BRITISH STANDARD

BS 5839-9:2003

Fire detection and fire alarm systems for buildings —

Part 9: Code of practice for the design, installation, commissioning and maintenance of emergency voice communication systems

ICS 13.220.20; 13.320

Committees responsible for this British Standard

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British Fire Consortium
British Fire Protection Systems Association
British Nuclear Fuels plc
BT plc
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Department of Health NHS Estates
Electrical Contractors Association
Energy Industries Council
Engineering Industries Association
Health and Safety Executive
Her Majesty's Fire Service Inspectorate
Institute of Fire Prevention Officers
Institution of Fire Safety
Institute of Petroleum
Institution of Electrical Engineers
Line of Fire
London Fire and Emergency Planning Authority
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MOD — UK Defence Standardization
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Contents

Foreword

This part of BS 5839 has been prepared by Technical Committee FSH/12/1. No existing standard is superseded.

Emergency voice communication systems allow firefighters and others to communicate with one another during emergency situations in and around buildings and at sports and similar venues, such as entertainment centres. They also allow communication with disabled persons. Although such emergency communication systems have been in common use for many years, they have not been directly covered by any British Standard or code of practice. In recent years, this absence of standardization has given rise to an anomaly, since fire detection and alarm systems and voice alarm systems, in the same buildings as emergency voice communications systems, are normally covered respectively by BS 5839-1 and BS 5839-8. Emergency voice communication systems, as later defined in this code of practice, are used in connection with life safety and should therefore be subject to high standards of design, manufacture, installation and servicing, similar to those covering fire detection and alarm systems and voice alarm systems.

There is very restricted reference to fire telephone systems (a form of emergency voice communication systems), or similar emergency communication systems, in other standards or codes of practice. This code of practice has, therefore, been prepared to:

a) give guidance to those who specify, design, manufacture, install, commission, service and use such emergency voice communication systems;

b) ensure that high standards of reliability, safety and security are achieved, together with acceptable standards of performance.

It has been assumed in the drafting of this standard that the execution of its provisions will be entrusted to appropriately qualified and experienced persons.

As a code of practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification, and particular care should be taken to ensure that claims of compliance are not misleading.

Normative clauses are arranged into two parts, namely, commentary and recommendations. It is envisaged that, when emergency voice communication systems are audited (e.g. by enforcing authorities, third party certification bodies, or representatives of the purchaser or user), only the recommendations will form the basis for the audit. The commentary is intended to provide an explanatory background to the recommendations, especially where the recommendations might otherwise appear arbitrary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 36, an inside back cover and a back cover.

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Section 1. General

1 Scope

This code of practice provides recommendations for the planning, design, installation, commissioning and maintenance of emergency voice communication systems in and around buildings and at sports, entertainment and similar venues. It does not recommend whether or not an emergency voice communication system should be installed in a given premises.

Henceforward in this code of practice, emergency voice communication systems are usually referred to as EVC systems and the term EVC is used to mean emergency voice communication.

This code of practice primarily relates to the use of EVC in assisting both firefighters and those responsible for evacuating buildings or sports stadia in fire emergency situations, including evacuation of disabled persons. Use, other than in fire emergency situations, by disabled persons and others, although not precluded, is not addressed in detail.

Other than in exceptional circumstances, EVC systems are not intended as the means of raising a fire alarm, in lieu of manual call points. Reference should be made to BS 5839-1 for guidance on fire detection and alarm systems.

In the context of this code of practice, an EVC system contains no portable parts. Mobile telephones and two-way radio sets are therefore not within its scope.

An EVC system should be:

1) restricted to a building, building complex or sports or similar venue;

2) continuously monitored for faults;

3) for use as described in this part of BS 5839.

The term emergency voice communication systems is therefore not intended to cover general-purpose intercom systems, lift intercom systems, local (internal) telephone systems for general use, or any external communication systems, such as the public switched telephone network.

Voice alarm systems are primarily intended for the automatic broadcasting of evacuation messages; they are covered by BS 5839-8 and are therefore excluded from this code of practice.

This part of BS 5839 does not cover systems combining electrically the functions of EVC systems with functions of other fire-related or non-fire-related systems. That is, for example, an EVC master station may mechanically share part of its enclosure with the control and indicating equipment of a fire alarm system, but recommendations for sharing a single mains-derived extra low voltage power supply are not within the scope of this standard. Recommendations for integrated systems are given in BS 7807.

This part of BS 5839 applies only to emergency voice communication systems for use in a temperate climate such as that of the United Kingdom.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 5499-1, *Graphical symbols and signs — Safety signs, including fire safety signs — Part 1: Specification for geometric shapes, colours and layout.*

BS 5588-5, *Fire precautions in the design, construction and use of buildings — Part 5: Code of practice for firefighting stairs and lifts.*

BS 5588-8, *Fire precautions in the design, construction and use of buildings — Part 8: Code of practice for means of escape for disabled people.*

BS 5588-10, *Fire precautions in the design, construction and use of buildings — Part 10: Code of practice for shopping complexes.*

BS 5588-11, *Fire precautions in the design, construction and use of buildings — Part 11: Code of practice for shops, offices, industrial, storage and other similar buildings.*

BS 5839-1:2002, *Fire detection and alarm systems for buildings — Part 1: Code of practice for system design, installation, commissioning and maintenance.*

BS 7671, *Requirements for electrical installations — IEE Wiring Regulations — Sixteenth edition.*

BS EN 54-2:1998*, Fire detection and fire alarm systems — Part 2: Control and indicating equipment.*

BS EN 54-4:1998*, Fire detection and fire alarm systems — Part 4: Power supply equipment.*

BS EN 60529*, Specification for degrees of protection provided by enclosures (IP code).*

BS EN 60651*, Specification for sound level meters.*
[IEC 60651]

BS EN 60702-1*, Mineral insulated cables and their terminations with a rated voltage not exceeding 750 V — Part 1: Cables.*
[IEC 60702-1]

BS EN 60702-2*, Mineral insulated cables and their terminations with a rated voltage not exceeding 750 V — Part 2: Terminations.*
[IEC 60702-2]

Guide to Safety at Sports Grounds. The Scottish Office, 1997.

Fire Safety Guide No. 3, Phased Evacuation from Office Buildings. London District Surveyors Association.

3 Terms and definitions

For the purposes of this part of BS 5839, the following terms and definitions apply.

3.1
competent person

person with the necessary training and experience, and with access to the requisite tools, equipment and information, and capable of carrying out a defined task

3.2
duplex operation

operation of transmitting and receiving apparatus at one location in conjunction with associated transmitting and receiving equipment at another location, the processes of transmission and reception being concurrent

3.3
emergency voice communication system

EVC system

system that allows voice communication in either direction between a central control point and a number of other points throughout a building or building complex, particularly in a fire emergency situation

3.4
evacuation lift

lift that may be used for the evacuation of disabled people in a fire under the direction of management or firefighters

3.5
firefighting lobby

protected lobby providing access from a firefighting stair to the accommodation area, and to any associated firefighting lift

3.6
firefighting stair

protected stairway communicating with the accommodation area only through a firefighting lobby

3.7
fire telephone system

commonly-used form of emergency voice communication system that includes telephone handsets at outstations and usually also at master stations

3.8
group call

call made from a master station to more than one outstation simultaneously

3.9
handset

part of a telephone, combining receiver and transmitter, one at each end of the handle

3.10
hook-switch

switch operated automatically by removal of a handset from, or replacement of a handset in, its rest position

3.11
intelligibility

measure of the proportion of the content of a speech message that can be correctly understood

3.12
master station

control unit located at a central control point which controls the EVC system

NOTE In large buildings or building complexes, there may be several master stations communicating with each other.

3.13
off-hook

the status of a handset when removed from its normal rest position to initiate an outgoing call or receive an incoming call.

3.14
on-hook

the status of a handset when in its normal rest position, terminating a call or permitting notification of an incoming call

3.15
outstation

unit, located at a strategic point in a building or building complex, that allows two-way voice conversation with a master station

3.16
phased evacuation

system of evacuation in which different parts of the premises are evacuated in a controlled sequence of phases, those parts of the premises expected to be at greatest risk being evacuated first

3.17
protected lobby/corridor

circulation area consisting of a lobby or corridor enclosed with fire-resisting construction (other than any part that is an external wall of a building)

3.18
protected stairway

stair discharging through a final exit to a place of safety (including any exit passageway between the foot of the stair and the final exit) that is enclosed with fire resisting construction

3.19
refuge

area that is enclosed with fire-resisting construction (other than any part that is an external wall of a building) and served directly by a safe route to a storey exit, evacuation lift or final exit, thus constituting a temporarily safe space for disabled people to await assistance for their evacuation

4 Need for an emergency voice communication system

4.1 Commentary

The need for EVC in any specific building or complex will normally be determined by the authority responsible for enforcing fire safety legislation in that building and/or by a fire risk assessment carried out by the owner, landlord, occupier(s), employer(s) or other responsible person, as appropriate.

It is appropriate to install EVC in many buildings where phased evacuation applies, to help appropriate persons in the building and, in particular, the fire service, to manage the evacuation of the building.

At sports venues and in similar complexes, EVC will assist stewards in controlling the evacuation of the area in an emergency. Stewards, firefighters and other emergency services will be able to communicate from strategic points throughout the site, with a central control area.

An EVC system will also assist the fire service in firefighting operations after evacuation of a building or other complex.

Installation of an EVC system may be appropriate for buildings without phased evacuation where the types, size and/or shape of the building necessitates communication between remote locations and a central control point, to facilitate evacuation or firefighting.

In any building or sports or similar venues where there are disabled people, the installation of an EVC system might be required to facilitate communication with people at refuges.

4.2 Recommendations

The following recommendations are applicable.

a) Where there is uncertainty regarding the need for an EVC system, reference should be made, by the potential purchaser or user, to one or more of the following:

1) BS 5588-5, -8, -10 and –11;

2) Guide to Safety at Sports Grounds. The Scottish Office, 1997;

3) Fire Safety Guide No 3, Phased Evacuation from Office Buildings. London District Surveyors Association;

4) Approved Document B, The Building Regulations 2000, DETR;

5) guidance documents that support fire safety legislation;

6) any authority responsible for enforcing fire safety legislation that applies to the premises.

5 Exchange of information and definition of responsibilities

5.1 Commentary

*The main purpose of an EVC system is to support the fire safety strategy of the building or complex (see Clause **7**). It is therefore important that system design suitably supports the required evacuation and firefighting procedures.*

The system requirements, including those imposed by the evacuation procedures, the configuration of the building or complex, and the use to which the building is put, should be ascertained as accurately as possible by consultation between the user or purchaser and other interested parties, such as the enforcing authority.

*A key performance requirement to be determined in relation to EVC systems is whether there is a need for calls to be made to, as well as from, outstations. Any proposal to make outstations more secure [see **11.5.2**g)] should also be agreed with the interested parties.*

There should also be relevant consultation between the user or purchaser and the system designer.

The design may be undertaken by the supplier, the installer, representatives of the user or purchaser, or by any combination of these parties.

5.2 Recommendations

The following recommendations are applicable:

a) The user or purchaser of the system should ensure that, to the extent appropriate, there is consultation at, or prior to, the system design stage with the authority enforcing legislation (e.g. the building control body, fire authority, local authority or Health and Safety Executive) and, where applicable, the police service.

NOTE 1 Where any variations from the recommendations of this part of BS 5839 are proposed, they should be agreed with the relevant interested parties.

b) The purchaser or user should ensure that the designer of an EVC system is adequately appraised of the objectives of the system and, in particular, whether there is a requirement for calls to be made to, as well as from, outstations.

c) The designer of the system should ensure that, to the extent appropriate, there is consultation at the design stage with all relevant interested parties within the following list:

— the user or purchaser;

— the supplier of the system;

— the installer of the system;

— consultants (including architects, mechanical and electrical consultants and fire safety engineering consultants).

NOTE 2 Some of the consultations may be undertaken by parties such as the designer or consultants, acting on behalf of the user or purchaser.

d) The installer of the system should ensure that, to the extent appropriate, there is consultation with all relevant interested parties within the following list:

— the designer;

— the supplier of the system;

— consultants (including architects, mechanical and electrical consultants and fire safety engineering consultants).

e) Before an order is placed for the system, the responsibility for each of the following stages should be clearly defined and documented:

— system design;

— installation;

— commissioning and certification.

6 Variations from the recommendations of this standard

6.1 Commentary

This part of BS 5839 is a code of practice and, as such, its contents take the form of recommendations, rather than requirements. The recommendations, which are based on recognized good practice in the design, installation and maintenance of EVC systems, should be suitable for the majority of normal applications.

There will, however, be applications in which the recommendations may be unsuitable and would lead to systems that would be unnecessarily expensive, incorporating measures that could not be regarded at cost-effective, or that could be difficult to install.

This does not, however, imply that the designer or installer should have freedom to ignore the recommendations of this standard under circumstances in which a user, purchaser or enforcing authority seeks compliance with it. Variations should always be the subject of specific agreement amongst all interested parties and should be clearly identified in all relevant system documentation.

Some variations may arise from a fire risk assessment, or may be based upon the engineering judgement of a competent person. There might, for example, be situations where the number or siting of outstations would not comply exactly with this code of practice for reasons relating to the particular building construction.

6.2 Recommendations

The following recommendations are applicable.

a) Any variations from the recommendations of this part of BS 5839 incorporated within a specification or design proposal should be clearly identified, so that they are obvious to any party from whom approval of the specification or design proposal may be sought, such as the user, purchaser, or enforcing authority.

b) Any variations from the recommendations of this part of BS 5839 identified or proposed during installation or commissioning, but not clearly identified in the documented design, should be documented (other than in the case of errors or "snags" for which rectification is proposed), for subsequent approval.

NOTE This recommendation is not intended to imply that it is the responsibility of the installer or commissioning engineer to verify or certificate compliance of the installation design with this standard. However, if variations are identified by an installer or commissioning engineer, particularly variations related to circumstances that might not have been known to the designer (e.g. structural features of the building that affect outstation number or siting), they should be documented for referral to the designer, user or purchaser for agreement or action.

c) All variations, whether of the type described in a) or b), should be agreed amongst the interested parties (see **5.2**).

d) All variations should be listed in the system certificate (see **22.2**).

Section 2. Design considerations

7 Purpose

7.1 Commentary

*Emergency voice communications systems, in the context of this part of BS 5839, are intended for specific types of communication. They are not, for example, designed for general use for non-emergency purposes, and the location and construction of EVC system component parts (see Clause **11** and Clause **12**) tend to illustrate this.*

Intended uses for EVC systems are as follows.

a) *Use by the management of the building or complex for its initial evacuation:*

In the first stages of evacuation, before the fire service arrives, the EVC system may be used for communication between a person at a fire control centre with, for example, fire wardens or fire marshals on various floors of the building or with stewards at a sports venue. Typically, in the case of a building, a call would be made from an outstation on a particular floor to advise the fire control centre that the floor in question had been cleared of occupants.

b) *Use by the fire service during an evacuation*:

After arrival in the building or at the venue, the fire service would normally take over control of evacuation, with an officer at the fire control centre communicating with other officers via the EVC system.

c) *Use by the fire service after evacuation*:

During the course of a fire, the fire service would continue to use EVC after completion of evacuation, to assist firefighting.

d) *Use by disabled people*:

*Particularly during a fire, but also in any other emergency situation, disabled persons in refuges would be able to identify their presence and communicate with a person, e.g. a control room operator, at the fire control centre, via appropriately situated outstations. Such communication arrangements would then comply with the recommendations of BS 5588-8:1999, Clause **13**, which states "...there has to be a system of two-way communication between those people who are temporarily waiting in each refuge and those members of the building management who are organizing the evacuation of the building. The two-way communication system needs to be readily operated by, and comprehensible to, disabled people."*

e) *Other uses*:

1) *An EVC system may be used by designated persons within a building for non-emergency purposes; for example, someone on a security patrol could use outstations to communicate that person's location to the fire control centre (which would normally also be a security centre).*

2) *An outstation may have a "loud speak" capability, allowing voice messages or signals arising from a master station to be broadcast over a limited area in the region of the outstation. This facility might be used to allow the operator at the master station to continue to speak to someone in distress near the outstation.*

3) *Whether on- or off-hook, an outstation may also have a "listen" facility such that any sound in its immediate vicinity can be heard at the relevant master station(s). In addition to enabling the operator at the master station to listen generally for any sounds near outstations, this facility might be used to allow that operator to continue a conversation with someone in distress near an outstation.*

4) *Use for communication between outstations is not recommended by this code of practice.*

NOTE When a group call is made by a master station, there may be a "conferencing" outcome, such that outstations are able to communicate with other outstations as well as with the master station.

The facilities referred to in e) as "other uses" are not addressed within the scope of this standard.

7.2 Recommendations

The following recommendations are applicable.

a) Other than in the case of EVC systems provided in refuges, users of an EVC system should generally be restricted to appropriate staff (e.g. stewards, fire marshals and control room operators) and members of the fire service.

b) Communication should be between an outstation and a master station, not between an outstation and any other outstation, except where this is possible only because the relevant master station has performed a group call.

c) Communication should normally be initiated from the outstation. However, the facility to call an outstation from the master station might be required in some applications. This should be determined by consultation with interested parties (see **5.2**).

d) Optional features such as the capability for "loudspeaking" and "listening" may also be provided subject to the following.

1) Where a voice alarm is installed in the building or complex, care should be taken that voice alarm emergency broadcast is not affected adversely or overridden by use of the "loudspeaking" capability of the EVC system as described in **7.1**e)2).

2) Where an outstation has the "listening" capability described in **7.1**e)3), this should not interfere with the use of the EVC system for communications within the scope of this code of practice.

8 System circuitry and software

8.1 Commentary

The components of EVC systems may be interconnected in various ways. A radial wiring arrangement can be used. It might, however, be more economical for cable to use a loop configuration, or multiple loops. Whichever arrangement is chosen, circuits should be continuously monitored for faults and circuit design should be as resilient as possible to faults.

8.2 Recommendations

The following recommendations are applicable.

a) A radial-wired system may be used. In this case, if a cable fault occurs, an individual fault indication should be given, specifically related to the radial link affected. [see **10.2.2**a)3)iv].

b) Alternatively, a single or multiple loop configuration may be used. In either case, for integrity in operation, each loop should be closed, such that emergency voice communication can continue to take place between any outstation and the master station, in the event of an open-circuit of the loop at any one point. Fault monitoring of the loop(s) should be as recommended in **10.2.2**a)3)iv).

c) Where program-controlled systems are used unauthorized changes to the programs need to be prevented.

d) If a master station is supplied with power from power supply equipment contained in a separate enclosure, the connections between the equipment should be duplicated such that a single open or short-circuit in the connections does not completely remove power from that master station.

9 Audio and data signal paths

9.1 Commentary

In an emergency situation, no delays in voice communication should be introduced by the system. Conversation should be possible exactly as if no electronic communication system were involved.

Since it is quite possible that a handset could be accidentally left off-hook (or the door of its enclosure could be left open), particularly in an emergency, this should not jeopardize the correct operation of the remainder of the EVC system.

Similarly, it is possible for a "call" button to become jammed in the "call" position. Once again, this should not affect communication between other elements of the EVC system.

Compatibility of EVC system components, both within a master station or outstation, and particularly between master station and outstation, is necessary for effective communication.

A typical EVC system will be supplied as a complete set of equipment, without wiring. Outstations may be presumed to have been designed to be compatible with the master stations supplied. However, it is important to use the correct type of interconnecting cables and for the cable links to be reliable.

9.2 Recommendations

The following recommendations are applicable.

a) To facilitate conversation in an emergency situation, duplex operation should be employed.

b) When a call is initiated, either at an outstation or at a master station, the incoming call warning indication at the receiving end should operate within three seconds of the initiation.

c) If any outstation handset is off-hook, this should not affect communication between any other outstation on the EVC system and the master station.

d) Jamming of a "call" button or any other means of initiating a call should not affect communication between any other outstation on the EVC system and the master station.

e) Compatibility should be ensured between system components. In particular, master stations and outstations should be compatible. Generally, therefore, it is recommended that the complete equipment set for an EVC system should be purchased from one supplier, which would then have responsibility for its overall performance, provided the wiring is acceptable.

f) Wiring should be in accordance with the recommendations of Clause **14** and all interconnecting cables should be monitored for faults as recommended in **10.2.1**f).

10 Fault monitoring and indication

10.1 Commentary

EVC needs to be a secure and reliable means of communication. However good its design and installation, there is still the possibility of an EVC system developing a fault. A fault could occur within a master station or an outstation, in a power supply, or anywhere in the system wiring. Such faults need to be detected and indicated without delay, so that a service engineer may be called in to effect any necessary repairs.

10.2 Recommendations

10.2.1 *Fault conditions*

The following recommendations are applicable.

The master station should be capable of monitoring any of the following conditions:

a) short-circuit or disconnection of any normal power supply associated with the operation of EVC equipment, or other total loss of power from such a normal supply;

b) short-circuit or disconnection of any standby power supply associated with the operation of EVC equipment, including where the standby power supply comprises a number of batteries connected in parallel;

c) disconnection of any one battery or short-circuit of a single cell within a battery;

NOTE Facilities may be provided for giving an audible and visible warning in the event of simultaneous failure or disconnection of both normal and standby power supplies.

d) short-circuit or disconnection of any battery charging equipment associated with the operation of EVC equipment;

e) rupture of any fuses or operation of automatic circuit breaker, isolator or protective devices that could prevent voice communication in an emergency;

f) failure of an outstation, including any open- or short-circuit fault in the circuits up to the microphone capsule, loudspeaker or ear-piece, and any fault in an associated amplifier;

g) open-circuit, and short-circuit faults on interconnecting cabling linking any outstation to any master station;

h) any earth fault on interconnecting cabling linking any outstation to any master station, where this fault would inhibit any mandatory function of the system;

i) failure of any processor to correctly execute its software program, including cessation of any scanning or interrogating process, or detection of any error in memory checking procedures;

j) failure of any component within a master station such that emergency voice communication would be impaired, including failure of the circuits up to the microphone capsule, loudspeaker or ear-piece.

10.2.2 *Fault indications*

The following recommendations are applicable.

a) In the event of any of the fault conditions listed in **10.2.1** occurring, a fault indication should be given at the master station, by the following:

1) an audible warning from a sounder, preferably within each master station. The sound level should not be less than 50 dB(A) at one metre from the master station, when measured with an instrument conforming to BS EN 60651 type 2 with slow response;

NOTE A master station should be located in an area with low background noise.

However, if the background noise exceeds 47 dB(A), the level of sound from the sounder should be at least 3 dB above that of the background noise. An (additional) external sounder might then be required.

2) a visible indication by means of a separate light emitting indicator (the general fault indicator);

3) separate light emitting indicators and/or an alphanumeric display, giving the following:

i) a visible indication, common to all power supplies, of the faults described in **10.2.1**a), b) and c);

ii) a visible indication, common to all signal paths, of the rupture of any fuse or operation of protective device, as described in **10.2.1**d), if the fault is capable of adversely affecting emergency voice communication and is not otherwise indicated as a fault of a monitored function;

iii) an individual visible indication, for each outstation, of the faults described in **10.2.1**e), except in the event of a fault of the type described in **10.2.1**f), that would prevent transmission of the fault signal to the master station;

iv) in the case of radially-wired systems, an individual visible indication, for each cable connecting an outstation to the master station, of the faults described in **10.2.1**f). In the case of a loop-wired system, assuming the loop to be closed as recommended in **8.2**b), an individual visible indication, for each such loop, of the faults described in **10.2.1**f);

v) a visible indication common to faults described in **10.2.1**g) and h). This indication may be the general fault indicator.

b) The fault indication should be given at all master stations in the system within 100 s of the occurrence of a fault regardless of whether the EVC system is being used for emergency or non-emergency purposes.

c) The indication of faults that exist prior to emergency use of the system may be suppressed during emergency use, except where these pre-existing faults might adversely affect any emergency voice communication.

d) If the indication of any fault condition is suppressed during emergency voice communication, the indication should be given in accordance with the recommendations of **10.2.2**a) within 100 s after cessation of that communication.

10.2.3 *Fault warning sounder*

The audible warning recommended in **10.2.2**a)1) should be distinctive. This warning should sound for a minimum of 0.5 s every 5 s.

10.2.4 *Silencing of the fault warning sounder*

Provision may be made for manually silencing the fault warning sounder. [see **12.2.2**i)].

10.2.5 *Resetting from the fault warning condition*

Resetting from the fault warning condition should either be automatic when all faults are removed (non-latching fault warnings), or should be by a manual control (latching fault warnings). If the fault warning condition can be cancelled by resetting when the fault(s) still exists, then the fault warning condition should be restored within 100 s.

NOTE It is permissible for the fault warnings to latch for some types of fault and not for others.

10.2.6 *Monitoring of software controlled equipment*

The correct operation of the system software by any processor should be monitored by internal self-checking procedures and by an appropriate monitoring circuit, e.g. a watch-dog circuit, in accordance with the following recommendations.

a) The monitoring circuit and its associated indication and signalling circuits should not be prevented from determining and signalling a fault condition by the failure of any monitored processor or associated clock circuits.

b) The monitoring circuit should monitor the operation of routines associated with the functions of the main program elements; i.e. it should not be solely associated with "waiting" or other "housekeeping" routines.

c) In the event of failure by a microprocessor to execute its software correctly the monitoring circuit should, in addition to initiating an audible and visual fault warning, perform as follows:

1) re-initialize the processor and attempt to restart the program at a suitable point within 10 s of the occurrence of the failure. The re-initialization procedure should verify that the contents of the memory, both program and data, are not corrupted;

2) either:

i) record that a failure has occurred using a system capable of recording a minimum of 999 failures and resettable only by an operation restricted to authorized servicing personnel; or

ii) automatically reset the equipment and give both a visual and audible warning that an automatic reset has occurred.

11 Outstations

11.1 General

11.1.1 *Commentary*

An EVC system contains a number of outstations, located at strategic points throughout a building or complex. Intercoms for disabled people may be included as forms of outstations, but there will often be several outstations specifically located for use by persons such as firefighters, during evacuation of the building or during firefighting.

Two (physical) types of outstation are covered by this code of practice. These are:

a) *Type A – an outstation using a telephone-style handset for voice communication, so that the user's mouth and ear can be as close as possible to the microphone and ear-piece, respectively.*

b) *Type B – an outstation using an intercom-style fixed microphone and adjacent loudspeaker, normally mounted on a wall or other vertical surface.*

During an evacuation or firefighting in a building or at a complex, there might be a high level of background noise. Outstation design should be such as to minimize the effect of background noise upon voice communication.

An outstation should be of high integrity so that it may be used in an emergency with high confidence that it will operate correctly.

11.1.2 *Recommendations*

The following recommendations are applicable.

a) An outstation intended for evacuation or firefighting use should be type A [see **11.1.1**a)]. A type B outstation [see **11.1.1**b)] should be used only where it is impractical to install a type A outstation.

b) An outstation intended for use by disabled people at refuges may be either type A or type B.

However, type B outstations should be used in situations where the outstation will be operated by members of the public.

c) When an outgoing call has been initiated, a reassurance tone, i.e. a tone similar to the ringing tone in a normal telephone system, should be heard by the caller at the outstation via either the handset ear-piece or the integral loudspeaker.

11.2 Controls

11.2.1 *Commentary*

Controls at outstations are for use during emergencies. Operation of an outstation should therefore be as simple as possible, to avoid confusion. All controls should be clearly labelled.

11.2.2 *Recommendations*

The following recommendations are applicable.

a) For operation of type A outstations, no controls should be necessary to make a call in EVC mode; i.e. lifting the handset to make a call should automatically operate the hook-switch or, alternatively, opening the door of the enclosure should initiate the call.

b) Operation of type B outstations should require only use of a single call button to initiate a call. This control should be a momentary-action pushbutton switch so that there is no need for it to be mechanically reset after use.

c) In the case of type B outstations, consideration should be given to the inclusion of means to help locate the call button. For example, a raised bezel might be fitted around the pushbutton.

d) Both type A and type B outstations should be labelled with simple instructions on how to initiate a call. Preference should be given to pictograms to describe the method of operation.

11.3 Indications

11.3.1 *Commentary*

Indications at an outstation should be kept to the minimum to avoid any confusion in an emergency.

For outstations intended to receive incoming calls, the incoming call should be indicated audibly and, where necessary, visually.

11.3.2 *Recommendations*

The following recommendations are applicable.

a) Where the facility for calls to, as well as from, outstations is required [see **5.2**b)], an audible warning of an incoming call should be provided at every outstation. This warning may be given by the ear-piece of a handset, a loudspeaker, or a separate buzzer or sounder. The audible warning should sound continuously or in pulsing mode (sounding for a minimum of 0.5 s every 5 s) when there is an incoming call. For a type A outstation, the sound should be cancelled when the handset is removed from its hook or the outstation's door is opened, depending on the mode of operation. In the case of a type B outstation, the buzzer should be cancelled preferably via the call button (which then acts also as a "buzzer silence" control).

b) For a type A outstation, if a handset is left off-hook or the outstation door is left open (depending upon the mode of operation) after a call has been completed, the master station should preferably still be able to initiate an audible warning at the outstation.

c) Where high background noise is unavoidably present in the vicinity of an outstation, the incoming call audible warning signal should be supplemented by a visual warning signal.

d) A red indicator may be provided to illuminate, either steadily or in flashing mode, when there is an incoming call.

11.4 Electrical performance

11.4.1 *Commentary*

An EVC system should be safe, secure and able to perform its designed functions satisfactorily. Since the main function of an EVC system is voice communication, audibility and intelligibility of conversation is very important.

11.4.2 *Recommendations*

The following recommendations are applicable:

a) Operating voltage should be extra low voltage, as defined in BS 7671. Guidance on wiring is provided in Clause **14**. Earthing of the housing of an outstation should also be in accordance with BS 7671.

b) Outstations should be monitored for faults [see **10.2.1**e)].

c) Both microphone and ear-piece or loudspeaker should have a minimum ±3 dB frequency response of 250 Hz to 4 kHz. Where a fixed microphone is used, the minimum ±3 dB frequency response should be 250 Hz to 5 kHz.

NOTE The upper frequency limit of 4 kHz is to allow for an overall upper audio transmission limit of about 3.4 kHz, traditionally used for telephone communication. That overall limit should be acceptable for communication via a telephone-style handset, where coupling to ear and mouth is fairly close, with consequent reduction of the effect of background noise on voice communication. Where a handset is not used, audio transmission of wider bandwidth is desirable to counter the effect of background noise.

d) Any pre-amplifier or other circuitry within an outstation should have a bandwidth such as to prevent the overall audio transmission bandwidth falling below 300 Hz to 3.4 kHz.

11.5 Mechanical details

11.5.1 *Commentary*

Outstations in an EVC system should be secure, robust, suitable for the environment, easy to locate and readily accessible in an emergency.

11.5.2 *Recommendations*

The following recommendations are applicable.

a) Handsets of type A outstations should be enclosed in a housing with a door or removable front panel.

b) All parts of an outstation should be of robust construction, including, as appropriate to type, housing and/or front panel, handset, curly cord to handset, hook-switch, and push button.

c) In locations where surface-mounted outstations could obstruct or injure people, or could readily suffer damage, outstations should be flush-mounted.

d) Where an outstation is mounted outdoors, e.g. at a sports venue, it should be weatherproof, i.e. housed in an enclosure providing a degree of protection of at least IP65, as specified in BS EN 60529. If mounted indoors, the degree of protection should be at least IP3X.

NOTE 1 If an outstation could be subject to water spray or splashing, higher IP classification for the enclosure might be needed.

e) Housings or front panels of outstations provided for evacuation and firefighting use should be red in colour or otherwise be indicated by means of a red sign complying with the recommendations of BS 5499-1.

f) Outstations should generally be readily accessible for use at all times. Where an outstation is unavoidably mounted in an area readily accessible by the public or where it might be subject to abuse, it may be secured, provided that a reliable means of opening it in an emergency is readily available.

g) If the door to an outstation is automatically opened or released to open when a fire Key locking alarm occurs, it should not shut automatically or relock until the fire alarm system is reset. Also, such an outstation should have a manual means of opening.

h) Where key locking is used as a method of securing the outstation, all outstations should have a common key. The user should be provided with sufficient keys for all relevant personnel.

i) Any proposal to secure an outstation should be agreed with the interested parties [see **5.2**a)].

j) In sports venues, outstations should be key locked to avoid misuse.

NOTE 2 Safety measures should ensure that management and stewards or marshals have appropriate keys and are trained to use the outstations in the event of emergencies.

k) Outstations provided for use by people at refuges should be readily available at all times and should not be secured.

11.6 Location

11.6.1 *Commentary*

The preferred location of an outstation varies dependent upon its use. Outstations for use by disabled people should be located in designated refuges, and outstations for evacuation/firefighting purposes where they would be of most use to firefighters and persons controlling an evacuation in an emergency, (e.g. in lobbies of firefighting staircases).

Outstations should be mounted at a height appropriate to the application.

Outstations should be located, as far as possible, in areas where voice communication can be carried out satisfactorily, i.e. without undue interference.

11.6.2 *Recommendations*

The following recommendations are applicable.

a) The number and location of outstations should be as agreed with the appropriate interested parties [see **5.2**a)].

b) The number and location of outstations should be determined on the basis of the purpose of the EVC system (see Clause **7**).

c) Within a sports or similar venue, no-one should have to travel more than 30 m to reach the nearest outstation. Outstations should also be provided at key points as recommended by the Guide to Safety at Sports Grounds.

d) Where an EVC system is provided in a building for use by the fire service to assist firefighting, outstations should be provided on all floors of the building served by firefighting stairs, and in the firefighting lobby to each firefighting stair. An additional outstation should be provided at each fire service access point.

e) Where an EVC system is provided in a building for use by management during an evacuation, outstations should be provided on all escape staircases on every floor of the building.

f) Each outstation should be located in a protected lobby or protected corridor, or, where there is no lobby or corridor approach to the staircase, in the protected stairway itself.

g) In a multi-storey building, to assist in locating outstations, outstations should normally be installed in the same horizontal location on each floor.

h) Because, in a building, an outstation will be located in an escape route that should be free from obstacles, it should normally be wall-mounted. In general, the outstation should be mounted at a height of 1.3 m to 1.4 m above the floor in an easily accessible, well illuminated and conspicuous position free from obstruction. Likewise, at sports and similar venues, such outstations should be mounted at a height of 1.3 m to 1.4 m above the ground in easily accessible positions free from obstruction.

i) As far as practicable, outstations in buildings should be located where background noise is normally low [preferably not more than 40 dB(A)]. Where there is a higher level of background noise, the installation of an “acoustic hood” or “sound canopy” around the outstation might help to reduce the effect of background noise to an acceptable level.

j) Where possible, outstations installed in public access buildings should not be installed in areas of the building where they can be subject to abuse. Where this is unavoidable, they should be secured [see 11.5.2g)].

k) Where the EVC system is provided to facilitate communication by disabled people in an emergency, outstations should be provided in all refuges and, where appropriate, an outstation should be provided adjacent to the evacuation lift on each floor. They should be mounted at a height of between 900 mm and 1.2 m above the floor in an easily accessible, well illuminated and conspicuous position free from obstruction. Likewise, if required at sports and similar venues, such outstations should be mounted at a height of 900 mm to 1.2 m above the ground in easily accessible positions free from obstruction.

12 Master stations

12.1 General

12.1.1 *Commentary*

An EVC system should contain at least one master station (a master station being an essential part of an EVC system). The EVC system is controlled from a master station, which should be located at a central control point such as a fire control centre or security room or, if there is no manned control centre, at the main fire service access point. A master station would be expected to be permanently manned in an emergency. In a fire emergency situation, control might be taken over by a fire officer. In a large building or complex, there may be more than one point from which evacuation or other emergency situations can be controlled. It may then be appropriate for a master station to be installed at each such location. Where more than one master station is installed in a building or complex, one master station needs to have overall control of the EVC system at any given time, the remainder of the "master stations" effectively becoming repeaters.

*A master station will communicate with a number of outstations throughout the building or complex (see Clause **11**). It should be powered from the normal low voltage electricity supply in the building or complex, but should also have a standby supply consisting of secondary batteries kept fully charged (whether or not the building or complex has a standby generator (see Clause **13**). Usually, all outstations will receive their power via cabling from a master station.*

A master station should be able to receive calls from all outstations. Where required, it should also have the facility to call each individual outstation, group of outstations or all outstations. As a minimum, a master station should have a telephone-style handset or microphone and loudspeaker for voice communication purposes, controls for making calls to, and receiving calls from, outstations, indicators to identify incoming calls, and fault and status indicators. Under the control of the master station, a "conferencing" facility may be available for a limited number of outstations.

In a complex of different buildings, it may be desirable to have a voice communication link between a master station in one building and master stations in other buildings.

12.1.2 *Recommendations*

The following recommendations are applicable.

a) There should be at least one master station in a building or complex, located as described in **12.6**.

b) Where more than one master station is installed in a building, the EVC system should be designed so that it can be controlled from only one master station at any given time. A secure means, such as an interlocking key system or an arrangement whereby a security code (password) has to be entered at a keypad, should be provided to switch EVC control from one master station to another.

c) The normal power supply for a master station should comply with the recommendations of Clause **13** and **15.2**b).

d) For communication with outstations, a master station should have either:

1) a telephone-style handset; or

2) a microphone mounted on a flexible or fixed arm with in-built windshield to prevent "popping" noise whilst speaking, and a separate panel- or desk-mounted loudspeaker.

e) A master station should have controls and indicators as recommended in **12.2** and **12.3**, respectively.

f) A master station should conform, electrically and mechanically, to the recommendations of **12.4** and **12.5**, respectively.

g) As an option, a facility may be provided for voice communication between master stations. If installed, such a facility may use the existing handset or microphone/loudspeaker (for communication with outstations) or a separate handset or microphone/loudspeaker. The interconnection line between master stations (for control signals and audio) should be monitored for short-circuit and open-circuit faults as outlined in **10.2.1**f) for outstations-to-master station connections.

12.2 Controls

12.2.1 *Commentary*

Controls at master stations are for use mainly during emergencies. Operation of a master station should therefore be simple and straightforward, with all controls clearly labelled.

12.2.2 *Recommendations*

The following recommendations are applicable.

a) An "accept call" switch should be provided to receive a call from each outstation individually or by another device fulfilling the same function e.g. scrolling or by another device fulfilling the same function e.g. scrolling alphanumeric display and accept/make call switch.

b) Where the EVC system is required to have the facility to call outstations, additional controls should be provided as follows:

1) a "make call" switch should be provided to initiate a call to each outstation individually or similar device fulfilling the same function;

2) an "all call" switch should be provided to allow a call to be made from the master station to all outstations connected to it;

3) as an option, "group call" switches may be provided to allow calls to be made from the master station to particular groups of outstations.

NOTE 1 Each "make call" and "accept call" switch may be combined.

c) Means should be provided to allow conversation to take place with selected outstations.

NOTE 2 This function may be an integral part of the functions of the call switches referred to in **12.2.2**b).

d) An arrangement should be provided for cancelling conversations with outstations. For example, a call to a particular outstation (or a group or all outstations) may be cancelled by a second operation of the appropriate call switch (if a pushbutton type) or by a similar "deselect" arrangement.

NOTE 3 This cancelling operation should not of itself cancel the "call indication" (see **12.3**), which should be cancelled only when the relevant outstation reverts to on-hook or "enclosure door closed" condition [see **11.2.2**a)].

e) A non-latching method of testing indicators should be provided When operated, it should cause all master station visual indicators to illuminate and the audible warning indicator to sound.

f) Where a "loudspeak" facility is required [see **7.1**e)2)], a momentary action "loud speak" switch may be provided to allow, in association with the operation of appropriate call switch(es), a local voice broadcast to be made from the outstation(s) selected.

g) Where a "listen" facility is required [see **7.1**e)3)], a momentary action switch should be provided to allow, in association with the operation of appropriate call switch(es), a facility whereby the operator at the master station can "listen in" for any sounds in the immediate vicinity of the outstation(s) selected.

h) Where software is used in the master station, a secure non-latching method should be provided either to:

1) reset the software execution failure recorder [see **10.2.6**c)2)i)]; or

2) reset the automatic reset warning [see **10.2.6**c)2)ii)].as appropriate.

NOTE 4 "Secure" in **12.2.2**h) means operated by a key, or on entry of a security code (password) via e.g. a number of pushbutton switches.

i) A momentary action switch may be provided to allow the fault warning sounder to be silenced (without affecting any visual fault indications). When this facility is provided, and the audible fault warning has been silenced, it should be automatically reinstated in the event of a different type of fault occurring. The buzzer should also be automatically reinstated after it has been silenced for a maximum of eight hours during a continuing fault condition.

j) A momentary action switch may be provided to cancel any fault conditions. (See **10.2.5**.)

k) Any further controls associated with voice communication that are outside of the scope of this code of practice should be clearly separate from the EVC controls and their functions should be overridden by use of the master station(s) as recommended in this code of practice.

NOTE 5 The controls referred to in **12.2.2**a) to k) may take the form of keys of a keypad, associated with an alphanumeric display. In large EVC systems, they may take the form of icons on a visual display unit, selected by, e.g., mouse pointer, light pen or touch.

l) All controls should be clearly labelled.

12.3 Indicators

12.3.1 *Commentary*

Indicators are needed at a master station for identification of outgoing and incoming calls, for identification of faults in the EVC system, to confirm that the system is operational and possibly to confirm that certain optional functions have been selected.

All indicators should be clearly labelled.

12.3.2 *Recommendations*

The following recommendations are applicable.

a) Where the facility to call outstations is required, a visual indicator should be provided at each "make call", "all call" or "group call" switch [see **12.2.2**b)]. The appropriate indicator should be red in colour, preferably in pulsing mode (lighting for a minimum of 0.5 s every 5 s), when an outgoing call is initiated via the "make call" switch. The indication should preferably change from red to green (pulsing) when the outstation(s) called becomes off-hook. Cancellation of the call at the master station should cause each appropriate indication to revert to flashing red mode until the outstation called becomes on-hook, when it should extinguish. [See **12.2.2**d)].

b) A visual indicator should be provided at each "accept call" switch [see **12.2.2**a)]. The appropriate indicator should be red in colour, preferably in pulsing mode (lighting for a minimum of 0.5 s every 5 s), when there is an incoming call. The indication should preferably change from red to green (pulsing) when the appropriate "accept call" switch is operated. Cancellation of the call at the master station should cause each appropriate indication to revert to flashing red mode until the outstation called becomes on-hook, when it should extinguish. [See **12.2.2**d)].

NOTE Each "make call" and "accept call" visual indicator may be combined. [See Note to **12.2.2**b)].

c) A common "incoming call" sounder should be provided, preferably within the master station. The sound level should not be less than 50 dB(A) at one metre from the master station, when measured with an instrument conforming to BS EN 60651 type 2 with slow response. However if the background noise exceeds 47 dB(A), the level of sound from the sounder should be at least 3 dB higher than that of the background noise. An additional external sounder might then be required. The type of sound from this sounder should be markedly different from that of the fault warning sounder referred to in **10.2.3**.

d) When a "loudspeak" facility [see **12.2.2**f)] is provided, a green visual indicator should be provided at the appropriate switch. This indicator should illuminate while the "loudspeak facility" is operational.

e) When a "listen in" facility [see **12.2.2**g)] is provided, a green visual indicator should be provided at the "listen in" switch. This indicator should illuminate while the "listen in" switch is operated.

f) A green visual indicator should be provided to show that the EVC system is energized (regardless of whether the system is energized from the normal supply or the standby supply). This indicator should normally be illuminated and should extinguish only in the event of total power failure.

g) All the fault indicators referred to in **10.2.2** should be provided. Each visual indicator should be yellow or amber.

h) All indicators should be clearly labelled.

i) Some or all of the indicators referred to in **12.3.2**a), and d) to g) may take the form of one or more graphics or alphanumeric displays, instead of, for example, individual LEDs. All the indications referred to in **12.3.2** should be displayed when required, and readily distinguishable as to their functions, e.g. "make call", "accept call", outstation off-hook, etc. The graphics or alphanumeric display(s) may then indicate such functions by appropriate text and/or numerals. Where graphics or alphanumeric displays are proposed to be used at the master station(s) of an EVC system, prior to installation of the system discussions should be held with appropriate persons, including the user and system designer, to ensure that the form and functioning of these displays are acceptable to all parties.

12.4 Electrical performance

12.4.1 *Commentary*

An EVC system should be safe, secure and able to perform its designed functions satisfactorily. Since the main function of an EVC system is voice communication, audibility and intelligibility of conversation is very important.

12.4.2 *Recommendations*

The following recommendations are applicable.

a) The recommendations of **13.2** apply for the normal power supply to the EVC system. These recommendations will therefore apply to the master station if the normal (mains) supply is fed directly into it. As in the case of the outstations, the operating voltage (derived from the mains supply) should be extra low voltage, as defined in BS 7671. Earthing of the housing of a master station should also be in accordance with BS 7671.

b) The master station should be monitored for faults [see **10.2.1**h)].

c) The path of audio through the master station (either from incoming audio from an outstation to the ear-piece piece or loudspeaker, or from the microphone to the outputs to the outstations) should have a minimum ±3 dB frequency response of 250 Hz to 4 kHz. Where a fixed microphone and loudspeaker arrangement is used at the master station, the minimum ±3 dB frequency response should be 250 Hz to 5 kHz for the microphone and for the loudspeaker.

NOTE The upper frequency limit of 4 kHz is to allow for an overall upper audio transmission limit of about 3.4 kHz, traditionally used for telephone communication. That overall limit should be acceptable for communication via a telephone-style handset, where coupling to ear and mouth is fairly close, with consequent reduction of the effect of background noise on voice communication. Where a handset is not used, audio transmission of wider bandwidth is desirable to counter the effect of background noise.

12.5 Mechanical construction

12.5.1 *Commentary*

Master stations in an EVC system should be secure, robust and suitable for the environment.

12.5.2 *Recommendations*

The following recommendations are applicable.

a) Where, in a building, there is no central control room and therefore the master station is located, for example, at a fire service access point, it will probably need to be wall-mounted, because of space restriction. In such a case, the master station should be locked, i.e. with a locked front door or with a key-operated switch to enable/disable all controls. A reliable means of manually opening it in an emergency should be available, local to the master station.

b) To allow for mounting in a common area, in the absence of a suitable control room, a master station should be of robust construction, including in particular its exposed parts, such as the housing, front panel, handset, curly cord to handset, control switches, etc.

c) In locations where a surface-mounted master station could obstruct or injure people, or could readily suffer damage, it should be flush-mounted.

12.6 Location

12.6.1 *Commentary*

To assist the operator of a master station in controlling an evacuation, or during firefighting, a master station should be located close to a fire panel or repeater fire panel.

To minimize the likelihood of unauthorised use or abuse, a master station should preferably be installed at a supervised location. Such a location would have additional advantages in that it would normally have a low background noise level and it would probably allow the master station to be desk-mounted.

Where a master station has to be mounted in a common area because of the absence of a suitable control room, it should be installed at an appropriate height above the floor.

12.6.2 *Recommendations*

The following recommendations are applicable.

a) A master station should be installed close to the main fire alarm panel or a repeater fire panel.

b) A master station should preferably be installed in a control or security room.

c) Where there is no suitable control room in a building or complex, a master station should be installed close to the fire service access point to the building. However, to avoid distraction of the operator of the master station by evacuating occupants, where possible the master station should not be installed in an escape route.

d) If a master station is to be used by a standing operator, the vertical centre of the panel controls and handset, if used, should normally be between 1.4 m and 1.5 m above the floor. In a control room, the master station controls and handset, if used, should be within easy reach from the operator's normal position.

e) A master station should be installed in an area of low fire risk.

f) In a building, where it is not possible to install the master station in a low-noise control room, it should, if possible, be located where background noise is normally low, preferably not more than 40 dB(A). Where there is a higher level of background noise, the installation of an "acoustic hood" or "sound canopy" around the master station might help to reduce the effect of background noise to an acceptable level.

13 Power supplies

13.1 Commentary

The normal supply for the EVC system will normally be derived from the low voltage mains supply in the building, transformed or modified as necessary. The mains supply should be reliable and capable of supplying the largest load that can be placed on it under normal and fault conditions.

In order to minimize the potential for failures, the design of the mains supply to the system should be such that it is unlikely to be affected by faults on other circuits or equipment, or by isolation of supplies in the building for maintenance or economy in consumption of electricity.

It is likely that the mains supply will fail at some time during the lifetime of the EVC system whether through failure of the mains supply to the building or failure of the final circuit serving the EVC system. Accordingly, the mains supply should be backed up by a standby supply, usually consisting of batteries under continuous charge, that is able to support the system while the fault in the mains supply is corrected. The standby supply should be reliable, and transfer between the two supplies should not affect the operation of the system.

The duration of the standby supply should be sufficient to allow for more than the maximum likely single-period failure time of the public electricity supply. Failure of the normal supply might, however, arise because of failure of the final normal supply circuit serving the EVC system. During any failure of the normal supply, there should be sufficient standby battery capacity to allow typical emergency use of the EVC system for a reasonable period.

*The presence of the mains supply should be indicated by a visual indicator at the master station(s) [see **12.3.2**e)] to enable mains failure to be identified by the user. This indication would be particularly useful when the building or complex was reoccupied after a period of non-occupation of longer than the maximum duration of the standby supply.*

If the premises are provided with an automatically started standby generator, the capacity of the standby batteries may be reduced, provided the circuits served by the generator include that of the EVC system.

13.2 Recommendations for mains power supplies

The following recommendations are applicable to the low voltage mains supply to the system.

NOTE 1 This supply should be regarded as an integral part of the EVC system, particularly for the purpose of certification of the system (see Clause **23**), regardless of whether it is provided by the organisation responsible for installation of the EVC system.

a) For reasons of electrical safety, the mains supply to all parts of the EVC system should be supplied, via an isolating protective device (such as a circuit-breaker), from the load ("dead") side of the main isolating device for the building or complex.

b) The mains supply circuit(s) to all parts of the EVC system should be dedicated solely to the EVC system, and should serve no other systems or equipment. The circuit(s) should be derived from a point in the building's electrical distribution system close to the main isolating device for the building.

c) To facilitate local isolation during maintenance, the low voltage supply circuit for the main power supply and master station(s) should supply the EVC system via double pole isolation facilities located adjacent to the equipment.

d) Subject to compliance with **13.2**a) to c), the number of isolating devices between the incoming power supply to the building and the EVC system power supply unit should be kept to the minimum practicable for compliance with BS 7671.

NOTE 2 For example, the supply may comprise a dedicated circuit emanating from the first electrical distribution board in the building's electrical distribution system.

e) Every isolator and protective device that can isolate the supply to the EVC system, other than the main isolator for the building, should be labelled either:

"EMERGENCY VOICE COMMUNICATION SYSTEM", in the case of a protective device that serves only the EVC circuit, but incorporates no switch;

"EMERGENCY VOICE COMMUNICATION SYSTEM. DO NOT SWITCH OFF", in the case of a switch (whether incorporating a protective device or not) that serves only the EVC circuit; or

"WARNING. THIS SWITCH ALSO CONTROLS THE SUPPLY TO THE EMERGENCY VOICE COMMUNICATION SYSTEM", in the case of any switch that disconnects the mains supply to both the EVC system and to other circuits.

f) Every isolator, switch and protective device that is capable of disconnecting the mains supply to the EVC system should be situated in a position inaccessible to unauthorized persons or be protected against unauthorized operation.

g) The circuit supplying the EVC system should not be protected by a residual current device unless this is necessary to comply with the requirements of BS 7671. Where a residual current device is necessary for electrical safety, a fault on any other circuit or equipment in the building should not be capable of resulting in isolation of the supply to the EVC system.

h) Irrespective of the condition of any standby battery (e.g. disconnected or fully discharged), the mains power supply should be capable of supplying the maximum operating load of the system, i.e. the load applying when, for example, continuous attention-drawing signals are being sent from the master station(s) to all outstations.

13.3 Recommendations for EVC system power supply units

The following recommendations apply to every power supply unit that forms part of the EVC system.

a) Transition between the normal supply and the standby supply, and vice versa, should not cause any interruption to voice communication via the system.

b) A fault in the normal supply should not affect the standby supply or vice versa. The operation of a single protective device should not result in failure of both the normal and the standby supply.

c) The condition of the normal supply should be indicated by a green lamp, lit when the normal supply is healthy, located in a position that makes it readily obvious to any person responsible for monitoring faults on the EVC system (e.g. mounted on every master station).

d) Normal and standby supplies should each be independently capable of supplying the maximum operating load of the system, irrespective of the condition of the other supply.

e) The standby supply should comprise a secondary (rechargeable) battery with an automatic charger.

f) The battery should be of a type having a life of at least four years under the conditions of use likely to be experienced in the EVC system. Automotive batteries (of the type used for starting car engines) should not be used.

g) Labels should be fixed to all batteries indicating their date of installation. The labels should be so sited that they can be read without disturbing the batteries.

h) The charging rate of the battery should be such that, having been discharged to its final voltage, the battery can be charged sufficiently to comply with the recommendations of **13.3**i) after a charging period of 24 h.

i) The recommended capacities of all standby batteries within the system are detailed below.

1) The following should apply, in the event of failure of the normal supply, where the building or complex does not have an automatically started standby generator to provide power to the EVC system. The capacity of the batteries should be sufficient to maintain the system in a quiescent state of operation for at least 24 h, after which sufficient capacity should remain to allow the system to be used for voice communication in an emergency situation for at least three hours.

2) The following should apply, in the event of failure of the normal supply, where the building or complex has an automatically started standby generator to provide power to the EVC system. The capacity of the batteries should be sufficient to maintain the system in a quiescent state of operation for at least three hours, after which sufficient capacity should remain to allow the system to be used for voice communication in an emergency situation for at least three hours.

14 Cables, wiring and other interconnections

14.1 Commentary

The components of most EVC systems are connected by cables and wiring, but it is possible to connect them by other means, such as fibre optics. Where fibre optic connections are used, they should provide equivalent integrity and reliability to other cables that could be used for the same purpose.

It is essential that all interconnections are ready to operate correctly at the start of a fire and that they will continue to do so for as long as possible during the fire. This is to ensure that voice communication will be possible during evacuation and, as far as possible, during firefighting. Interconnecting cables therefore need to have long-term resistance to fire.

The integrity of the mains supply to the system is also regarded as essential; even though the system has a standby power supply, its reliability might not be as high as that of the normal mains supply. Accordingly, mains supply cables should also be inherently fire resisting.

*Clause **26** of BS 5839-1:2002 defines two levels of fire performance of fire resisting cables, termed "standard" and "enhanced". EVC systems in buildings generally need to operate correctly during a fire for periods well in excess of those normally required for single phase evacuation of a building, and well in excess of normal fire service attendance times. Such cables should therefore have "enhanced" fire performance. In sports and similar venues, underground sections of cable may not need to have "enhanced" fire performance but they will require appropriate mechanical protection. Mineral insulated copper sheathed cables normally provide both "enhanced" fire performance and mechanical protection.*

The probability of disablement of any part of the EVC system as a result of mechanical damage to cables can be reduced by the use of adequately strong cables, careful selection of cable routes and by the provision of mechanical protection in areas where cables are susceptible to mechanical damage.

Monitoring of circuits does not ensure that cable faults will not occur, but is essential to minimize the time between occurrence and identification (and hence repair) of the fault. Monitoring of circuits and protection of cables against damage are, therefore, complementary precautions, rather then alternatives.

It is the responsibility of the designer to ensure that the electrical characteristics of the cables, including current carrying capacity and voltage drop, are suitable for the system. The choice of cable and routes selected should take into account the need to avoid electromagnetic interference from other cables and sources of electromagnetic radiation, particularly in the case of systems in which cables are used for transmission of serial data. In the latter case, the cable selected should also be suitable for the speed of data transmission.

EVC circuits should be segregated from the cables of other circuits to minimize any potential for other circuits to cause malfunction of an EVC system arising from:

— *breakdown of cable insulation of other circuits*;

— *a fire caused by a fault on another circuit*;

— *electromagnetic interference to any EVC circuit as a result of the proximity of another circuit*;

— *damage resulting from the need for other circuits to be installed in, or removed from, conduit, ducts or trunking containing an EVC circuit.*

The use of cables conforming to BS EN 60702-1, BS EN 60702-2 or BS 7846 (see BS 5839-1), together with corresponding terminations, is sufficient to achieve segregation of the EVC cables from those of other services for the purpose of protecting the integrity of the EVC system against failures in the insulation of other cables and fires involving those cables.

EVC cables should be colour coded or otherwise marked, e.g. by labels, so that the possible need for appropriate segregation can be identified. There will also be less likelihood of inadvertent manual interference with the circuits of EVC systems (e.g. during work on other electrical circuits).

14.2 Recommendations

The following recommendations are applicable.

a) The electrical characteristics of all cables, such as voltage drop, current carrying capacity and impedance, should be suitable for the system.

b) Cables used for all interconnections between components of an EVC system, and for the low voltage mains supply to the system, should be of enhanced resistance to fire [see **26.2**e) of BS 5839-1:2002], except for underground sections of cabling at sports and similar venues.

c) Methods of cable support should be such that circuit integrity will not be reduced below that afforded by a cable that complies with **26.2**e) of BS 5839-1:2002 if the cable remained supported throughout the duration of the fire tests specified.

NOTE 1 In effect, this recommendation precludes the use of plastic cable clips, cable ties or trunking that need to remain in place for circuit integrity to be assured.

d) Junctions in cables should be avoided wherever practicable. The method of jointing cables should be such as to minimize the probability of early failure in the event of fire. Where cables of enhanced resistance to fire are provided in order to satisfy the recommendations of this part of BS 5839, other than in the case of joints within system components such as master stations and outstations, terminals used to joint cables should be constructed of materials (e.g. porcelain) that will withstand high temperatures. All joints, other than those within system components, should be enclosed within junction boxes, labelled with the words “Emergency Voice Communication System” to avoid confusion with other services.

NOTE 2 At the time of drafting this standard, no definitive guidance can be given on the means for ensuring that the entire cable system, as opposed to the cable itself, can provide adequate resistance to the effects of fire.

e) Except in particularly arduous conditions, mineral insulated copper sheathed cables and steel wire armoured cables may be used throughout all parts of the installation without additional mechanical protection.

f) All conductors should have a cross-sectional area of at least 1 mm^2, other than in the case of stranded or twisted-pair cables, in which individual conductor size should be at least 0.5 mm^2.

g) Cables should be segregated from the cables, conduit and trunking of all other services (including those of other safety services, such as fire alarm systems).

h) Where multicore cable is used for interconnection of EVC circuits, none of the conductors should be used for circuits other than those of the EVC system.

NOTE 3 This recommendation does not preclude the multiplexing of signals of other systems with those of the EVC system. Guidance on such integrated systems is given in BS 7807.

i) EVC system cables carrying electric current at a voltage in excess of extra-low voltage should be segregated from extra-low voltage EVC circuits. In particular, the mains supply cable to any master station should not enter the equipment through the same cable entry as cables carrying extra-low voltage. Within the equipment, low voltage and extra-low voltage cables should be kept separate to the extent practicable.

j) Where practicable, all EVC cables should be of a single, common colour, that is not used for cables of general electrical services in the building, to enable these cables to be distinguished from those of other circuits.

15 Environmental conditions

15.1 Commentary

The design of an EVC system needs to allow it to operate in accordance with this part of BS 5839, over a reasonable range of ambient conditions, such as temperature and humidity. Parts of an EVC system may be installed out-of-doors, particularly in sports and similar venues.

15.2 Recommendations

The following recommendations are applicable.

a) For applications in buildings, the equipment used in an EVC system (including master stations, power supplies and outstations) should be capable of performing all its functions in the environmental conditions expected in buildings.

b) A power supply should, in particular, when subjected to the environmental tests described in **9.4** to **9.8** of BS EN 54-4:1998, satisfy the criteria for conformity specified in those clauses.

NOTE BS EN 54-4 is a specification for power supplies for fire alarm systems. There are, therefore, references in Clause **9** of BS EN 54-4 to "c.i.e", i.e., control and indicating equipment used in fire detection and fire alarm systems. For the purposes of this code of practice, "c.i.e." should be read to mean "master station(s)".

c) Master stations should, in particular, when subjected to the environmental tests described in **15.4** to **15.7** of BS EN 54-2:1998, satisfy the criteria for conformity specified in those clauses. See Annex A.

16 Variations in power supply

16.1 Commentary

Mains supplies in a building or complex can vary within the normally expected range of voltage and frequency. EVC system design should allow for such variations.

16.2 Recommendations

The following recommendations are applicable.

The equipment used in EVC systems should be capable of performing all its functions when exposed to expected variations in power supply. In particular, when subjected to the tests described in **15.12** of BS EN 54-2:1998, it should satisfy the criteria for conformity specified in that clause.

17 Electromagnetic compatibility

17.1 Commentary

Particular care should be taken in the design and installation of the EVC system to avoid electromagnetic interference, particularly from, but also to, other equipment. Electromagnetic interference to an EVC system can result from mobile telephones, radio transmitters, other equipment used within the building, lightning and power transients.

17.2 Recommendations

The following recommendations are applicable.

a) EVC systems should be so designed and installed that they do not cause, and are not unduly susceptible to, electromagnetic interference, in accordance with the Electromagnetic Compatibility Regulations 1992 (as amended to date), which implement the EMC Directive 89/336/EEC (as amended).

b) In order to comply with the Regulations, there should be compliance with, at least, the following recommendations, although these might not, alone, be sufficient to ensure compliance.

1) Every system component should satisfy the relevant requirements of the product standard for that component in respect of electromagnetic capability.

2) Cables should be installed in accordance with the recommendations of **14.2**.

3) Installation workmanship should comply with the relevant recommendations of Section 3, particularly in relation to quality of terminations and continuity of earthed screens.

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Section 3. Installation

18 Responsibility of installer

18.1 Commentary

This section of this part of BS 5839 provides recommendations for the work associated with installation of the EVC system equipment.

18.2 Recommendations

The following recommendations are applicable.

a) The responsibility for installation of an EVC system should be clearly defined and documented before the start of the installation contract.

b) The installer should comply with the recommendations of **5.2**d).

c) The installer should comply with the recommendations of **6.2**b).

d) The installation of outstations should be in accordance with the recommendations of Clause **11**.

e) The installation of master stations should be in accordance with the recommendations of Clause **12**.

f) The installer of the mains power supplies to the master stations should ensure that the supplies comply with the recommendations of **13.2**.

g) The installer should ensure that all outstations, master stations and power supply equipment that are likely to need routine attention for maintenance are sited in readily accessible locations that facilitate safe maintenance work.

19 Installation practices and workmanship

19.1 Commentary

The nature and quality of the installation work should be such as to maintain the integrity of the EVC system and minimize the duration and extent of disablement of the system during maintenance or modifications. Installation practices and workmanship should conform to the requirements of BS 7671.

Penetrations of construction (e.g. for the passage of cables, conduit, trunking or tray) should be made good to avoid the free passage of fire or smoke, regardless of whether the construction has a recognized degree of fire resistance.

19.2 Recommendations

The following recommendations are applicable.

a) The entire installation should conform to the requirements of BS 7671. In general, the recommendations of this standard supplement, but do not conflict with, these requirements. Where any such conflict is considered to exist, the recommendations of this standard should take precedence.

b) Surface-laid cables should be neatly run and securely fixed at suitable intervals, in accordance with the recommendations of the cable manufacturer.

NOTE Cables should not rely on false ceilings for their support.

c) The installer should ensure that all wiring complies with the recommendations of Clause **14**.

d) Joints in cables, other than those contained within the enclosures of equipment, should be avoided wherever practicable.

e) Where new conduit, trunking or tray is installed, ample facilities should be provided for installation of cable.

f) Where a cable passes through an external wall, a smooth-bore sleeve of metal or other non-hygroscopic material should be sealed into the wall. It should slope downwards towards the outside and should be plugged with a suitable non-hardening waterproof compound to prevent the entry of rain, dust or vermin.

g) Where a cable passes through an internal wall, a small clearance hole should be provided. If additional mechanical protection is necessary, a smooth-bore sleeve should be sealed into the wall.

h) Care should be taken to ensure that the ends of any sleeves are free from sharp edges to guard against damage to cables during installation.

i) When a cable passes through a floor, the considerations of **19.2**g) and h) apply, but the sleeve should extend as far above floor level as is required for protection of the cable it is to carry, and in any case not less than 300 mm.

j) Where cables, conduits, trunking or tray pass through floors, walls, partitions or ceilings, the surrounding hole should be as small as reasonably practicable and made good with fire stopping materials that ensure that the fire resistance of the construction is not materially reduced. Spaces through which fire or smoke could spread should not be left around the cable, conduit, trunking or tray.

k) If cables or conduits are installed in channels, ducts, trunking or shafts that pass through floors, walls, partitions or ceilings, barriers with the appropriate level of fire resistance should be provided within the channels, etc to prevent the spread of fire unless, in the case of ducts and shafts, the construction of the duct or shaft affords equivalent fire resistance to the structure penetrated; in the latter case, fire stopping need only be provided where cables pass into, or out of, the duct or shaft.

20 Testing of wiring

20.1 Commentary

*On completion of wiring, or sections of wiring, the installer should carry out tests to ensure the integrity of cable insulation and adequacy of earthing. Usually, the tests on cables will be carried out with equipment disconnected and prior to completion of the entire installation. Further tests should, therefore, be carried out on completion of the installation; these tests may form part of the commissioning process. Maximum impedance may sometimes be specified by the system manufacturer, in which case any measurements of impedance recommended by the manufacturer should also be carried out, either by the installer on completion of installation or at commissioning (see Clause **21**).*

20.2 Recommendations

The following recommendations are applicable:

a) All installed cable should be subject to insulation testing at 500 V d.c. Prior to this test, cables should be disconnected from all equipment that could be damaged by the test.

b) Insulation resistance, measured in the above test, between conductors, and between each conductor and earth, should be at least 10 MΩ.

c) Earth continuity and, where appropriate, earth loop impedance, should be tested to ensure compliance with BS 7671.

d) Unless there is specific agreement that the following tests will form part of the commissioning process, the tests should be carried out on completion of the installation work:

1) where maximum circuit resistance for any circuit is specified by the manufacturer, measurement of the resistance of every such circuit;

2) any other tests specified by the manufacturer of the system.

e) The results of all tests should be recorded and made available to the organization responsible for commissioning the system.

Section 4. Commissioning and handover

21 Commissioning

21.1 Commentary

*The process of commissioning involves thorough testing of the installed system to ensure that it operates correctly in accordance with the recommendations of this standard and with the specification. At commissioning, it should also be confirmed that all relevant documentation has been handed over to the user (see Clause **22**). The organization responsible for commissioning the system should have been clearly defined prior to the start of the installation work.*

It is not, in general, the responsibility of the commissioning engineer to verify compliance of the design, or of the installation work, with this part of BS 5839 (i.e. with Section 2 and Section 3 of this standard). In general, the responsibility of the commissioning engineer is to verify that the system operates correctly in the manner designed and that the installation workmanship is generally of an adequate standard. The commissioning engineer should be provided with the specification for the system.

21.2 Recommendations

The following recommendations are applicable.

a) The system should be commissioned by a competent person, who has access to the requirements of the designer (i.e. the system specification).

b) Any person responsible for commissioning an EVC system in accordance with the recommendations of this standard should possess, at least, a basic knowledge and understanding of Section 2 and Section 3 of this standard.

c) At commissioning, the entire system should be inspected and tested to ensure that it operates satisfactorily and in particular, that:

1) intelligible conversation can be carried out between any outstation and the master station(s). The intelligibility check should be carried out in the presence of the approximate level of background noise anticipated to be present when the building or sports or similar venue is fully occupied and there is an emergency;

2) all controls and indicators at outstations and master stations operate correctly;

3) the style of outstations complies with **11.1.2**;

4) the siting of outstations complies with **11.6.2**;

5) electrical and mechanical details of all outstations comply with **11.4.2** and **11.5.2**, respectively;

6) the location of master station(s) complies with **12.6**.

7) the electrical and mechanical details of master station(s) comply with **12.4** and **12.5** respectively;

8) the mains power supplies comply with the recommendations of **13.2**.

9) the standby power supplies comply with the recommendations of **13.3**.

10) as far as it is reasonably practicable to ascertain, the specified cable type has been used in all parts of the installation and the workmanship complies with **19.2**;

11) there are no other obvious shortcomings in compliance with Section 2 of this standard;

NOTE The above recommendation is not intended to imply that it is the responsibility of the commissioning engineer to verify or certificate compliance of the installation design with this standard. However, if variations are identified by the commissioning engineer, particularly variations related to circumstances that might not have been known to the designer, they should be documented for referral to the designer, user or purchaser for agreement or action [see **6.2**b)].

12) adequate records of insulation resistance, earth continuity and, where appropriate, earth loop impedance tests exist;

13) all relevant documentation has been provided to the user or purchaser.

d) Unless already undertaken and documented by the installer, the tests recommended in **20.2**d) should be carried out and the results recorded.

e) Labels, visible when batteries are in their normal position, should be fixed to batteries, indicating the date of installation.

22 Documentation

22.1 Commentary

On completion of the system, it should be ensured that adequate records and other documentation are provided to the purchaser or user. Particular importance should be attached to "as fitted" drawings and operation and maintenance manuals. Without these drawings and manuals, maintenance or future modification of the system might be difficult.

22.2 Recommendations

It is recommended that the following documentation should be provided to the purchaser or user of the system.

a) A certificate for design, installation and commissioning of the system (see Clause **23**).

b) Adequate operation and maintenance manuals for the system; these should provide information regarding the following:

1) the equipment provided and its configuration;

2) the meaning of all indications and the use of all controls;

3) routine testing of the system;

4) servicing of the system.

c) "As fitted" drawings indicating at least the following:

1) the positions of all outstations;

2) the position of the master station(s);

3) the type, sizes and routes of cables.

NOTE 1 The cable routes shown should comprise a reasonable representation of the route followed, such as to enable a competent person to locate the cable in the event of a fault or need for modification or extension of the system.

NOTE 2 In the case of extensions or alterations, existing "as fitted" drawings should be updated.

d) Such other records as are required by any purchase specification (e.g. insulation resistance test records or commissioning records).

23 Certification

23.1 Commentary

On completion of the system, it will be handed over to the purchaser or user; at this stage, the organization bearing contractual responsibility to the purchaser for the system should issue a certificate to the purchaser. The purpose of this certificate is to confirm compliance with the recommendations of this standard. The certificate should also confirm that adequate instruction and documentation has been handed over to the user. The purchaser may wish to carry out an independent inspection of the system, or to witness certain tests (which may include any or all commissioning tests) as reassurance that the system is fully operational when handed over.

It is essential that the person who signs the certificate is competent to verify whether the recommendations of this standard have, or have not, been satisfied. The purchaser or user might, subsequently, rely on the certificate as, for example, evidence of compliance with legislation. Liability could arise on the part of any organization that issues a certificate without due care in ensuring its validity.

23.2 Recommendations

The following recommendations are applicable.

a) On completion, a certificate should be issued certifying compliance with the recommendations of this standard or, if variations exist, clearly identifying these variations.

b) A model certificate is contained in Annex B.

NOTE The certificate issued may vary in format from that shown in Annex B but, as a minimum, the information and statement of compliance within the model certificate should be provided.

24 Training

24.1 Commentary

Before accepting the handover of the system, the purchaser should ensure that they are satisfied with the installed system and that the user has an adequate understanding of the operation of the system. This should involve training of personnel in the operation of outstations and the use of the master station controls.

24.2 Recommendations

The following recommendations are applicable.

a) Before accepting a system, the purchaser (or appropriate representative of the purchaser) should ensure that sufficient representatives of the user have been properly trained in the operation of the system.

b) Responsibility for provision of the training should rest with the organization bearing contractual responsibility to the purchaser for the system, albeit that the provider of the training is likely to be the supplier of the system.

NOTE This is likely to necessitate a formal training course for a number of people; the requirements for such training should be defined in the purchase specification.

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Section 5. Maintenance

25 Routine testing

25.1 Commentary

Although EVC systems incorporate a high degree of monitoring, so that faults are indicated automatically, it is still necessary for the responsible person nominated by the user to ensure that fault indications at the master station are identified for appropriate action. It is also important for a regular test to be carried out to ensure that there has not been any major failure of the entire system, or a significant part of the system.

25.2 Recommendations for weekly testing by the user

The following recommendations are applicable.

a) In premises in which the location of the master station is such that the audible fault warning signal could go unnoticed for longer than 24 h, a special check should be carried out each day to confirm that either the equipment indicates normal operation or that any fault indication is receiving necessary attention. This inspection need not be recorded.

b) Every week, an outstation should be operated. It should be confirmed that the call is correctly received at the master station.

c) A different outstation should be used at the time of every weekly test, so that all outstations in the building are tested in rotation. The result of the weekly test and the identity of the outstation used should be recorded.

25.3 Recommendations for monthly attention by the user

The following recommendations are applicable.

a) If an automatically started emergency generator is used as part of the standby power supply to the EVC system, it should be started up once each month by simulation of failure of the normal power supply and operated on-load for at least one hour. The test should be carried out in accordance with the instructions of the generator manufacturer, including instructions on the load that should be operated. At the end of the test, the fuel tanks should be left filled, and the oil and coolant levels should be checked and topped up as necessary.

b) If vented batteries are used as a standby power supply, a visual inspection of the batteries and their connections should be made to ensure that they are in good condition. Action should be taken to rectify any defect, including low electrolyte level

NOTE Care should be taken to ensure that any person undertaking this task is competent to do so safely.

26 Inspection and servicing

26.1 Commentary

It is essential that the system is subject to periodic inspection and servicing so that unrevealed faults are identified and preventive measures can be taken to ensure the continued reliability of the system.

Periodic inspection and servicing should be carried out by a competent person with specialist knowledge of the equipment used. This will normally be an outside organization; care should be taken to ensure that, if, for example, in-house employees are used for this task, they have equivalent competence to the technicians of a typical servicing organization.

26.2 Recommendation for quarterly inspection of vented batteries

The following recommendation is applicable.

All vented batteries and their connections should be examined by a person competent in battery installation technology. Electrolyte levels should be checked and topped up as necessary, and the specific gravity of the electrolyte in each cell should be checked to ensure that it is correct.

NOTE In many large premises and sites, in-house maintenance personnel are competent to carry out this task.

26.3 Recommendations for six-monthly inspection and test of the system

The following work should be carried out by a competent person every six months.

a) Each outstation should be operated to check that the outstation is functioning and that speech is clear and intelligible. A visual inspection should be made to check that all outstations remain unobstructed and conspicuous.

b) Batteries and their connections should be examined and load tested, to ensure that they are in good serviceable condition and not likely to fail before the next service visit. Vented batteries should be examined to ensure that the specific gravity of each cell is correct.

c) The functions of the master station should be checked.

d) All controls and visual indicators at the master station should be checked for correct operation.

e) Where provided, all optional functions of the control and indicating equipment should be tested.

f) All fault indicators should be checked, where practicable, by simulation of fault conditions.

g) All further checks and tests recommended by the manufacturer of the EVC system should be carried out.

h) On completion of the work, any outstanding defects should be reported to the responsible person and a certificate of servicing issued to the user.

Section 6. User responsibilities

27 Responsible person

27.1 Commentary

The user should appoint a single, named responsible person to supervise all matters pertaining to the EVC system. The role of the responsible person should be to ensure that the system is tested and serviced in accordance with the recommendations of this part of BS 5839, that appropriate records are kept, and that relevant occupants in the protected premises are aware of their roles and responsibilities in connection with the EVC system.

27.2 Recommendations

The following recommendations are applicable.

a) A single, named responsible person should be appointed to supervise all matters pertaining to the EVC system. The responsible person should be given sufficient authority to carry out the duties described in this sub-clause.

b) The responsible person should ensure that arrangements are in place for testing and servicing of the system in accordance with the recommendations of Section 5 of this standard.

c) The responsible person should ensure that suitable records are kept in relation to testing and servicing.

d) The responsible person should ensure that all relevant staff or occupants of the premises are instructed in the proper use of the system. Particular care should be taken to ensure they are adequately familiar with the appropriate controls and understand when and when not to use the system and how to make calls efficiently and to the point. In premises in multiple occupation, it should be ensured that sufficient representatives of each building occupier are instructed.

e) When changes are made to the system, the responsible person should ensure that record drawings are updated.

Annex A (normative)
Modified subclauses from BS EN 54-2:1998

BS EN 54-2 is a specification for control and indicating equipment used in fire detection and fire alarm systems. There are therefore references in **15.1** and **15.2** of BS EN 54-2 to "c.i.e.", zones, detection circuits, and other non-EVC items. For the purposes of this code of practice only, **15.1.2** to **15.2.2.2** should be read as the following modified version:

15.1.2 ***Specimen configuration***

The specimen configuration shall include at least two outstations of each type (type A and type B) provided by the manufacturer or supplier, appropriate transmission paths and internal circuits.

15.1.3 ***Mounting and orientation***

Unless otherwise stated in a test procedure, the specimen shall be mounted in its normal orientation by the normal means of mounting indicated by the manufacturer.

15.1.4 ***Electrical connection***

If a test procedure requires the specimen to be in the operating condition, it shall be connected to a power supply complying with the requirements of BS EN 54-4. Unless otherwise required, the power supply shall be in the nominal operating condition.

All transmission paths (to communicate with outstations) shall be connected to cables and outstations or to dummy loads. Equipment other than master stations and outstations may be kept in the standard atmospheric condition during the tests.

15.2 Functional test

15.2.1 ***The object of the test***

The object of the test is to demonstrate the operation of the equipment before, during and/or after the environmental conditioning.

15.2.2 ***Test schedule***

A test schedule shall be drawn up, which ensures that during the functional test each type of input function and each type of output function is exercised.

This shall include as a minimum tests of signalling and audio communication between outstations and master station(s), and fault warning condition.

15.2.2.1 *Signalling and audio communication between outstations and master station(s)*

Where the facility is provided, initiate a call from an outstation to a master station(s). Check that the correct indications are given at the master station(s), and that an appropriate "reassurance tone" is received at the outstation ear-piece. Accept the call and check that audio can be satisfactorily transmitted and received in both directions, using microphones and ear-pieces/loudspeakers. Cancel the call and check that all indicators revert to their pre-call condition. Repeat the test using at least one different outstation.

Initiate a call from a master station to an outstation. Check that the correct indications are given at the master station(s), and that an appropriate call signal is received at the outstation, either at the ear-piece/loudspeaker or as a separate warning signal. Accept the call and check that audio can be satisfactorily transmitted and received in both directions, using microphones and ear-pieces/loudspeakers. Cancel the call and check that all indicators revert to their pre-call condition. Repeat the test by calling at least one different outstation from the master station.

15.2.2.2 *Fault warning condition*

Initiate and reset fault warnings corresponding at least to:

a) loss of one of the power sources;

b) short-circuit in a circuit connecting outstations to the master station(s);

c) open-circuit in a circuit connecting outstations to the master station(s).

Check that the correct indications are given at the master station(s)."

Annex B (informative)
Model certificate

Certificate for the emergency voice communication system at:

Address:

I/we being the person(s) responsible (as indicated by my/our signatures below) for the supply, installation and commissioning of the EVC system, particulars of which are set out below, certify that the system complies to the best of my/our knowledge and belief with the recommendations of BS 5839-9:2002, except for the variations, if any, stated in this certificate.

Name (in block letters): Position: .....

Signature: Date:

For and on behalf of:

Address:
Postcode:

The extent of liability of the signatory is limited to the system described below.

Variations (see BS 5839-9, Clause **6**): .....

☐ All equipment operates correctly.

The following documents have been provided to the purchaser or user:

☐ "As fitted" drawings.

☐ Operating and maintenance instructions.

☐ Sufficient representatives of the user have been properly instructed in the use of the system.

Maintenance

It is strongly recommended that, after completion, the system is tested, inspected and serviced in accordance with Section five of BS 5839-9:2002.

The user should appoint a responsible person to supervise all matters pertaining to the EVC system in accordance with the recommendations of Section six of BS 5839-9:2002.

Bibliography

Standards publications

BS 5588-8:1999, *Fire precautions in the design, construction and use of buildings — Part 8: Code of practice for means of escape for disabled people.*

BS 5839-8, *Fire detection and alarm systems for buildings — Part 8: Code of practice for the design, installation and servicing of voice alarm systems.*

BS 7807, *Code of practice for design, installation and servicing of integrated systems incorporating fire detection and alarm systems and/or other security systems for buildings other than dwellings.*

BS 7846, *Electric cables — 600/1000 V armoured fire-resistant cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire.*

Other publications

Approved Document B, The Building Regulations 2000, DETR.

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BSI
389 Chiswick High Road
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W4 4AL