BRITISH STANDARD

BS EN
12094-2:2003

Fixed firefighting systems — Components for gas extinguishing systems —

Part 2: Requirements and test methods for non-electrical automatic control and delay devices

The European Standard EN 12094-2:2003 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 12094-2:2003.

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 April 2006.

The UK participation in its preparation was entrusted by Technical Committee FSH/18, Fixed firefighting systems, to Subcommittee FSH/18/6, Gaseous extinguishing media and 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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Fixed firefighting systems - Components for gas extinguishing systems - Part 2: Requirements and test methods for non-electrical automatic control and delay devices

Installations fixes de lutte contre l'incendie - Eléments constitutifs pour installations d'extinction à gaz - Partie 2: Exigences et méthodes d'essai pour les dispositifs non électriques de commande et de temporisation

Ortsfeste Brandbekämpfungsanlagen - Bauteile für Löschanlagen mit gasförmigen Löschmitteln - Teil 2: Anforderungen und Prüfverfahren für automatische nicht-elektrische Steuer- und Verzögerungseinrichtungen

This European Standard was approved by CEN on 13 February 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
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document (EN 12094-2:2003) 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 part of EN 12094 is one of a number of European Standards prepared by CEN/TC 191 covering components for gas extinguishing systems.

They are included in a series of European Standards 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

[1] under preparation

- Part 7: Requirements and test methods for nozzles for CO_2 systems
- 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 odorising devices for CO_2 low pressure systems
- Part 17: Requirements and test methods for pipe hangers
- Part 20: Requirements and test methods for compatibility of components

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 European 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 non-electrical automatic control devices incorporating non-electrical delay devices for CO_2, inert gas- or halo-carbon-gas fire extinguishing systems.

This European Standard applies to devices which may be triggered by:

— automatic fire detection installation

— electrical control device

— non-electrical special fire detector

— manual triggering device or

— combination of the above.

Where applicable the requirements and test methods also apply to separate non-electrical delay devices.

This European Standard covers devices which are powered pneumatically, mechanically or by a combination of both.

2 Normative references

This European Standard incorporates by dated or undated reference, 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.*

prEN 12094-4, *Fixed firefighting systems – Components for gas extinguishing systems – Part 4: Requirements and test methods for high-pressure container valve assemblies and their actuators.*

EN 12094-9, *Fixed firefighting systems – Components for gas extinguishing systems – Part 9: Requirements and test methods for special fire detectors.*

EN 12094-10*, Fixed firefighting systems – Components for gas extinguishing systems – Part 10: Requirements and test methods for pressure gauges and pressure switches.*

EN 12094-11*, Fixed firefighting systems – Components for gas extinguishing systems – Part 11: Requirements and test methods for mechanical weighing devices.*

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

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation (ISO 228-1:2000).*

IEC 60068-2-42, *Basic environmental testing procedures - Part 2 : Tests. Test Kc: Sulphur dioxide test for contacts and connections.*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation.*

3 Terms and definitions

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

3.1
activated condition
condition of a non-electrical automatic control device, when a fire alarm signal is received and indicated

3.2
actuator
component which causes a valve to operate

3.3
condition
defined status of the non-electrical automatic control device and non-electrical delay device which is indicated at the device

NOTE The conditions recognised in this European Standard are the following:

- Activated Condition;
- Stand-by Condition;
- Operating Condition;
- Disabled Condition;
- Released Condition;
- Quiescent Condition.

3.4
control device
device which receives a signal from a special fire detector, a fire detection installation or a manual triggering device and processes and transmits signals for actuation and auxiliary functions

NOTE 1 Parts of the control devices can be: cable, rolls, weights, pilot container, pneumatic triggering pipework, pilot valves, solenoids, springs, etc. In general all parts are needed between detection or triggering and actuating of container and selector valves.

NOTE 2 The monitoring of the installation can be a function of a control device.

3.5
CO_2-high-pressure installation
fire extinguishing installation in which the CO_2 is stored at ambient temperature, e.g. the pressure of the CO_2 in storage is p_{abs} = 58,6 bar at 21 °C

3.6
CO_2-low-pressure installation
fire extinguishing installation in which the CO_2 is stored at low temperature, normally at a temperature of – 19 °C to – 21 °C

3.7
delay device
component of the control device to delay the signal for actuation for a given period of time

3.8
electrical control device
control device using electrical means

3.9
electrical delay device
delay device using electrical means

3.10
fire detector
component as defined in EN 54-1

3.11
functional reliability
ability to function under different working conditions

3.12
gas extinguishing installation
system installed to provide fire protection

3.13
halocarbon gas
extinguishing agent that contains as primary components one or more organic compounds containing one or more of the elements fluorine, chlorine, bromine or iodine

3.14
halocarbon gas installation
fire extinguishing installation in which the halocarbon gas is stored at ambient temperature

3.15
indication
information given by an indicator

3.16
indicator
device capable of changing state to give information

3.17
inert gas
non-liquefied gas or mixture of gases which extinguish the fire mainly by reducing the oxygen concentration in the protected zone, e.g. argon, nitrogen or CO_2 or mixtures of these gases

3.18
inert gas installation
fire extinguishing installation in which the inert gas is stored at ambient temperature

3.19
manual triggering device
manually operated device to trigger the control device

3.20
non-return valve
component permitting flow only in one direction

3.21
non-electrical control device
control device using mechanical or pneumatic means

3.22
non-electrical delay device
delay device using mechanical or pneumatic means

3.23
pre-warning time
period of time between activation of the evacuation alarm devices and the discharge of the extinguishant

3.24
special fire detector
electrical, pneumatic and mechanical component as defined in EN 12094-9

3.25
system
selection of approved components tested for correct interaction and compatibility

3.26
system delay for discharge
time between the response of a fire detection installation, a special fire detector or a manual triggering device and the triggering of the actuator of the valve which causes the gas discharge, without taking into account the prewarning time

3.27
system delay for alarm
time between the triggering of the non-electrical automatic control devices and the operation of the sounders

3.28
transmission path
electrical connection necessary for the transmission and reception of data and signals from or to control and indicating equipment and between devices connected within the extinguishing system

3.29
working pressure
pressure at which the component is used in the system

4 Requirements

4.1 General design

4.1.1 Pilot container valves and their actuators, which are only used in the non-electrical automatic control devices, and non-electrical delay devices shall be tested in accordance with prEN 12094-4, except for the vibration test, the temperature test, the corrosion test, the stress corrosion and the operational reliability test, which shall be tested according to this European Standard.

Components which are powered by pneumatic energy shall be designed to ensure that leakage from pilot lines does not affect the function of the components downstream of the pilot line.

NOTE See prEN 12094-20.

4.1.2 All materials shall be resistant to media with which they come into contact.

4.1.3 The component shall be designed so that the function cannot be adversely affected by ageing or environmental influences.

4.1.4 Non-metallic materials and elastomers shall be selected to be stable and not alter their performance over the working life recommended by the manufacturer.

4.1.5 The delay time of the component shall be adjustable up to 60 s either by infinitely variable adjustment or by step function. The maximum increments for the step function shall be 5 s. There shall be physical protection of the component to prevent tampering (e.g. locked door or protective cover) and clear indication in the event of any unauthorised adjustment to the setting mechanism.

The setting and the operation of the non-electrical delay devices shall not be affected by other components like fire detection and alarm devices.

4.1.6 The component shall be powered using any of the following sources of energy

a) pneumatic (CO_2, air, or inert gases) or

b) mechanical or

c) a combination of these energy sources.

4.1.7 Components powered by pneumatic energy shall be specified by the manufacturer for a working pressure according to Table 1.

Table 1 — Working pressure

Energy	**Working pressure** **bar**
CO_2 stored in high-pressure cylinder	140
CO_2 stored in low-pressure cylinder	25
Non liquefied inert gas (e.g. nitrogen)	pressure in the container delivering the control energy at 50^{o} C
Pneumatic energy regulated by a pressure reducing valve	as specified by the manufacturer

4.1.8 The manufacturer shall specify the capacity of the energy supply. If other devices, e.g. alarm sounders, are operated by the same energy supply, the manufacturer shall also specify these devices and the maximum number to be connected.

4.1.9 If the component incorporates a pneumatic actuator, the manufacturer shall specify nominal, maximum and minimum values for the pressure supply.

4.1.10 If the component incorporates a mechanical powered actuator, the manufacturer shall specify the weights and the drop distance.

4.1.11 If the component incorporates an electrical powered actuator, the manufacturer shall specify the nominal, maximum and minimum figures for voltage and current. Electrical powered actuators shall be specified for continuous duty.

4.1.12 If the component incorporates a pyrotechnic powered actuator, the manufacturer shall specify:

— minimum all-fire current and its minimum duration and the form of the signal; and

— maximum monitoring current; and

— range of voltage; and

— maximum storage time under specified storage conditions; and

— maximum life time under stand-by conditions (50 °C and 70 % relative humidity)

In addition data shall be provided by the manufacturer to show that:

a) the failure rate of the device in the energy transfer path does not exceed 1 in 10 000 at the recommended firing current; and

b) actuators will achieve the required power output after being subjected to a 90 day ageing test at a test temperature of (90 ± 2)°C; and

c) the power output of the actuator at the end of its service life as recommended by the manufacturer will be not less than three times that required to operate the valve at the most disadvantageous operating conditions.

4.2 Connection threads

Connection threads shall comply with International Standards or European Standards for threads, e.g. ISO 7-1 or EN ISO 228-1.

4.3 Signal processing and indication

The component shall be capable of receiving, processing, transmitting and indicating signals separately for each flooding zone.

It shall carry out the following functions in accordance with 5.4:

a) Receive and process the triggering signal from

1) non-electrical special fire detector, and/or

2) manual triggering device, and/or

3) electrical control device, and/or

4) appropriate electrical delay device in connection with electrical special fire detectors, and/or

5) control and indicating equipment of an automatic fire detection installation initiated by automatic fire detectors, electrical special fire detectors or from manual triggering devices either connected directly to the non-electrical automatic control devices or to the control and indicating equipment.

b) Ensure that the extinguishing release signal can only be activated after the alarm device(s) have sounded and the delay time period, if applicable, has elapsed;

c) Transmit an un-delayed triggering signal which may be used for other purposes e.g. activation of pilot container, shutting down, or operating equipment external to the extinguishing system;

d) In principle prevent alarm silencing before the completion of flooding period. If means are provided, which permit alarm silencing during flooding period, there shall be physical protection of the component to prevent unauthorised operation (e.g. locked door or protective cover);

e) Delay the extinguishing release signal for a given period of time if a non-electrical automatic delay device is present;

f) Control the flooding time for low pressure CO_2 systems, where applicable;

g) Where applicable, control a secondary flooding for low pressure CO_2 systems initiated by manual means. This component shall be operational only after finalising of the normal discharge. It shall be possible to commence the secondary flooding immediately after the first discharge has been completed, when the alarms are sounding;

h) Indicate the quiescent, activated and disabled conditions in an unambiguous manner;

i) Transmit the information of the released condition e.g. to a control and indicating equipment, if applicable.

4.4 System delay

The system delay for discharge shall not exceed 15 s, when tested in accordance with 5.5.

The system delay for alarms shall not exceed 5 s, when tested in accordance with 5.5.

4.5 Function at ambient temperatures

The component shall operate within an ambient temperature range encompassing 0 °C to + 50 °C or - 20 °C to + 50 °C, when tested in accordance with 5.4 and 5.6. The deviation measured for delay time and if applicable for extinguishing period shall be within ± 10 % of the set time.

4.6 Internal pressure

The component shall not show any deterioration, when tested in accordance with 5.7.

4.7 Strength

Mechanically powered parts of components shall show no deterioration and shall correctly function, when tested in accordance with 5.8.

4.8 Operational reliability

There shall be no deterioration of performance, when a component is tested in accordance with 5.9.

4.9 Corrosion

The component shall operate satisfactorily when tested in accordance with 5.4.3 after being subjected to the corrosion test in accordance with 5.10.

4.10 Stress corrosion

Any copper alloy part under permanent pressure used in the component shall not crack, when tested in accordance with 5.11.

4.11 Vibration

When tested in accordance with 5.12 the components shall not operate or be damaged during conditioning and shall operate satisfactorily after conditioning.

4.12 Pneumatic energy supply using pilot containers

If pilot containers deliver pneumatic energy for the component and other devices (e.g. alarm devices) the tests in accordance with 5.13 shall be carried out in combination with these devices. The reserve capacity for pneumatic energy supplies shall be at least five times the quantity required to execute a release cycle for control and discharge plus one times the quantity for the alarm equipment with the maximum number of sounders, specified by the manufacturer for a time period of at least 30 min, if applicable. In the case of pneumatic energy supplies using CO_2, the contents of the pilot pressure containers, where used, shall be at least 500 g.

CO_2 pilot containers shall be continuously monitored using a weighing device according to EN 12094-11.

The content of a pilot container filled with air or inert gas shall be continuously monitored by a pressure gauge according to EN 12094-10 or a weighing device according to EN 12094-11.

The pilot containers shall be dedicated exclusively for the gas extinguishing installation.

4.13 Operating force

The effective force of all signal or function transmissions shall be at least two times and in the case of pyrotechnic devices at least three times the force necessary for the proper function of the components, when tested in accordance with 5.14.

4.14 Functional reliability

4.14.1 When the component is triggered by electrical means, there shall be no deterioration of performance, when tested in accordance with 5.15.2, 5.15.3, 5.15.4 and 5.15.5. The component shall operate at 85 %, 100 % and 115 % of the rated voltage.

The electrical devices shall be specified for continuous duty.

4.14.2 There shall be no deterioration of performance when a pneumatic powered component is tested in accordance with 5.15.2, 5.15.3, 5.15.4 and 5.15.5. The component shall operate at the nominal, maximum and minimum pressure as specified by the manufacturer.

4.14.3 There shall be no deterioration of performance when a gravity powered component is tested in accordance with 5.15.2, 5.15.3, 5.15.4 and 5.15.5. The free travel of the travel weight shall not be inhibited and there shall be at least 50 mm clearance beyond the fully operated position.

Springs acting as the prime mover in the component shall be free to complete their full travel without impedance, and there shall be no deterioration of performance when tested in accordance with 5.15.6.

4.14.4 When the component is triggered by pyrotechnic means, there shall be no deterioration when tested in accordance with 5.15.2, 5.15.3, 5.15.4 and 5.15.5. The component shall operate at the minimum specified current of the pyrotechnic device.

4.15 Safety classification

The component shall be engineered in accordance with EN 60529, class IP 44. Switch and monitoring equipment intended for installation outside the housing of the component shall be engineered in accordance with EN 60529, class IP 65, solenoid coils as per class IP 55, and pyrotechnic devices as per class IP X7.

4.16 Test facility

Provision shall be made for checking the complete function of the component except actuation of pilot containers without actually releasing the extinguishing media. If necessary special means shall be provided, e.g. connection for a pneumatic energy supply for checking.

4.17 Documentation

4.17.1 The manufacturer shall prepare and maintain documentation.

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

a) general description of the equipment, including a list of the features and functions;

b) technical specification including:

   1) the information as given in 4.1;

   2) sufficient information to permit an assessment of the compatibility with other components of the system (if applicable e.g. mechanical, electrical or software compatibility);

c) installation instructions including mounting instructions;

d) operating instructions;

e) maintenance instructions;

f) routine testing instruction, if appropriate.

4.17.3 The manufacturer shall also prepare, maintain and submit the following detailed documentation, except where the conditions of supply to the manufacturer make this impossible:

a) description of the overall mechanical design including

   1) main parts of components and their tasks;

   2) way in which the parts interact;

b) component lists;

c) layouts;

d) design drawings.

This documentation shall also comprise details of any sub-components.

4.17.4 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.

5 Tests

5.1 Test conditions

The components shall be tested assembled as recommended for installation by the manufacturer. The tests shall be carried out at a temperature of (25 ± 10) °C, except when otherwise stated.

The tolerance for all test parameters is 5 %, unless otherwise stated.

5.2 Test samples and order of tests

Three samples shall be used for the tests. The order of tests shall be as shown in Table 2.

Table 2 - Order of tests

Tests	Test order for		
	sample A	sample B	sample C
5.3 Compliance	1	1	1
5.4 Function	2	2	2
5.5 System delay	3	-	-
5.6 Temperature	4	-	-
5.7 Internal pressure	5	-	-
5.8 Strength	-		4
5.9 Operational reliability	-	4	-
5.10 Corrosion	6	-	-
5.11 Stress corrosion	-	-	5
5.12 Vibration	-	5	-
5.13 Energy supply	-	-	3
5.14 Operating force	7	-	-
5.15 Functional reliability	-	3	-

The function test in accordance with 5.4.3 shall be carried out after each of the following tests:

— internal pressure

— strength

— corrosion

— stress corrosion

— vibration

— energy supply

— operational reliability.

5.3 Compliance

A visual and measurement check shall be made to determine that the test samples correspond to the description in the drawings, parts lists, description of functions, operating and installation instructions.

5.4 Function

5.4.1 The test relates to the requirements of 4.3 and 4.5.

5.4.2 The delay time shall be set to 10 s, 30 s and 45 s. The delay device shall be triggered by the normal means. The function shall be tested and the delay time shall be recorded.

The component shall be triggered by the normal means, e.g. a manual control device. The function shall be tested and for CO_2 low-pressure systems the flooding time shall be recorded. In components for CO_2 low-pressure systems, a test shall be carried out with the extinguishing period set at 30 s, 120 s and 240 s. The cycle shall be carried out 10 times.

5.4.3 The delay time shall be set to 30 s and the discharge time to 120 s, if applicable. The function shall be tested 10 times and the actual times shall be recorded.

5.5 System delay

The test relates to the requirements of 4.4.

With the maximum configuration of components specified by the manufacturer, e.g. alarm sounders, actuators and pipe volume connected, the non-electrical automatic control devices shall be triggered under most unfavourable energy supply conditions, e.g. low temperature. The time between a signal from a manual control device or special fire detector and the triggering of the actuator shall not exceed 15 s and 5 s for the alarm sounders.

5.6 Temperature

5.6.1 General

The test relates to the requirements of 4.5.

5.6.2 High temperature

The test sample shall be conditioned at (50 ± 2)°C for at least 4 h. Then the cycle as described in 5.4.2 shall be carried out 10 times at (50 ± 3) °C.

5.6.3 Low temperature

The test sample shall be conditioned at (- 20 ± 2) °C or (0 ± 2) °C for at least 4 h. Then the cycle as described in 5.4.2 shall be carried out 10 times at – 20°C or 0°C.

5.7 Internal pressure

The test relates to the requirements of 4.6.

Pressurised parts shall be connected to a suitable pressure supply (hydraulic or pneumatic). All ports shall be blocked.

The pressure shall be increased to 1,5 times the working pressure and shall be maintained for 5 min.

The component shall be depressurised and the function test shall be carried out in accordance with 5.4.3.

5.8 Strength

This test relates to the requirements of 4.7.

For mechanically powered parts the function shall be tested with 1,5 times the maximum operating force.

After the above test the function shall be tested in accordance with 5.4.3.

5.9 Operational reliability

This test relates to the requirements of 4.8.

The following test cycle shall be carried out 500 times:

a) the nominal working pressure ± 10 % shall be applied to the inlet port of a pressurised part assembly using CO_2, air or nitrogen or the nominal force shall be applied in the case of mechanically powered devices;

b) the device shall be operated by normal means.

After the above test the function shall be tested in accordance with 5.4.3.

5.10 Corrosion

5.10.1 The test relates to the requirements of 4.9.

5.10.2 The sample in its normal mounting position shall be subjected to a sulphur dioxide test in accordance with IEC 60068-2-42, test Kc.

The test procedure generally described in IEC 60068-2-42, test Kc shall be used, except that the conditioning shall be as described below.

The following conditions shall be applied:

— temperature (25 ± 2) °C;

— relative humidity (93 ± 3) %;

— SO_2 concentration (25 ± 5) μg/g;

— duration: 21 days.

5.10.3 Immediately after conditioning the sample shall be subjected to a drying period of 16 h at 40 °C, maximum 50 % relative humidity, followed by a recovery period of 1 h to 2 h at standard atmospheric conditions. After this recovery period the sample shall be subjected to a functional test in accordance with 5.4.3 and shall be inspected for mechanical damage both externally and internally.

5.11 Stress corrosion

The test relates to the requirements of 4.10.

Complete samples or parts of samples shall be used in this test. A suitable container of known capacity fitted with a capillary tube vent shall be used. The aqueous ammonia solution shall have a specific weight of 0,94 kg/l ± 2 %. The container shall be filled with (10 ± 0,5) ml of the solution for each litre of container volume.

The sample shall be degreased for the test and shall be exposed for 10 d to the moist atmosphere of ammonia and air, at a temperature of (34 ± 2)°C. The samples shall be positioned (40 ± 5) mm above the level of the liquid.

After testing, the samples shall be cleaned and dried and subjected to careful visual examination. To make cracking clearly visible, the liquid penetration method shall be used.

After the above test the function shall be tested in accordance with 5.4.3.

5.12 Vibration

This test relates to the requirements of 4.11.

The sample shall be attached to a vibration table using fixing materials provided by the manufacturer.

The sample shall then be subjected to sine-wave vibration in all three axes, in a range of from 10 Hz to 150 Hz, the frequency shall be raised uniformly at a rate of one octave every 30 min. The vibration acceleration shall be 0,2 *g* in the frequency range from 10 Hz to 50 Hz and 0,5 *g* in the frequency range from 50 Hz to 150 Hz.

The sample shall not operate during the test caused by the vibrations. No deterioration or detachment of parts shall occur.

After the above test the function shall be tested in accordance with 5.4.3.

5.13 Energy supply

The test relates to the requirements of 4.12.

With the maximum configuration of components specified by the manufacturer, such as alarm sounders, actuators and pipe volume connected, the component shall be triggered five times under most unfavourable energy supply conditions e.g. low temperature. After this cycle the alarm sounders shall be run for at least 30 min, if connected to the same energy supply.

After the above test the function shall be tested in accordance with 5.4.3.

5.14 Operating force

The test relates to the requirements of 4.13. The complete component shall be tested to verify compliance with the requirements of 4.13 using a suitable test procedure applicable to the component design.

5.15 Functional reliability

5.15.1 The tests relate to the requirements of 4.14.

5.15.2 Electrical triggered components shall be triggered five times with nominal, maximum and minimum specified voltage.

5.15.3 Pneumatic powered components shall be triggered five times supplied with the minimum, nominal and maximum specified pressure.

5.15.4 Gravity powered components shall be triggered five times at the specified drop distance.

5.15.5 Components which are triggered by pyrotechnic means shall be tested 10 times with the minimum specified current.

5.15.6 Spring powered components shall be triggered five times with the specified pre-loading.

6 Marking and data

The component shall be marked with the following information:

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

b) model designation; and

c) working pressure, if applicable; and

d) some mark(s) or code(s) (e.g. serial number or batch code), by which, at least, the date or batch and place of manufacture (if several places of manufacture) can be identified by the manufacturer; and

e) temperature range.

The marking shall be non-detachable, non-flammable, permanent and legible.

Where the requirements of ZA.3 give the same information as above, the requirements of this clause 6 have been met.

7 Evaluation of conformity

7.1 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.

7.2 Initial type testing

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

All characteristics given in clause 4 (except 4.17) shall be subject to this initial type testing, except as described in 7.2.3 to 7.2.5.

7.2.2 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 clause 4 (except 4.17), which may be changed by the modification, shall be subject to this initial type testing, except as described in 7.2.3 to 7.2.5.

7.2.3 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.

7.2.4 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.

7.2.5 Where the characteristics of the component have previously been demonstrated according to the requirements of prEN 12094-4 and EN 60529, no further evaluation of the component, in respect of these characteristics, is required to show conformity with this European Standard.

7.2.6 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 7.3), it is verified that the component continuously complies with the initial type testing samples.

7.2.7 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.

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

7.3 Factory production control (FPC)

7.3.1 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 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.

7.3.2 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.

7.3.3 Component specific requirements

7.3.3.1 The FPC system shall

— address this European Standard; and

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

7.3.3.2 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 may 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 component) shall be indicated in the records.

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

7.3.4 Initial inspection of factory and FPC

7.3.4.1 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.

7.3.4.2 The following shall be assessed to verify that the requirements of 7.3.2 and 7.3.3 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 7.3.4.1) available; and

b) that the FPC-procedures in accordance with the FPC-documentation are or will be (see 7.3.4.1) implemented and followed in practice; and

c) that the component complies or will comply (see 7.3.4.1) 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 7.3.2) 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.

7.3.4.3 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 7.3.4.2 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.

7.3.4.4 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.

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

7.3.5 Continuous surveillance of FPC

7.3.5.1 All factories which have been assessed according to 7.3.4 shall be re-assessed once a year, except as stated in 7.3.5.2.

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

7.3.5.2 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 7.3.4.2 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.

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

7.3.6 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 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 product falling within the scope of this European 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 www.europa.eu.int/comm/entreprise/construction/internal/hygiene.htm).

Construction Product : non-electrical control and delay device

Intended use(s): Components for use in gas extinguishing system installed in as a part of 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)	4.4	-	
Operational reliability	4.1, 4.5, 4.6, 4.7, 4.8, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16	-	
Durability of operational reliability against corrosion	4.9, 4.10	-	
Performance characteristics under fire conditions	4.3	-	

ZA.2 Procedure for the attestation of conformity of non-electrical automatic control and delay devices

Non-electrical automatic control and delay devices 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
non-electrical 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 characteristics given in Table ZA.1 in accordance with the provisions of 7.2, 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 7.3.

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 6, except d). 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

— last two digits of the year in which the marking was affixed, and

— appropriate number of the EC-certificate of conformity, and

— number of this standard (EN 12094-2), and

— marking in accordance with clause 6, except d), and

— type of system (e.g. CO_2-high-pressure fire extinguishing system, CO_2-low-pressure fire extinguishing system, inert gas fire extinguishing system, halocarbon gas fire extinguishing system), and

— type of energy (e.g. pneumatic, mechanical, pneumatic/mechanical), and

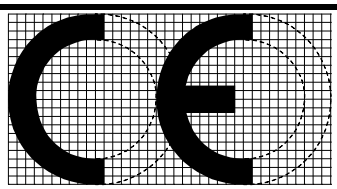
— range of operating pressure (only for pneumatic and pneumatic/mechanical powered components), and

— temperature range, and

— range of delay time, and

— range of flooding time (if provided).

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



0123

AnyCo Ltd, P.O. Box 21, B – 1050
02
0123-CPD-002

EN 12094-2
non-electrical control and delay device
for CO_2-low-pressure fire extinguishing systems
pneumatic

operating pressure range	4 bar to 8 bar
Temperature range	0 °C to 50 °C
delay time	0 s to 60 s
flooding time	10 s to 240 s

Figure ZA.1 - Example CE marking information

In addition to any specific information relating to dangerous substances shown above, the product 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 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 product (type, identification, use), and a copy of the information accompanying the CE marking

— provisions to which the product conforms (i.e. annex ZA of this EN)

— particular conditions applicable to the use of the product [if necessary]

— the name and address (or identification number) of the Notified Product 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:

— name and address of the certification body,

— 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 official language(s) of the Member State of the use of the product.

Bibliography

prEN 12094-20, *Fixed firefighting systems – Components for gas extinguishing systems – Part 20: Requirements and test methods for the compatibility of components.*

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 (ISO/IEC 17025:1999).*

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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