BRITISH STANDARD

BS EN
12094-1:2003

Fixed firefighting systems — Components for gas extinguishing systems —

Part 1: Requirements and test methods for electrical automatic control and delay devices

The European Standard EN 12094-1:2003 has the status of a British Standard

ICS 13.220.20

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 12094-1:2003.

This European Standard is subject to transitional arrangements agreed under a Commission mandate which is intended to lead to CE marking in support of the Construction Products Directive. In order to allow for any changes in national regulations, the Member States have agreed a transition period before CE marking becomes effective, and this period will end in August 2006.

The UK participation in its preparation was entrusted by Technical Committee FSH/18, Fixed fire fighting systems, to Subcommittee FSH/18/6, Gas extinguishing systems, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/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 Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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Installations fixes de lutte contre l'incendie - Eléments constitutifs pour installations d'extinction à gaz - Partie 1: Exigences et méthodes d'essais applicables aux dispositifs électriques automatiques de commande et de temporisation

Ortsfeste Brandbekämpfungsanlagen - Bauteile für Löschanlagen mit gasförmigen Löschmitteln - Teil 1: Anforderungen und Prüfverfahren für automatische elektrische Steuer- und Verzögerungseinrichtungen

This European Standard was approved by CEN on 9 January 2003.

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 Management Centre 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document (EN 12094-1:2003) has been prepared by Technical Committee CEN /TC 191, "Fixed firefighting systems", the secretariat of which is held by BSI.

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 October 2003, and conflicting national standards shall be withdrawn at the latest by April 2006.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

This European Standard is part of a series concerned with gas extinguishing system components.

The following European Standards are planned to cover:

- gas extinguishing systems (EN 12094)
- sprinkler systems (EN 12259 and EN 12845)
- powder systems (EN 12416)
- explosion protection systems (EN 26184)
- foam systems (EN 13565)
- hose systems (EN 671)
- smoke and heat control systems (EN 12101)
- water spray systems[1)]

This European Standard has the general title "Fixed firefighting systems – Components for gas extinguishing systems" and will consist of the following parts:

- Part 1: Requirements and test methods for electrical automatic control and delay devices
- Part 2: Requirements and test methods for non-electrical automatic control and delay devices
- Part 3: Requirements and test methods for manual triggering and stop devices
- Part 4: Requirements and test methods for container valve assemblies and their actuators
- Part 5: Requirements and test methods for high and low pressure selector valves and their actuators for CO_2 systems
- Part 6: Requirements and test methods for non electrical disable devices for CO_2 systems
- Part 7: Requirements and test methods for nozzles for CO_2 systems

1) under preparation

- Part 8: Requirements and test methods for flexible connectors for CO_2 systems
- Part 9: Requirements and test methods for special fire detectors
- Part 10: Requirements and test methods for pressure gauges and pressure switches
- Part 11: Requirements and test methods for mechanical weighing devices
- Part 12: Requirements and test methods for pneumatic alarm devices
- Part 13: Requirements and test methods for check valves and non-return valves
- Part 16: Requirements and test methods for odorizing devices for CO_2 low pressure systems
- Part 17: Pipe hangers
- Part 20: Requirements and test methods for compatibility of components

Annex A is normative. Annex B is informative.

This document includes a Bibliography.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

It has been assumed in the preparation of this standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

All pressure data in this European Standard are given as gauge pressures in bar, unless otherwise stated.

NOTE 1 bar = 10^5 N m^{-2} = 100 kPa.

1 Scope

This European Standard specifies requirements and test methods for electrical automatic control and delay devices (e.c.d.) for use in combination with automatic fire detection and fire alarm systems and CO_2-, Inert Gas- or Halocarbon Gas-Fire Extinguishing Systems installed in buildings.

The standard specifies compulsory functions which shall be provided on all electrical automatic control and delay devices and optional functions (options with requirements) which may be provided.

Additional functions associated with fire extinguishing can be provided, but are not covered by this standard.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are 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 (including amendments).

EN 54-1, *Fire detection and fire alarm systems - Part 1: Introduction.*

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

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

EN 12094-2, *Fixed firefighting systems - Components for gas extinguishing systems - Part 2: Requirements and test methods for non-electrical automatic control and delay devices.*

EN 60068-1, *Environmental testing - Part 1: General and guidance (IEC 60068-1:1988 + Corrigendum 1988 + A1:1992) .*

EN 60068-2-30, *Environmental testing – Part 2: Tests - Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle) (IEC 60068-2-30:1980 + A1:1985).*

prEN 60068-2-42, *IEC 60068-2-42: Environmental testing - Part 2-42: Test methods; Test Kc: Sulphur dioxide test for contacts and connections*

EN 60529, *Degrees of protection provided by enclosures (IP-Codes) (IEC 60529:1989).*

EN 60721-3-3, *Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weather-protected locations (IEC 60721-3-3:1994).*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply.

3.1.1
access level
one of several states of an e.c.d. as defined in EN 54-2

NOTE In the access levels 1 to 4:

- selected controls can be operated;

- selected manual operations can be carried out;

- selected indications are visible;

- selected information can be obtained.

3.1.2
alphanumeric display
indicator capable of giving information by the display of messages consisting of text and/or numeric characters

3.1.3
condition
defined status of the e.c.d. or of the gas extinguishing system, which is indicated at the e.c.d.

NOTE 1 The conditions of the e.c.d. recognised in this European Standard are the following:

- Activated Condition, when the commencing of the extinguishing control sequence is indicated;

- Pre-activated Condition, when the first of two necessary input triggering signals is indicated;

- Fault Warning Condition, when a fault is indicated;

- Disabled Condition, when the disablement of functions is indicated;

- Released Condition, when the flow of the extinguishing agent into the protected room or area is indicated;

- Quiescent Condition, when the e.c.d. is powered by power supply conforming to EN 54-4 and no other condition status of the e.c.d. is indicated.

NOTE 2 In some European countries in the quiescent condition the automatic/manual mode is indicated.

NOTE 3 The following condition of the gas extinguishing system is recognised in this European Standard:

- Blocked Condition, when the non-electrical disable device prevents the release of the extinguishing agent.

3.1.4
earth fault
unwanted connection between earth potential and any part of the e.c.d., transmission paths to the e.c.d., or transmission paths between parts of the e.c.d.

3.1.5
field
subdivision of a window

3.1.6
indication
information given by an indicator

3.1.7
indicator
device which can change its state to give information

3.1.8
module
independent part of the program which fulfils specified functions

3.1.9
monitoring
supervision of the operational condition of electrical and non-electrical components of the extinguishing system

3.1.10
non-volatile memory
memory element that does not require the presence of an energy source for the retention of its contents

3.1.11
pre-discharge-warning time
time period between the start of the warning indication and the discharge to warn personnel of impending gas release

3.1.12
program
software necessary for an e.c.d. to comply with the requirements of this standard

NOTE Software includes e.g. initializing data, reset and interrupt vectors, operating code, declarations.

3.1.13
reset
operation capable of terminating the indication of the "Activated Condition", "Released Condition" or the "Fault Warning Condition"

3.1.14
running data
alterable data subject to temporary modification during operation either automatically or by manual controls

3.1.15
silencing
manual operation to switch off the audible signal of a sounding device which is capable of being automatically resounded by a new event

3.1.16
site specific data
alterable data required for operation in a defined system configuration

3.1.17
transmission path
physical connection, external to the enclosure of the e.c.d., for the transmission of information and/or power

NOTE Examples are the connections:

- from or to a c.i.e. of a fire detection and fire alarm system, and/or

- from or to devices connected within the extinguishing system.

3.1.18
volatile memory
memory element that requires the presence of an energy source for the retention of its content

3.1.19
window
part or all of an alphanumeric display used for information relating to one condition at a given time

NOTE A subdivision of the display can be realised either by mechanical separation, or under software control.

3.2 Abbreviations

For the purposes of this European Standard, the following abbreviations apply:

3.2.1
c.i.e.
control and indication equipment of an automatic fire detection and fire alarm system

3.2.2
e.c.d.
electrical automatic control and delay device

3.2.3
f.d.a.s.
fire detection and fire alarm system

3.2.4
p.s.e.
power supply equipment

4 Functional requirements

4.1 General

The e.c.d. shall be either a separate device or part of a c.i.e.

If the e.c.d. is part of a c.i.e., functions and indications required for the e.c.d. and the c.i.e., that are common to both, may be executed using the same component. In this case the requirements of this European Standard and that for the c.i.e. (see EN 54-2) shall be fulfilled.

The e.c.d. shall be powered by power supply equipment in accordance with EN 54-4.

Concerning the compulsory functions and the provided optional functions, the e.c.d. shall conform to the requirements in clauses 4, 5 and 6 together with those in 9.3 (environmental tests).

If the e.c.d. provides any of the optional functions the manufacturer shall specify which options are provided, see 8.2. The e.c.d. including these options shall be subjected to the testing and shall meet the requirements of this European Standard.

4.2 Environmental class

The e.c.d. shall be classified and specified by the manufacturer for one of the classes as indicated below depending upon the intended ambient conditions:

- Class A: temperature range of - 5 °C to + 40 °C;

- Class B: temperature range of – 20 °C to + 50 °C;

- Class C: temperature range of - 5 °C to + 40 °C and corrosive atmosphere class 3C4 of EN 60721-3-3;

- Class D: temperature range of - 20 °C to + 50 °C and corrosive atmosphere class 3C4 of EN 60721-3-3.

4.3 Signal processing and indication

4.3.1 General

The e.c.d. shall be designed to receive, process and indicate signals for each flooding zone.

All processing of the functions necessary for the electrical control of the fire extinguishing installation shall be carried out by the e.c.d..

4.3.2 Compulsory and optional functions

The e.c.d. shall be able to carry out the following compulsory functions (see also Figure 1):

a) Reception and processing of at least one input triggering signal from an f.d.a.s. and an input triggering signal from manual triggering device(s) connected directly to the e.c.d. (see also 4.4);

b) On receipt of the input triggering signal(s), transmission of the extinguishing signal (see also 4.5, 4.3.2 g) and 4.17);

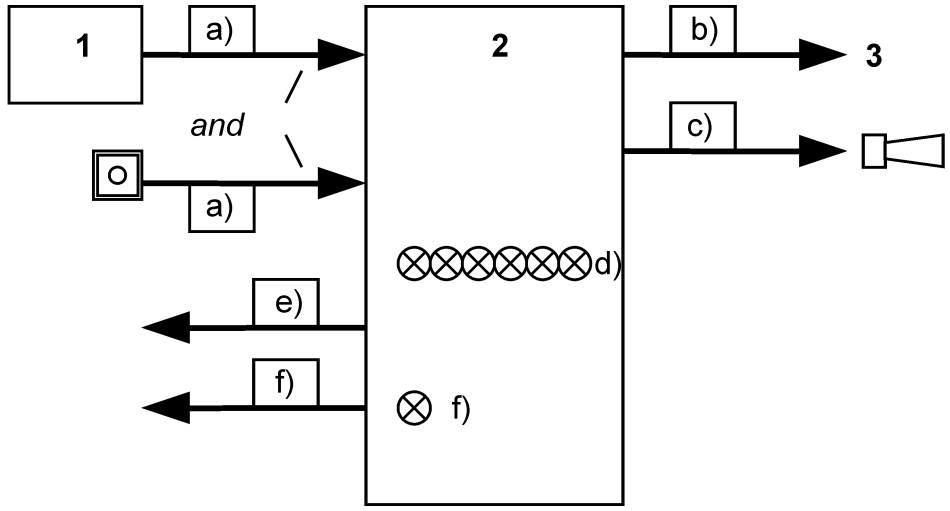
c) On receipt of the input triggering signal(s) activation of alarm devices (see also 4.6);

d) Indication of each condition unambiguously e.g. activated condition, fault warning condition (see also 4.7 to 4.16);

e) Transmission of the information of the incorrect status of components as specified in 4.19 (monitoring), if provided, and of the information of the fault warning condition (see also 4.14 and 4.19);

f) Transmission of the information of the released condition (see also 4.11);

If the information is transmitted to automatic routing equipment E as defined in EN 54-1 the transmission to E shall be indicated visibly at access level 1 by a separate light emitting indicator and/or by an alphanumeric display in a clearly identifiable way.



Key

1 Fire detection and fire alarm system (f.d.a.s.)

2 Electrical control device (e.c.d.)

3 Release equipment

NOTE Functions a) to f) per flooding zone; outputs e) and f) at least common for each function. The indicator f) is only compulsory in the case of a connection as specified in EN 54-1.

Figure 1 — Compulsory functions

The e.c.d. may be able to carry out the following optional functions (options with requirements), (see also Figure 2):

g) Delay the extinguishing signal (see 4.3.2 b)) for a given period of time which is known as a pre-discharge-warning time (see also 4.17);

h) Reception of a signal representing the flow of the extinguishing agent (see also 4.18);

i) Monitoring of the status of components (e.g. weighing devices, valve positions), (see also 4.3.2 e) and 4.19);

j) Reception of signals from an emergency hold device (see also 4.20);

If this option is used, means shall be provided to transmit the information concerning the activation of the emergency hold device.

k) Separate monitoring of the status of non-electrical disable device(s) (see also 4.3.2 e) and 4.19);

If this option is used, means shall be provided to transmit the information concerning the blocked position.

l) Control of flooding time, for instance in the case of low pressure CO_2 systems (see also 4.21);

m) Initiating of a secondary flooding, for instance in the case of low pressure CO_2 systems, including the reception of a signal from a manual control device (see also 4.22);

n) Reception of signals from ancillary devices on the change over from manual only mode to automatic/manual mode and vice versa (see also 4.23);

If this option is used, means shall be provided to transmit the information concerning the change over.

o) Transmission of a triggering signal to equipment within the fire extinguishing system (e.g. pilot cylinders, optical warning devices) (see also 4.24);

p) Transmission of extinguishing signals to spare cylinders or spare cylinder banks (see also 4.25);

If a main and a spare bank is provided, it shall be indicated on the e.c.d. that the spare bank will be activated in case of alarm. The indication shall be given at access level 1 by a physically separated light emitting indicator or by an alphanumeric display.

q) Transmission of signals to equipment outside the fire extinguishing system (triggering of doors, ventilation shut down, plant shut down etc.) (see also 4.26);

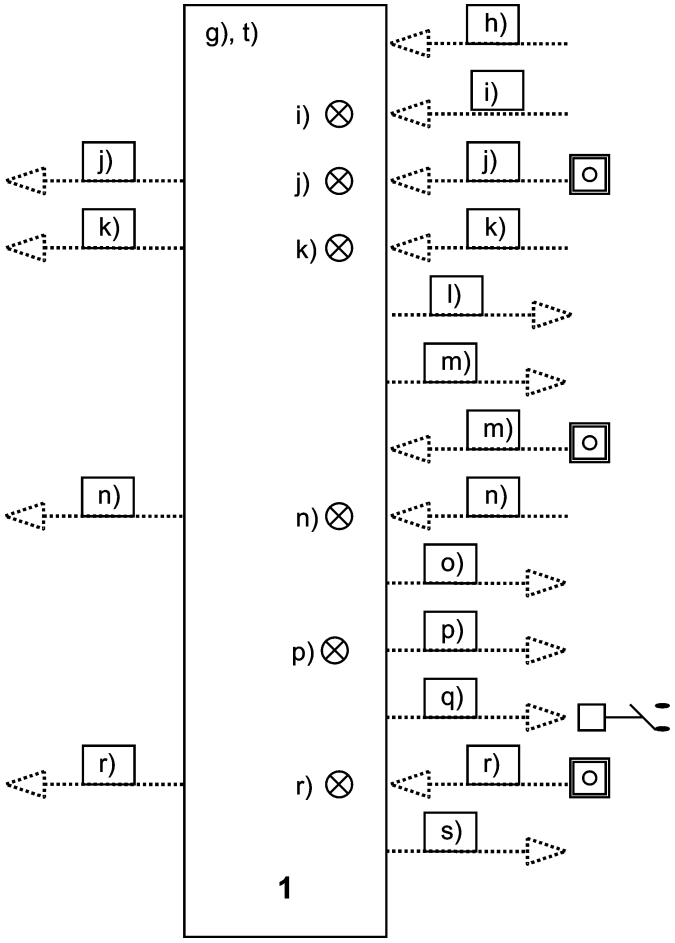
r) Reception of signals from emergency abort device (see also 4.27);

If this option is used, means shall be provided to transmit the information concerning the activation of the emergency abort device.

s) Control of an extended discharge, for instance in the case of low pressure CO_2 systems (see also 4.28);

t) Release of the extinguishing media for selected flooding zones (see also 4.29);

u) Activation of alarm devices with different signals (see also 4.30).



Key

1 Electrical control device (e.c.d.)

NOTE 1 Functions g) to u) per flooding zone; outputs j), k), n) and r) at least common for each function.

NOTE 2 Functions g), t) and u) are optional extensions of the compulsory functions a), b) and c).

NOTE 3 Functions l) and m) can be provided in combination with the compulsory function b).

Figure 2 — Optional functions g) to u)

4.4 Reception and processing of input triggering signals

NOTE This subclause relates to 4.3.2 a).

4.4.1 The e.c.d. shall be designed to receive and process at least one triggering signal from an f.d.a.s. and a triggering signal from manual triggering device(s) connected directly to the e.c.d.

NOTE In some European countries there are national regulations requiring that the activated condition can only be established after the reception of two input triggering signals from two independent transmission paths between a c.i.e. of an f.d.a.s. and the e.c.d.

4.4.2 The processing of the input triggering signal shall have the highest priority unless

- the signal from an emergency hold or abort device is present or
- a fault of the transmission path to the emergency hold or abort device is present or
- the disabled condition is present or

- the release of extinguishing media is to be prevented in accordance with 4.29.

If the processing of the input triggering signal has started, no disablement shall be possible for the appropriate flooding zone.

4.5 Transmission of extinguishing signal

NOTE This subclause relates to 4.3.2 b).

The e.c.d. shall be designed, on receipt of the input triggering signal, to transmit the extinguishing signal (see also 4.3.2 g) and 4.17).

4.6 Activation of alarm devices

NOTE This subclause relates to 4.3.2 c).

4.6.1 The e.c.d. shall be designed, on receipt of the input triggering signal, to activate alarm devices.

4.6.2 If a silencing function is provided, after activation the alarm devices shall only be capable of being silenced manually at access level 2, after establishment of the released condition.

4.7 Indication of the supply with power

4.7.1 The e.c.d. shall be designed so that the supply with power is indicated unambiguously.

4.7.2 A visible indication shall be given at access level 1 by means of a separate light emitting indicator while the e.c.d. is supplied with power (see also annex A).

4.8 Activated condition

4.8.1 The e.c.d. shall enter the activated condition within a time specified by the manufacturer up to a maximum of 3 s after the activation of a manual triggering device connected directly to the e.c.d. or the activation of a transmission path from an f.d.a.s.

The manufacturer may specify a time shorter than 3 s. In this case, this specification shall be tested and verified.

4.8.2 After establishing the activated condition all appropriate outputs shall be triggered within a time specified by the manufacturer up to a maximum of 1 s unless a time delay is interposed in an output function circuit (see 4.17).

The manufacturer may specify a time shorter than 1 s. In this case, this specification shall be tested and verified.

4.9 Indication of activated condition

NOTE This subclause relates to 4.3.2 d) and see annex A.

4.9.1 The activated condition shall be indicated unambiguously without any prior manual intervention by:

a) an audible indication and

b) visible indications for each flooding zone at access level 1 by one or both of the following means:

   1) physically separated light emitting indicators;

   2) an alphanumeric display.

4.9.2 The audible indication shall be capable of being silenced manually at access level 1 or 2 by an operation separate from the reset function. It shall not be silenced automatically.

Each new alarm signal from another zone shall cause the audible indication again (see also 4.14.10).

4.9.3 If the activated condition is established only after the reception of two input triggering signals from an f.d.a.s, the reception of the first signal shall be indicated visibly and audibly as the pre-activated condition. On reception of the first signal, outputs (e.g. for plant shut down) may be activated.

For the indication of the pre-activated condition, the same indicators may be used as for the indication of the activated condition. If the same light emitting indicator is used, the reception of the first signal shall be indicated with flashing light, the activated condition with steady light.

4.10 Released condition

The released condition shall be established upon reception of a signal representing the flow of the extinguishant or upon the triggering of the extinguishing signal output.

4.11 Indication of Released condition

NOTE This subclause relates to 4.3.2 d) and 4.3.2 f) and see annex A.

4.11.1 The released condition shall be indicated unambiguously without any prior manual intervention by visible indications for each flooding zone at access level 1 by one or both of the following means:

- physically separated light emitting indicators;
- an alphanumeric display.

When the released condition is established upon reception of a signal representing the flow of extinguishant without the activated condition, the released condition shall also be indicated audibly.

The audible indication shall be capable of being silenced manually at access level 1 or 2 by an operation separate from the reset function. It shall not be silenced automatically.

4.11.2 The e.c.d. shall provide an output signalling the "Released Condition".

If the information is transmitted to automatic routing equipment E as defined in EN 54-1 the transmission to E shall be indicated visibly at access level 1 by a separate light emitting indicator and/or by an alphanumeric display in a clearly identifiable way.

4.12 Resetting of the Activated condition and the Released condition

4.12.1 The activated condition and the released condition shall be capable of being reset, except as required in 4.12.2, at access level 2. The same element may be used as for terminating the fault warning condition. Following the reset operation the indication of the correct conditions, corresponding to any received signals, shall either remain or be re-established within 20 s.

4.12.2 Technical means shall be provided to inhibit the reset function after establishing the activated condition either for an adjustable time period up to 30 min or until the reception of a signal representing the end of discharge. The setting is restricted to access level 3. The adjusted time shall be indicated at least at access level 3 (e.g. label).

4.13 Fault warning condition

4.13.1 The e.c.d. shall be capable of recognising and indicating in a clearly identifiable way the following as a "Fault Warning Condition", if the function is provided, within 100 s of their occurrence unless otherwise specified in this standard.

NOTE The value of 100 s is chosen in accordance with EN 54-2.

a) Short circuit or interruption in a transmission path for the reception of input triggering signal(s) from an f.d.a.s.;

b) Short circuit or interruption in a transmission path to the actuators and additional non-electrical control and delay devices (see EN 12094-2) (e.g. mechanical), if the additional control device is not in the same cabinet as the electrical one;

c) Short circuit or interruption in a transmission path to alarm devices;

d) Short circuit or interruption in a transmission path to manual controls (e.g. emergency hold device, emergency abort device, manual triggering device) (see also 4.20 or 4.27 respectively);

e) Short circuit or interruption in a transmission path to a non-electrical disable device;

f) Short circuit or interruption in the transmission path for monitoring of components relevant for the proper function of the extinguishing installation;

g) Short circuit or interruption in the transmission path for the reception of the signal representing the flow of the extinguishing agent;

h) Short circuit or interruption in the transmission path to fault warning routing equipment as specified in EN 54-1 (J);

i) Short circuit or interruption in the transmission path to fire alarm routing equipment as specified in EN 54-1 (E);

j) Power supply faults:

1) Faults of power supplies as defined in EN 54-4;

2) Short circuit or interruption of transmission paths carrying power between the e.c.d. and the power supply, if these transmission paths are outside the e.c.d. cabinet and outside the power supply cabinet and where the transmission path between the two cabinets exceeds 0,1 m. In this case, in addition, provision shall be made for two separate transmission paths from the power supply to the e.c.d. such that a short circuit or interruptions in one of the transmission paths does not prevent the supply of power to the e.c.d. Transmission paths between the e.c.d. and the power supply, which are outside the e.c.d. cabinet and outside the power supply cabinet and where the transmission path is up to 0,1 m, shall be mechanically protected (e.g. by a steel pipe);

k) Earth fault which affects the function of the e.c.d.;

l) Rupture of a fuse or operation of any protective device that would prevent the operation of the e.c.d.;

m) Incorrect execution of the operating program and/or corruption of the memory content (see clause 6, only in case of a software controlled e.c.d.).

4.13.2 The fault warning condition shall be capable of being reset manually or automatically. Manual reset shall be restricted to access level 2. The same element may be used as for resetting the released condition. Following the reset operation the indication of the correct conditions, corresponding to any received signals, shall either remain or be re-established within 20 s.

NOTE The value of 20 s is chosen in accordance with EN 54-2.

4.14 Indication of Fault warning condition

NOTE 1 This subclause relates to 4.3.2 d) and 4.3.2 e).

NOTE 2 See also 5.7 and 6.7.

4.14.1 Faults as under 4.13.1 shall be indicated automatically and unambiguously at the e.c.d. in the following manner:

a) an audible indication; and

b) a visible indication by means of a light emitting indicator at access level 1;

Faults on a transmission path for 4.13.1 a) to g) covering one flooding zone shall be indicated at least as a common fault of that flooding zone.

Faults on a transmission path for 4.13.1 a) to g) covering more than one flooding zone shall be indicated at least as a fault of that transmission path.

4.14.2 For faults as under 4.13.1a), b), c), d), e), f) and g) the affected transmission path shall be identified by a signal of a separate light emitting indicator for each transmission path or by means of an alphanumeric display at access level 1, 2 or 3.

4.14.3 For faults as under 4.13.1 h) and i) the affected transmission path shall be identified by a signal of a separate light emitting indicator or by means of an alphanumeric display at access level 1.

4.14.4 Faults as under 4.13.1 j) shall be indicated by a signal of a separate light emitting indicator or by means of an alphanumeric display at least as a common indication for all mentioned power supply faults at access level 1.

4.14.5 Faults as under 4.13.1 k) shall be indicated by a signal of a separate light emitting indicator or by means of an alphanumeric display at least as a common indication for all earth faults at access level 1, if not covered by another fault indication.

4.14.6 Faults as under 4.13.1 l) shall be indicated at least as a fault of the supervised function as e.g. "Power Supply Fault".

4.14.7 Faults as under 4.13.1 m) shall be indicated by a signal of a separate light emitting indicator or by means of an alphanumeric display at access level 1 per flooding zone, or in case of fully redundant techniques per e.c.d. (see also 5.7.1).

This fault indication shall remain until manual reset and/or another manual operation.

4.14.8 Faults which have been detected but cannot be displayed because of limited space of the used alphanumeric display shall be capable of being indicated by manually initiated scrolling at access level 1 or 2.

If more faults have been detected than can be simultaneously indicated, this shall be indicated.

4.14.9 The indication of the fault warning indicator for each flooding zone common for the flooding zone faults shall not be suppressed by any other status indications of the e.c.d. (e.g. "Activated Condition").

4.14.10 The audible signal shall be capable of being silenced manually at access level 1 or 2. The audible signal shall be silenced automatically, if the control device has been reset automatically from the fault warning condition to the quiescent condition, except faults as under 4.13.1m).

4.14.11 Each new fault shall cause the audible signal again. The audible signal may be different from the signal of the activated condition. If they are different the signal for the "Activated Condition" shall have priority.

4.14.12 The e.c.d. shall provide an output in accordance with 4.3.2 e). This signal shall be given even if the e.c.d. is deenergised.

4.15 Disabled condition

4.15.1 The e.c.d. shall at least be capable of disabling and re-enabling for each flooding zone the following by separate manual operation at access level 2.

a) the function of processing alarm signals received via the transmission path(s) to a f.d.a.s., if the manual only mode is not provided.

b) the function of processing alarm signals received via the transmission path(s) to manual triggering devices.

c) output signal(s) and/or transmission path(s) to actuators and associated triggering signals to activate the outputs mentioned in 4.3.2 e) and f).

d) output signal(s) and/or transmission path(s) for triggering of equipment outside the fire extinguishing system (triggering of doors, ventilation shut down, plant shut down etc.), if such outputs are provided.

The released condition shall not be reached when the actuators are disabled, unless the signal representing the flow of extinguishant is received, see 4.18.3.

4.15.2 Disablement shall not be affected by a reset function.

Disabling of the transmission path to the alarm devices of a flooding zone shall be possible only in combination with the disabling of the transmission path to the actuators of that flooding zone.

4.15.3 Provision shall be made so that the enabling of a function and/or transmission path shall not produce a signal to the actuators with the consequence of a direct release of the extinguishing agent.

The enabling of a function and or transmission path to actuators during the presence of an alarm signal in the disabled condition shall not release the extinguishing agent without the elapsing of the predetermined pre discharge warning time.

4.16 Indication of Disabled condition

NOTE This subclause relates to 4.3.2 d).

The disablement as described in 4.15 shall be indicated at access level 1 for each flooding zone within 2 s unambiguously by means of:

- separate light emitting indicators for each disablement or
- an alphanumeric display.

4.17 Delay of extinguishing signal (Option with requirements)

NOTE This subclause relates to 4.3.2 g).

4.17.1 The e.c.d. may provide technical means to delay the transmission of the extinguishing signal (see 4.3.2 b)) for a given period of time which is known as a pre-discharge-warning time.

4.17.2 The delay time of the e.c.d. shall be adjustable for a delay time from 0 s up to a maximum of 60 s. The setting shall be done in steps of maximum 5 s and shall be restricted to the access level 3. The adjusted delay time shall be indicated at least at access level 3 (e.g. label).

4.17.3 The set delay time shall not be affected by other components like fire detection and alarm devices.

4.17.4 The set delay time shall remain within deviation limits of ± 10% of the set value.

4.18 Signal representing the flow of extinguishing agent (Option with requirements)

NOTE This subclause relates to 4.3.2 h).

4.18.1 The e.c.d. may be designed to receive a signal representing the flow of the extinguishing agent.

4.18.2 Concerning the transmission paths for signals representing the flow of the extinguishing agent, the requirements of 4.13 and 4.14 shall be satisfied.

4.18.3 Upon reception of a signal representing the flow of extinguishant without the activated condition the released condition shall be established and the e.c.d. shall activate all appropriate outputs as required in 4.8.2.

4.19 Monitoring of the status of components (Option with requirements)

NOTE This subclause relates to 4.3.2 i) and 4.3.2 k).

4.19.1 The e.c.d. may be designed to monitor the status of components.

4.19.2 Incorrect status of components, e.g. loss of agent, shall be indicated within 100 s of its occurrence by an audible indication and by a visible indication at access level 1 by a separate light emitting indicator or alphanumeric display at least as a common indication and shall activate the output as required in 4.3.2 e).

NOTE National guidelines for planning and installation can require e.g. a separate indicator per flooding zone or a maximum number of monitored components per indicator.

4.19.3 The blocked position of the non-electrical disable device shall be indicated by visible indications for each flooding zone at access level 1 by one or both of the following means:

a) physically separated light emitting indicators;

b) an alphanumeric display.

Means shall be provided to transmit the information concerning the blocked position.

The normal transition of the non-electrical disable device from the operational position to the blocked position shall not result in an activation of the output as required in 4.3.2 e).

An indication and activation of the output as required in 4.3.2 e) shall be given if the non-electrical disable device remains in a position which is neither the fully operational nor blocked (see 4.19.2).

4.20 Emergency hold device (Option with requirements)

NOTE This subclause relates to 4.3.2 j).

4.20.1 The e.c.d. may provide technical means to connect emergency hold devices.

4.20.2 The signal of the emergency hold device shall not influence the extinguishing signal once established.

4.20.3 By the operation of the emergency hold device one of the following function sequences shall be started:

a) The extinguishing signal shall not be activated as long as the emergency hold device is continuously operated. De-activation of the operation of the emergency hold device after the end of the specified pre-discharge warning time shall cause the transmission of the extinguishing signal immediately. The pre-discharge warning time shall not be interrupted, shortened or reset by the signal from the emergency hold device. Activation of the emergency hold device shall be indicated visibly and audibly (if audible indication was silenced before) at the e.c.d. The visible indication shall be given at access level 1 by means of a separate light emitting indicator for each flooding zone and shall remain until manual reset.

b) The extinguishing signal shall not be activated while the emergency hold device is continuously operated. The pre-discharge warning time shall be re-started from the beginning by each release of the emergency hold device. The activation of the emergency hold device during the pre-discharge warning time shall be indicated in the protected area by a change of the signal to the alarm devices.

   NOTE The intention of this is to provide a different audible signal from that given during the pre-discharge time delay period and the released condition.

   Activation of the emergency hold device shall be indicated visibly and audibly (if audible indication was silenced before) at the e.c.d. The visible indication shall be given at access level 1 by means of a separate light emitting indicator for each flooding zone while the emergency hold device is activated.

4.20.4 Faults of the transmission path to the emergency hold device shall be recognised and indicated within 2 s and prevent the transmission of the extinguishing signal.

4.20.5 If an emergency hold function is provided, the e.c.d. shall have at least a common output able to transmit the information of the activation of the emergency hold device.

4.21 Control of flooding time (Option with requirements)

NOTE This subclause relates to 4.3.2 l).

4.21.1 The e.c.d. may be designed to control the flooding time, for instance in the case of low pressure CO_2 systems.

4.21.2 If the e.c.d. is intended to control the flooding time, e.g. in CO_2 low pressure systems, the flooding time shall be adjustable from a minimum time specified by the manufacturer up to at least 300 s. The setting shall be done in steps of maximum 5 s and is restricted to the access level 3. The adjusted flooding time shall be indicated at least at access level 3 (e.g. label).

4.21.3 The set flooding time shall not be affected by other components like fire detection and alarm devices.

4.21.4 The set flooding time shall remain within deviation limits of ± 10% of the set value.

4.21.5 If the e.c.d. is intended to control the flooding time, means shall be provided which for test purposes allow the termination of an already running flooding time. This shall only be possible by means of a separate manual control at access level 3. The operation shall have no effect on the intended operation of the e.c.d. after this test.

4.22 Initiation of secondary flooding (Option with requirements)

NOTE This subclause relates to 4.3.2 m).

4.22.1 The e.c.d. may be designed to initiate a secondary flooding, for instance in the case of low pressure CO_2 systems, including the reception of a signal from a manual triggering device specifically for this function.

4.22.2 A secondary flooding shall not be initiated when the manual triggering device is operated during the normal flooding. Upon operation of the manual triggering device after completion of the normal extinguishing sequence, the initiation of a secondary flooding shall only be possible when the alarm sounders are not yet silenced. In this case the secondary flooding shall be initiated immediately after the operation of this special manual triggering device.

NOTE If the alarm sounders have been silenced or the system was reset this special manual triggering device has no function.

4.23 Manual only mode (Option with requirements)

NOTE This subclause relates to 4.3.2 n).

4.23.1 The e.c.d. may be designed to change over from manual only mode to automatic/manual mode and vice versa.

4.23.2 The status of the manual only mode shall be indicated visibly on the e.c.d. and an output shall be provided that is able to transmit the information about this mode.

Changing of the mode shall be possible by manual operation at access level 2 or upon an input signal (e.g. from a key switch).

The visible indication shall be given for each flooding zone at access level 1 by one or both of the following means:

- physically separated light emitting indicators;
- an alphanumeric display.

During the manual only mode, the activation of the e.c.d. shall only be possible by signals from manual triggering devices.

4.24 Triggering signals to equipment within the system (Option with requirements)

NOTE This subclause relates to 4.3.2 o).

4.24.1 The e.c.d. may be designed to transmit triggering signals to equipment within the fire extinguishing system (e.g. pilot cylinders, optical warning devices).

4.24.2 Concerning the transmission paths for triggering signals to equipment within the system, the requirements of 4.13 to 4.16 shall be satisfied.

4.25 Extinguishing signals to spare cylinders (Option with requirements)

NOTE This subclause relates to 4.3.2 p).

4.25.1 The e.c.d. may be designed to transmit extinguishing signals to spare cylinders or spare cylinder banks.

4.25.2 If a main and a spare bank are provided, it shall be indicated on the e.c.d. that the spare bank will be activated in case of alarm. The indication shall be given at access level 1 by a physically separated light emitting indicator or by an alphanumeric display.

4.25.3 Concerning the transmission paths for extinguishing signals to spare cylinders, the requirements of 4.13 to 4.16 shall be satisfied.

4.26 Triggering of equipment outside the system (Option with requirements)

NOTE This subclause relates to 4.3.2 q).

4.26.1 The e.c.d. may be designed to transmit triggering signals to equipment outside the fire extinguishing system (triggering of doors, ventilation shut down, plant shut down etc.).

4.26.2 Concerning the transmission paths for triggering signals to equipment outside the system, the requirements of 4.15 and 4.16 shall be satisfied.

4.27 Emergency abort device (Option with requirements)

4.27.1 The e.c.d. may provide technical means to connect emergency abort devices.

4.27.2 During the quiescent and activated condition the activation of the emergency abort device shall inhibit the extinguishing signal until the emergency abort device has been deactivated and the e.c.d. has been reset from the activated condition.

NOTE After activation the emergency abort device is latched.

4.27.3 Faults of the transmission path to the emergency abort device shall be recognised and indicated within 2 s and prevent the transmission of the extinguishing signal.

4.27.4 Activation of the emergency abort device shall be indicated visibly and audibly (if audible indication was silenced before) at the e.c.d. The visible indication shall be given at access level 1 by means of a separate light emitting indicator for each flooding zone and shall remain until manually reset.

4.27.5 If an emergency abort function is provided, the e.c.d. shall have at least a common output able to transmit the information of the activation of the emergency abort device.

4.28 Control of extended discharge (Option with requirements)

NOTE 1 This subclause relates to 4.3.2 s).

NOTE 2 During the normal flooding time the design quantity of extinguishant is discharged into the flooding zone and the design concentration is built up. In some cases this concentration is to be maintained over a longer time (e.g. 10 min, 20 min). This can be supported by a so called "extended discharge". During the extended discharge flooding time, the concentration is maintained by a small flow of extinguishant through a separate extended discharge pipework into the flooding zone.

4.28.1 The e.c.d. may be designed to control an extended discharge, for instance in the case of low pressure CO_2 systems.

4.28.2 If the e.c.d. is intended to control an extended discharge, e.g. in CO_2 low pressure systems, the extended discharge flooding time shall be adjustable up to at least 20 min. The setting shall be done in steps of maximum

1 min and is restricted to the access level 3. The adjusted extended discharge flooding time shall be indicated at least at access level 3 (e.g. label).

4.28.3 The set extended discharge flooding time shall not be affected by other components like fire detection and alarm devices.

4.28.4 The set extended discharge flooding time shall remain within deviation limits of ± 10 % of the set value.

4.28.5 If the e.c.d. is intended to control an extended discharge, means shall be provided which for test purposes allow the termination of an already running extended discharge flooding time. This shall only be possible by means of a separate manual control at access level 3. The operation shall have no effect on the intended operation of the e.c.d. after this test.

4.29 Release of the extinguishing media for selected flooding zones (Option with requirements)

NOTE 1 This subclause relates to 4.3.2 t).

NOTE 2 In some cases, e.g. selector valves, it can be sensible after having established the released condition in one flooding zone to prevent the release of the extinguishing media for other flooding zones.

4.29.1 The e.c.d. may provide technical means by which, after having established the released condition in one flooding zone, only the output(s) to the actuators of other flooding zones shall be automatically disabled. The disablement shall be indicated as the disabled condition of the flooding zone(s) (see 4.16).

4.29.2 All flooding zones shall be selectable to prevent the release of the extinguishing media.

4.29.3 The selection is restricted to access level 3. The selected combinations shall be identifiable at access level 1, 2 or 3.

4.29.4 Received input triggering signals for (a) flooding zone(s), where the release of the extinguishing media for the flooding zone(s) is prevented, shall be indicated as the activated condition of the flooding zone(s) (see 4.9).

4.29.5 The re-enablement of automatically disabled actuators shall only be possible after the e.c.d. has been reset.

4.30 Activation of alarm devices with different signals (Option with requirements)

NOTE This subclause relates to 4.3.2 u).

4.30.1 The e.c.d. may provide output(s) to alarm devices with at least two different signals, if the e.c.d. has the facility to delay the extinguishing signal (see 4.17 and 4.20.3 b)).

4.30.2 The signal during the pre-discharge warning time shall be intermittent and the signal for the released condition shall be continuous.

5 Design requirements

5.1 General

5.1.1 The following subclauses describe requirements of the mechanical, electrical and software design.

5.1.2 Compliance of the e.c.d. with this standard cannot be fully verified by functional testing because of the impracticability of testing all possible combinations and of determining long-term reliability. In order that a verification of the design can be achieved, it is necessary for the test organisation to assess the design.

5.1.3 The manufacturer shall declare that the design had been carried out in accordance with an appropriate factory production control system.

Within this factory production control system a set of design rules shall be incorporated and used for the design of hardware, software and software controlled elements of the e.c.d.

5.2 Mechanical design

The e.c.d. shall be protected against environmental influences by a cabinet of suitable mechanical strength. The cabinet shall be classified as at least

a) IP 30 as specified in EN 60529 for e.c.d. classes A and B, or

b) IP 54 as specified in EN 60529 for e.c.d. classes C and D.

5.3 Manual controls

5.3.1 All manual controls on the e.c.d. shall be clearly labelled to indicate their purpose.

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

5.4 Visible indicators

5.4.1 General

For the indication of the required information either separate light emitting indicators as specified in 5.4.2 or alphanumeric displays as specified in 5.4.3 shall be used (see annex A).

5.4.2 Indications by means of separate light emitting indicators

5.4.2.1 All compulsory light emitting indicators shall be testable by manual operation at access level 1 or 2.

5.4.2.2 All light emitting indicators at access level 1 shall be clearly labelled to indicate their purpose.

Labels shall be readable at a distance of 0,8 m at an ambient light intensity between 100 lx and 500 lx.

5.4.2.3 Indications from the light emitting indicators in 5.4.2.1 and 5.4.2.2 shall be visible at any angle within 22,5 ° from a line with its origin in the centre of the light emitting indicator and perpendicular to its mounting surface at a distance of 3 m at an ambient light intensity up to 500 lx.

5.4.2.4 Where the same light emitting indicator is used for the indication of fault and disablement of transmission paths fault warning shall be indicated by flashing and disablement by steady lights.

5.4.2.5 Where flashing indications are used the on/off period shall each be not less than 0,25 s. The frequencies of flash shall be:

a) for indicators of activated condition, not less than 1 Hz;

b) for indicators of fault, not less than 0,2 Hz.

5.4.3 Indications by means of alphanumeric displays

5.4.3.1 Where an alphanumeric display is used to indicate required information additional general light emitting indicators for the "Activated Condition", "Released Condition", "Fault Warning Condition", "Disabled Condition" and "Blocked Condition" shall be provided.

5.4.3.2 The alphanumeric display should consist at least of a sufficient number of fields to be capable of indicating all released flooding zones simultaneously. If the alphanumeric display does not consist of a sufficient number of fields to be capable of indicating all released flooding zones simultaneously, the released flooding zones shall be indicated by separate light emitting indicators.

5.4.3.3 For each condition there shall be only one window, in which all of the fields relating to that condition are grouped.

5.4.3.4 Each field shall be clearly identifiable. If not already included in the displayed information, the purpose of the indication of a field shall be clearly labelled.

5.4.3.5 A field shall consist at least of:

- 16 characters, where the display of information uses a cross reference to other information to identify the location;

- 40 characters, where the display is intended to include the complete information on the location.

5.4.3.6 At any time during the "Activated Condition" and the "Released Condition" it shall be possible to display suppressed information, which is not currently indicated, by manual operation at access level 1. Reversion to the indication of the released flooding zones shall occur between 15 s and 30 s after the last interrogation.

5.4.3.7 A window shall be clearly identifiable and distinguishable from other windows. A window may be realised by subdivision of a larger display e.g. a screen. Such a subdivision may be realised either by mechanical separation (frames) or by software (windows).

5.4.3.8 If an alphanumeric display consists of elements or segments, a failure of a single element or segment shall not affect the correct interpretation of the displayed information.

5.4.3.9 Where alphanumeric displays are used the angle in which the information can be read relative to a line perpendicular to the mounting surface of the alphanumeric display shall be at least 22,5° viewed from the side, at least 15° viewed from above and at least 15° viewed from below.

5.4.3.10 The indications from the separate additional general indicators shall be visible in an ambient light intensity up to 500 lx, at any angle up to 22,5° from a line through the indicator perpendicular to its mounting surface at 3 m distance.

Information shown on an alphanumeric display shall be readable at a distance of 0,8 m at an ambient light intensity between 5 lx and 500 lx.

5.4.3.11 No colour distinction is needed for alphanumeric displays. Where colour distinction is used the same colour shall be used as for light emitting indicators.

5.5 Audible indicators

The minimum sound level, measured under anechoic conditions at a distance of 1 m from the cabinet, shall be at least 60 dB(A) for the activated condition and the activation of the emergency hold or abort device and 50 dB(A) for other indications. E.c.d.s equipped with a door have to be checked with the door closed. The signalling device may be the same for all required audible indications.

5.6 Electrical design of components

The manufacturer has to certify in writing that all electrical components have been selected for the intended purpose and operate within their ratings when the environmental conditions outside the cabinet of the e.c.d. comply with EN 60721-3-3, class 3k5 for class A or class C e.c.d.s and 3k6 for class B or class D e.c.d.s.

5.7 Circuit design

5.7.1 The circuit design has to be such that a fault on any transmission path shall only affect this transmission path and the function of the e.c.d. related to this transmission path. No other transmission path and no other function of the e.c.d. shall be affected.

In any case, a fault on a transmission path as specified in 4.13.1 a) to g) shall not affect the function of more than one flooding zone. Where the room and its false floor are subdivided into two flooding zones, a fault on a transmission path may affect these two flooding zones.

5.7.2 All terminals shall have appropriate power limitation in order to ensure that in case of external short circuits no danger exists because of heat production.

6 Additional design requirements for software controlled e.c.d.s

6.1 General

The e.c.d.s may contain elements which are controlled by software in order to fulfil the requirements of this standard. In this case, the e.c.d.s shall comply with the requirements of this clause, as well as those of clause 5, where relevant to the technology used.

NOTE The following requirements are derived from the requirements for software controlled c.i.e.s (EN 54-2). Changes were implemented, when necessary, to take into account the special functions and use of e.c.d.s.

6.2 Software design

In order to ensure the reliability of a software controlled e.c.d. 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) the software shall be designed to avoid the occurrence of a deadlock in the program flow.

6.3 Program monitoring

NOTE See also annex B.

6.3.1 The execution of the program shall be monitored as under 6.3.2 or 6.3.3. If routines associated with the main functions of the program are not executed, the e.c.d. shall enter the fault warning condition and shall indicate either or both of the following:

a) a fault, as in 4.14.1 a) and 4.14.7;

b) faults of supervised functions, as in 4.14.1 to 4.14.6, where only these functions are affected.

6.3.2 If the program executes in one processor, the execution of the routines as in 6.3.1 shall be monitored by a monitoring device as in 6.3.4. (see 5.7.1).

6.3.3 If the program executes in more than one processor, the execution of the routines as in 6.3.1 shall be monitored in each processor. A monitoring device as in 6.3.4 shall be associated with one or more processors and at least one such processor shall monitor the functioning of any processor not associated with such a monitoring device (see 5.7.1).

6.3.4 The monitoring device of 6.3.2 and 6.3.3 shall have a time base independent of that of the monitored system. 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.

6.3.5 In the event of a fault as specified in 6.3.1 a) or 6.5, those parts of the e.c.d. affected shall enter a safe state not later than the indication of the fault (see annex B).

6.4 Storage of program and data

NOTE See also annex B.

6.4.1 All executable code and data necessary to comply with this standard shall be held in memory which is capable of continuous, non-maintained, reliable operation for a period of at least 10 years.

6.4.2 For the program, the following requirements shall apply:

a) the program shall be held in non-volatile memory, which can only be written to at access level 4.

b) it shall be possible to identify the version reference(s) of the program at access level 3. The version reference(s) shall be in accordance with the documentation of 6.6.1.

6.4.3 For site specific data, the following requirements shall apply:

a) the alteration of site specific data shall only be possible at access level 3 or 4;

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

c) the site specific data shall be given a version reference, which shall be updated when each set of alterations is carried out;

d) it shall be possible to identify the version reference of the site specific data at access level 3;

e) 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 two weeks;

f) If stored in read-write memory, there shall be a mechanism which prevents the memory being written to during normal operation at access level 1 or 2, such that its contents are protected during a failure in program execution.

6.5 Monitoring of memory contents

The contents of the memory containing 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.

6.6 Software documentation

6.6.1 The manufacturer shall prepare documentation which gives an overview of the software design, which shall be submitted to the testing authority together with the e.c.d. 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 functional description of the main program flow shall be explained using a clear methodology appropriate to the nature of the software, e.g. graphical representations of the system design, the data flows and control flows.

b) A description of which areas of memory are used to store the program, site specific data and running data. Where dynamic memory management is employed, a separation shall be implemented between the program, site specific data and running data and this shall be described in connection with the method of memory allocation.

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

6.6.2 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, as it is implemented in the source code of the program, containing :

1) the name of the module;

2) the identification of the author(s);

3) the date and/or version reference;

4) a description of the tasks performed;

5) 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 recognised;

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

6.7 Operation of the e.c.d. in the event of a system fault

In the event of a system fault as specified in 6.3 and 6.5 not more than one flooding zone shall be affected. Where the room and its false floor are subdivided into two flooding zones, a system fault may affect these two flooding zones.

7 Marking

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

a) the name or trademark of the manufacturer or supplier;

b) the model designation (type or number);

c) the environmental class (according to 4.2).

It shall be possible to identify a code or number identifying the production period of the e.c.d., at access level 2 or 3.

The marking shall be non-detachable and permanent.

Where the requirements of ZA.3 give the same information as above, the requirements of this clause 7 have been met.

8 Documentation

8.1 The manufacturer shall prepare and maintain documentation.

8.2 The documentation shall be submitted to the testing authority and shall comprise at least the following:

a) A general description of the equipment, including a list of the features and functions relating to:

1) compulsory and optional functions with requirements of this European Standard;

2) ancillary functions not required by this European Standard;

b) A technical specification of the inputs and outputs of the e.c.d. sufficient to permit an assessment of the mechanical, electrical and software compatibility with other components of the system, including:

1) the power requirements for recommended operation;

2) the maximum number of external connectable devices and transmission paths;

3) the maximum and minimum electrical ratings for each input and output;

4) information on the communication parameters on transmission paths;

5) recommended types of cable for each transmission path;

6) fuse ratings;

c) Installation information, including mounting instructions;

d) Operating instructions;

e) Configuring and commissioning instructions;

f) Maintenance and routine testing instructions.

8.3 The manufacturer shall also prepare, maintain and submit the following detailed description of the overall mechanical and electrical design including:

- the main parts of the e.c.d. and their tasks;
- the way in which the parts interact;
- circuit diagrams;
- component lists;
- layouts;
- design drawings.

This documentation shall also comprise details of any components specific to the manufacturer (e.g. customised integrated circuits).

8.4 All documentation normally supplied by and specified by the manufacturer for use by the end user shall be supplied with the device and constitute part of the supply.

9 Tests

9.1 General test requirements

9.1.1 Unless otherwise stated in a test procedure, the testing shall be carried out after the test specimen has been allowed to stabilise in the standard atmospheric conditions for testing as described in EN 60068-1 as follows:

Temperature:	(15 to 35) °C
Relative humidity:	(25 to 75) %
Atmospheric pressure:	(860 to 1060) hPa

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

9.1.2 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.

9.1.3 The specimen configuration shall include at least one of each type of input and output circuits, internal circuits and transmission paths.

9.1.4 If the test procedure requires the specimen to be in the quiescent condition, it shall be connected to a power supply according to the requirements in EN 54-4. Unless otherwise required, the power supply shall be in the quiescent condition. All inputs and outputs shall be connected to appropriate cables and equipment or to

dummy loads. At least one of each type of transmission path shall be maximum loaded as specified by the manufacturer.

Test specimen(s) shall be connected with at least the following devices:

a) a triggering signal input device which simulates an f.d.a.s.;

b) a manual triggering device;

c) an emergency hold device, if an emergency hold function is provided;

d) an emergency abort device, if an emergency abort function is provided;

e) actuator(s);

f) alarm equipment.

NOTE Peripheral devices can be kept during the tests in the standard atmospheric conditions.

9.2 Functional tests

9.2.1 The object of the functional tests is to check the compliance of the specimen with each requirement in this standard and to demonstrate the operation of the specimen before, during and/or after the environmental conditioning.

9.2.2 The test schedule shall be drawn up to ensure that during the functional test each type of input function and each type of output function is exercised.

9.2.3 This shall include as a minimum:

a) Test of the Activated/Released Condition

Initiate the Activated Condition by the:

1) triggering signal input device which simulates an f.d.a.s.;

2) manual triggering device.

After each step check that the e.c.d. is in the Activated/Released Condition and that the transmission paths to the alarm equipment and actuator(s) and ancillary device(s) are active.

Check that the set delay time is within the tolerance limits, if a delay function is provided. Check that the set flooding time is within the tolerance limits, if a control flooding time is provided.

In a second test sequence, if an emergency hold function is provided, the emergency hold device shall be activated:

— during the pre-discharge warning time;

— immediately after activation of the actuator(s).

Check that

— in the first case the triggering signal for the actuator(s) is delayed for the time the emergency hold device is activated;

— in the second case the activated actuator is not influenced;

— the activation of the alarm equipment and ancillary equipment is not influenced in any case.

Check after each step that the conditions are indicated correctly.

In a third test sequence, if an emergency abort function is provided, the emergency abort device shall be activated:

— during the quiescent condition, followed by an input triggering signal;

— during the pre-discharge warning time.

Check that the output to the actuator(s) is not activated.

Check after each step that the conditions are indicated correctly.

b) Test of Fault warning condition and monitoring;

Initiate and reset successively fault warnings corresponding at least to short circuit and interruption in the following transmission paths to the:

— actuator(s);

— alarm equipment;

— manual triggering device(s);

— emergency hold device, if an emergency hold function is provided;

— emergency abort device, if an emergency abort function is provided;

— f.d.a.s.;

— device(s) for monitoring, if a monitoring function is provided;

— non-electrical disable device, if a separate monitoring function is provided;

In addition, initiate and reset successively fault warnings corresponding also to a loss of each of the power sources.

Check after each step that the conditions are indicated correctly.

If an emergency hold and/or abort function is provided, check that no activation of the transmission path to the actuator(s) is possible, when a fault is present on the transmission path to the emergency hold and/or abort device.

c) Test of the Disabled condition;

1) Disable and re-enable the function of processing alarm signals from the transmission path to an f.d.a.s.

2) Disable and re-enable the function of processing alarm signals from the transmission path to manual triggering device(s).

3) Disable and re-enable the transmission path to the actuator(s).

4) Disable and re-enable the transmission path to the alarm equipment, if this function is provided.

5) Disable and re-enable the transmission path to equipment outside the fire extinguishing system (triggering of doors, ventilation shut down, plant shut down etc.), if this function is provided.

Check that the operation of the disablement controls result in the correct indication on the e.c.d.; that only the intended parts of the system are disabled, except the disabling of the transmission path to the alarm equipment, where the simultaneous disablement of the transmission path to the actuator(s) is required, and that on removal of the disablement the function is restored.

9.3 Environmental tests

One or more test specimen(s) are subjected to environmental tests in accordance with EN 54-2, with the following exceptions and amendments:

a) the fire alarm condition of EN 54-2 is considered equivalent to the activated and released condition of this standard;

b) wherever a functional test is required, it shall be carried out in accordance with 9.1 and 9.2;

c) for e.c.d.s class B or e.c.d.s class D the test "damp heat, steady state (operational)" is replaced by the test "damp heat, cyclic (operational)" in accordance with 9.4;

d) for e.c.d.s class C or e.c.d.s class D the test schedule is extended by an additional corrosion-test (endurance) in accordance with 9.5;

e) in the test "cold (operational)" the test temperature during conditioning shall be:

- (-5 ± 3) °C for e.c.d.s class A or e.c.d.s class C;

- (-20 ± 3) °C for e.c.d.s class B or e.c.d.s class D.

f) In the test "vibration, sinusoidal (operational)" the acceleration amplitude shall be:

- 0,981 m/s^2 (0,1 g_n) for e.c.d.s class A or e.c.d.s class B;

- 4,905 m/s^2 (0,5 g_n) for e.c.d.s class C or e.c.d.s class D.

g) In the test "vibration, sinusoidal (endurance)" the acceleration amplitude shall be:

- 4,905 m/s^2 (0,5 g_n) for e.c.d.s class A or e.c.d.s class B;

- 9,81 m/s^2 (1,0 g_n) for e.c.d.s class C or e.c.d.s class D.

9.4 Damp heat, cyclic (Operational)

9.4.1 Object of the test

The object of the test is to demonstrate the ability of the equipment to function correctly at high relative humidity (with condensation) which may occur for short periods in the anticipated service environment.

9.4.2 Test procedure

9.4.2.1 General

Use the test procedure described in EN 60068-2-30, using the variant 1 test cycle and controlled recovery conditions.

9.4.2.2 Initial examination

Before conditioning, subject the specimen to the functional test.

9.4.2.3 State of the specimen during conditioning

Mount the specimen as specified in 9.1.2 and connect it to suitable power supply, monitoring and loading equipment (see 9.1.4). The specimen shall be in the quiescent condition.

9.4.2.4 Conditioning

Apply the following severity of conditioning:

a) lower temperature: (25 ± 3) °C;

b) upper temperature (55 ± 2) °C;

c) relative humidity at lower temperature: (93 ± 3) %;

d) relative humidity at upper temperature: (93 ± 3) %;

e) number of cycles: 2.

9.4.2.5 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.

9.4.2.6 Final measurements

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

9.4.3 Requirements

During this test, the specimen shall not change status, except when such a change is a result of the functional test.

When subjected to the functional test the specimen shall respond correctly.

9.5 Sulphur dioxide (SO_2) corrosion (endurance)

9.5.1 Object of the test

The object of the test is to demonstrate the ability of the equipment to withstand the corrosive effects of sulphur dioxide as an atmospheric pollutant.

9.5.2 Test procedure

9.5.2.1 General

Use the test procedure described in prEN 60068-2-42 Test Kc, except that the conditioning shall be as described below.

9.5.2.2 Initial examination

Before conditioning, subject the specimen to the functional test.

9.5.2.3 State of the specimen during conditioning

Mount the specimen as specified in 9.1.2 and connect it to a suitable power supply, monitoring and loading equipment (see 9.1.4). The specimen shall not be supplied with power during the conditioning.

9.5.2.4 Conditioning

Apply the following conditioning for class C or class D e.c.d.s:

- Temperature: (25 ± 2) °C;

- Relative humidity (93 ± 3) %;
- SO_2 concentration: (25 ± 5) µg/g;
- Duration: 21 days.

9.5.2.5 Final measurements

Immediately after conditioning the specimen shall be subjected to a drying period of 16 h at 40 °C and a relative humidity of maximum 50 %, followed by a recovery period of 1 h to 2 h at standard atmospheric conditions. After this recovery period subject the specimen to the functional test and inspect it visually for mechanical damage both externally and internally.

9.5.3 Requirements

When subjected to the functional test the specimen shall respond correctly.

10 Evaluation of conformity

10.1 General

The compliance of the component with the requirements of this European Standard shall be demonstrated by:

— initial type testing,

— factory production control by the manufacturer.

NOTE The manufacturer is a natural or legal person, who places the component on the market under his own name. Normally, the manufacturer designs and manufactures the component himself. As a first alternative, he may have it designed, manufactured, assembled, packed, processed or labelled by subcontracting. As a second alternative he may assemble, pack, process, or label ready-made products.

The manufacturer shall ensure:

— that the initial type testing in accordance with this European Standard is initiated and carried out (where relevant, under the control of a product certification body); and

— that the component continuously complies with the initial type testing samples, for which compliance with this European Standard has been verified.

He shall always retain the overall control and shall have the necessary competence to take the responsibility for the component.

The manufacturer shall be fully responsible for the conformity of that component to all relevant regulatory requirements. However, where the manufacturer uses components already shown to conform to those requirements relevant for that component (e.g. by CE marking) the manufacturer is not required to repeat the evaluation which led to such conformity. Where the manufacturer uses components not already shown to conform, it is his responsibility to undertake the necessary evaluation to show conformity.

10.2 Initial type testing

10.2.1 Initial type testing shall be performed to demonstrate conformity with this European Standard.

All characteristics given in clauses 4, 5 and 6 shall be subject to this initial type testing, except as described in 10.2.3 to 10.2.5.

10.2.2 In the case of modification of the component or of the method of production (where these may affect the stated properties), initial type testing shall be performed. All characteristics given in clauses 4, 5 and 6, which may be changed by the modification, shall be subject to this initial type testing, except as described in 10.2.3 to 10.2.5.

10.2.3 Tests previously performed in accordance with the provisions of this standard may be taken into account providing that they were made to the same or a more rigorous test method under the same system of attestation of conformity on the same component or components of similar design, construction and functionality, such that the results are applicable to the component in question.

NOTE Same system of attestation of conformity means testing by an independent third party under the control of a product certification body.

10.2.4 Components may be grouped into families where one or more characteristics are the same for all components within that family or the test results are representative of all components within that family. In this case not all components of the family have to be tested for the purposes of the initial type testing.

10.2.5 Where the characteristics of the component have previously been demonstrated according to the requirements of EN 54-2, EN 54-4 and EN 60529, no further evaluation of the component, in respect of these characteristics, is required to show conformity with this European Standard.

10.2.6 Test samples shall be representative of the normal production. If the test samples are prototypes, they shall be representative of the intended future production and shall be selected by the manufacturer.

NOTE In the case of prototypes and third party certification, this means that it is the manufacturer not the third party who is responsible for selecting the samples. During the initial inspection of the factory and of the factory production control (see 10.3), it is verified that the component continuously complies with the initial type testing samples.

10.2.7 If the technical documentation of the test samples does not give a sufficient basis for later compliance checks, a reference sample (identified and marked) shall remain available for this purpose.

10.2.8 Any initial type testing and its results shall be documented in a test report.

10.3 Factory production control (FPC)

10.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the components placed on the market conform with the stated performance characteristics.

If the manufacturer has the component designed, manufactured, assembled, packed, processed and labelled by subcontracting, FPC of the subcontractor may be taken into account. Where subcontracting takes place, the manufacturer shall retain the overall control of the component and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard. The manufacturer who subcontracts all of his activities may in no circumstances discharge himself of his responsibilities to a subcontractor.

FPC is the permanent internal control of production exercised by the manufacturer.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This production control system documentation shall ensure a common understanding of conformity evaluation and enable the achievement of the required component characteristics and the effective operation of the production control system to be checked.

Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the conformity of the component with its technical specifications. Its implementation may be achieved by controls and tests on measuring equipment, raw materials and constituents, processes, machines and manufacturing equipment and finished components, including material properties in components, and by making use of the results thus obtained.

10.3.2 General requirements

The FPC system should fulfil the requirements as described in the following clauses of EN ISO 9001:2000, where applicable:

— 4.2 except 4.2.1 a)

— 5.1 e), 5.5.1, 5.5.2

— clause 6

— 7.1 except 7.1 a), 7.2.3 c), 7.4, 7.5, 7.6

— 8.2.3, 8.2.4, 8.3, 8.5.2

The FPC system may be part of a Quality Management system, e.g. in accordance with EN ISO 9001.

10.3.3 Component specific requirements

10.3.3.1 The FPC system shall

— address this European Standard; and

— ensure that the components placed on the market conform with the stated performance characteristics.

10.3.3.2 The FPC system shall include a component specific FPC- or Quality-plan, which identifies procedures to demonstrate conformity of the component at appropriate stages, i.e.

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down; and/or

b) the verifications and tests to be carried out on finished components according to a frequency laid down.

If the manufacturer uses finished components, the operations under b) shall lead to an equivalent level of conformity of the component as if normal FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production are carried out by the manufacturer, the more operations under b) may be replaced by operations under a). In any case the operation shall lead to an equivalent level of conformity of the component as if normal FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) centre as much on the intermediate states of the component as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency are chosen based on component type and composition, the manufacturing process and its complexity, the sensitivity of component features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records which provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available at least for ten years. Where the component fails to satisfy the acceptance measures, the provisions for non-conforming products shall apply, the necessary corrective action shall immediately be taken and the components or batches not conforming shall be isolated and properly identified. Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The component description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test. With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of the component) shall be indicated in the records.

10.3.3.3 Individual components or batches of components and the related manufacturing documentation shall be completely identifiable and retraceable.

10.3.4 Initial inspection of factory and FPC

10.3.4.1 Initial inspection of factory and FPC shall generally be carried out when the production is already running and the FPC is already in practice. It is, however, possible, that the initial inspection of factory and FPC is carried out before the production is already running and/or before the FPC is already in practice.

10.3.4.2 The following shall be assessed to verify that the requirements of 10.3.2 and 10.3.3 are fulfilled:

— the FPC-documentation; and

— the factory.

In the assessment of the factory it shall be verified:

a) that all resources necessary for the achievement of the component characteristics required by this European Standard are or will be (see 10.3.4.1) available; and

b) that the FPC-procedures in accordance with the FPC-documentation are or will be (see 10.3.4.1) implemented and followed in practice; and

c) that the component complies or will comply (see 10.3.4.1) with the initial type testing samples, for which compliance with this European Standard has been verified; and

d) whether the FPC system is part of a Quality Management system in accordance with EN ISO 9001 (see 10.3.2) and as part of this Quality Management system is certified and has yearly surveillance by a certification body, who is recognised by an accreditation body which is member of the "European Co-operation for Accreditation" and which has signed the "Multilateral agreement" (MLA) there.

10.3.4.3 All factories of the manufacturer, where for the relevant component final assembling or at least final testing is performed, shall be assessed to verify that the conditions of 10.3.4.2 a) to c) are in place. One assessment may cover one or more components, production lines and/or production processes. If the FPC system covers more than one component, production line or production process, and if it is verified that the general requirements are fulfilled then the detailed verification of the component specific FPC requirements for one component may be taken as representative of the FPC of other components.

10.3.4.4 Assessments previously performed in accordance with the provisions of this standard may be taken into account providing that they were made to the same system of attestation of conformity on the same component or components of similar design, construction and functionality, such that the results may be considered applicable to the component in question.

NOTE Same system of attestation of conformity means inspection of FPC by an independent third party under the control of a product certification body.

10.3.4.5 Any assessment and its results shall be documented in a report.

10.3.5 Continuous surveillance of FPC

10.3.5.1 All factories which have been assessed according to 10.3.4 shall be re-assessed once a year, except as stated in 10.3.5.2.

In this case each FPC assessment shall verify a different component or production process, where applicable.

10.3.5.2 If the manufacturer provides proof of continuing satisfactory operation of his FPC system the frequency of the re-assessment may be reduced to once every four years.

NOTE 1 Sufficient proof can be the report of a certification body, see 10.3.4.2 d).

NOTE 2 If the overall Quality Management system in accordance with EN ISO 9001 is well implemented (verified in the initial assessment of factory and FPC) and continuously practised (verified in QM-audits), it can be assumed that the integrated FPC-relevant part is well covered. On this basis, the work of the manufacturer is well controlled, so that the frequency of special FPC-surveillance-assessments can be reduced.

10.3.5.3 Any assessment and its results shall be documented in a report.

10.3.6 Procedure for modifications

In the case of modification of the component, the method of production or the FPC system (where these may affect the stated properties), a re-assessment of the factory and of the FPC system shall be performed for those aspects which may be affected by the modification.

Any assessment and its results shall be documented in a report.

Annex A
(normative)

Summary of indications

A summary of indications is shown in Table A.1.

Table A.1 — Indications

Information	Indication						
	A	Visible					Special conditions
		L	L/D	per	AL	Colour	
e.c.d. is supplied with power	---	x	---	e.c.d	1	green	---
Activated condition	x	x	---	f.z.	1	red	4.9.3 (two alarm signals)
Released condition	---	x	---	f.z.	1	red	---
Transmission 'Released condition'	---	---	x	e.c.d	1	red	4.3.2 f) (output specified for EN 54-1 (E))
Fault warning condition							
Fault in t.p. to an f.d.a.s. or inside the fire extinguishing system	x	---	x	f.z.	1	yellow	4.14.10 (No suppression). 4.14.1 b) (faults related to more than 1 f.z.). 4.20 (emergency hold 2 s).
	x	---	x	t.p.	1, 2 or 3	yellow	---
Fault in t.p. to J or E (EN 54-1)	x	---	x	t.p.	1	yellow	---
Power supply fault, faults of p.s.e. as described in EN 54-4 and fault of t.p. between e.c.d. and p.s.e.	x	---	x	e.c.d	1	yellow	4.13.1 j) 2) (t.p. not inside the cabinet(s) of the e.c.d. or p.s.e. more than 0,1 m)
Earth fault affecting the function of the e.c.d.	x	---	x	e.c.d	1	yellow	4.14.5 (visible indication only required, if not covered by another fault indication)
Rupture of fuse or operation of protective device, preventing the operation of the e.c.d.	x	---	x	e.c.d	1	yellow	4.14.6 (visible indication at least as fault indication for the supervised function)
Incorrect execution of program and/or corruption of memory content (only for software controlled e.c.d.)	x	x	---	f.z. or e.c.d	1	yellow	4.14.7 (indication until manual reset and/or another manual operation), 6.3.1 (program)
Common fault	x	x	---	e.c.d.	1	yellow	5.3.1
Additional conditions for fault warning indications 4.14.8/4.14.9 (indication of faults, detected but not displayed because of limited space of display). 4.14.13 (output to transmit information of the fault warning condition, even if e.c.d. is deenergized).							
Disabled condition	---	x	x	f.z.	1	yellow	---
Monitoring (e.g. incorrect status of components, loss of agent)	x	---	x	---	1	yellow	4.19.2 (activation of output 'fault condition')
Separate monitoring of non-electrical disable device, indication of blocked position	x	x	---	f.z.	1	yellow	separate indication of blocked position and also fault indication, see 4.19.3 (output), (indication of incorrect position), (activation of output 'fault condition')
Manual only mode	---	x	---	f.z.	1	yellow	4.23 (output to transmit the information about this mode)
Emergency hold device activated	x	x	---	f.z.	1	yellow	4.20 (indication until manual reset), (output)
Emergency abort device activated	x	x	---	f.z.	1	yellow	4.27 (indication until manual reset), (output)
Spare bank activation at next alarm	---	---	x	Bank	1	yellow	---

Key:
A: Audible indication by audible indicator (internal buzzer)
L: Visible indication by a separate light emitting indicator
L/D: Visible indication by a separate light emitting indicator or by an alphanumeric display
AL: Access level
Colour: Colour of separate light emitting indicator
f.z.: Flooding zone
t.p.: Transmission path

Annex B
(informative)

Design requirements for software controlled e.c.d.

If a failure of program execution is detected, as specified in 6.3.1, the e.c.d. enters a safe state, as defined by the manufacturer. It is expected that this safe state will not result in the false actioning of compulsory outputs, nor give a false impression to a user that the e.c.d. remains operational if it is not.

It is accepted 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 e.c.d. 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 can be advantageous if the e.c.d. is capable of automatically recording details of the restart event. In any event the fault indication of the failure of program execution will be latched until a manual intervention.

6.4.1 requires that all executable code and data necessary to comply with this standard will be 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 recommended at the time of drafting this standard.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

ZA.0 Scope of this annex

The scope as given in clause 1 is applicable.

ZA.1 Relationship between EU Directive and this European Standard

This European Standard has been prepared under a Mandate given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the Mandate given under the EU Construction Products Directive (89/106).

Compliance with these clauses confers a presumption of fitness of the construction products covered by this European Standard for their intended use.

WARNING — Other requirements and other EU Directives, not affecting the fitness for intended use may be applicable to a construction product falling within the scope of this standard.

NOTE In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply. An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (CREATE, accessed through http://europa.eu.int/comm/enterprise/construction/internal/hygiene.htm).

Construction product: Electrical automatic control and delay device

Intended use(s): Components for use in gas extinguishing systems installed in buildings as a complete operating system.

Table ZA.1 — Relevant Clauses

Essential characteristics	Clauses in this European Standard	Mandated levels and/or classes	Notes
Response delay (response time)	4.8	None	-
Operational reliability	4, 5, 6*,		*) where relevant
Performance parameters under fire conditions	4.3, 4.4, 4.5, 4.6		-
Durability	9		-

ZA.2 Procedure for the attestation of conformity of e.c.d.s

E.c.d.s for the intended use listed shall follow the system of attestation of conformity shown in Table ZA.2

Table ZA.2 — Attestation of conformity system

Product	Intended use	Level(s) or class(es)	Attestation of conformity system
Electrical automatic control and delay device	Fire safety	-	1
System 1: See CPD annex III.2.(i), without audit testing of samples			

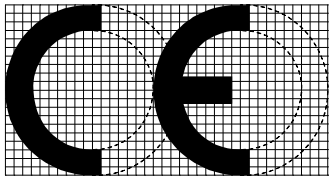
The product certification body will certify the initial type testing of all relevant characteristics given in Table ZA.1 according to the provisions of 10.2 and for the initial inspection of the factory and of the factory production control, and for the continuous surveillance, assessment and approval of the factory production control, all characteristics shall be of interest to the approved body. The manufacturer shall operate a factory production control system in accordance with the provisions of 10.3.

ZA.3 CE marking

The CE marking symbol in the format specified in the EU Directive 93/68/EEC shall be shown on the component together with the marking as specified in clause 7. In addition, the CE marking symbol shall appear on the packaging and/or on the accompanying commercial documents, together with the following information:

- identification number of the certification body, and
- the last two digits of the year in which the marking was affixed, and
- the appropriate number of the EC-certificate of conformity, and
- the number of this standard (EN 12094-1), and
- the type of component (i.e. electrical automatic control device or electrical automatic control and delay device), and
- the environmental class, and
- the number of flooding zones,
- per flooding zone: the type of flooding zone (e.g. CO_2-high-pressure, CO_2-low-pressure, inert gas, Halocarbon gas) and provided options,
- the response delay activated condition (i.e. $\leq$ 3 s),
- the response delay triggering of outputs (i.e. $\leq$ 1 s).

Figure ZA.1 gives an example of the information to be given on the commercial documents.



0123

Any Co Ltd, P.O. Box 21, B1050
02
0123 - CPD – 001

EN 12094-1
Electrical automatic control and delay device

Environmental class A
6 flooding zones
Flooding zones 1 to 4:
CO_2-low-pressure
Provided options:
- Delay of extinguishing signal
- Monitoring of status of components
- Control of flooding time from 0 s to 300 s
- Initiation of secondary flooding
- Triggering of equipment outside the system
- Control of extended discharge

Release of extinguishing media for selected flooding zones
Flooding zones 5 and 6:
CO_2-high-pressure
Provided options:
- Delay of extinguishing signal

Response delay activated condition maximum 3 s
Response delay triggering of outputs maximum 1 s

Figure ZA.1 — Example CE marking information

In addition to any specific information relating to dangerous substances shown above, the component should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned**.**

ZA.4 EC certificate and declaration of conformity

The manufacturer or his agent established in the EEA, shall prepare and retain a declaration of conformity, which authorises the affixing of the CE marking. This declaration shall include:

- name and address of the manufacturer, or his authorised representative established in the EEA, and the place of production,
- description of the component (type, identification, use), and a copy of the information accompanying the CE marking,
- provisions to which the component conforms (i.e. annex ZA of this EN),
- particular conditions applicable to the use of the component [if necessary],
- name and address (or identification number) of the certification body,

- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

For characteristics where certification is required (system 1), the declaration shall contain a certificate of conformity with, in addition to the information above, the following information:

- the name and address of the certification body,
- the certificate number,
- conditions and period of validity of the certificate, where applicable,
- name of, and position held by, the person empowered to sign the certificate.

The declaration and certificate shall be presented in the language(s) of the Member State of use of the component.

Bibliography

EN 45002, *General criteria for the assessment of testing laboratories.*

EN 45011, *General requirements for bodies operating product certification systems (ISO/IEC Guide 65:1996).*

EN ISO 9001:2000, *Quality management systems - Requirements (ISO 9001:2000).*

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories.*

EU Directive 93/68/EEC, *COUNCIL DIRECTIVE 93/68/EEC of 22 July 1993 amending Directives 87/404/EEC (simple pressure vessels), 88/378/EEC (safety of toys), 89/106/EEC (construction products), 89/336/EEC (electromagnetic compatibility), 89/392/EEC (machinery), 89/686/EEC (personal protective equipment), 90/384/EEC (non-automatic weighing instruments), 90/385/EEC (active implantable medicinal devices), 90/396/EEC (appliances burning gaseous fuels), 91/263/EEC (telecommunications terminal equipment), 92/42/EEC (new hot-water boilers fired with liquid or gaseous fuels) and 73/23/EEC (electrical equipment designed for use within certain voltage limits).*

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