 (as amended by Amendment Nos. 1 and 2) together with the relevant answers.

NOTE. The titles of the publications referred to in this Published Document are listed on the inside back cover.

2 Interpretations of BS 5839: Part 1: 1988

2.1 Manual and automatic systems

Query

BS 5839 : Part 1 seems to be ambiguous about the provision of manual call points and sounders. For instance, 10.3 says '... If manual and automatic devices are to be installed ...' and 'Where manual call points are incorporated ...', but 3.2 says '... manual call points should always be provided'. Similarly, a type L system is stated in 3.1 to be an 'automatic' system, but appendix J.1 says that the recommendations for manual call points are applicable to all types of system. If I am installing a type P system, do I have to include manual call points and the sounders required for a type M system? If I am installing a type L system, do I have to include manual call points in the system?

Answer

BS 5839 : Part 1 has been written to cover fire alarm systems for a very wide range of premises. Some will be new, while others will be older premises, with existing fire alarm systems.

In most cases there will be legislative requirements for the premises to have provision for sounding the alarm, and often in older premises these will already have been satisfied by a manual alarm system. If the occupier now wishes to protect his property by installing a type P system, then the code makes no recommendations on whether or not the new system should incorporate or replace the old system. The code discriminates between 'the system' and 'the building'. Thus, in 10.3, it permits, but does not require, manual and automatic devices to be incorporated into a single system.

If a single system is to perform the functions of both type M and type P systems, then it should perform all the recommended functions. In such a case the type P system would need to have the sounders recommended for life protection by 9.3. If the functions were performed by separate systems, then the type M system would need to have the sounders called up by 9.3, while the type P system would need those called up by 9.2. Frequently in such cases the integration into a single system will make economic sense, since there will be a reduction in the total amount of wiring and maintenance will be easier.

Clause 3.6 recommends that 'the type of system to be installed should always be included in the specification'. Where necessary, the contract specification should call up multiple types; L/M, P/M, L/P or even L/P/M.

2.2 Short circuit monitoring

Query

My system senses a fire alarm by monitoring for an increase in the current taken by one or more detectors, and monitors the wiring by looking for the current taken by an end-of-line resistor. The result is that a fault warning is given if the line is broken, but a fire warning if the line is short circuited. Since this method is fail-safe, is it acceptable?

Answer (see also 3.2 of this Published Document)

The code is quite specific about this, both in the definition of monitored wiring (2.10) and in the recommendations for circuit design (6.6.1, fourth paragraph). A fault warning, and not a fire alarm, should be given in response to either a short or open circuit of cable such that it would disable one or more detectors or call points.

The purpose behind the recommendation is to avoid unnecessary false alarms. The committee takes the view that any false alarm will reduce people's confidence in the system. Thus the system proposed in the question is not fail-safe, since it may lead to an increase in the danger of a real fire alarm being ignored.

2.3 Monitoring of alarm sounder circuits

Query

9.1 says that 'advice on the connection of sounder circuits is given in 6.6.3'. 6.6.3 recommends that disconnection of a sounder should generate a fault warning, but does not recommend monitoring of sounder cables. Does this mean that unmonitored cables can be used?

Answer

No. Monitoring of sounder circuits (and other circuits) is covered in 6.6.1, which recommends that '... an indication is given at the control and indicating equipment within 100 s of the occurrence of any disconnection,.... or of a failure of any other interconnection...'. This applies even where the interconnection is a short spur running from the main sounder circuit to feed a single sounder.

Furthermore, the committee believes that in this context the recommendations for sounder circuits also cover other devices for giving the alarm, including loudspeakers in voice alarm systems.

2.4 The use of isolators between zones

Query

Clause **6.6.2** sets limitations as to the effect of a fault or faults in the wiring. What is the philosophy behind these limitations?

Answer

Clause **6.6.2**, as amended by AMD 6874 (May 1992), contains the following four recommendations relating to wiring faults:

- ‘if separate circuits are used for each zone, then a fault or faults on one circuit cannot affect any other circuit;
- if any circuit is used for more than one zone, then a single fault on that circuit cannot remove protection from an area greater than that allowed under **7.2(a)** to (d) for a single zone;
- if a circuit is used for more than one zone and multiple faults within one fire compartment could remove protection from an area greater than that allowed under **7.2(a)** to (d) for a single zone, then the circuit within that compartment is suitably protected (see **17.15**);
- two simultaneous faults should not remove protection from an area greater than 10 000 m².

These recommendations were put into the standard because of the introduction of addressable systems, in which signals from individual detectors could be separately identified even though sharing common cables with other detectors.

The objective of the committee was that the new systems should be allowed to introduce advantages, but that any disadvantages should be excluded or at least limited.

In non-addressable systems each zone has a separate circuit (remember that a zone is defined as an area of the building, not as part of the fire alarm system). Damage to that circuit (whether at one place or at several) can affect only one zone. **6.6.2(1)** maintains this property irrespective of system.

In addressable systems one circuit can feed many zones. The committee could have maintained comparability with non-addressable systems by a recommendation that a single fault should affect only one zone. Such a recommendation could have been conformed to by the use of fault isolators between zones, together with an alternative return path such as might be supplied by a loop circuit.

However, one of the advantages of the addressable system is its ability to give a more accurate location of the fire by allowing the use of smaller zones, specified only in software and without expensive wiring or additional zone modules in the control equipment. The committee decided that a recommendation for isolation between all zones would penalize this advantage, and therefore expressed its recommendation as in **6.6.2(2)**, needing isolation only at the same zone limits as for conventional systems. Isolation of the smaller zones is, of course, allowable but is optional.

Of course, the ability to use isolators in this way depends on the use of loops or similar circuits, so that in the event of failure at one point of the loop the signal from unaffected parts can still be returned to the control equipment. But if both sides of the loop return through the same fire compartment, then a large fire within that compartment could break both sides of the loop, leaving the intermediate detectors isolated and leaving unprotected any area covered by the isolated part. To prevent this, **6.6.2(3)** and **17.15** recommend the use of wiring able to withstand prolonged exposure to fire in such cases.

The recommendation of **6.6.2(4)** is concerned with the limitation of damage to the system due to two unrelated faults. In theory (given the necessary zone isolation) it would be possible to have an addressable system in which many thousands of detectors were connected to one loop circuit. Two unrelated faults could then remove protection from a very large area. Although such a circumstance was considered unlikely, the committee felt that the extent of the resultant loss of protection should be limited. **6.6.2(4)** limits the area of the building that might be affected to 10 000 m². In most cases this will limit the maximum area that can be served by a single loop circuit.

2.5 Addressable detector/sounder units

Query

Clause **6.6.3** recommends that ‘If alarm sounders use the same wiring as detectors, then no alarm sounder should be affected by the removal of any detector’. Does this imply that combined detector/sounder units cannot be used in BS 5839 : Part 1 systems?

Answer

In 1988, when the standard was written, this type of unit did not exist, and hence was not catered for in the standard. Its use, therefore, should be considered against the background philosophy of the recommendations of **6.6.3**.

In non-addressable systems, detectors (particularly smoke-sensitive detectors) are frequently mounted in plug-in sockets for ease of maintenance. In many such systems removal of a detector will break the circuit, isolating any detectors beyond the break. Alarm sounders are generally considered to be more robust, and are therefore usually wired directly into the circuit, with a much reduced risk of the circuit being broken by removal of a sounder. However, if detectors and sounders are mounted on a common circuit a risk arises that the easy removal of a detector by unplugging will isolate both detectors and alarm sounders beyond the break.

Under **6.6.2a** the removal of a detector should raise a fault warning. In general, it would be expected that the fire routine for the building would include arrangements to deal with the loss of detection ability in the now unprotected area, usually by a wakeful watch system. However, although this may be adequate for the detection of the fire, it is not