BRITISH STANDARD

FIRE-GAS

BS EN 54-2:1998

Fire detection and fire alarm systems

Part 2. Control and indicating equipment

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The European Standard EN 54-2 : 1997 has the status of a British Standard

ICS 13.220.20

BS

National foreword

This British Standard is the English language version of EN 54-2 : 1997 published by the European Committee for Standardization (CEN). Together with BS EN 54-4 : 1997, it supersedes BS 5839 : Part 4 : 1988 which will be withdrawn on 1999-04-30. It is one of a series of standards for fire detection and fire alarm systems (see BS EN 54-1 for a full list of current and proposed standards).

The UK participation in its preparation was entrusted by Technical Committee FSH/12, Fire detection and alarm systems, to Subcommittee FSH/12/3, Control and indicating equipment, which has the responsibility to:

- ± aid enquirers to understand the text;
- ± present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- ± monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled `International Standards Correspondence Index', or by using the `Find' facility of the BSI Standards Electronic Catalogue.

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

Summary of pages

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Descriptors: Fire equipment, fire detection systems, automatic equipment, safety devices, signal devices, inspection devices, specifications, tests, classification, marking

English version

Fire detection and fire alarm systems Ð Part 2: Control and indicating equipment

SysteÁmes de deÂtection et d'alarme incendie Ð Brandmeldeanlagen Ð
Partie 2: Equipement de controÃle et de signalisation Teil 2: Brandmelderzentralen

This European Standard was approved by CEN on 25 December 1996.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
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Foreword

This European Standard has been prepared by the technical Committee CEN/TC 72, Fire detection and fire alarm systems, the secretariat of which is held by BSI.

This standard has been prepared in co-operation with the CEA (ComiteÂ EuropeÂen des Assurances) and with EURALARM (Association of European Manufacturers of Fire and Intruder Alarm Systems).

EN 54 is published in a series of parts. Information on the relationship between this European Standard and other standards of the EN 54 series is given in annex A of EN 54-1.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 1998, and conflicting national standards shall be withdrawn at the latest by April 1999. In addition, a further 36 months shall be allowed for certification purposes for equipment conforming to the national standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

Introduction

This Part of the European Standard EN 54 is drafted on the basis of mandatory functions which are to be provided on all control and indicating equipment, and optional functions (with requirements) which may be provided. It is intended that the options be used for specific applications, as recommended in application guidelines.

Each optional function is included as a separate entity, with its own set of associated requirements, in order to permit control and indicating equipment with many different combinations of functions to comply with this European Standard.

Other functions associated with fire detection and fire alarm may also be provided, even if not specified in this European Standard.

1 Scope

This European Standard specifies requirements, methods of test, and performance criteria for control and indicating equipment (see item B of figure 1 of EN 54-1) for use in fire detection and fire alarm systems installed in buildings.

2 Normative references

Standard incorporates by dated or undated reference, provisions from other publications.

places in the text and the publications are

These normative references are cited at the

listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 54	*Fire detection and fire alarm systems*
EN 54-1 : 1996	*Introduction*
EN 54-4 : 1997	*Power supplies*
EN 54-7 : 1982	*Point type smoke detectors Ð Detectors using scattered light, transmitted light or ionization*
ENV 50142 : 1994	*Electromagnetic compatibility Ð Basic immunity standard Ð Surge immunity tests*
IEC 68	*Basic environmental testing procedures*
IEC 68-1 : 1988	*General and guidance*
IEC 68-2 :	*Tests*
IEC 68-2-1 : 1990	*Test A: Cold*
IEC 68-2-2 : 1974	*Test B: Dry heat*
IEC 68-2-3 : 1969 + A1 : 1984	*Test Ca: Damp heat, steady state*
IEC 68-2-6 : 1982 + A1 : 1983 + A2 : 1985	*Test Fc and guidance Ð Vibration (sinusoidal)*
IEC 68-2-47 : 1982	*Specification for mounting of components, equipment and other articles for dynamic tests*
IEC 529 : 1989	*Classification of degrees of protection provided by enclosures*
IEC 721	*Classification of environmental conditions*
Part 3 :	*Classifications of groups of environmental parameters and their severities*
721-3-3 : 1978	*Stationary use and weather protected locations*
IEC 801	*Electromagnetic compatibility for industrial process measurement and control equipment*
IEC 801-2 : 1991	*Method of evaluating susceptibility to electrostatic discharge*
IEC 801-3 : 1984	*Radiated electromagnetic field Ð Requirements*
IEC 801-4 : 1988	*Electrical fast transient/burst requirements*
IEC 817 : 1984	*Spring-operated impact test apparatus and its calibrations*

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this standard, the definitions given in EN 54-1 apply together with the following:

3.1.1 access level

One of several states of a c.i.e. in which selected:

± controls can be operated;

± manual operations can be carried out;

± indications are visible, and/or;

± information can be obtained. NOTE. Further information on access levels is given in annex A.

3.1.2 addressable point

A point which can be individually identified at the c.i.e. (see also the definition for `point').

3.1.3 alphanumeric display

An indicator capable of giving information by the display of messages consisting of text and/or numeric characters.

3.1.4 functional condition

A condition of the c.i.e. characterized by its indication at the c.i.e.

The functional conditions recognized in this European Standard are the:

± fire alarm condition, when a fire alarm is indicated;

± fault warning condition, when a fault is indicated;

± disabled condition, when the disablement of functions is indicated;

± test condition, when the testing of functions is indicated;

± quiescent condition, when the c.i.e. is powered by a power supply conforming to EN 54-4 and no other functional condition is indicated.

3.1.5 detection circuit

A transmission path which connects points to the c.i.e. (see also the definition for `point' and `transmission path').

3.1.6 earth fault

An unwanted connection between earth potential and any part of the c.i.e., transmission paths to the c.i.e., or transmission paths between parts of the c.i.e.

3.1.7 field

A sub-division of a window.

3.1.8 indicator

A device which can change its state to give information.

3.1.9 indication

The information given by an indicator.

3.1.10 mandatory

Adjective used to describe:

± functions which shall be provided on all c.i.e.s, and the requirements of these functions; and

± the requirements of optional functions with requirements, if these are provided.

3.1.11 non-volatile memory

Memory elements which do not require the presence of an energy source for the retention of their contents.

3.1.12 point

A component connected to a detection circuit able to transmit, or receive information in relation to fire detection (includes items A and D of figure 1 of EN 54-1).

3.1.13 program

Software necessary for a c.i.e. to comply with at least the requirements of this European Standard, including initializing data, reset and interrupt vectors, operating code, and declarations.

3.1.14 reset

The operation capable of terminating the fire alarm condition and/or the fault warning condition.

3.1.15 running data

Alterable data subject to temporary modification during operation, either automatically or by manual controls.

3.1.16 separate

Physically separate and exclusively provided for the purpose or purposes stated in this European Standard.

3.1.17 silencing

Manual operation to switch off the audible signal of a sounding device which is capable of being automatically resounded by a new event.

3.1.18 site specific data

Alterable data required for the c.i.e. to operate in a defined system configuration.

3.1.19 transmission path

A physical connection, external to the cabinet of the c.i.e., for the transmission of information and/or power:

± between the c.i.e. and other components of a fire detection and fire alarm system as defined in EN 54-1; and/or

± between parts of a c.i.e. contained in different cabinets.

3.1.20 volatile memory

Memory elements which require the presence of an energy source for the retention of their contents.

3.1.21 window

Part or all of an alphanumeric display used for information relating to one functional condition at a given time. A sub-division of the display may be realized either by mechanical separation, or under software control.

3.1.22 zone

A geographical sub-division of the protected premises in which one or more points are installed and for which a common zonal indication is provided.

3.2 Abbreviations

For the purposes of this European Standard the following abbreviation applies:

c.i.e.: control and indicating equipment.

4 General requirements

If an optional function with requirements is included in the c.i.e., then all the corresponding requirements shall be met (see also annex B).

If functions other than those specified in this European Standard are provided they shall not jeopardize compliance with any requirements of this European Standard.

5 General requirements for indications

5.1 Display of functional conditions

5.1.1 The c.i.e. shall be capable of unambiguously indicating the following functional conditions, as described in clauses **6** to **10**.

± Quiescent condition.

± Fire alarm condition.

± Fault warning condition.

± Disablement condition.

± Test condition.

5.1.2 The c.i.e. shall be capable of being simultaneously in any combination of the following functional conditions.

± Fire alarm condition.

± Fault warning condition.

± Disablement condition.

± Test condition.

5.2 Display of indications

All mandatory indications shall be clearly identifiable, except where otherwise specified in this European Standard.

5.3 Indications on alphanumeric displays

Where an alphanumeric display is used to display indications relating to different functional conditions these may be displayed at the same time. However, for each functional condition there shall be only one window, in which all of the fields relating to that functional condition are grouped.

5.4 Indication of the supply of power

A visible indication shall be given by means of a separate light emitting indicator while the c.i.e. is supplied with power.

5.5 Audible indications

The audible indication for the fire alarm condition may be the same as that for the fault warning condition. If they are different, the fire alarm indication shall have priority.

5.6 Additional indications

Where indications are used in addition to mandatory indications these shall not result in contradiction or confusion.

6 The quiescent condition

Any kind of system information may be displayed during the quiescent condition. However, no indications shall be given which could be confused with indications used in the:

± fire alarm condition;

± fault warning condition;

± disabled condition;

± test condition.

7 The fire alarm condition

7.1 Reception and processing of fire signals (see also annex C)

7.1.1 The c.i.e. shall enter the fire alarm condition when signals are received which after any necessary processing are interpreted as a fire alarm.

7.1.2 The c.i.e. shall be capable of receiving, processing and indicating signals from all zones. A signal from one zone shall not falsify the processing, storing and/or indication of signals from other zones.

7.1.3 Unless **7.12** applies, the time taken by scanning, interrogation, or other processing of signals from fire detectors, in addition to that required to take the fire alarm decision, shall not delay the indication of the fire alarm condition, or of a new zone in alarm by more than 10 s.

7.1.4 The c.i.e. shall enter the fire alarm condition within 10 s of the activation of any manual call point.

7.1.5 The mandatory indications and/or outputs shall not be falsified by multiple fire signals received from the same or different detection circuits, resulting from the simultaneous operation of two points and/or the operation of further points.

7.2 Indication of the fire alarm condition

The fire alarm condition shall be indicated without prior manual intervention. The indication is established when all of the following are present.

a) A visible indication, by means of a separate light emitting indicator (the general fire alarm indicator).

b) A visible indication, as specified in **7.3**, of the zones in alarm, which may be omitted for c.i.e.s capable of receiving signals from only one zone.

c) An audible indication, as specified in **7.4**.

7.3 Indication of the zones in alarm (see also annex D)

7.3.1 The zones in alarm shall be visibly indicated by means of a separate light emitting indicator for each zone and/or an alphanumeric display.

7.3.2 If the zonal indications are on an alphanumeric display, which because of its limited capacity cannot simultaneously indicate all the zones in alarm, at least the following shall apply.

a) The first zone in alarm shall be displayed in a field at the top of the display.

b) The most recent zone in alarm shall be permanently displayed in another field.

c) The total number of zones in alarm shall be permanently displayed.

d) Zones in alarm not currently indicated shall be capable of being displayed at access level 1. A single manual action shall be required for each display of zonal information, which shall either be in the field used for the first zone in alarm, or in another field. In the former case the display shall revert to the first zone in alarm between 15 s and 30 s following the last interrogation.

7.4 Audible indication

7.4.1 The audible indication shall be capable of being silenced by means of a separate manual control at access level 1 or 2. This control shall only be used for silencing the audible indication, and may be the same as that used for silencing in the fault warning condition.

7.4.2 The audible indication shall not be silenced automatically.

7.4.3 The audible indication shall resound for each new zone in alarm.

7.5 Other indications during the fire alarm condition

If the fire alarm indications are on an alphanumeric display, the following shall apply to the display of other information.

a) Information not related to the fire alarm condition shall be suppressed, unless the display has more than one window, one of which is exclusively reserved for fire alarm indications.

b) Suppressed indications of faults and disablements shall each be capable of being displayed, at any time, by manual operations at access level 1 or 2. These operations shall be different from, or additional to that specified in **7.3.2**d to display zones in alarm. If the display is in the field where the first zone in alarm is displayed, the indication shall revert to the first zone in alarm between 15 s and 30 s following the last interrogation.

7.6 Reset from the fire alarm condition

7.6.1 The c.i.e shall be capable of being reset from the fire alarm condition. This shall only be possible by means of a separate manual control at access level 2. This control shall be used only for reset and may be the same as that used for reset from the fault warning condition.

7.6.2 Following a reset operation, the indication of the correct functional conditions, corresponding to any received signals, shall either remain, or be re-established within 20 s.

7.7 Output of the fire alarm condition

7.7.1 At least one output which signals the fire alarm condition shall be provided, which may be an output as specified in **7.8**, **7.9**, or **7.10**.

7.7.2 Unless **7.11** and/or **7.12** apply, the c.i.e shall action all mandatory outputs within 3 s of the indication of a fire alarm condition.

7.7.3 Unless **7.11** applies, the c.i.e. shall action all mandatory outputs within 10 s of the activation of any manual call point.

7.8 Output to fire alarm devices (option with requirements Ð see also 8.2.5a and 9.4.2a)

The c.i.e. may have provision for the automatic transmission of fire alarm signals to fire alarm devices (item C of figure 1 of EN 54-1). In this case the following shall apply.

a) It shall be possible to silence the fire alarm devices at access level 2.

b) Following silencing, it shall be possible to resound the fire alarm devices at access level 2.

7.9 Output to fire alarm routing equipment (option with requirements Ð see also 8.2.5b and 9.4.2b)

The c.i.e. may have provision for the automatic transmission of fire alarm signals to fire alarm routing equipment (item E of figure 1 of EN 54-1). In this case the transmission of the signal shall be indicated by means of a separate light emitting indicator and/or an alphanumeric display. The indication shall remain until the fire alarm condition is reset.

7.10 Output to fire protection equipment (option with requirements - see also 8.2.4f and 9.4.1b)

The c.i.e. may have provision for the transmission of fire alarm signals to controls for automatic fire protection equipment (item G of figure 1 of EN 54-1).

7.11 Delays to outputs (option with requirements see also 9.4.2c and annex E)

The c.i.e. may have provision to delay the actioning of outputs to fire alarm devices (item C of figure 1 of EN 54-1) and/or to fire alarm routing equipment (item E of figure 1 of EN 54-1). In these cases at least the following shall apply.

a) The operation of delays to outputs to C shall be selectable at access level 3 to apply to:

± fire detectors; and/or

± manual call points; and/or

± signals from specific zones.

b) The operation of delays to outputs to E shall be selectable at access level 3, to apply to:

±fire detectors; and/or

±signals from specific zones.

c) The delay times shall be configurable at access level 3, in increments not exceeding 1 minute, up to a maximum of 10 minutes.

d) It shall be possible to override the delays and immediately action delayed outputs by means of a manual operation at access level 1 and/or by means of a signal from a manual call point.

e) The delay to one output signal shall not affect the actioning of other outputs.

7.12 Coincidence detection (option with requirements)

Following the receipt of a signal from a fire detector, and until one or more confirmatory signals are received from the same or other points, the c.i.e. may have provision to inhibit either the indication of the fire alarm condition, or the operation of outputs to:

± fire alarm devices (item C of figure 1 of EN 54-1); and/or

± fire alarm routing equipment (item E of figure 1 of EN 54-1); and/or

± fire protection equipment (item G of figure 1 of EN 54-1).

In these cases at least the following shall apply.

a) It shall be possible to select the feature at access level 3 for individual zones.

b) The inhibition of one output signal shall not affect the actioning of other outputs.

7.13 Alarm counter (option with requirements)

The c.i.e. may have provision to record the number of instances that the c.i.e. enters the fire alarm condition.

a) Re-initialization of the counter shall only be possible at access level 4.

In this case at least the following shall apply.

b) The information shall be available at access level 1 or 2.

c) The counter shall be capable of recording at least 999 instances.

8 Fault warning condition (see also annex F)

8.1 Reception and processing of fault signals

8.1.1 The c.i.e. shall enter the fault warning condition when signals are received which, after any necessary processing, are interpreted as a fault.

8.1.2 The c.i.e. shall be capable of simultaneously recognizing all of the faults specified in **8.2** and if provided, in **8.3**, unless this is prevented by:

± the presence of fire alarm signals from the same zone; and/or

± the disablement of the corresponding zone or function; and/or

± the testing of a corresponding zone or function.

8.1.3 The c.i.e. shall enter the fault warning condition within 100 s of the occurrence of the fault or the reception of a fault signal, or within another time as specified in this European Standard or in other parts of EN 54.

8.2 Indication of faults in specified functions

8.2.1 The presence of faults in specified functions shall be indicated without prior manual intervention. The fault warning condition is established when the following are present.

a) A visible indication by means of a separate light emitting indicator (the general fault warning indicator).

A visible indication for each recognized fault, as specified in **8.2.4**, **8.2.5** and **8.2.6**.

b) An audible indication, as specified in **8.6**.

8.2.2 If the indication is by means of separate light emitting indicators, these may be the same as those used to indicate disablement and/or testing of the corresponding zones or functions.

8.2.3 If the indication is on an alphanumeric display, which cannot simultaneously indicate all of the faults because of its limited capacity, at least the following shall apply.

a) The presence of fault indications which have been suppressed shall be indicated.

b) Suppressed fault indications shall be capable of being displayed by means of a manual operation at access level 1 or 2 which interrogates only fault indications.

8.2.4 The following faults shall be indicated by means of separate light emitting indicators and/or an alphanumeric display. The indications may be suppressed during the fire alarm condition.

a) An indication for each zone in which the transmission of signals from a point to the c.i.e. is affected by:

± short circuit or interruption in a detection circuit;

± the removal of a point.

b) An indication at least common to any power supply fault resulting from:

± a short circuit or an interruption in a transmission path to a power supply (item L of figure 1 of EN 54-1), where the power supply is contained in a different cabinet from that of the c.i.e.;

± power supply faults as specified in EN 54-4.

c) An indication at least common to any earth fault which is capable of affecting a mandatory function, and which is not otherwise indicated as a fault of a supervised function.

d) An indication as a fault of the supervised function of the rupture of any fuse, or the operation of any protective device which is capable of affecting a mandatory function in the fire alarm condition.

e) An indication of any short circuit or interruption, at least common to all transmission paths between parts of the c.i.e. contained in more than one mechanical cabinet, which is capable of affecting a mandatory function, and which is not otherwise indicated as a fault of a supervised function.

f) An indication of any short circuit or interruption, at least common to all transmission paths, which affects the transmission of signals to controls for automatic fire protection equipment (item G of figure 1 of EN 54-1).

g) An indication of any short circuit or interruption, at least common to all transmission paths, which affects the transmission of signals to fault warning routing equipment (item J of figure 1 of EN 54-1).

8.2.5 The following faults shall be indicated by means of separate light emitting indicators and/or an alphanumeric display. The indications shall not be suppressed during the fire alarm condition.

a) An indication of any short circuit or interruption, at least common to all transmission paths, which affects the transmission of signals to fire alarm devices (item C of figure 1 of EN 54-1).

b) An indication of any short circuit or interruption, at least common to all transmission paths, which affects the transmission of signals to fire alarm routing equipment (item E of figure 1 of EN 54-1).

8.2.6 The following faults shall be indicated at least by means of the general fault warning indicator.

a) Any short circuit or interruption in a transmission path between parts of the c.i.e. contained in more than one mechanical cabinet, where the fault does not affect a mandatory function.

b) Any short circuit or interruption in a detection circuit, where the fault does not prevent the transmission of signals to the c.i.e.

8.3 Fault signals from points (option with requirements)

The c.i.e. may have provision for the reception, processing and indication of fault signals from points. In this case faults shall be indicated at least as zone faults, as specified in **8.2.4**a.

8.4 Total loss of the power supply (option with requirements)

In the event of the loss of the main power source (as specified in EN 54-4), the c.i.e. may have provision to recognize and indicate the failure of the standby power source to a point where it may no longer be possible to fulfil mandatory functions of this European Standard. In this case at least an audible indication shall be given for a period of at least one hour.

8.5 System fault

A system fault is a fault as specified in **13.4** or **13.6** in the case of a software controlled c.i.e. A system fault may prevent requirements of this European Standard, other than those specified in **8.5** and **13.7**, from being fulfilled. In the event of a system fault at least the following shall apply.

a) A system fault shall be visibly indicated by means of the general fault warning indicator and a separate light emitting indicator. These indications shall not be suppressed by any other functional condition of the c.i.e and shall remain until a manual reset and/or another manual operation.

b) A system fault shall be audibly indicated. This indication may be capable of being silenced.

8.6 Audible indication

8.6.1 The audible indication of faults under **8.2** shall be capable of being silenced manually at access level 1 or 2. The same manual operation may be used as that for silencing in the fire alarm condition.

8.6.2 The audible indication shall be silenced automatically if the c.i.e. is automatically reset from the fault warning condition.

8.6.3 If previously silenced, the audible indication shall resound for each newly recognized fault.

8.7 Reset of fault indications

8.7.1 Indications of faults as under **8.2** shall be capable of being reset:

± automatically when faults are no longer recognized; and/or

± by a manual operation at access level 2, which may be the same as that used for resetting from the fire alarm condition.

8.7.2 Following reset, the indication of the correct functional conditions, corresponding to any received signals, shall either remain or be re-established within 20 s.

8.8 Fault output

The c.i.e. shall have an output which signals all faults specified in clause **8**. This may be the output specified in **8.9**. The output signal shall be given if the c.i.e. is de-energized.

8.9 Output to fault warning routing equipment (option with requirements - see also 9.4.1c)

The c.i.e. may have provision for the transmission of fault signals to fault warning routing equipment (item J of figure 1 of EN 54-1). This output shall signal all faults specified in clause **8**. The output signal shall be given if the c.i.e. is de-energized.

9 Disabled condition

9.1 General requirements

9.1.1 Disablements as under **9.4** and **9.5** shall inhibit all corresponding mandatory indications and/or outputs, but shall not prevent other mandatory indications and/or outputs.

9.1.2 The c.i.e. shall have provision to independently disable and re-enable each of the functions specified in **9.4**, by means of manual operations at access level 2.

9.1.3 The c.i.e. shall be in the disabled condition while a disablement as under **9.4** and/or **9.5** exists.

9.1.4 Disablement and re-enablement shall not be affected by a reset from the fire alarm condition, or from the fault warning condition.

9.2 Indication of the disabled condition

The disabled condition shall be indicated visibly, by means of the following.

a) A separate light emitting indicator (the general disablement indicator).

b) An indication for each disablement, as specified in **9.3**, **9.4** and **9.5**.

9.3 Indication of specific disablements

9.3.1 Disablements shall be indicated within 2 s of the completion of the manual operation.

9.3.2 The same light emitting indicator may be used as that for the indication of the corresponding fault, although the indication shall be distinguishable. The same light emitting indicator and the same indication may be used to indicate a disabled zone and a zone under test.

9.3.3 If the indication is on an alphanumeric display, which cannot simultaneously indicate all of the disablements because of its limited capacity, at least the following shall apply.

a) The presence of disablement indications which have been suppressed shall be indicated.

b) Suppressed indications shall be capable of being displayed, independently of other indications, by means of a manual operation at access level 1 or 2.

9.4 Disablements and their indication

9.4.1 The following shall be capable of being independently disabled and re-enabled.

a) Each zone.

b) Output signals and/or transmission paths to controls for automatic fire protection equipment (item G of figure 1 of EN 54-1), with control and indication at least common for all G.

c) Output signals and/or transmission paths to fault warning routing equipment (item J of figure 1 of EN 54-1).

The disablements shall be indicated by means of separate light emitting indicators and/or an alphanumeric display. The indications may be suppressed during the fire alarm condition.

9.4.2 The following shall be capable of being independently disabled and re-enabled.

a) Output signals and/or transmission paths to fire alarm devices (item C of figure 1 of EN 54-1), with the manual controls and indication at least common for all C.

b) Output signals and/or transmission paths to fire alarm routing equipment (item E of figure 1 of EN 54-1).

c) The immediate actioning of outputs, to delay outputs in response to a fire alarm as specified in **7.11**, with the control and indication at least common for all the functions specified in **7.11** (see also annex E).

The disablements shall be indicated by means of separate light emitting indicators and/or an alphanumeric display. The indications shall not be suppressed during the fire alarm condition.

9.5 Disablement of addressable points (option with requirements)

The c.i.e. may have provision for disabling and enabling signals from addressable points by a manual operation at access level 2, either individually, or in groups which do not comprise a complete zone. In this case, at least the following shall apply.

a) It shall be possible to disable each addressable point individually.

b) It shall be possible to identify all the disablements by manual interrogation at access level 1 or 2.

c) The disablement of addressable points shall not be indicated as zone disablements unless all the addressable points in the zones have been disabled.

10 Test condition (option with requirements)

10.1 General requirements

The c.i.e. may have provision for testing the processing and indication of fire alarm signals from zones. This may inhibit the requirements during the fire alarm condition which correspond to that zone. In this case, at least the following shall apply.

a) The c.i.e. shall be in test condition while one or more zones are under test.

b) A test state shall only be entered or cancelled by a manual operation at access level 2 or 3.

c) It shall be possible to test the operation of each zone individually.

d) Zones in the test state shall not prevent the mandatory indications and outputs from zones not in the test state.

e) Signals from a zone under test shall not lead to the operation of the outputs to:

± fire alarm devices (item C of figure 1 of EN 54-1), except temporarily in order to test their functioning in relation to the corresponding zone;

± fire alarm routing equipment (item E of figure 1 of EN 54-1);

± controls for automatic fire protection equipment (item G of figure 1 of EN 54-1);

± fault warning routing equipment (item J of figure 1 of EN 54-1).

10.2 Indication of the test condition

The test condition shall be indicated visibly, by means of the following.

a) A separate light emitting indicator (the general test indicator).

b) An indication for each zone, as specified in **10.3**.

10.3 Indication of zones in the test state

Zones in the test state shall be visibly indicated, by means of a separate light emitting indicator for each zone and/or an alphanumeric display. The same light emitting indicator and the same indication may be used to indicate a zone under test and a disabled zone. For indications on alphanumeric displays at least the requirements of **9.3.3** shall apply.

11 Standardized input/output interface (option with requirements - see also annex G)

The c.i.e. may have provision for a standardized input/output interface, suitable for the transmission and reception of signals to and from ancillary equipment (e.g. a fire brigade panel). In this case at least the following shall apply.

a) The interface shall be capable of transmitting at least the occurrence of the following.

± The fire alarm condition.

± Each zone in alarm.

± The transmission of output signals to fire alarm routing equipment (item E of figure 1 of EN 54-1).

± The transmission of output signals to fire protection equipment (item G of figure 1 of EN 54-1).

± The fault warning condition.

± Each zone fault.

± The disablement and re-enablement of each zone.

± The disablement and re-enablement of the output to fire alarm devices (item C of figure 1 of EN 54-1).

± The disablement and re-enablement of the output to fire alarm routing equipment (item E of figure 1 of EN 54-1).

b) The interface shall be capable of receiving at least the following information and of activating the corresponding functions of the c.i.e.

± Silencing of the audible indication.

± The reset of the fire alarm condition.

± Silencing and re-sounding of the fire alarm devices (item C of figure 1 of EN 54-1).

± The disablement and re-enablement of zones.

± The disablement and re-enablement of output signals to fire alarm devices (item C of figure 1 of EN 54-1).

± The disablement and re-enablement of output signals to fire alarm routing equipment (item E of figure 1 of EN 54-1).

12 Design requirements

12.1 General requirements and manufacturer's declarations

The c.i.e. shall comply with the design requirements of clause **12**, where relevant to the technology used. Some requirements can be verified by testing. Others can only be verified by inspection of the design and its accompanying documentation, because of the impracticability of testing all of the possible combinations of functions, and of establishing the long term reliability of the c.i.e.

In order to assist the process of design inspection, the manufacturer shall declare the following in writing.

a) The design has been carried out in accordance with a quality management system, which incorporates a set of rules for the design of all elements of the c.i.e..

b) The components of the c.i.e. have been selected for the intended purpose, and are expected to operate within their specification when the environmental conditions outside the cabinet of the c.i.e. comply with class 3k5 of IEC 721-3-3 : 1978.

12.2 Documentation

12.2.1 The manufacturer shall prepare installation and user documentation, which shall be submitted to the testing authority together with the c.i.e. This shall comprise at least the following.

a) A general description of the equipment, including a list of the:

± optional functions with requirements of this European Standard;

± functions relating to other parts of EN 54;

± ancillary functions not required by this European Standard.

b) Technical specifications of the inputs and outputs of the c.i.e., sufficient to permit an assessment of the mechanical, electrical, and software compatibility with other components of the system (e.g. as described in EN 54-1), including where relevant:

± the power requirements for recommended operation;

± the maximum number of zones, points and/or addressable points per detection circuit;

± the maximum number of zones, points, addressable points and/or fire alarm devices per c.i.e.;

± the maximum and minimum electrical ratings for each input and output;

± information on the communication parameters employed on each transmission path;

± recommended cable parameters for each transmission path;

± fuse ratings.

c) Installation information, including:

± the suitability for use in various environments;

± if more than 32 detectors and/or manual call points may be configured on a detection circuit, how the requirements of **12.5.2** may be met;

± if the c.i.e. is contained in more than one cabinet, how the requirements of **12.3.2** and **12.5.3** may be met;

± mounting instructions;

± instructions for connecting the inputs and outputs.

d) Configuring and commissioning instructions.

e) Operating instructions.

f) Maintenance information.

12.2.2 The manufacturer shall prepare design documentation, which shall be submitted to the testing authority together with the c.i.e. This documentation shall include drawings, parts lists, block diagrams, circuit diagrams and a functional description to such an extent that compliance with this European Standard may be checked and that a general assessment of the mechanical and electrical design is made possible.

12.3 Mechanical design requirements

12.3.1 The cabinet of the c.i.e. shall be of robust construction, consistent with the method of installation recommended in the documentation. It shall meet at least classification IP30 of IEC 529 : 1989.

12.3.2 The c.i.e. may be housed in more than one cabinet. If the documentation shows that the cabinets may be installed in locations distributed within the protected premises, then all of the mandatory manual controls and indicators shall be on one cabinet, or on cabinets declared to be only suitable for mounting adjacent to each other.

12.3.3 All mandatory manual controls and light emitting indicators shall be clearly labelled to indicate their purpose. The information shall be legible at 0,8 m distance in an ambient light intensity from 100 lux to 500 lux.

12.3.4 The terminations for transmission paths and the fuses shall be clearly labelled.

12.4 Electrical and other design requirements

12.4.1 The c.i.e. shall have provision for grouping the signals from points to provide zonal indications.

12.4.2 The processing of signals shall give the highest priority to the indication of fire alarms.

12.4.3 Transitions between the main and the standby power sources shall not change any indications and/or the state of any outputs, except those relating to the power supplies.

12.4.4 If the c.i.e. has provision for disconnecting or adjusting the main or the standby power source, this shall only be possible at access level 3 or 4.

12.5 Integrity of transmission paths (see also annex H)

12.5.1 A fault in any transmission path between the c.i.e. and other components of the fire detection system (as defined in EN 54-1) shall not affect the correct functioning of the c.i.e. or of any other transmission path.

12.5.2 If the manufacturer's documentation shows that more than 32 fire detectors and/or manual call points may be connected to one detection circuit, then means shall be specified and provided which ensure that a short circuit or an interruption in this detection circuit does not prevent the indication of a fire alarm from more than 32 fire detectors and/or manual call points.

12.5.3 If the manufacturer's documentation shows that a c.i.e. contained in more than one cabinet may be installed in locations distributed within the protected premises, then means shall be specified and provided which ensure that a short circuit or an interruption in any transmission path between the cabinets does not prevent the indication of a fire alarm from more than 32 fire detectors and/or manual call points.

12.5.4 If the c.i.e. is designed to be used with a power supply (item L of figure 1 of EN 54-1) contained in a separate cabinet, then an interface shall be provided for at least two transmission paths to the power supply, such that a short circuit or an interruption in one does not affect the other.

12.6 Accessibility of indications and controls (see also annex A)

12.6.1 Four access levels shall be provided on the c.i.e., from access level 1 (most accessible) to access level 4 (least accessible). Manual controls and other functions shall be grouped on the appropriate access level, as specified in this European Standard.

12.6.2 All mandatory indications shall be visible at access level 1 without prior manual intervention (e.g. the need to open a door).

12.6.3 Manual controls at access level 1 shall be accessible without special procedures.

12.6.4 Indications and manual controls which are mandatory at access level 1 shall also be accessible at access level 2.

12.6.5 The entry to access level 2 shall be restricted by a special procedure.

12.6.6 The entry to access level 3 shall be restricted by a special procedure, differing from that for access level 2.

12.6.7 The entry to access level 4 shall be restricted by special means which are not part of the c.i.e.

12.7 Indications by means of light emitting indicators

12.7.1 Mandatory indications from light emitting indicators shall be visible in an ambient light intensity up to 500 lux, at any angle up to 22,5 degrees from a line through the indicator perpendicular to its mounting surface:

± at 3 m distance for the general indications of functional condition;

± at 3 m distance for the indication of the supply of power;

± at 0,8 m distance for other indications.

12.7.2 If flashing indications are used, the on and/or the off periods shall not be less than 0,25 s, and the frequencies of flash shall not be less than:

± 1 Hz for fire alarm indications;

± 0,2 Hz for fault indications.

12.7.3 If the same light emitting indicators are used for the indication of specific faults and disablements, fault indications shall be flashing and disablement indications shall be steady.

12.8 Indications on alphanumeric displays

12.8.1 If an alphanumeric display consists of elements or segments, the failure of one of these shall not affect the interpretation of the displayed information.

12.8.2 Alphanumeric displays used for mandatory indications shall have at least one clearly distinguishable window, consisting of at least two clearly identifiable fields.

12.8.3 If not included in the displayed information, the purpose of each field shall be clearly labelled.

12.8.4 A field shall be capable of containing at least the following.

a) 16 characters where the display of a fire alarm uses a cross-reference to other information to identify the location.

b) 40 characters, where the display is intended to include the complete information on the location of a fire alarm.

12.8.5 Mandatory indications on an alphanumeric display shall be legible at 0,8 m distance, in ambient light intensities from 5 lux to 500 lux, at any angle from the normal to the plane of the display up to:

± 22,5 degrees when viewed from each side;

± 15 degrees when viewed from above and below.

12.9 Colours of indications

12.9.1 The colours of the general and specific indications from light emitting indicators shall be as follows.

a) Red for indications of:

± fire alarms;

± the transmission of signals to fire alarm routing equipment (item E of figure 1 of EN 54-1);

± the transmission of signals to controls for automatic fire protection equipment (item G of figure 1 of EN 54-1).

b) Yellow for indications of:

± fault warnings;

± disablements;

± zones in the test state;

± the transmission of signals to fault warning routing equipment (item J of figure 1 of EN 54-1).

c) Green for the indication that the c.i.e. is supplied with power.

12.9.2 The use of different colours is not necessary for indications on alphanumeric displays. However, if different colours are used for different indications, the colours used shall be as specified in **12.9.1**.

12.10 Audible indications

12.10.1 Audible indicators shall be part of the c.i.e. The same device may be used for fire alarm and fault warning indications.

12.10.2 The minimum sound level, measured under anechoic conditions at a distance of 1 m, with any access door on the c.i.e. closed, shall be:

± 60 dB(A) for fire alarm indications;

± 50 dB(A) for fault warning indications.

12.11 Testing of indicators

All mandatory visible and audible indicators shall be testable by a manual operation at access level 1 or 2.

13 Additional design requirements for software controlled control and indicating equipments

13.1 General requirements and manufacturer's declarations

The c.i.e. may contain elements which are controlled by software in order to fulfil requirements of this European Standard. In this case, the c.i.e. shall comply with the requirements of clause **13**, as well as those of clause **12**, where relevant to the technology used.

13.2 Software documentation

13.2.1 The manufacturer shall prepare documentation which gives an overview of the software design, which shall be submitted to the testing authority together with the c.i.e. This documentation shall be in sufficient detail for the design to be inspected for compliance with this European Standard, and shall comprise at least the following.

a) A functional description of the main program flow, including:

± a brief description of each module and the tasks it performs;

± the way in which the modules interact;

± the way in which the modules are called, including any interrupt processing;

± the overall hierarchy of the program.

The description shall use graphical representations of the system design and the data flows, or an equivalent clear method of software documentation.

b) A description of which areas of memory are used for the various purposes (e.g. the program, site specific data and running data).

c) A description of how the software interacts with the hardware of the c.i.e.

13.2.2 The manufacturer shall prepare and maintain detailed design documentation. This need not be submitted to the testing authority, but shall be available for inspection in a manner which respects the manufacturer's rights of confidentiality. This documentation shall comprise at least the following.

a) A description of each module of the program, containing

± the name of the module;

± the identification of the author(s);

± the date and/or version reference;

± a description of the tasks performed;

± a description of the interfaces, including the type of data transfer, the valid data range, and the checking for valid data.

b) The source code listing, including all global and local variables, constants and labels used, and sufficient comment for the program flow to be recognized.

c) Details of any software tools used in the preparation of the program (e.g. high level design tools, compilers, assemblers, etc.).

13.3 Software design

In order to ensure the reliability of the c.i.e. the following requirements for software design shall apply.

a) The software shall have a modular structure.

b) The design of the interfaces for manually and automatically generated data shall not permit invalid data to cause an error in the program execution.

c) Measures shall be included in the program to prevent the occurrence of a deadlock in the system.

13.4 Program monitoring (see also annex J)

13.4.1 The execution of the program shall be monitored. The monitoring device shall signal a system fault if routines associated with the main functions of the program are not executed within a time limit of 100 s.

13.4.2 The functioning of the monitoring device, and the signalling of a fault warning shall not be prevented by a failure in the execution of the program of the monitored system.

13.4.3 If an execution failure as in **13.4.1** is detected, the c.i.e. shall enter a safe state within 100 s. This safe state shall be defined by the manufacturer.

13.4.4 The monitoring device shall use the highest priority feature provided to enter the safe state of **13.4.3** (e.g. the highest priority non-maskable interrupt).

13.5 The storage of programs and data (see also annex J)

13.5.1 All executable code and data necessary to comply with this European Standard shall be held in memory which is capable of continuous, unmaintained, reliable operation for a period of at least 10 years.

13.5.2 The program shall be held in non-volatile memory, which can only be written to at access level 4. Each memory device shall be identifiable such that its contents can be uniquely cross-referenced to the software documentation.

13.5.3 For site specific data, the following requirements shall apply.

a) Alteration shall not be possible at access levels 1 or 2.

b) The alteration of site specific data shall not affect the structure of the program.

c) If stored in volatile memory, the site-specific data shall be protected against power loss by a back-up energy source which can only be separated from the memory at access level 4, and which is capable of maintaining the memory contents for at least 2 weeks.

d) If stored in read-write memory, there shall be a mechanism which normally prevents the memory being written to during program execution, such that its contents may be protected in the event of a failure in program execution.

13.6 The monitoring of memory contents

The contents of the memories containing the program and the site specific data shall be automatically checked at intervals not exceeding 1 h. The checking device shall signal a system fault if a corruption of the memory contents is detected.

13.7 Operation of the c.i.e in the event of a system fault

If the manufacturer's documentation shows that more than 512 fire detectors and/or manual call points may be connected to a c.i.e., in the event of a system fault, as specified in **13.4** or **13.6**, either or both of the following shall apply.

a) Not more than 512 fire detectors and/or manual call points and their associated mandatory functions shall be affected.

b) At least the following functions shall be provided in response to fire alarm signals from all fire detectors and/or manual call points.

± The indication of a fire alarm by means of the general fire alarm indicator and an audible indication.

± The operation of an output, as specified in **7.7.1**.

± The transmission of signals to fire alarm routing equipment, (if provided) as specified in **7.9**.

14 Marking

The c.i.e. shall be marked with the following information, which shall be legible at access level 1.

a) The number of this European Standard (EN 54-2 : 1997).

b) The name or trademark of the manufacturer or supplier.

c) The type number or other designation of the c.i.e.

d) The code or number identifying the production period of the c.i.e.

15 Tests

15.1 General

15.1.1 *Standard atmospheric conditions for testing*

Unless otherwise stated in a test procedure, the testing shall be carried out after the test specimen has been allowed to stabilize in the standard atmospheric conditions for testing as described in IEC 68-1 : 1988 as follows.

a) Temperature	: 15 8C 2 35 8C.
b) Relative humidity	: 25 % 2 75 %.
c) Air pressure	: 86 kPa 2 106 kPa.

The temperature and humidity shall be substantially constant for each environmental test where the standard atmospheric conditions are applied.

15.1.2 *Specimen configuration*

The specimen configuration shall include at least one of each type of detection circuit, transmission path and internal circuits.

Unless it is designed only for one detection circuit then at least two detection circuits of each type shall be provided.

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. The equipment shall be in the condition of access level 1, except where otherwise required for functional testing.

15.1.4 *Electrical connection*

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

Unless otherwise required the power supply shall be in the nominal operating condition.

All detection circuits and transmission paths shall be connected to cables and equipment or to dummy loads. At least one of each type of detection circuit shall be maximum loaded, all within manufacturer's specification. Equipment other than the c.i.e 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 functional 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 the fire alarm condition, the fault warning condition and the disabled condition.

15.2.2.1 *Fire alarm condition*

Initiate and reset a fire alarm from at least two zones (unless only one zone is provided).

Check that the correct indications and the correct outputs to C, E, and G (if provided) are given.

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 detection circuit;

c) interruption in a detection circuit;

d) interruption in a transmission path to C, E, and G if they are provided.

Check that the correct indications and the output to J (if provided) are given.

15.2.2.3 *Disabled condition*

a) Disable and restore one zone.

b) Disable and restore one transmission path to C, E, and G, where provided.

Check that the operation of the disablement controls result in the correct indication on the c.i.e., that only the relevant parts of the system are disabled and that on restoration of the disablements the function is restored.

15.3 Environmental tests

15.3.1 *General*

One, two or three specimens may be supplied for environmental testing. The tests to be applied are shown in table 1.

15.3.2 *Tests for one specimen*

If a single specimen is supplied for environmental testing, the specimen shall be subjected to all the operational tests, which may be carried out in any order. After the operational tests the endurance tests shall be carried out on the same specimen in any order. Before and after each environmental test a functional test shall be carried out.

NOTE. The functional test after one environmental test may be taken as the functional test before the next environmental test.

15.3.3 *Tests for two specimens*

If two specimens are supplied for environmental testing, then the first test specimen shall be subjected to all the operational tests, which may be carried out in any order, followed by one of the endurance tests. The second specimen shall be subjected to the other endurance test. Before and after each environmental test a functional test shall be carried out.

NOTE. For the first specimen, the functional test after one environmental test may be taken as the functional test before the next environmental test.

15.3.4 *Tests for three specimens*

If three specimens are supplied for environmental testing, then one test specimen is subjected to all the operational tests, which may be carried out in any order. The second specimen shall be subjected to one of the endurance tests, and the third specimen shall be subjected to the other endurance test. Before and after each environmental test a functional test shall be carried out.

NOTE. For the first specimen, the functional test after one environmental test may be taken as the functional test before the next environmental test.

15.3.5 *Requirements*

During the tests of **15.4** to **15.13** the specimen shall not change status in each of the functional conditions as specified in the corresponding clauses, except when such a change is required by the test procedure or when the change is a result of a functional test.

NOTE. In the tests of **15.8**, **15.10**, **15.11**and **15.12** visible and audible indications of purely transitory nature occurring during the application of the conditioning are allowed.

When subjected to the functional test each specimen shall respond correctly (see **15.2**).

15.4 Cold (operational)

15.4.1 *Object of the test*

The object of the test is to demonstrate the ability of the equipment to function correctly at low ambient temperatures appropriate to the anticipated service environment.

15.4.2 *Test procedure*

15.4.2.1 *General*

The test procedures with gradual changes in temperature described in IEC 68-2-1 : 1990 shall be used. Test Ad shall be used for heat-dissipating specimens (as defined in IEC 68-2-1 : 1990) and test Ab shall be used for non-heat-dissipating specimens.

15.4.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.4.2.3 *State of the specimen during conditioning*

Mount the specimen as specified in **15.1.3** and connect it to suitable power supply-, monitoring- and loading equipment (see **15.1.4**).

The specimen shall be in the quiescent condition.

Table 1. Environmental tests

Test	Operational or endurance	Clause number
Cold	Operational	**15.4**
Damp heat, steady state	Operational	**15.5**
Impact	Operational	**15.6**
Vibration, sinusoidal	Operational	**15.7**
Electrostatic discharge	Operational	**15.8** [1)]
Radiated electromagnetic interference	Operational	**15.9**
Voltage transients Ð fast transient bursts	Operational	**15.10** [1)]
Voltage transients Ð slow high energy surge	Operational	**15.11** [1)]
Mains voltage dips and interruptions	Operational	**15.12** [1)]
Supply voltage variations	Operational	**15.13**
Damp heat, steady state	Endurance	**15.14**
Vibration, sinusoidal	Endurance	**15.15**

[1)] Visible and audible indications of purely transitory nature are allowed during the application of the conditioning.

15.4.2.4 *Conditioning*

Apply the following severity of conditioning.

Temperature : 25 8C ± 3 8C

Duration : 16 h.

15.4.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning period to detect any change in status. During the last hour of the conditioning period, subject the specimen to the functional test.

15.4.2.6 *Final measurements*

After the recovery period, subject the specimen to the functional test and inspect it visually for mechanical damage both externally and internally.

15.5 Damp heat, steady state (operational)

15.5.1 *Object of the test*

The object of the test is to demonstrate the ability of the equipment to function correctly at high relative humidities (without condensation) which may occur for short periods in the service environment.

15.5.2 *Test procedure*

15.5.2.1 *General*

Use the test procedure described in IEC 68-2-3 : 1969.

15.5.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.5.2.3 *State of the specimen during conditioning*

Mount the specimen as specified in **15.1.3** and connect it to suitable power supply-, monitoring- and loading equipment (see **15.1.4**).

The specimen shall be in the quiescent condition.

15.5.2.4 *Conditioning*

Apply the following severity of conditioning.

Temperature : 40 8C ± 2 8C.

Relative humidity : (93^{+2}_{23}) %

Duration : 4 days.

Precondition the specimen at the conditioning temperature (40 8C ± 2 8C) until temperature stability has been reached to prevent the formation of water droplets on the specimen.

15.5.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning period to detect any change in status. During the last hour of the conditioning period, subject the specimen to the functional test.

15.5.2.6 *Final measurements*

After the recovery period, subject the specimen to the functional test and inspect it visually for mechanical damage both externally and internally.

15.6 Impact (operational)

15.6.1 *Object of the test*

The object of the test is to demonstrate the immunity of the equipment to mechanical impacts upon the surface, which it may sustain in the normal service environment and which it can reasonably be expected to withstand.

15.6.2 *Test procedure*

15.6.2.1 *General*

Apply the test apparatus and procedure described in IEC 817 : 1984.

15.6.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.6.2.3 *State of the specimen during conditioning*

Mount the specimen as specified in **15.1.3** and connect it to a suitable power supply, monitoring and loading equipment (see **15.1.4**).

The specimen shall be in the quiescent condition.

15.6.2.4 *Conditioning*

Apply impacts to all surfaces of the specimen which are accessible at access level 1.

For all such surfaces three blows shall be applied to any point(s) considered likely to cause damage to or impair the operation of the specimen.

Care should be taken to ensure that the results from a series of three blows do not influence subsequent series.

In case of doubts, the defect shall be disregarded and a further three blows shall be applied to the same position on a new specimen.

Apply the following severity of conditioning.

Impact energy : (0,5 ± 0,04) J.

Number of impacts per point : 3.

15.6.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning periods to detect any changes in functional condition, and to ensure that results of three blows do not influence subsequent series.

15.6.2.6 *Final measurements*

After the conditioning, subject the specimen to the functional test and inspect it visually for mechanical damage both externally and internally.

15.7 Vibration, sinusoidal (operational)

15.7.1 *Object of the test*

The object of the test is to demonstrate the immunity of the equipment to vibrations at levels appropriate to the service environment.

15.7.2 *Test procedure*

15.7.2.1 *General*

Use the test procedure described in IEC 68-2-6 : 1982.

NOTE. The vibration operational test may be combined with the vibration endurance test, so that the specimen is subjected to the operational test conditioning followed by the endurance test conditioning in each axis.

15.7.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.7.2.3 *State of the specimen during conditioning*

Mount the specimen as specified in **15.1.3** and in accordance with IEC 68-2-47 : 1982 and connect it to a suitable power supply-, monitoring- and loading equipment (see **15.1.4**).

The specimen shall be tested in each of the following functional conditions.

a) Quiescent condition.

b) Fire alarm condition, initiated in a zone.

c) Disabled condition, initiated by disablement of a zone and an output according to EN 54-1.

15.7.2.4 *Conditioning*

Subject the specimen to vibration in each of the three mutually perpendicular axes in turn, one of which is perpendicular to the plane of mounting of the specimen.

Apply the following severity of conditioning.

a) Frequency range	: 10 Hz to 150 Hz.
b) Acceleration amplitude	: 0,981 $m \cdot s^{-2}$ (0,1 g_n).
c) Number of axes	: 3.
d) Number of sweep cycles per axis	: 1 for each functional condition.

15.7.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning periods to detect any changes in functional conditions.

15.7.2.6 *Final measurements*

After the conditioning, subject the specimen to the functional test and inspect it visually for mechanical damage both externally and internally.

15.8 Electrostatic discharges (operational)

15.8.1 ***Object of the test***

The object of the test is to demonstrate the immunity of the equipment to electrostatic discharges caused by personnel, who may have become electrostatically charged, touching the equipment or other equipment near by.

15.8.2 ***Test procedure***

15.8.2.1 *General*

The test procedure for type tests performed in laboratories shall be used, as described in IEC 801-2 : 1991.

The tests consist of:

a) direct electrostatic discharges onto parts of the equipment accessible at access level 2;

b) indirect electrostatic discharges onto adjacent coupling planes equipment.

15.8.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.8.2.3 *State of the specimen during conditioning*

Mount the specimen as specified in **15.1.3** and connect it to suitable power supply, monitoring and loading equipment (see **15.1.4**).

The specimen shall be tested in each of the following functional conditions.

a) Quiescent condition.

b) Fire alarm condition, initiated in a zone.

c) Disabled condition, initiated by disablement of a zone and an output according to EN 54-1.

15.8.2.4 *Conditioning*

Apply the following severity of conditioning.

a) Test voltages	: 2 kV, 4 kV and 8 kV for air discharges at insulating surfaces. : 2 kV, 4 kV and 6 kV for contact discharges to conducting surfaces and coupling planes.
b) Polarity	: Positive and negative.
c) Number of discharges	: 10 per pre-selected spot.
d) Time between successive discharges	: at least 1 s.

15.8.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning period to detect any changes in functional conditions, other than those of a transitory nature.

15.8.2.6 *Final measurements*

After the conditioning, subject the specimen to the functional test.

15.9 Radiated electromagnetic interference (operational)

15.9.1 ***Object of the test***

The object of the test is to demonstrate the immunity of the equipment to electromagnetic fields such as those produced by portable radio transceivers, etc.

15.9.2 ***Test procedure***

15.9.2.1 *General*

Use the type test procedure of IEC 801-3 : 1984.

15.9.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.9.2.3 *State of the specimen during conditioning*

Mount the specimen as required in **15.1.3** in access level 2 state and connect it to suitable power supply-, monitoring- and loading equipment (see **15.1.4**).

The specimen shall be tested in each of the following functional conditions.

a) Quiescent condition.

b) Fire alarm condition, initiated in a zone.

c) Disabled condition, initiated by disablement of a zone and an output according to EN 54-1.

15.9.2.4 *Conditioning*

Apply the following severity of conditioning.

a) Frequency range : 1 MHz to 1 GHz.

b) Field strength : 10 V/m.

c) Sinusoidal amplitude modulation : 80 % at 1 kHz.

15.9.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning to detect any changes in functional conditions.

15.9.2.6 *Final measurements*

After the conditioning, subject the specimen to the functional test.

15.10 Voltage transients - fast transient bursts (operational)

15.10.1 ***Object of the test***

The object of the test is to demonstrate the immunity of the equipment to bursts of fast low energy transients which may be produced by relays, contactors, switching inductive loads etc. and may be induced into signal and data circuits.

15.10.2 ***Test procedure***

15.10.2.1 *General*

Use the test procedure described in IEC 801-4 : 1988.

The test procedures for type tests performed in laboratories shall be used.

15.10.2.2 *Initial examination.*

Before conditioning, subject the specimen to the functional test.

15.10.2.3 *State of the specimen during conditioning*

Mount the specimen as required in **15.1.3** and connect it to suitable power supply, monitoring and loading equipment (see **15.1.4**).

The specimen shall be tested in each of the following functional conditions.

a) Quiescent condition.

b) Fire alarm condition, initiated in a zone.

c) Disabled condition, initiated by disablement of a zone and an output according to EN 54-1.

15.10.2.4 *Conditioning*

Apply the following severity of conditioning.

a) 2 kV to mains power supply terminals of the associated p.s.e. and protective earth conductor via a coupling/decoupling network.

b) 1 kV to each type of d.c. extra low voltage terminals and other inputs, signal-, data- and control terminals via a capacitive coupling clamp.

15.10.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning period to detect any changes in functional conditions, other than those of a transitory nature.

15.10.2.6 *Final measurements*

After the conditioning subject the specimen to the functional test.

15.11 Voltage transients - slow high energy transients (operational)

15.11.1 ***Object of the test***

The object of the test is to demonstrate the immunity of the equipment to relatively slow high energy transients which may be included in power and signal cables from lightning strikes in the vicinity or by switching in power distribution system or large voltage network, including the switching of large capacitor batteries.

15.11.2 ***Test procedure***

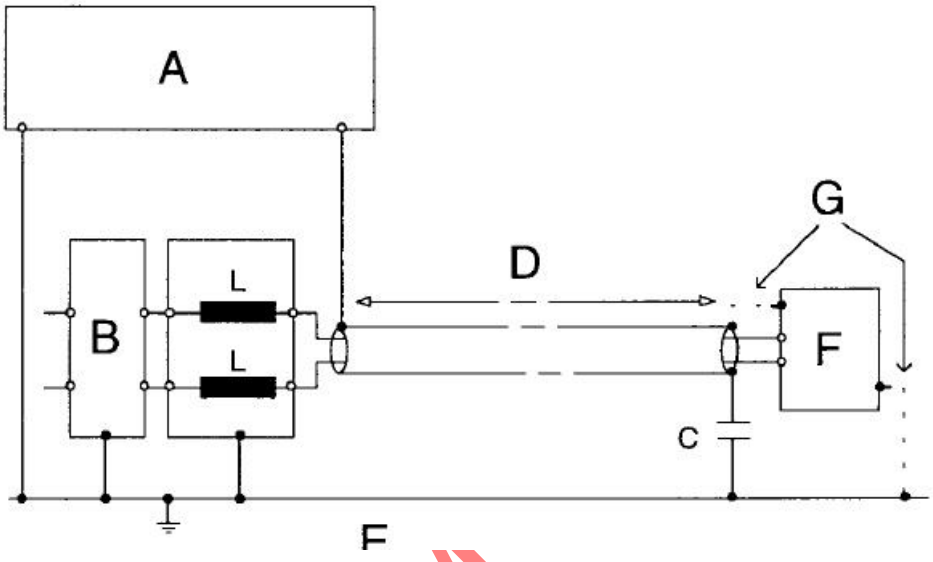
15.11.2.1 *General*

The test apparatus and procedure shall be generally as described in ENV 50142 : 1994 and hereafter.

A.C. mains power lines shall be subjected to transients injected by both line-to-line and line-to-ground coupling modes. With line-to-ground coupling the transients shall be injected via a 10 V series resistor. The length of the power lines between the specimen and the coupling/decoupling network shall be # 2 m. At least 20 pulses of each polarity shall be applied at each of the voltage levels shown for the appropriate severity. These pulses shall be synchronized with the mains voltage wave such that at least 5 pulses are applied at each of the zero crossing points and at the maximum and minimum points. The pulses may be applied at a maximum rate of 1 per 5 s, however, it is necessary to ensure that any failures are not due to applying the pulses too frequently, and that if this is not clear then the failed devices should be replaced and the test repeated with the pulses applied at a rate of less than 1 per min.

Extra low voltage and signal lines shall be subjected to transients injected by line-to-ground coupling mode only, via a 40 V series resistor. If the c.i.e. has a large number of identical input/outputs (e.g. detector loops) then representative samples of each type of input/output may be selected for testing.

The length of the signal lines between the c.i.e. and the coupling/decoupling network(s) shall be # 2 m, however, if it is specified that certain signal lines shall only be connected with screened cables, then in these cases the transients shall be applied to the screen of a 20 m length of screened cable as shown in figure 1. At least 5 pulses of each polarity shall be applied at each of the voltage levels shown for the appropriate severity. The pulses may be applied at a maximum rate of 1 per 5 s, however, it is necessary to ensure that any failures are not due to applying the pulses too frequently, and that if this is not clear then the failed devices should be replaced and the test repeated with the pulses applied at a rate of less than 1 per min.



Key:

A: test generator;

B: protection equipment;

C: 10 nF capacitor (included if the screen is not connected to the equipment under test or if the equipment under test is not earthed);

D: 20 m of screened cable, bundled non-inductively;

E: earth reference;

F: equipment under test;

G: earthing connections in accordance with the manufacturer's instructions;

L: 20 mH inductor (2 off).

Figure 1. Transient injection into screened cable

15.11.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.11.2.3 *State of the specimen during conditioning*

Mount the specimen as required in **15.1.3** and connect it to suitable power supply, monitoring and loading equipment (see **15.1.4**) in accordance with the manufacturer's installation instructions. Apart from the manufacturer's specified earth connections, the specimen and interconnecting cables shall be insulated from the ground reference.

The specimen shall be tested in each of the following functional conditions.

a) Quiescent condition.

b) Fire alarm condition, initiated in a zone.

c) Disabled condition, initiated by disablement of a zone and an output according to EN 54-1.

15.11.2.4 *Conditioning*

Apply the following severity of conditioning under each of the functional conditions specified in **15.11.2.3**.

a) For a.c. mains power lines:

line to line: 500 V and 1 kV;

line to ground: 500 V, 1 kV and 2 kV via a 10 ohm series resistor.

NOTE. The above levels are open-circuit voltages.

b) For d.c. low voltage and signal lines:

line to ground: 500 V and 1 kV via a 40 ohm series resistor.

NOTE. The above levels are open-circuit voltages.

15.11.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning period to detect any changes in functional condition, other than those of a transitory nature.

15.11.2.6 *Final measurements*

After the conditioning subject the specimen to the functional test.

15.12 Mains voltage dips and interruptions (operational)

15.12.1 *Object of the test*

The object of the test is to demonstrate the immunity of the equipment to short durations dips (reductions) and interruptions in the a.c. mains such as those caused by load switching and operation of protective devices, on the mains distribution network.

15.12.2 *Test procedure*

15.12.2.1 *General*

No reference can be made to any internationally accepted standard at present.

A test generator capable of producing the required reductions in the amplitude of one or more half-cycles of the a.c. mains voltage, starting and finishing at zero crossings, shall be used.

The specimen shall be in the operating condition and monitored during conditioning.

The supply voltage shall be reduced from nominal value by the percentage reduction specified for the specified period.

Each of the reductions shall be applied ten times with an interval of not less than 1 s and not more than 1,5 s.

15.12.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.12.2.3 *State of the specimen during conditioning*

Mount the specimen as required in **15.1.3** and connect it to suitable power supply-, monitoring- and loading equipment (see **15.1.4**). The specimen shall be tested in each of the following functional conditions.

a) Quiescent condition.

b) Fire alarm condition, initiated in a zone.

c) Disabled condition, initiated by disablement of a zone and an output according to EN 54-1.

15.12.2.4 *Conditioning*

Apply the severity of conditioning shown in table 2.

Table 2.

Voltage reduction	Duration of the reduction in half cycles
50 %	20
100 %	10

15.12.2.5 *Measurements during conditioning*

Monitor the specimen during the conditioning period to detect any changes in functional conditions, other than those of a transitory nature.

15.12.2.6 *Final measurement*

After conditioning, subject the specimen to the functional test.

15.13 Supply voltage variation (operational)

15.13.1 ***Object of the test***

The object of the test is to demonstrate the ability to function correctly over the anticipated range of supply voltage conditions.

15.13.2 ***Test procedure***

15.13.2.1 *General*

No reference can be made to an international accepted standard at present.

The specimen shall be subjected to each of the specified power supply conditions until temperature stability is reached and the functional test has been conducted.

15.13.2.2 *Initial examination*

Before conditioning subject the specimen to the functional test.

15.13.2.3 *State of the specimen during conditioning*

Mount the specimen as specified in **15.1.3** and connect it to suitable power supply, monitoring and loading equipment (see **15.1.4**).

The specimen shall be in the quiescent condition.

15.13.2.4 *Conditioning*

Apply the following conditions.

a) Supply of maximum input voltage as specified by the manufacturer.

b) Supply of minimum input voltage as specified by the manufacturer.

NOTE. Compatibility between the c.i.e. and any specific type of power supply equipment will require that the range of input voltages specified for the c.i.e. includes the range of output voltages recorded for the power supply equipment in the tests of EN 54-4:1997.

15.13.2.5 *Measurements during conditioning*

Monitor the specimen at the supply voltage conditions until temperature stability is reached and subject the specimen to the functional test at each voltage condition.

15.13.2.6 *Final measurements*

After the conditioning subject the specimen to the functional test.

15.14 Damp heat, steady state (endurance)

15.14.1 ***Object of the test***

The object of the test is to demonstrate the ability of the equipment to withstand the long term effects of humidity in the service environment (e.g. changes in electrical properties due to absorption, chemical reactions involving moisture, galvanic corrosion etc.).

15.14.2 ***Test procedure***

15.14.2.1 *General*

Use the test procedure described in IEC 68-2-3 : 1969.

15.14.2.2 *Initial examination*

Before conditioning, subject the specimen to the functional test.

15.14.2.3 *State of the specimen during conditioning*

Mount the specimen as required in **15.1.3** and connect it to suitable power supply, monitoring and loading equipment (see **15.1.4**). The specimen shall not be supplied with power during the conditioning.

15.14.2.4 *Conditioning*

Apply the following severity of conditioning.

a) Temperature : 40 8C ± 2 8C.

b) Relative humidity : (93 $^{+2}_{23}$) %

c) Duration : 21 days.

Pre-condition the specimen at the condition temperature (40 8C ± 2 8C) until temperature stability has been reached, to prevent the formation of water droplets on the specimen.

15.14.2.5 *Final measurements*

After the recovery period, subject the specimen to the functional test and inspect it visually for mechanical damage both externally and internally.

15.15 Vibration, sinusoidal (endurance)

15.15.1 *The object of the test*

The object of the test is to demonstrate the ability of the equipment to withstand the long term effects of vibration at levels appropriate to the environment.

15.15.2 *Test procedure*

15.15.2.1 *General*

Use the test procedure described in IEC 68-2-6 : 1982.

NOTE. The vibration endurance test may be combined with the vibration operational test, so that the specimen is subjected to the operational test conditioning followed by the endurance test conditioning in each axis in turn.

15.15.2.2 *Initial examination*

Before conditioning subject the specimen to the functional test.

15.15.2.3 *State of the specimen during conditioning*

Mount the specimen as required in **15.1.3** and in accordance with IEC 68-2-47 : 1982 and connect it to a suitable power supply-, monitoring- and loading equipment (see **15.1.4**). The specimen shall not be supplied with power during the conditioning.

15.15.2.4 *Conditioning*

Subject the specimen to vibration in each of the three mutually perpendicular axes in turn, one of which shall be perpendicular to the plane of mounting of the specimen.

Apply the following severity of conditioning.

a) Frequency range : 10 Hz to 150 Hz.
b) Acceleration amplitude : $4{,}905\ m\acute{}s^{-2}$ ($0{,}5\ g_n$).
c) Number of axes : 3.
d) Number of sweep cycles : 20 per axis.

15.15.2.5 *Final measurements*

After conditioning subject the specimen to the functional test and inspect it visually for mechanical damage both externally and internally.

Annex A (informative)

Explanation of access levels

This standard defines access levels for the indications and controls relating to mandatory functions. In some cases alternatives are offered (e.g. access level 1 or 2). This is because either may be appropriate in different operational circumstances. The purpose of the different access levels is not defined by this standard. However, in general they are expected to be used as follows.

Access level 1:

By members of the general public, or persons having a general responsibility for safety supervision, who might be expected to investigate and initially respond to a fire alarm or a fault warning.

Access level 2:

By persons having a specific responsibility for safety, and who are trained and authorized to operate the c.i.e. in the:

- ± quiescent condition;
- ± fire alarm condition;
- ± fault warning condition;
- ± disabled condition;
- ± test condition.

Access level 3:

By persons who are trained and authorized to:

- ± re-configure the site specific data held within the c.i.e. or controlled by it (e.g. labelling, zoning, alarm organization);
- ± maintain the c.i.e. in accordance with the manufacturer's published instructions and data.

Access Level 4:

By persons who are trained and authorized by the manufacturer either to repair the c.i.e., or to alter its firmware, thereby changing its basic mode of operation.

Sub-clause **12.6** defines the minimum requirements for accessibility. Only access levels 1 and 2 have a strict hierarchy. Examples of special procedures for entry to access level 2 and/or to access level 3 are the use of:

- ± mechanical keys;
- ± a keyboard and codes;
- ± access cards.

Examples of special means for entry to access level 4 are the use of:

- ± mechanical keys;
- ± tools;
- ± an external programming device.

It may be acceptable that the entry to access level 4 requires only a simple tool, such as a screwdriver, after access level 2 or 3 has been reached. For example, the manufacturer may declare in his documentation which parts of the c.i.e. are not user serviceable, and the entry to access level 4 may then be controlled by management of the user. It is also considered acceptable to use external tools to carry out certain functions at access level 3, e.g. to program site specific data.

It may be desirable in certain circumstances that the c.i.e. has additional access levels within access level 2, or access level 3 (e.g. 2A and 2B), which would permit different classes of authorized user to have access to a selected group of controls or functions. This is not forbidden by this European Standard. The exact configuration will depend on the type of installation, the way the c.i.e. is used, and the complexity of the functions provided.

Annex B (informative)

Optional functions with requirements and alternatives

This European Standard specifies mandatory functions and options with requirements. A c.i.e. complying with this European Standard will need to fulfil the requirements of all of the mandatory functions, together with the requirements of those optional functions which are provided. The options described in this European Standard are currently used in the CEN member countries and have been incorporated into this European Standard in order to comply with application guidelines. They may also be called up in national codes of practice. Optional functions and their relevant clause numbers are listed in table B.1.

Table B.1 Optional functions

Option	See clause
Indications:	
Fault signals from points	**8.3**
Total loss of power supply	**8.4**
Recording of the numbers of entries into fire alarm condition	**7.13**
Controls:	
Coincidence detection	**7.12**
Delay of the actioning of outputs	**7.11**
Disablement of each address point	**9.5**
Test condition	**10**
Outputs:	
Fire alarm device(s)	**7.8**
Fire alarm routing equipment	**7.9**
Automatic fire protection equipment	**7.10**
Fault warning routing equipment	**8.9**
Standardized I/O interface	**11**

In addition, alternatives are offered in this European Standard. Examples of these are:

- ± automatic or manual reset of the fault warning condition;
- ± indications by means of separate light emitting indicators, or on an alphanumeric display;
- ± access level 1 or 2 for certain functions.

The choice of an alternative is entirely up to the manufacturer. They are equivalent solutions in this European Standard and should not be called up in national regulations.

Annex C (informative) Processing of signals from fire detectors

Functions associated with other parts of EN 54 may be integrated within the design of a c.i.e. This may include the processing of signals from fire detectors to the point at which a fire alarm decision is taken. The design documentation needs to show where and how this decision is taken, so that these delays may be assessed. This would generally only be the case in a software controlled c.i.e.

For the purposes of this European Standard, the processing of the fire signals to this point is not considered to be a function of the c.i.e., but of the appropriate detector standard (e.g. EN 54-7 in the case of smoke detectors). Functions which are part of the c.i.e. include:

- ± the scanning and acquisition of signals by the c.i.e. from points;
- ± the control or scheduling of any processing of signals from points, where this is contained within

- ± any other processing required for indications and/or the actioning of outputs, subsequent to the fire alarm decision.

The intent of **7.1.3** and **7.1.4** is that the times associated with the above functions of the c.i.e. do not add a delay of more than 10 s to the approved detector signal processing, either to indicate the fire alarm condition or a new zone in alarm. Demonstration of compliance may be achieved by inspection of the design documentation and/or by testing with suitable means, such as a simulated detector.

Annex D (informative) Explanation of zones and the zonal indication of fire alarms

A zone will contain one or more fire detectors or manual call points, installed within a localized area of the protected premises. The requirements for grouping these into zones are more fully described in the application guidelines. In general, a protected premises is divided into zones in order to assist in:

- ± the rapid location of the source of a fire alarm;
- ± assessing the size of the fire, and monitoring its rate of growth;
- ± sub-dividing the installed system, for the purposes of alarm organization and fire protection measures.

The number of fire detectors and/or manual call points in a zone will vary, depending on the circumstances. More than one zone is not expected to be configured in a single volume, unless this is very large. It is assumed that a zone will not contain more than 32 fire detectors and/or manual call points, since this would correspond to an unacceptably large search area.

In this European Standard, zones are the mandatory units for the discrete indication of fire alarms. The aim is to provide unique indications for the zones in which fire alarms originate, so that a multiplicity of alarm signals from fire detectors in one volume do not clutter an alphanumeric display, and risk preventing the rapid recognition of new zones in alarm.

Zones may be sub-divided, such that signals from individual points, or groups of points, may also be identified at the c.i.e., thus providing more detailed information on the location of an event, in addition to the indication of the affected zone.

Annex E (informative) Delays to outputs

Sub-clause **7.11**, which deals with delays to output signals, permits a c.i.e. to be configured so that the presence of a fire may be verified following an alarm before automatic actions or an orderly evacuation of persons are carried out.

If the manufacturer declares that fire detectors and manual call points may be mixed in the same zone, and that output delays may also be operative, the c.i.e. will need to be capable of distinguishing signals from manual call points from signals from fire detectors, in order that the requirements of **7.11** a) and b) may be met.

The maximum delay times quoted represent the upper limit of times currently used in the CEN member countries and are not recommended times. Recommended times are given in application guidelines. Delays to signals from manual call points should be used only in exceptional circumstances.

Delays may be structured such that an initial short delay period may be extended by the use of a manual control, but the total delay should not exceed the specified maximum. It may also be desirable that the operation of any manual call point on the installation can override the delay, so that an alarm can be immediately raised if human inspection of an incident verifies that a fire exists.

Note that **9.4.2**c deals with the disablement and enablement of the functions referred to in **7.11**. The meaning is that an indication is given if the immediate operation of the outputs is disabled, i.e. if delays are operative.

Annex F (informative)

Fault recognition and indication

Clause **8** requires that the faults most likely to occur in a fire alarm system can be recognized and indicated, so that they may be repaired as soon as possible. These include the following.

- ± Certain faults within the c.i.e. itself, and in transmission paths between parts of the c.i.e. contained in more than one cabinet.
- ± Faults in transmission paths to other components of an installed system, where these are in different cabinets to that of the c.i.e..
- ± Faults in other components of an installed system, as defined in EN 54-1.

The faults fall into 3 classes, which are described in the relevant sub-clauses:

- ± **8.2** and **8.3**, faults in specified functions;
- ± **8.4**, total loss of power supply (option with requirements);
- ± **8.5**, system fault.

These classes differ in the implications of the fault, hence the reason for the different requirements. Faults as under **8.2** and **8.3** are assumed to affect only the specified function, the rest of the c.i.e. and its connected system remaining fully operational. Faults as under **8.4** and **8.5** may lead to a partial or total loss of all the functions of the c.i.e.

This European Standard does not define the technical means for recognizing faults. It defines those faults which are to be recognized and how these are to be indicated. For example, the monitoring for short circuits or interruptions in transmission paths may be carried out by the c.i.e. or by other components of the connected system. However, all the recognized faults have to be indicated on the c.i.e.

The monitoring for faults within other components of the installed system may be at intervals less frequent than 100 s. The c.i.e. has to indicate a fault within 100 s of receiving a signal from this component.

Both automatic and manual reset are possible on the same c.i.e., since it may be desirable that certain fault indications reset automatically, whilst others are latched until a manual reset. In the case of a system fault only a manual reset is permitted, because of the special implications.

Annex G (informative)

Standardized input/output interface for the connection of ancillary equipment (e.g. a fire brigade panel)

The input/output interface is an optional part of the c.i.e. which transmits information on the status of the c.i.e. to ancillary equipment. It is also capable of receiving signals and actioning the appropriate functions on the c.i.e. The ancillary equipment is not a part of the c.i.e. for the purposes of this European Standard, although it may be mechanically integrated with the c.i.e. in the same cabinet.

Clause **11** specifies the functions which are to be included in the interface. All the specified functions are to be included if a manufacturer declares compliance with this option. The requirements for fire brigade panels differ within the CEN countries, because of differences in national fire fighting practices. Rather than attempting to harmonize fire brigade panels at a European level, an interface has been specified which implements the more common functions used in the CEN countries. Consequently, more input and output functions have been specified than may be needed for any given piece of equipment.

It may not be necessary to call up this option for the connection of ancillary equipment (e.g. a fire brigade panel) which conforms to specific application guidelines or local regulations. As an option without requirements a sub-set of the functions listed may be provided for this purpose.

No electrical specifications for the interface are given in this European Standard. **12.2.1**b requires that the manufacturer's technical documentation gives sufficient information to permit the specification of compatible ancillary equipment.

Annex H (informative)
Integrity of transmission paths

If the manufacturer's documentation shows that more than 32 fire detectors and/or manual call points may be connected to a detection circuit then **12.5.2** requires that means be specified and provided to ensure that a short circuit or an interruption in a detection circuit does not prevent the indication of a fire alarm from more than 32 fire detectors and/or manual call points.

In fact the maximum number of zones or points which may be lost in the event of a fault in a detection circuit is defined in installation guidelines. If the manufacturer makes such a declaration, then in order to comply with this European Standard he needs to demonstrate a capability for limiting the consequences of a fault. For example he may

- ± specify that detection circuits should be installed as loops;
- ± provide detection circuit interfaces on the c.i.e. which are capable of independently powering and receiving signals from each end of a loop;
- ± provide devices for installation on the detection circuit which are capable of automatically isolating short circuits.

Similar considerations apply to **12.5.3**, concerning the protection of transmission paths between different parts of a c.i.e. contained in more than one cabinet.

Annex J (informative)
Design requirements for software controlled control and indicating equipments

13.4 requires that if a failure of program execution is detected the c.i.e. will enter a safe state. The safe state is defined by the manufacturer, but it is expected that it will not result in the false actioning of mandatory outputs, nor give a false impression to a user that the c.i.e. remains operational if it is not.

In practice, it may be acceptable either to stop, or to automatically attempt to restart the program execution. If there is a risk that memory may have been corrupted, the restart procedure should check the contents of the memories, and if necessary re-initialize running data to ensure that the c.i.e. enters a safe operating state.

Even if program execution is successfully restarted, it is important that the user is made aware of the incident. For this reason it may be advantageous if the c.i.e. is capable of automatically recording details of the restart event. In any event the system fault indication is required by **8.5** to be latched until a manual intervention.

13.5.1 requires that all executable code and data necessary to comply with this European Standard is held in memory which is capable of continuous, unmaintained, reliable operation for a period of at least 10 years. In the existing state of the art, memory with moving mechanical parts is not believed to be sufficiently reliable. The use of tapes, or magnetic or optical data discs for the storage of programs and data is therefore not acceptable at the time of drafting this European Standard.

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